SIFP

Strategic Integrated Framework Plan
for the Shannon Estuary
2013-2020

Strategic Integrated Framework Plan for the Shannon Estuary

An inter–jurisdictional land and marine based framework to guide the future development and management of the Shannon Estuary

VOLUME 2: APPENDICES

Appendices

APPENDIX A

SIFP STEERING GROUP

SIFP Steering Group

- Clare County Council (Lead Authority, with Tom Coughlan as Chair)
- Kerry County Council
- Limerick County Council
- Limerick City Council
- Mid-West Regional Authority
- Department of Environment, Community and Local Government
- Shannon Development
- Shannon Foynes Port Company
- National Parks and Wildlife Service
- Marine Institute
- Environmental Protection Agency
- Office of Public Works National Monuments Service Limerick Clare Energy Agency
- Inland Fisheries Ireland
- Eirgrid
- Shannon Airport Authority
- Shannon International River Basin District Project

APPENDIX B

APPROACH TO THE SELECTION OF STRATEGIC DEVELOPMENT LOCATIONS

1.0 Introduction

The Thematic Spatial plan sets out a range of development objectives which identify and direct potential pathways for cultivating economic development, within various economic growth sectors on the Shannon Estuary, in the context of National and Regional policies. These objectives aspire to achieve the overall vision for the Estuary outlined in Section 3.0 of the Plan.

This Vision recognises that the Shannon Estuary has a rich and valuable natural environment a diverse and unique ecosystem both in the terrestrial area and within the marine waters – all the elements of this environment need to be protected and conserved. However this valuable resource is an asset and there are opportunities to carefully and sensitively promote the natural environment on that basis. In parallel, the Estuary provides a rich and valuable resource base for existing economic and social activity within the region with a number of large maritime industries namely Tarbert Power Plant, ESB Moneypoint, Aughinish Alumina and Foynes Port & Limerick Docks, providing employment for local communities, neighbourhood infrastructure, and investment into the local and regional economy, supporting the role of Limerick City as the Gateway, but also creating a foundation and support network for the local economies of coastal and rural communities. Traditional industries of heritage tourism and water based eco-tourism have also provided income and employment for the coastal communities, in support of their health and well being. Sustainable development is increasingly recognised as the key to managing economic and environmental interdependence, and is an important guiding theme throughout all strands of the SIFP.

To help achieve some of the development objectives supporting the Vision, and create a strong foundation for encouraging, attracting and facilitating economic growth in the region, the Plan identifies a number of strategic development locations. These are considered optimal locations to facilitate expansion and growth by the existing economic drivers / operators and to attract new investment, trade and industry into the Estuary, in support of the Gateway and the Mid-West Region.

These locations are considered as key drivers in providing the necessary focus and direction to harnessing the potential within the Estuary. They have emerged from the systematic appraisal undertaken as the locations which present the greatest opportunity for facilitating development. The appraisal evaluated the broad environmental, social, technical/economic, and planning merits of numerous candidate locations along the Estuary coastline, for a range of themes or land use options that were considered to be potential economic growth areas of the region. This identified those locations which were likely to generate the greatest potential opportunities in terms of economic and social aspirations, while still safeguarding the critical and valued features of the natural environment. The sensitivity of the natural environment was a key consideration in the evaluation, and the process for identifying locations and the evaluation criteria were influenced and informed by the Strategic Environmental Assessment and the Appropriate Assessment, which considered the potential threats to the Natura 2000 network.

This was a high level evaluation, which recognised that a significant amount of further assessment will be required however, at project level, to evaluate the potential interrelationships between specific proposals and the natural environment, and understand the nature of the benefits and the impacts. It also recognises, that whilst the locations identified are those considered optimal opportunities for the themes indicated, this does not prohibit alternative opportunities / development proposals by both the public and private sector. It is hoped that the information provided in the SIFP will provide direction for such proposals.

2.0 Evolving the Approach

In aspiring to achieve the Vision set out in Section 3.1 of the Plan, an evidence based approach to selecting optimal locations was developed to help understand the key opportunities, threats and goals for the region. The approach is centred on the key principles of sustainable development, which are at the heart of the overall evaluation. The aim is to ensure the methodology is balanced and allows the coordination of competing interests from the economy, society and the natural environment, alongside the use of good governance and sound science/logic.

The National Sustainable Development Strategy indicates the Government's commitment to ensuring that a sound relationship is established between the Irish economy and the environment. It indicates that the principles of sustainable development can address those areas of economic and societal activity which impact on the environment, by ensuring that all policies underpinning and driving strong growth, will be environmentally sustainable1.

Informed by these principles, the approach to the SIFP has evolved two key strands:

- **Evidence-Based**

Evidence-based spatial planning is informed decision making using robust data, analysis and pragmatic rational at a strategic level, to create an effective and deliverable framework for a particular area.

Best practice indicates that spatial planning policy should be founded on a thorough understanding of the needs of an area and the opportunities and constraints which operate within that area. For the SIFP to be effective, it needs to be informed by evidence, that is informative about the location, its character and communities, the future needs and aspirations of all stakeholders, and how change can be managed to progress towards a more beneficial future for all. Up to date information on key aspects of the social economic and environmental characteristics of the Estuary are critical, enabling the preparation of a sound spatial plan meeting the objectives of sustainable development. The evidence base is integral to the whole process of SIFP preparation and critical to the value of the Framework.

- **Integrated**

Strategic Environmental Assessment (SEA) aims to integrate environmental and sustainability considerations into strategic decision-making at each stage of the evaluation.

Integration is a leading mechanism for sustainable development and ensuring consistency of approach with Government Policy at all levels, International, national and regional level is critical. The use of Strategic Environmental Assessment (SEA) as part of this approach has ensured that critical environmental considerations are addressed as an integral part of the policy formation and site selection process, thereby ensuring the approach is effective, comprehensive and consistent with all policies. Article 1 of the SEA Directive states;

"The objective of this 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"

The SEA process commenced at the same time as the Plan preparation process, ensuring that the environmental quality and consequences of the Plan have been evaluated

at the earliest opportunity. This systematic and comprehensive process has evaluated the environmental effects of the Plan, including the alternatives, and has clearly influenced decision making.

3.0 Stage 1: Data Collation & Baseline Analysis

Stage 1 of the approach concentrated on the collation of information relating to the area, to understand the existing context, gather information about current needs and demands, and begin to predict where opportunities might arise. The focus of this approach centred on the themes agreed with the Steering Group at the outset of the project, which were based on the key economic drivers, functions and activities prevalent in the Estuary at present. The tasks undertaken are outlined in the subsequent sections.

3.1 Site visit & Literature Review

A multi-disciplinary team visited the SIFP study area, and carried out a visual and photographic survey of the Estuary. This focused on establishing the physical conditions on the ground, existing opportunities, relating to the agreed themes, including features such as existing maritime infrastructure, and to explore existing opportunities. The team carried out a literature review of the project, commencing with the overarching framework documents which provide the core planning context for the Study Area, including land use planning documents, the recently published Integrated Marine Spatial Plan '*Harnessing our Ocean Wealth*' along with various other statutory and non-statutory guidance documents. The team reviewed all the literature collated by the Steering Group at the outset of the project through the initial scoping stage. This included numerous reports, studies, assessments and reviews of various aspects, issues and uses within the Estuary dating back to the early 1960's, relating to both land use planning, and those relating to various activities within the marine area.

The following information was also collated to assist compiling a GIS database of environmental information:

- IWeBS & NEWS data
- Shannon River Basin District Data Sets
- Coastal Heritage Viewer Information
- Marine Monitoring information
- EPA Monitoring Information
- Draft Conservation Management Plans and generic
- conservation objectives, site synopisis (NPWS)
- Bird Data from NPWS & previous reports
- Specific Habitat and Species Information from NPWS
- GIS data & ortho-imagery from each Local & City Authority, and other Steering Group Members.
- Archaeological and Cultural Heritage Information (Site and Monuments Records, Historic Shipwreck Inventory, The Discovery Programme, Fergus Estuary Studies and the Ordnance Survey First Edition six-inch series of maps)
- Bottlenose Dolphin information for the Shannon Estuary
- BIM data
- A number of key data gaps were identified at the outset of the project, raising concerns about the potential to robustly evaluate the key environmental considerations. To this end, the following key baseline field work was carried out by RPS to inform environmental considerations of future proposals:
- The identification and rating of important areas for Bottlenose Dolphins using the deployment of C-Pods at:
    - Tarbert

    - Foynes
    - Auginish
    - Shannon Airport
- Identification and rating of vulnerable bird areas within the SPA which may be more susceptible to future development.
- Cultural heritage assessment of the Shannon Estuary study area based on a desktop study. (This involved mapping all known records within the study area)

3.2 Stakeholder Engagement

The programme of consultation was initiated at the outset of the project, to ensure comprehensive engagement with all stakeholders was carried out and this helped inform the SIFP. The team worked closely with the Steering Group to identify and include stakeholders in a comprehensive, appropriate and timely manner during the development of the project. Engagement included the following:

- Notice of Intent advertised at outset of Project inviting submissions from the general public
- Notice of Intent to carry out an SEA Scoping Study
- Notice of Intent to carry out an Appropriate Assessment
- Public Notices on websites of Steering Group Members (including three Local Authorities, City Authority, Shannon Foynes Port Authority and Shannon Development).
- Press Release issued to National and local newspapers inviting submissions
- Letters sent to a range of community groups
- Letters sent to & meetings with a range of Statutory Agencies and Community Groups
- One-To-One Meetings with each Steering Group Member
- Presentations to Local Authority Elected Members and Mid-West Regional Authority
- One-to-one meetings with a number of large private sector industries within the Estuary
- Circulation of SEA Scoping Study to Statutory Authorities
- Publication of a Draft Plan and an invite to comment
- Circulation of Draft Plan to Steering Group members for comment / discussion.

Numerous submissions were received in response to this stakeholder engagement, with information ranging from broad policy issues to location specific information received, and used to inform the context to the selection of strategic locations.

The process for selecting locations commenced with the identification of Areas Of Interest – broad locations where opportunities exist. Following consideration through a number of matrices, short listing and consultation with key stakeholders, the Areas of Interest were refined (particularly through findings of the Multi Criteria Analysis) to identify those locations which were optimum choices for strategic development. Strategic Development locations are identified within the terrestrial area, and Areas of Opportunity in respect of the marine area.

4.0 Stage 2: Identification of Opportunities

Stage II of the approach focused on identification of opportunities or locations where opportunities may exist within the various themes, based on the information collated in Stage I.

It was agreed with the Steering Group that the focus was on the identification of large strategic development locations only i.e. those areas that would accommodate large scale development, to be brought forward as part of the County / City Plans. It was agreed that

areas already zoned /protected within the County Plans /Local Area Plans / Environs Plans would remain as such, and would not be duplicated within the SIFP. The one exception to this is the recognition of Shannon Airport, within the SIFP, which is considered to be a key driver of regional and national importance. The boundary of the Airport Lands, as shown in the Shannon Town & Environs Plan has been brought forward and reproduced in the SIFP.

4.1 Marine Related Industry

The site visit and desk top study of the area yielded a number of areas of interest under this theme. The following factors were taken into account when selecting potential locations for future development under this theme:

- Land use and land use viability
- Several factors considered when identifying key locations:
- Navigational requirements/safety
- Existing / Neighbouring commercial activity
- Commercial marine traffic
- Availability of land for development
- Geographical location
- Proximity of deepwater sites identified
- Overall suitability for future development

In considering these areas of interest, a wide range in the scale of development was evaluated, from small scale commercial to major commercial developments and use by the fishing industry. 24 areas of interest were identified for consideration. These were supplemented by consideration of lands within two existing strategic zonings:

- Tarbert-Ballylongford Land Bank, Co Kerry and;
- Askeaton Industrial Park, Co Limerick.

4.2 Marine Tourism Leisure & Recreation

The site visit and desk top study of the area yielded a number of areas of interest under this theme. The following factors were taken into account when selecting potential locations for future development under this theme:

- Navigational requirements/safety
- Geographical location
- Existing marine infrastructure
- Existing landside access
- Surrounding rural/urban location
- Existing leisure / recreation activity
- Overall suitability for future development

In considering these areas of interest, a wide range in the scale of development was evaluated, ranging from a single pontoon or mooring to cruise berth or large marina. 31 areas of interest were identified.

4.3 Energy

The Estuary was considered for development and potential worth to the Renewable Energy Sector. This included a number of areas:

- Potentially suitable areas for Biomass
- Potentially suitable areas for Port Facilities servicing Energy developments including:
- Commercial Wave
- Tidal Energy

- Offshore wind energy developments
- Marine areas suitable as a tidal energy resource
- Marine areas suitable as a wave energy resource
- Marine areas suitable as an offshore wind resources The areas of interest identified under the Marine Related Industry, were assessed under the Energy Theme, for the development potential for Biomass, Ports to Service Energy

Desktop survey identified that the Draft Offshore Renewable Energy Plan (dOREDP) and the SEI Report titled 'Tidal & Current Energy Resources in Ireland' provided location specific information on the availability of technical resources within the Shannon Estuary for Tidal Energy, Wave Energy and Offshore Wind. It is understood that NUI Galway are currently researching renewable energy resources within the Shannon Estuary, as part of the EU Atlantic Area MAREN Project, however this information was not available during the preparation of the SIFP.

Incorporating the information in these two documents, four broad areas were identified as having potential technical resource for Tidal Energy, namely:

- Moneypoint
- Carrig Island
- Kilconly Point
- Tarbert Bay

The Estuary is located on the west coast of Ireland, which is subject to the North Atlantic Fetch, and hence blessed with a significant wave resource. Although the dOREDP did not indicate any designated wave energy resources within the Estuary itself, there are a number of sites on the west coast of Ireland which could be serviced by Port facilities existing or planned within the Estuary.

The area at the mouth of the Estuary (within the study boundary), whilst blessed with a healthy wind resource, is unlikely to be suitable for an offshore wind commercial development for a number of reasons. The water depth is generally too deep for the deployment of conventional piled foundations required to support the wind turbines required for offshore wind. The shipping traffic in / out of the Shannon is also felt too busy to locate an offshore wind development within the vicinity, although a shipping channel could be marked up through the development. From a visual impact perspective, the preference is for location of offshore wind developments is normally located further offshore than the waters at the mouth of the Shannon, outwith the boundary of this study

It is important to note that the SIFP does not rule out possibilities for harnessing wave energy or offshore wind within the Estuary - particularly, as these are emerging industries, and knowledge and technology associated with them is progressing daily. These opportunities are influenced by their specific location and its context, as well as the specific technological solution, and require a considerable amount of technical and environmental baseline, survey, feasibility, assessment and statutory consents, before coming to fruition. On this basis, it is more appropriate to take an objective-led approach to harnessing the potential of the Estuary from a wave and offshore wind perspective, as opposed to a site specific led approach.

4.4 Commercial Fishing & Aquaculture

The Estuary was considered for development and potential worth to the commercial fishing and aquaculture sectors.

Commercial fishing takes place in the outer Estuary and further out to sea, serviced at various harbours and piers within the Estuary itself. Good maritime infrastructure, marine services, and connectivity within the onshore transport network is important, however the industry is influenced to a considerable extent by national and international regulations. On this basis, it is more appropriate to take an objective-led approach to harnessing the potential of the Estuary from a commercial fishing perspective, as opposed to a site specific led approach.

Aquaculture is an active industry for the coastal communities within the Estuary. Previous reports and studies were supplemented with consultations with Department of Agriculture, Food and the Marine (DAFM) and Bord Iascaigh Mhara, to determine the extent of the activity and its potential to expand. GIS data was provided to the SIFP team outlining the location of all active, inactive and pending license activity, as well as the existing Fishery Orders. Consultation with the Marine Institute (MI) and National Parks & Wildlife Service (NPWS) provided information on the ongoing Appropriate Assessment work on Fishing and Aquaculture which is being carried out on a bay by bay basis. The assessment for the Shannon Estuary has not been completed to date but will look at the interrelationship between this industry and the Natura 2000 designations. Analysis of the areas designated for the Pollution Reduction Programmes under the Shellfish Directive was also undertaken. 8 broad areas of interest were identified, which incorporated all this information.

5.0 Stage 3: Exploration of Location Potential

The potential of the Estuary was explored using a Multi Criteria Analysis (MCA). This involved the use of a number of matrices as tools to explore all the locations/areas of interest, using various criteria, namely economic/technical, environmental, social and planning considerations to explore potential alternatives, and identify potential strategic development locations for the SIFP. The MCA audits the different characteristics of each location and considers a broad scale and type of developments possible.

5.1 Technical & Economic Assessment Matrix

For Marine Related Industry and Renewable Energy, this matrix explored each of the 24 areas of interest from a technical, economic and engineering perspective, in particular:

- Existing facilities / Suitability for development;
- Potential Development

Each area of interest was examined and scored in terms of its physical suitability and existing facilities, under the following criteria:

- Water Depth Proximity
- Existing Road Access
- Distance from Road Network/HighwayAccessibility
- Existing Infrastructure
- Available hinterland
- Distance from shipping lane

Each area of interest was examined and scored in terms of its potential or level of development possible. These were broad / generic categories based on the types of development likely within the relevant themes. These are:

- Small Commercial
- Use by the fishing industry
- Major commercial
- Use by the Renewables Industry
- Potential Use by Biomass Industry
- Use by Tourism Industry (Cruise Berth)

The two scores were combined to provide an overall rating for the site. The higher the rating, the greater the development potential to facilitate all types of commercial development with less economic investment. The lower the rating the greater the economic investment required to provide lesser facilities. The exploration of these issues also informed any key site consideration or guiding principles for each site.

For Marine Tourism Leisure & Recreation, this matrix explored each of the 31 areas of interest from a technical, economic and engineering perspective, in particular:

- Existing facilities / Suitability for development;
- Potential Development

Each area of interest was examined and scored in terms of its physical suitability and existing facilities, under the following criteria:

- Shelter
- Water Depth Proximity
- Existing Road Access
- Distance from Road Network/HighwayAccessibility
- Existing Infrastructure
- Distance from shipping lane

Each area of interest was examined and scored in terms of its potential or level of development possible. These were broad / generic categories based on the types of development likely within the relevant themes.

These are:

- Large Marina > 50 boats
- Small Marina < 50 boats
- Access Pier
- Slipway
- Moorings facility
- Surfing venue
- Cruise Terminal

The two scores were combined to provide an overall rating for the site. The higher the rating, the greater the development potential to facilitate all types of marine tourism, leisure and recreation development with less economic investment. The lower the rating the greater the economic investment required to provide lesser facilities. The exploration of these issues also informed any key considerations or guiding principles for each location.

5.2 Preliminary Screening Matrix (PST)

At this stage, a high number of areas of interest have been identified under each of the theme, and the next stage of the approach involves examining these areas, to identify and

select those locations offering the greatest potential opportunity within the environmental, social and planning context of the Estuary.

The SIFP covers the entire Estuary, and includes almost the full extent of the following designations:

- Special Area of Conservation (SAC) – Lower Shannon
- Special Protection Area (SPA) – River Shannon & Fergus Estuary
- Various Natural Heritage Areas (NHA) & proposed Natural Heritage Areas (pNHA)
- RAMSAR sites

These national and European designations are an important component of the location selection process, and as per the requirements of the Strategic Environmental Assessment (SEA), the SIFP must ensure a high level of protection to the environment. As such, a key aspiration is to ensure that the optimal locations for development, can be absorbed by the Estuary and do not result in an unacceptable cumulative impact.

In this context, the Preliminary Screening Table examines all the areas of interests to identify a shortlist of those locations offering the greatest potential opportunity within the Estuary, under a number of core criteria heading. These relate to key objectives within the SEA and Habitats Directive, as well as key planning objectives, and incorporate the results of the technical and engineering matrix, to provide a balanced approach to examining all the areas of interest.

Each area of interest was given a score between -6 and +6 on the basis of how its development potential could achieve the social, environmental, technical and planning objectives of the Estuary. It also includes a score which identifies whether an Appropriate Assessment will be required. The individual criteria scores are then added to provide an overall score for each area of interest. All areas of interest over the range of themes considered, resulting in a positive score (+1 and above) were brought forward for further considerationthrough the multi-criteria analysis. It was considered that these areas (shortlist) represented a positive opportunity for development potential within the integrated aspirations of the Estuary context.

A copy of the Preliminary Screening Table and the populated matrix tables are located in the accompanying Strategic Environmental Assessment (Appendices A-G).

Key Assumptions in this approach included:

- The scores within the Technical/Economic Matrix have been incorporated into the PST under the Technical Heading;

- Two additional locations were added into the Marine Related Industry, to incorporate fully two existing strategic zonings, namely Tarbert-Ballylongford Land Bank, Co Kerry and Askeaton Industrial Lands, Co Limerick. Both were attributed a score of +4, on the basis that development has been approved on one of them and they are previously zoned sites therefore considered developable in principle.

- One additional location was added into the Marine Tourism Leisure & Recreation to incorporate a specific request from the Local Authority, namely Cahiracon House & Woods.

- The aquaculture areas of interest were not subject to the technical / economic matrix, and are assumed to be technically acceptable due to the presence of license (active/inactive/pending) activity, they were all given a score of +6

- The tidal energy areas of interest are likely to be connected to onshore, and as such this element was given a score under the planning objectives

- Tidal energy areas of interested were taken from the dOREDP and the SEI Report which indicated that these areas are likely to be technically acceptable, and as such were attributed a +5

- Single areas of interest, which were initially considered as suitable for a range of themes, were considered as one (singular) area, to be brought forward for further consideration through the multi-criteria analysis, following the Preliminary Screening Matrix.

5.3 Consideration of Areas of Interest

Additional consultation with key stakeholders and members of the Steering Group at this stage, informed a further consideration of these areas of interest. These discussions incorporated the following:

- Site specific knowledge of various constraints;
- Further studies previously undertaken in respect of specific areas of interest;
- Planning considerations;
- Local Area Plan issues.

These issues further informed the decision making process and the following conclusions were made:

- **Aquaculture:**

All the Areas of Interest identified under the Aquaculture would be taken forward, for further consideration as part of the Multi-Criteria Analysis, with a view to allocating these as Areas of Opportunity for Aquaculture within the SIFP;

- **Renewable Energy**

Areas of Interest considered for Ports to Service the Renewables Industry and Biomass worked in parallel with the theme of Marine Related Industry, and would be taken forward as objective-led proposals under Renewable Energy, and as acceptable uses within those strategic development locations identified for Marine Related Industry (where appropriate);

All the Areas of Interest identified under Tidal Energy would be taken forward, for further consideration as part of the Multi-Criteria Analysis, with a view to allocating these as Areas of Opportunity for Tidal Energy within the SIFP;

- **Marine Tourism, Leisure & Recreation**

Under the theme Marine Tourism, Leisure & Recreation, the PST tables identified those areas of interest for potential opportunity however upon closer examination and in consultation with the Local Authorities, it was considered more appropriate that proposals for development were objective led as opposed to site specific. These objectives would direct the Local Area Plans to certain settlements and locations where greater potential exists, to be examined as part of the Local Area Plan process. This was supported by the lack of proposals brought forward for strategic opportunities, both through the consultation process with the public and Steering Group members.

- **Marine Related Industry**

The priority is to ensure that existing strategic economic drivers within the Estuary are safeguarded, particularly if they do not currently benefit from an existing zoning within the

Development Plan hierarchy. These will be brought forward as strategic development locations

The area of interest located at Foynes Island to Collen Point was discounted as a potential strategic development location. Consultation with Shannon Foynes Port Authority noted that a detailed feasibility study had been carried out which outlined the limitations of the site for port related development, for the larger vessels anticipated, and for navigational safety reasons.

The area of interest located at Cappa was not brought forward as a potential strategic development location, following consultations with Shannon Foynes Port Authority. It was agreed that the limitations of water depth, the potential for major dredging, prevailing marine conditions, lack of suitable hinterland and proximity to Scattery Island would likely limit the potential for its growth as a strategic marine industrial location.

Following this, the remaining areas of interest were brought forward for consideration under the Multi Criteria Analysis in the next stage which was driven and focused by the SEA process. The sites which were assessed under the PST were considered the alternatives with the sites brought forward to the Stage III Multi Criteria Analysis considered the preferred options under the SEA.

6.0 Stage 4: Multi Criteria

The areas of interest identified in the previous stage were brought forward for detailed consideration within a Multi-Criteria Analysis (MCA). The MCA consists of key objectives which are scored under a number of core criteria headings, similar to those within the PST Matrix. The key SEA topics of Social and Environment were considered in detail within this Matrix. The core criteria also include planning and technical/economic criteria.

The purpose of this matrix is to look in detail at the key issues of the area of interest to:

- Consider all the core criteria and whether the aspirations for the location within a particular theme can be met within the Estuary context;
- Determine its suitability to be brought forward as a strategic development location;
- Identify any key issues and features which may influence the refinement of the area of interest to a specific location;
- Identify any guiding principles or key development considerations which should underpin the future development of the location.

Through this process, the Areas of Interest were refined further, directed by the information sourced and considered as part of this examination. Consequently the Areas of Interest became strategic development locations and Areas of Opportunity.

A copy of the MCA matrix and the populated matrix tables are located in the accompanying Strategic Environmental Assessment (Appendices A-G).

7.0 Stage 5: Habitats Directive Assessment

The next stage of the process was to consider each of the proposed Strategic Development Locations and Areas of Opportunity under the Habitats Directive Assessment. As discussed earlier, considerable information was collated regarding the details of the qualifying features of the Natura 2000 Network within the Estuary. This is critical in understanding the potential impacts which may arise at a particular site based on interrelationship between the potential opportunities of the site and the qualifying interests of the European site.

An example of the Habitats Directive Screening Assessment Table and the populated matrix tables are located in the accompanying Habitats Directive Assessment (Appendices A-G) This Assessment was carried out for each Strategic Development Locations and Areas of Opportunity identified. It will serve to inform the critical first steps for any future potential investor or body in examining the details of the Natura site at a specific location, with respect to the potential impacts which might occur on it from various types of development. It may also provide an indication of the additional steps, studies, and field investigations required in support of a proposed development at project level, in order to meet the requirements of Article 6 of the Habitats Directive.

8.0 Conclusions

All the sites considered under the MCA and HDA were brought forward within the SIFP as Strategic Development Locations, within the relevant theme. The consideration of locations under the PST informed the objectives and policies outlined within the SIFP.

APPENDIX C

Guiding Principles for Strategic Development Locations & Areas of Opportunity

1.0 Introduction

The Strategic Integrated Framework Plan (SIFP) proposes a Thematic Spatial Plan which identifies a number of strategic development locations and areas of opportunity, where development is directed. An evidence based process of location selection was carried out which examined core Strategic Environmental Assessment (SEA) topics and also included an Appropriate Assessment of the Strategic Development Locations and the Areas of Opportunity within the SIFP. Supporting development information and key mitigation measures were also proposed by both the SEA, AA and through consultation with the Steering Group Members and the Local Authorities. This is key information provided to guide and assist the future development of these important development opportunities.

The location specific measures, supporting information, and mitigation measures are included in this Volume.

2.0 Guiding Principles for Strategic Development Locations / Areas of Opportunity

The following information has been collated from consultation with various key stakeholders, including statutory agencies, and the local Authorities, and the overall location selection process. These are outlined as 'Guiding Principles' and are intended as indicators of the likely information or design requirements to enable and direct future development on the Estuary.

2.1 Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

2.1.1 Strategic Development Location: Inishmurry / Cahiracon, Kildysert, Co Clare

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- This location is identified for marine related industrial uses. Alternative land uses which create a synergism or are compatible with the primary anticipated use may be acceptable where the ability to deliver the primary use is not compromised.
- Opportunities may exist to create synergies with lands adjacent Cahiracon House or as a multi- use maritime industry, incorporating components to cater for Cruise Ship berths, enabling tourism linkages, with the wider tourism offering in Co Clare linking in with the tourism potential existing within the wider CO Clare and Mid West Region.
- All proposals for development should provide a Concept Masterplan which includes an:
    - Analysis of location features, opportunities and constraints
    - Explanation of the design, its component parts, and how these are compatible and intergrate with the location characteristics.

- All proposals will be encouraged to utilise existing previously developed lands and existing maritime infrastructure (to minimise impacts on the environment) adjacent to a natural deep water pocket, which is well sheltered.
- All proposals should consider retention of existing landscape features to provide visual screening from the R473 and provide a backdrop to the project.
- All proposals should consider the opportunities to create / retain access for recreational angling from the area, as a potential community gain.
- Initial consideration within the Multi Criteria analysis indicates that although the deep water pocket will provide benefits for port access, some reclamation and dredging maybe required to facilitate major development within the location.
- The Preliminary Flood Risk data prepared by OPW, indicates a small portion of the location (namely the existing Pier) is subject to risk from coastal and pluvial flooding. It is anticipated that only water compatible uses would be acceptable in these locations. However, any future development shall be subject to detail flood risk to identify in detail the exact nature and extent of flood risk, and ensure that all proposals are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System, and should in particular, address the issues of flood protection, climate change and sea level rise.
- There are known heritage features located on the Sites & Monuments Record within the location and in addition, records have shown underwater heritage potential within the inter-tidal and tidal areas, including presence of fish weirs. These should be subject to detailed evaluation at project level stage
- The scenic location on the coastline indicates a potential to impact on the surrounding landscape and seascape, and this should be looked at in detail at project level.
- A clear benchmark was created for road infrastructure improvements as part of the Shannon Explosives project. These should be examined with respect to any future proposals. A Traffic and Transportation Assessment in accordance with NRA DMRB Guidelines will likely be required, and should consider the following:
    - Provision of good quality and improved connections to the National Road Network (N67 & N68)
    - Improvements to the Regional Road Network, including connections to the Killimer – Tarbert Ferry
    - Interlinkages with Kiladysert and consideration of a Relief Road
    - Good quality access arrangements and internal road layout.
- All proposals should consider the provision of adequate water supply. The supply network from the Kildysart water treatment plant passes along the R473 at the junction of the road to the existing pier, and its treatment capacity is small and near capacity. All proposals for maritime industry should consider the following in addressing supply:
- A major upgrade of Kildysart WTP, increased storage at the service reservoir, significantly more abstraction from Gortglass Lake, and upgrade of the network between the service reservoir and the site road.
- A major upgrade to the Doolough network, which comes as far as Labasheeda village, approx. 12 km along the R473 from the junction of the road to site. This option may require a booster pumping station of any new main laid from Labasheeda, and (depending on the size, condition and draw-off of the network upstream of Labasheeda) may also need upgrading of the existing network.
- All proposals should consider the provision of adequate wastewater treatment facilities to cater for the new development, with capacity to serve the nearby Kiladysert Village.
- Foreshore consent and planning permission will likely be required, in addition to any other environmental permitting relevant at Project level, in additional to legal agreements relating to ownership.

2.1.2 Strategic Development Location: Moneypoint & Lands adjacent, Kilrush, Co Clare

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- This location is identified for energy uses. Alternative land use, in particular marine related industry on the green field areas, which create a synergism or are compatible with the primary anticipated use may be acceptable, where the ability to deliver the primary use is not compromised.
- All development proposals likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive
- The role of ESB Moneypoint shall be safeguarded within the Region, ensuring that its power generation, transmission capability and distribution functions are protected, as well as those core assets required for their operations, including key access to cooling water, marine waters and the commercial shipping lane access are maintained
- Potential opportunities exist to harness the potential from the adjacent Area of Opportunity for tidal Energy outlined in Volume 1.
- All proposals for development should provide a Concept Masterplan which includes an:
    - Analysis of location features, opportunities and constraints
    - Explanation of the design, its component parts, and how these are compatible and integrate with the location characteristics.
- ESB Moneypoint facility is a SEVESO Upper Tier site, due to the presence of hazardous substances. This should be taken into account when considering future proposals for marine related industry on the lands adjacent, particularly those uses which may also include hazardous substances, which will require rigorous evaluation of the combined risks and potential consequences to the environment. Early consultation with the Health & Safety Authority is strongly advised
- The extent of improvement / enhancement to the surrounding transport network will be subject to the detail of any future proposal at detailed design stage. However, a full Traffic and Transportortation Assessment in accordance with NRA DMRB Guidelines will be required, and should consider the following:
- Provision of good quality and improved connections to the National Road Network (N67 & N68)
- Improvements to the Regional Road Network, including connections to the Killimer–Tarbert Ferry
- Inter-linkages with Kilrush Town and consideration of a Relief Road
- Good quality access arrangements and internal road layout.
- All proposals should ensure adequate water supply:
- This location is well served by water supply, with a large diameter main between the New Doolough treatment plant to Moneypoint, primarily to supply cooling water for equipment, and which may contain significant spare capacity in the big main, subject to the requirements of ESB Moneypoin.
- There is also spare capacity in the New Doolough plant for production, and in Doolough itself for abstraction, which is subject to the requirements of the Water Framework Directive
- All proposals should consider adequate provision for wastewater treatment. Potential may exist for a scheme in conjunction with ESB Moneypoint facility within their existing site. An alternative may be the upgrade/new treatment plant at Killimer Village (which currently only serves the domestic areas in the surrounding estate)

which could be redesigned to accommodate industrial development however will need to take account of the topography between Moneypoint and Woodview, Killimer.
- Foreshore consent and planning permission will likely be required, in addition to any other environmental permitting relevant at Project level, in additional to legal agreements relating ownerships etc

2.1.3 Strategic Development Location: Foynes Island, Foynes, Co Limerick

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- These lands are considered to be suitable for development in principle, for Marine Related Industry, and in particular Port related development. The existing commercial jetty will require a considerable upgrade to accommodate larger vessel, and a clear network of connections to link into the existing site.
- All development proposals within this location likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive;
- All development proposals should be accompanied with a concept Masterplan showing how the proposals integrate the principles of sustainable development into their design, including
    - Ensuring development is not prominent or visually intrusive within the landscape
    - Integrates adequately with the existing landscape features of the area;
    - Promoting connectivity and enhancing linkages
    - Promote sustainable travel patterns
    - Reuse of existing infrastructure and linkages within the area
- All development proposals should ensure the provision of adequate water supply. The Clareville Plant and the upgrading of the Southern Ring Road may offer potential storage capacity however upgrades to the system are likely;
- All development proposals should ensure adequate provision for wastewater treatment.
- Based on the Preliminary Flood Risk data carried out by OPW, a small portion of the area is subject to risk from coastal flooding. It is anticipated that only water compatible uses would be acceptable in these locations, however all proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise.
- It is likely that all proposals will require planning approval before commencement. In addition, development on the foreshore will likely require foreshore lease / license, in addition to normal legal agreements relating to land ownership.

2.1.4 Strategic Development Location: Lands at the Port of Foynes, Co Limerick

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- These lands are considered to be suitable for development in principle, for Marine Related Industry, and in particular Port related development, and those alternative uses compatible with or complementary with the Port uses, and the nature of the coastal flood risk present. Land uses which endorse the aspiration for the area to develop as a strategic transport energy and logistics Hub will be promoted.
- All development proposals within this location likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive
- All development proposals should be accompanied with a concept Masterplan showing how the proposals integrate the principles of sustainable development into their design, including
    - Ensuring development is not prominent or visually intrusive within the landscape
    - No adverse impact on residential amenity
    - Promoting connectivity and enhancing linkages
    - Promote sustainable travel patterns
    - Reuse of existing infrastructure and linkages within the location
- All development proposals should ensure the provision of adequate water supply.
- All development proposals should ensure adequate provision for wastewater treatment.
- Based on the Preliminary Flood Risk data carried out by OPW, a considerable portion of the area is subject to risk from coastal flooding. It is anticipated that only water compatible uses would be acceptable in these locations It congruent with Port-related activity, however all proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise.
- In terms of road infrastructure improvements, a Traffic and Transportation Assessment in accordance with NRA DMRB Guidelines will likely be required, and should consider the following:
    - Provision of good quality and improved connections to the National Road Network (N69)
    - Potential connection with future rail network on the Limerick-Foynes rail link
    - Good quality access arrangements and internal road layout.
- It is likely that all proposals will require planning approval before commencement. In addition, development on the foreshore will likely require foreshore lease / license, in addition to normal legal agreements relating to land ownership.

2.1.5 Strategic Development Location: Askeaton

Guiding principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- The SIFP identifies this SDL as existing strategic industrial land, where the development priority reflects the objective of the Limerick County Development Plan to safeguard the lands for the establishment of industry and enterprise of regional importance.
- These lands may be suitable as a remote location for Port / marine related development and such development is encouraged where it is consistent with the criteria in Policy Objective SIFP MRI 1.2.
- Alternative land uses which create a synergism or are compatible with the primary anticipated use may be acceptable where the ability to deliver the primary use is not compromised.
- All development proposals within this location likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive
- All proposals for development should provide a Concept Masterplan which includes an:
    - Analysis of location features, opportunities and constraints
    - Explanation of the design, its component parts, and how these are compatible and intergrate with the location characteristics.
    - Integration of linkages and connections to the surrounding lands and Askeaton Village
- All proposals should consider retention of existing landscape features to provide visual screening from the N69 and provide a backdrop to the project.
- The Preliminary Flood Risk data prepared by OPW, indicates a small portion of the area (namely the existing Pier) maybe subject to fluvial flooding. Any future development shall be subject to detail flood risk to identify in detail the exact nature and extent of flood risk, and ensure that all proposals are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System, and should in particular, address the issues of flood protection, climate change and sea level rise.
- In terms of road infrastructure improvements, a Traffic and Transportation Assessment in accordance with NRA DMRB Guidelines will likely be required, and should consider the following:
    - Provision of good quality and improved connections to the National Road Network (N69)
    - Potential connection with future rail network on the Limerick-Foynes rail link
    - Good quality access arrangements and internal road layout.
- All development proposals should ensure the provision of adequate water supply.
- All development proposals should ensure adequate provision for wastewater treatment.

2.1.6 Strategic Development Location: Aughinish Island, Co Limerick

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- These lands are considered to be suitable for development in principle, for Marine Related Industry. The location is also likely to be acceptable for general industry, and alternative land uses which are considered complementary or compatible with the primary use of the area. In addition, uses complementary with the energy aspects of the area are also likely to be acceptable in principle.
- All development proposals within this location likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive
- All development proposals should be accompanied with a concept Masterplan showing how the proposals integrate the principles of sustainable development into their design, including
    - Promoting connectivity and enhancing linkages
    - Promote sustainable travel patterns
    - Consideration of the potential contribution of the rail network to future enterprise and industry development
- All proposals should adequately consider the ecological features of the proposed Natural Heritage Area which migrates within the location
- The extent of improvements required to the surrounding transport network will be dependant on the detail of the individual proposals to be brought forward at project level. This may require the submission of a Traffic and Transportation Assessment in accordance with NRA Guidelines
- All development proposals should ensure the provision of adequate water supply.
- Water Treatment Plant has been recently upgraded and additional capacity may be available.
- All development proposals should ensure adequate provision for wastewater treatment. Although a major refurbishment of the Min Drainage System has been undertaken, upgrades maybe required depending on the nature and scale of the scheme proposals
- Based on the Preliminary Flood Risk data carried out by OPW, a considerable portion of the area is subject to risk from coastal flooding. The land currently accommodates flood embankments along its boundary with the Robertstown Creek. It is anticipated that only water compatible uses would be acceptable in these locations however all proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise.
- It is likely that all proposals will require planning approval before commencement. In addition, development on the foreshore will likely require foreshore lease / license, in addition to normal legal agreements relating to land ownership.

2.1.7 Strategic Development Location: Tarbert Power Plant, Tarbert, Co Kerry

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- These lands are also considered suitable for Port / marine related development and such development is encouraged where it is consistent with the criteria in Policy Objective SIFP MRI 1.2.
- All development proposals likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive

- The role of Tarbert Power Plant (including the Strategic oil reserves) shall be safeguarded within the Region, ensuring that its power generation, transmission capability and distribution functions are protected, as well as those core assets required for their operations.
- All proposals for development should provide a Concept Masterplan which includes an:
    - Analysis of location features, opportunities and constraints
    - Explanation of the design, its component parts, and how these are compatible and integrate with the location characteristics
- Tarbert Power Plant facility is a SEVESO Upper Tier site, due to the presence of hazardous substances. The Strategic Oil Reserves are also an Upper Tier site. This should be taken into account when considering future proposals for energy or marine related industry, particularly those uses which may also include hazardous substances, which will require rigorous evaluation of the combined risks and potential consequences to the environment. Early consultation with the Health & Safety Authority is strongly advised
- Based on the Preliminary Flood Risk data carried out by OPW, a considerable portion of the area is subject to risk from coastal flooding. All proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise
- The extent of improvement / enhancement to the surrounding transport network will be subject to the detail of any future proposal at detailed design stage. However, a full Traffic and Transportation Assessment in accordance with NRA DMRB Guidelines will be required. It should be noted that extensive improvements to the road network in the are have been approved as part of the proposed LNG facility
- All proposals should ensure adequate water supply:
- All proposals should consider adequate provision for wastewater treatment.
- Foreshore consent and planning permission will likely be required, in addition to any other environmental permitting relevant at Project level, in additional to legal agreements relating ownerships etc

2.1.8 Strategic Development Location: Tarbert-Ballylongford Land Bank, Tarbert, Co Kerry

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- This location is identified for marine related industry and energy uses. Alternative land uses, which creates a synergism or are compatible with the primary anticipated uses may be acceptable, where the ability to deliver the primary use is not compromised.
- All development proposals likely to have significant effect on the Natura 2000 network will be subject to compliance with the objectives and requirements of the Habitats Directive
- The strategic role of the land bank shall be safeguarded within the Region, ensuring that its development potential for energy and marine related industry is protected, maintained and enhanced where required.
- All proposals for development should provide a Concept Masterplan which includes an:
    - Analysis of location features, opportunities and constraints

  - Creation of linkages and connection within and around the location
  - Explanation of the design, its component parts, and how these are compatible and integrate with the location characteristics
- This area is adjacent to an active aquaculture licensed area. Early consultation with the license holder to determine the detail of any issues / concerns.
- Upon commencement of operations within the landbank the Shannon LNG facility is likely to become a SEVESO site. At this point HSA have not been notified. However, upon notification all future proposals should take account of this designation, particularly those uses which may also include hazardous substances. These proposals will require rigorous evaluation of the combined risks and potential consequences to the environment. Early consultation with the Health & Safety Authority is strongly advised
- Based on the Preliminary Flood Risk data carried out by OPW, a small portion of the area is subject to risk from coastal flooding. All proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise
- The extent of improvement / enhancement to the surrounding transport network will be subject to the detail of any future proposal at detailed design stage. A full Traffic and Transportation Assessment in accordance with NRA DMRB Guidelines maybe required. It should be noted that extensive improvements to the road network in the area have been approved as part of the proposed LNG facility, which will be implement upon commencement of the project.
- All proposals should ensure adequate water supply.
- Foreshore consent and planning permission will likely be required, in addition to any other environmental permitting relevant at Project level, in additional to legal agreements relating ownerships etc

2.1.9 Strategic Development Location: Limerick Docks and lands adjacent, Limerick City

Guiding Principles

To assist with the implementation of these objectives and future development of these lands, a number of guiding principles have been outlined below:

- SA considerable portion of these lands are identified as a strategic employment location, logistics and residential hub. They are considered to be suitable for Mixed Use development, including Marine Related Industry. The acceptable uses are outlined in the zoning matrix within the Limerick City Development Plan.
- All development proposals within this location will be subject to compliance with the objectives and requirements of the Habitats Directive
- All development proposals should be accompanied with a concept Masterplan showing how the proposals integrate the principles of sustainable development into their design, including:
  - Improving the urban structure and its aesthetic
  - Promoting connectivity and enhancing linkages
  - Promote sustainable travel patterns
  - Improve the streetscape and public realm along the Dock Road (where relevant)
- Reuse of the existing buildings and land within the Strategic development location will be encouraged in accordance with existing policies

- The extent of improvements required to the surrounding transport network will be dependant on the detail of the individual proposals to be brought forward at project level. This may require the submission of a Traffic and Transportation Assessment in accordance with NRA Guidelines
- All proposals within this location should take into account adjacent SEVESO Sites:
- Grassland Fertilizers ltd (Lower Tier)
- Topaz Energy Ltd (Lower Tier)
- These are located adjacent to the Strategic development location, and may influence the nature and extent of the development potential. More specifically, development which may include hazardous substances will require rigorous evaluation of the combined risks and potential **consequences to the environment and** early consultation with the Health & Safety Authority is strongly advised
- All development proposals should ensure the provision of adequate water supply.
- All development proposals should ensure adequate provision for wastewater treatment. Although a major refurbishment of the Min Drainage System has been undertaken, upgrades maybe required depending on the nature and scale of the scheme proposals
- Based on the Preliminary Flood Risk data carried out by OPW, a considerable portion of the area is subject to risk from coastal and fluvial flooding. It is anticipated that only water compatible uses would be acceptable here, however all proposals will be subject to a detailed flood risk assessment to identify the exact nature and extent of flood risk, and ensure they are developed and designed in accordance with the DOECLG and OPW Guidelines for Flooding and the Planning System. The assessment should include consideration of the existing flood embankments, future flood protection, climate change and sea level rise.
- It is likely that all proposals will require planning approval before commencement. In addition, development on the foreshore will likely require foreshore lease / license, in addition to normal legal agreements relating to land ownership.

Appendix D

SEA and HDA Mitigation Measures

1.0 Introduction

A number of recommendations and mitigation measures were proposed within the SEA Environmental Report and Habitats Directive Natura Impact Report, where it was deemed necessary, due to potential negative impacts. These evolved through the examination of the sites as part of the Site Selection process, and examination of the sites under a range of environmental topics. The cumulative effects were assessed and the results are outlined in Chapter 10 of the SEA Environmental Report together with the Mitigation and Monitoring measures which are outlined in Chapter 11. The Natura Impact Report is contained in has highlighted the more significant potential positive and negative environmental impacts from the implementation of the Plan (including cumulative impacts). Further detailed mitigation measures are likely to be required at individual project level, e.g. through habitat and Species survey, Ecological Impact Assessment and Habitats Directive Assessments. The mitigation measures are outlined in more detail within Chapter 6 – Mitigation of the Natura Impact Report, of this Plan, and specifically includes the following:

- **Over-Arching Mitigation;**
- **General Mitigation per Theme; and**
- **Mitigation for the Strategic Development Locations and Areas of Opportunity.**

The information and objectives contained in this Plan should be read in conjunction with the mitigation measures outlined in Chapter 6 of the Natura Impact Report

This Appendix (Appendix D) provides a concise document of all monitoring and mitigation measures arising from the environmental assessments which form a core element of the SIFP; this includes both the Strategic Environmental Assessment and the Habitats Directive Assessment. The monitoring and mitigation measures outlined within this document should be considered in combination with the potential future development or any Strategic Development Location or Area of Opportunity.

It should be noted that while the SIFP has looked at the potential environmental effects at a strategic level, at a project level given the dual Natura 2000 designation within the Shannon Estuary should a project require development within part of a designated site the developer/investor will most likely need to examine whether there is Imperative Reasons of Overriding Public Interest (IROPI) for the project to go ahead.

At a project level should the assessment satisfy the requirements of either 6 (3) and/or 6 (4) the level and duration of mitigation measures required, extent of baseline data collection, duration of monitoring etc should be commensurate with the potential impact of the development on the sensitive environment including the magnitude and duration of the potential impact that may result from the proposed development. In particular the mitigation measures should be directed at achieving the conservation objectives of the Natura 2000 sites.

It should be noted that while the SIFP has looked at the potential environmental effects at a strategic level, at a project level given the dual Natura 2000 designation within the Shannon Estuary should a project require development within or adjacent to part of a designated site the developer/investor will most likely need to examine whether there is Imperative Reasons of Overriding Public Interest (IROPI) for the project to go ahead. In some instances this may

need to be considered from the inception of the project given the scale and nature of developments which may be proposed for any of the Strategic Development Locations and Areas of Opportunity.

2.0 Mitigation and Monitoring

2.1 Introduction

Article 10 of the SEA Directive requires that monitoring should be carried out in order to identify at an early stage any unforeseen adverse effects due to implementation of the Plan, with the view to taking remedial action where adverse effects are identified through monitoring. A monitoring programme is developed based on the indicators selected to track progress towards achieving strategic environmental objectives and reaching targets, enabling positive and negative impacts on the environment to be measured. The environmental indicators have been developed to show changes that would be attributable to implementation of the Plan. See **Table 1.1** for targets and indicators.

It should be noted that the implementation of the Plan through the future development of key Strategic Development Location or Areas of Opportunity 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 SIFP, 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 Plan. 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 Plan 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 Plan 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

Chapter 7 provides the assessment of the Plan objectives which identifies the likely significant effects on the environment of the Lower Shannon Estuary through implementing the components of the draft Shannon SIFP. It also contains the SEA Assessment Unit tables which assess each of the strategic development location and provide site specific mitigation where deemed necessary due to negative impacts.

2.2 Water Framework Directive Compliance

As the entire study area lies within largely transitional and coastal waterbodies together with the potential to impact on some river waterbodies under the Water Framework Directive and forms one of the most critical components of the Shannon International River Basin Management Plan it is critical that any future development which is brought forward for any of the strategic development location or the alternative sites are assessed for compliance with the WFD.

The WFD general objective to be achieved in all surface and groundwater bodies is good status by 2015 and introduces the principle of preventing any further deterioration of status. Article 4.7 sets out circumstances in which failure to achieve certain WFD objectives are permitted.

Art 4.7.

Member States will not be in breach of this Directive when:
- failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or

- failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities

and all the following conditions are met:

(a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;

(b) the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;

(c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development, and

(d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

Source; EC Common Implementation Strategy Guidance Document No. 20

Article 4.7 does not provide an exemption if deterioration of the waterbody is caused by inputs of pollutants from point or diffuse sources. If this leads to the deterioration in the waterbody status or causes the status to be less than good then Article 4.7 does not apply. This can apply to the development of strategic development location in the estuary where the construction of a facility itself does not cause the deterioration but the outfall or discharge does. If the proposed development does not lead to a deterioration of status on the waterbody Article 4.7 does not have to be used.

The European Commission guidance document on exemptions should be used to assess and identify the most sustainable type of development for each of these strategic development locations under the proposed themes identified in the Plan. **Figure 1.1 provides an example of an iterative approach to the identification of a sustainable development.**

http://circa.europa.eu/Public/irc/env/wfd/library?l=/framework_directive/guidance_documents/documentn20_mars09pdf/_EN_1.0_&a=d

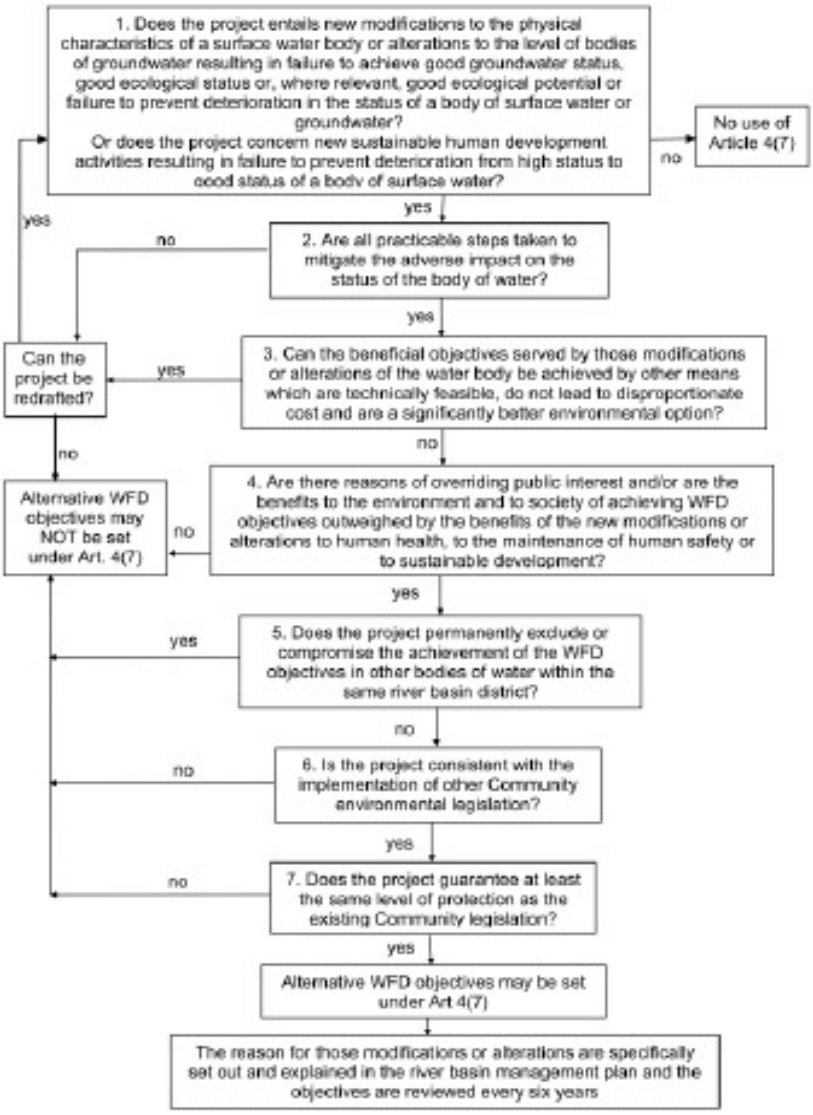


Figure 1.1 Approach to the identification of sustainable development under Article 4.7 of the WFD.

2.3 Flood Risk Compliance

As outlined in **Section 5.1.6.6** and through Annex 1 of the SEA while the SIFP process has strategically assessed the flood risk of potential development within the strategic development locations, based on the indicative flood extents outlined in the PFRA, a formal Strategic Flood Risk Assessment has not been carried out. Therefore, a more detailed flood risk assessment will be required at site level as and when developments are brought forward. In the absence of a strategic flood risk assessment the SIFP has made use of the best available information to provide an indication of the flood zone located within the strategic development locations and the flood risk potential. This process will be refined further following the outcome of the Shannon CFRAMS which will look at refining the information within the PFRA. As and when project specific proposals are brought forward for these strategic development locations they will need to satisfy the requirements of the justification test and the acceptable developments within flood risk zones.

2.3.1 Development Plan Justification Test

Notwithstanding the need for future development to avoid areas at risk of flooding, it is recognised that the existing urban structure of the country contains many well-established cities and urban centres, which will continue to be at risk of flooding this includes the location of many ports and docks which are largely concentrated either within or adjacent to urban areas. At the same time such centres may also have been targeted for growth in the National Spatial Strategy, regional planning guidelines and the various city and county development plans taking account of historical patterns of development and their national and strategic value. In addition, development plans have identified various strategically located urban centres and particularly city and town centre areas whose continued growth and development is being encouraged in order to bring about compact and sustainable urban development and more balanced regional development. Furthermore, development plan guidelines, issued by the Minister for the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000, have underlined the importance of compact and sequential development of urban areas with a focus on town and city centre locations for major retailing and higher residential densities.

The Justification Test has been designed to rigorously assess the appropriateness, or otherwise, of particular developments that for the reasons outlined above are being considered in areas of moderate or high flood risk. The test is comprised of two processes the “Plan Making Justification Test and the Development Management Justification Test. The first process is undertaken during the production of a development plan and the second during consideration of planning applications.

Box 1.1 is a reproduction of Box 4.1 from the Planning Guidelines which specifies the three requirements that developments (land use zones) lying within the Flood Zones have to meet in order to pass the Development Plan Justification Test.

Box 4.1: Justification Test for development plans

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan[1], a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
   - (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement[2];
   - (ii) Comprises significant previously developed and/or under-utilised lands;
   - (iii) Is within or adjoining the core[3] of an established or designated urban settlement;
   - (iv) Will be essential in achieving compact and sustainable urban growth; and
   - (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

   N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment.

Box 1.1: Justification Test Requirements. (Source; Planning Guidelines)

Box 1.2: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development and that required to meet the Justification Test. (Source; Planning Guidelines)

In relation to the SIFP, flood mapping for the estuary has been produced utilising the output from the OPW's National Preliminary Flood Risk Assessment and supplemented by coastal flood mapping produced as part of the Irish Coastal Protection Strategy Study. The strategic nature of these datasets means their accuracy is limited and therefore caution was taken zoning land based on the respective flood zones this mapping produced. Furthermore the Planning Guidelines state that "a planning authority must be satisfied that it can clearly demonstrate on a solid evidence base that the zoning or designation for development will satisfy the Justification Test outlined in Table 4.1" (Box 1.1 above). Subsequently the lack of detailed mapping (solid evidence base) means that land falling within the SIFP deemed at

high or moderate risk of flooding should only be zoned for appropriate development. Box 1.2 is a reproduction of Table 3.1 from the Planning Guidelines and provides the definition of appropriate development.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Box 1.2: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development and that required to meet the Justification Test. (Source; Planning Guidelines)

Subsequently in the SIFP any land designated as being at moderate (Flood Zone B) or high risk of flooding (Flood Zone A) has only been zoned for Water Compatible (appropriate) development. This conservative approach means that any subsequent planning applications, when accompanied by a robust, detailed site specific flood risk assessment would have an expectation of complying with the Planning Guidelines.

Box 1.3 is a reproduction of Table 3.1 from the Planning Guidelines and provides the definition of vulnerability classes and the types of development which would be considered as water compatible.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Box 1.3: Classification of vulnerability of different types of development (Source; Planning Guidelines)

2.3.2 Sources of Information for Monitoring

While the recent publication of the NPWS Conservation Objectives for the Lower River Shannon SAC and the River Shannon and River Fergus Estuaries SPA have served to fulfil some of the data gaps which existed for developers and investors further information is still needed. Datasets with the appropriate combination of spatio-temporal coverage, relevance and continuity over a sustained period are required in the Shannon Estuary to quantify natural variation. Monitoring should also include the recording of pressures as well as biotic variables in any implementation of a strategic framework. This will assist in targeting biotic monitoring to areas under the greatest anthropogenic pressure and will allow the identification of deterioration or degradation of habitats and/species for which the relevant human activity or development can be identified, ceased or restricted to halt the deterioration. Through the use of the Preliminary Screening Tables and Multi Criteria Analysis the Plan has prioritised the protection of key priority areas deemed to be of highest conservation value within the Lower Shannon Estuary. Until more detailed relevant data is collated to indicate these areas are not of high conservation value these areas will remain as alternatives to the strategic development locations. Monitoring will focus on aspects of the environment that are likely to be significantly impacted by the Plan. Where possible indicators have been chosen based on the availability of the necessary information and the degree to which the data will allow the target to be linked directly with the implementation of the Plan. **Table 2.1** presents the Environmental Monitoring Programme to track progress towards achieving strategic environmental objectives and reaching targets, and includes sources of relevant information. While the development of this monitoring programme for the SIFP reflects the requirements at the onset of the Plan it should it should remain iterative throughout the lifetime of the Plan or throughout the implementation stage in order to be able to take into consideration any issues which may arise and require the development of specific monitoring elements.

From **Table 2.1**, it can be seen that the majority of information required is already being actively collected (through the implementation of other Directives, Plans and Programmes), but not all of this is being gathered and reported on at a regional or the estuarine level.
Mitigation measures derived from the relevant assessments need to be compatible and simultaneously considered for their incorporation into the Plan. Mitigation measures from the AA need to be reflected in the Plan also. Monitoring arrangements are required under SEA in order to identify at an early stage unforeseen adverse effects of plan implementation and to undertake appropriate remedial action. Monitoring also enables addressing any identified data gaps through additional data gathering to be subsequently used during the plan review or at project level.

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 2.1** and the source of monitoring data. This report and its Appendix of datasets should also be used to inform the project level assessment.

The SIFP Steering Group structure with its current representatives should be maintained in order to review the outputs of the Plan, SEA and AA monitoring programmes and used to inform the on-going implementation of the Plan in a sustainable manner. Depending on requirements the representatives on the steering group should be supplemented with the

relevant experts from the various agencies in order to discuss the detailed findings. While the overall review of the Plan will take place every six years or as and when a Strategic Development Location is developed the monitoring results should be reviewed on a yearly basis. This will ensure that should significant effects are be identified provisions are made in the SIFP to ensure appropriate measures are taken to remedy the situation.

Table 2.1 Environmental Monitoring Programme

Strategic Environmental Objectives		
Objective 1 (BFF): Prevent damage to terrestrial, aquatic and soil biodiversity, particularly EU designated sites and protected species and/or conserve, maintain and restore where appropriate. To include both the freshwater and marine environment		
Objective 2 (PHH): Reduce risk to human health. Provide opportunities for human beings.		
Objective 3 (S): Avoid damage to the function and quality of the soil resource		
Objective 4 (W): Prevent deterioration of the status of water bodies, as appropriate to the WFD and the MSFD. Support the achievement of good ecological status/potential (GES/GEP) under the WFD.		
Objective 5 (CFA): Minimise emissions to air as a result of Plan activities		
Objective 6 (CAAH): To avoid damage to and protect the setting and amenity of the cultural, architectural and archaeological heritage sites and resources.		
Objective 7 (LS): Avoid damage to designated landscapes in the Lower Shannon region.		
Objective 8 (MA): Ensure any existing infrastructure is not compromised by future development and sufficient capacity is maintained or development as needs arise.		
Target	**Indicator**	**Data Availability, Source and Frequency, (Responsibility for Monitoring))**
BFF 01: Halt spread of Alien and Invasive Species and their associated impact to the aquatic environment. Ensure future development within the Shannon Estuary does not facilitate the introduction of new species or assist the spread of existing species such as *Spartina.*	Geographical spread of Alien and Invasive Species in the Lower Shannon Estuary Introduction of new Alien or Invasive Species through the development of Marine Related Industry sites No. of submissions/observations	National Invasive Species Database from Invasive Species Ireland. (http://invasivespeciesireland.com/) Compilation is ongoing. Monitoring information from IFI and NPWS (Infrequent) Irish Didemnum Species Database (National Biodiversity Data Centre). Irish Wire Weed Database (Irish Seaweed Centre; Stefan Kraan). National Invasive Species Database (National Biodiversity Data Centre). At 6 year review the SIFP Steering Group should ensure the Plan is up-dated to include changes in legislation given the proposed introduction of invasive species legislation and should also keep appraised of Irelands most “unwanted species” as provided on Invasive Species Ireland web-site.

Strategic Environmental Objectives		
BFF 02: Halt deterioration of habitats or their associated species due to future expansion of existing industrial sites and the development of new sites including aquaculture and tidal energy sites. No loss of protected habitats and species during the lifetime of the Plan.	Interim Indicator: 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. Medium to long term indicator: Designation of additional areas due to biodiversity &/or geological value	Species Action Plan. NPWS Draft Cloon pearl mussel conservation management plan in place 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) Up-dates to NPWS SAC, SPA and NHA GIS layers (NPWS) Review and up-date SIFP at 6 year review or sooner if deemed necessary to take on board any additional designations or changes to the current designations (SIFP Steering Group)
	Long Term Indicator: 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. SIFP should be up-dated at the next review to take on board the outcome of this report (SIFP Steering Group)
	Long Term Indicator: Condition of Selection Features in sites designated for nature conservation (SACs, SPAs, Ramsar and NHAs).	Not currently compiled (NPWS)

Strategic Environmental Objectives		
	Long Term Indicator: Condition of qualifying interest features of Natura 2000 sites as per conservation objectives and targets.	Detailed Conservation Objectives have now been set (September, 2012) for the River Shannon and Fergus Estuaries SPA and the Lower River Shannon SACs. Awaiting Conservation Management Plan from the NPWS. Therefore consideration should be given to the implementation of a shared GIS which is supported by environmental information and a robust monitoring system for the estuary to provide the basis for evidence based decision making. The starting point for this should be the GIS layers which have been collated as part of the SIFP process and developed for use in the Plan, SEA and AA. As new information becomes available through a variety of sources over the coming years e.g. detailed flood risk maps, detailed conservation objectives and mapping these should integrated, where possible, into such a system. (SIFP Steering Group)
BFF 03: 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.	Medium to Long Term Indicator: Percentage of unique habitat and species lost in designated sites through the survey reports.	Finding of no significant impact through out process in consultation with NPWS (Potential Developer, Local Authorities, NPWS)
BFF 04: No loss of protected habitats and species during the lifetime of the plan. 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 the HDA process in consultation with NPWS. (Potential Developer, Local Authorities, NPWS)

Strategic Environmental Objectives		
BFF 05: In order to supplement biodiversity data gaps additional data gathering to be subsequently used during the plan review or at project level should be undertaken.	Increase in availability of baseline biodiversity data on the Lower Shannon Estuary.	The establishment of the SIFP Steering Group should be further utilised to prioritise the baseline data requirements and bring forward proposals for monitoring. It should commence a programme of pressure monitoring in conjunction with targeted biotic monitoring in order to establish links with habitat degradation or species loss in a pressure-receptor scenario and establish the pathway between both. The most significant data gaps which should be prioritised are bird surveys (inter-tidal feeding areas, wintering and migratory) on an appropriate spatial and temporal scale together with cetacean monitoring upstream from Tarbert. Following publication of the SIFP the Steering Group should investigate the development of an Integrated Environmental Management Plan for the Shannon Estuary utilising and building on the existing information and structure which has been collated and established through the SIFP process. (SIFP Steering Group within first 6 year review)
BFF T06: In order to prevent impact from low frequency noise on both fish and cetacean species (in-directly through the impact on their diet of fish) from an increase in the occurance of large vessels in the estuary and their production of low frequency noise**.**	Large vessels produce low frequency noise which will increase if vessel movement increases. Although the sound is produced at a high intensity and low frequencies travel large distances, bottlenose dolphins are not sensitive to these low frequencies. The sound sensitivities of many fish species which may contribute to the diet of the bottlenose dolphins in the Shannon Estuary are not known and any disturbance to them will have a knock-ob effect on the dolphins. If low frequency sound is to increase it is recommended that a noise monitoring station be created in the estuary to ensure this source of pollution is within acceptable levels. Such a monitoring station was trialled off Tarbert, Co Kerry during June to November 2012 through the LIDO system (see www.listentothedeep.com) and is a requirement of the Marine Strategy Framework Directive.	The SIFP should engage with the Department of Environment and EPA to establish one of the national ocean noise monitoring stations in the Shannon estuary.
BFF 07: An estuarine or ecosystem wide detailed habitat map of the Lower Shannon Estuary is required and should be undertaken.	Medium to Long Term Indicator: Percentage of unique habitat declining, in risk of deterioration or degradation or lost in designated sites through the survey reports.	The steering group structure together with its members should seek to prioritise the creation of an estuarine wide habitat map. (SIFP Steering Group within first 6 year review)

Strategic Environmental Objectives		
PHH: Protect drinking water areas (including private abstractions)	Heath issues and complaints to local authorities in relation to drinking water	All drinking water areas (including groundwater), as identified on the register of protected areas, to achieve good status, or maintain high status, by 2015 under the WFD. (Local Authorities)
PHH: No exceedances of air quality standards due to expansion or diversification of industrial facilities	Air quality/air pollutant levels within the Shannon Region and on a county level.	Air Quality in Ireland Report (Annual).
PHH: Improve access to outdoor recreational areas	Increased public use of local recreational facilities. Number of tourist visits to the Shannon region	Tourism Boards Annual Reports, Shannon Development Tourism Reports. Statistics of passenger numbers through Shannon Airport and Cruise ships docking at Foynes Port.
PHH: Enhance the local community by improving the recreational environment.	Increased use by the local community of existing recreational facilities or development of new facilities	Numbers of festivals and/or organised fetes, sports competitions, walks/runs in the local environment.
PHH: To protect human health and quality of life from hazards or nuisances arising from exposure to incompatible landuses/developments	No spatial concentrations of health problems arisiong from environmental factors. No displacement of residents as a result of development.	Occurrence (if any) of a spatially concentrated deterioration in human health. Displacement of residents or homeowners.
S: Avoid loss of a usable or natural soil resource	Long Term Indicator: Area and zoning of lands for new development within Strategic Development Locations	Land Cover change Reports. EPA currently under taking Corine 2012 Data Series. Comparison with 2006 data will provide indication.
S: Maximise the sustainable development of existing industrial or zoned locations on a priorisited basis thereby reducing developmenmt on Greenfield sites.	Long Term Indicator: Development on at least one pre existing industrial or previously zoned location during the life time of the plan.	% of new developments in pre existing industrial sites.
W: No deterioration in status of waters currently with high or good status (WFD Objective) and the achievement of at least Good Status in all waters by 2015. Ensure the provision of a riparian zone of at least 5m for development close to water.	Medium Term Indicator: Changes in receiving water quality as identified during water quality monitoring for the WFD, ShIRBD and PoMs Long Term Indicator: Water status in 2015 report. (WFD)	Shannon IRBD, Local Authorities, EPA. Up to date monitoring and status information can be downloaded from the EPA ENVISION Portal http://gis.epa.ie/Envision/ Water Status Report to be published in 2015 as part of second RBMP cycle and should be incorporated in the review of the SIFP. EPA/SIFP Steering Group.
W: Ensure new developments are set back at least 10m from the River Shannon in particular but als from all other tributaries feeding into the Shannon.	Provision of riparian zones for developments close to the water.	No of planning permission close to the water. (Relevant Local Authority or An Bord Pleanála)

Strategic Environmental Objectives		
W: Restoration to good status of waters currently at moderate, poor or bad status (WFD Objective).	Medium Term Indicator: Changes in receiving water quality as identified during water quality monitoring for the WFD, ShIRBD and PoMs Long Term Indicator: Water status in 2015 report. (WFD)	Interim Water Status in 2011 Report. EPA Up to date monitoring and status information can be downloaded from the EPA ENVISION Portal http://gis.epa.ie/Envision/ Water Status Report to be published in 2015 as part of second RBMP cycle. EPA
W: Progressively reduce chemical pollution in waters (WFD Objective).	Medium Term Indicator: Changes in receiving water quality as identified during water quality monitoring for the WFD, ShIRBD and PoMs Long Term Indicator: Water status in 2015 report. (WFD)	Interim Water Status in 2011 Report. EPA Water Status Report to be published in 2015 as part of second RBMP cycle. EPA Improvement in chemical status to coastal and transitional water bodies in the Lower Shannon Estuary which can be viewed through http://gis.epa.ie/Envision/
W: Limit pollution inputs to groundwaters and prevent deterioration (WFD Objective).	Medium Term Indicator: Changes in receiving water quality as identified during water quality monitoring for the WFD, ShIRBD and PoMs Long Term Indicator: Water status in 2015 report. (WFD)	Interim Water Status in 2011 Report. EPA Water Status Report to be published in 2015 as part of second RBMP cycle. EPA
W: All bathing waters, as identified on the register of protected areas, to achieve good status, or maintain high status, by 2015.	Interim Indicator: Compliance with Bathing Water Standards. Long Term Indicator: Parameters to be measured in accordance with the environmental quality standards to determine Good Status.	The Quality of Bathing Water in Ireland. EPA. Published annually
W: All economic shellfish waters, as identified on the register of protected areas, to achieve good status, or maintain high status, by 2015.	Interim Indicator: Compliance with the Quality of Shellfish Water Regulations. Long Term Indicator: Parameters to be measured in accordance with the environmental quality standards to determine Good Status.	Water Quality in Ireland report. EPA. Published every 1 to 2 years. Local Authority compliance with Shellfish Pollution Reduction Programmes
W: All water bodies designated for salmonids, as identified on the register of protected areas, to achieve good status, or maintain high status, by 2015.	Interim Indicator: Water quality in designated salmonid waters. Long Term Indicator: Parameters to be measured in accordance with the environmental quality standards to determine Good Status.	Water Quality in Ireland report. EPA. Published every 1 to 2 years.

Strategic Environmental Objectives		
W: Prevent increased risk of flooding or floods.	Long Term Indicator: Reduce number of flood events or prevent future flood events.	Information on flood risk to be sourced from the OPW on the Shannon CFRAMS
W (Drinking Water Supply): Upgrade infrastructure to meet future water supply needs	Medium Indicator: Realisation of projects on the 2010-2012 WaterServices Investment Programme Long Term Indicator: Inclusion of new projects for the next round of the Water Services Investment Programme as upgrade to infrastructure or new infrstrucutre needs are identified in response to new development.	Prioritisation of requirements by Local Authorities and inclusion on DoE Water Services Investment Programme.
W: (Waste Water Treatment) Facilitate the safe and controlled dispoal of surface waters to approved receptors which will not lead to negative environmental effects	Medium Indicator: As and when projects or developments are brought forward independent studies on the available capacity at existing WWTPs to be undertaken. Long Term Indicator: Identification of the need for new WWTP facilities to co-inside with new development proposals	Upgrade of existing WWTP facilities or construction of new facilities.
CFA: Compliance with odour criteria to prevent deterioration in amenity beyond the site boundary as set out in license for new or upgraded wastewater infrastructure.	Number of complaints received related to odour.	Monitored by the EPA as part of the IPPC license process. This information is usually included in the Annual Environmental Report for each licensed facility.
CFA: Compliance with odour criteria to prevent deterioration in amenity beyond the site boundary due to changes in industrial practices due to plan implementation. E.g. through expansion or diversification	Number of complaints received related to odour.	Monitored by the EPA as part of the IPPC license process. This information is usually included in the Annual Environmental Report for each licensed facility.
CFA: Use BAT, including renewable energy, to minimise GHG from new or upgraded wastewater infrastructure in line with Ireland's commitments to reduce GHG emissions under the Kyoto Protocol.	Calculated CO_2 equivalent in tonnes from new or upgraded water infrastructure, e.g. WWTP / WWTW, including emissions associated with the digestion and / or incineration of sludge.	To be calculated based on changes in water infrastructure. This will need to be carried out by the Local Authority in line with WFD requirements.
CFA: No net loss of CO_2 sequestering vegetation due to changes in forestry practices as a result of implementation of Plan.	Calculated CO_2 sequestering potential of forest vegetation based on forest cover.	CO_2 sequestration potential could be sourced from the National Council for Forest Research and Development or similar source. Land cover information to be sourced from the Ireland's Corine Land Cover 2006 (CLC2006) project and the revised dataset once complete in 2012.

Strategic Environmental Objectives		
CAAH: No physical damage or alteration of the context of cultural heritage features due to Plan activities.	Changes in the condition of monuments on the SMR and due to Plan implementation. Changes in condition or loss of features identified through the SIFP Cultural Heritage desk top study.	The Archaeological Survey monitoring programme, Ireland. DoEHLG. Updated on an ongoing basis. Cross reference of planning applications with the Cultural Heritage datasets generated as part of the SIFP process to ensure no loss of features.
L: No damage to designated landscapes or Seascapes as a result of Plan implementation.	Number of strategic developments sited in landscapes/seascapes with a high sensitivity to change.	Data on number of developments which are put forward for planning to be sources from Local Authorities.
	Percentage changes in land cover types in areas with a high sensitivity to change.	Ireland's Corine Land Cover 2006 (CLC2006) and up-dated 2012 project.
MA: Transport: Development of a sustainable Transportation infrastructure which reduces the need for travel and journey length of workers associated with the development of SDLs or Areas of Opportunity	Reduce the number of private vehicles on the road. Increase use of public transport	Up-grade and expansion of existing rail links. Increased use and frequency of the Shannon ferry.
MA Transport: Reduce car dependency within the area of interest by way of, inter alia, encouraging modal change from car to more sustainable forms of public transport and encouraging development which will not be dependent on private transport.	An increase in the percentage of the population travelling to work by public transport or non-mechanical means A decrease in the average distance travelled to work.	Percentage of population within the plan area travelling to work by public transport or non-mechanical means Average distance travelled to work by the population of the associated counties within the Area of Interest.
MA: Waste Management Minimise waste production and pollution and introduce sustainable waste management practices	Reduction in the quantities of waste sent to landfill Increase in the quantities of waste sent for recycling Compliance with the Mid Western Waste Management Plan	Compliance with Mid- Western Waste Management Plan Quantity of waste sent to landfill Quantity of waste sent for recycling

Strategic Environmental Objectives
MA: Waste Management promote the production and reuse of aggregates from C&D waste and their use in construction projects associated with the realisation of the Plan objectives within the SDL's or Areas of Opportunity.

2.3.3 Mitigation (Recommendations from the SEA to Feed into the Plan)

The Environmental Report has highlighted the more significant potential positive and negative environmental impacts from the implementation of the Plan (including cumulative impacts). The following mitigation measures have been identified to reduce the negative impacts identified. These mitigation measures (as listed in **Table 1.2**) form part of the Plan as over arching mitigation measures and should be adhered to prior to and during any development associated with either the Strategic development locations or Areas of Opportunity. The mitigation measures are listed under each of the SEA topics. It is recommended that the mitigation measures listed in this chapter are integrated into and adopted as part of the Strategic Integrated Framework Plan. In addition the mitigation measures which have been identified and proposed through the detailed Strategic Development Location SEA Assessment Tables in Chapter 7 and as summarised in Table 1.3 are also integrated into the SIFP. Detailed mitigation measures to those detailed within this chapter and integrated into the SIFP are likely to be required at individual project level, e.g. through habitat and Species survey, Ecological Impact Assessment and Habitats Directive Assessments. Any further changes to the Plan following consultation would require integration and evaluation in this Environmental Report. During the lifetime of the Plan and through the six yearly reviews regard should be had to future legislation, policies and guidelines. In addition numerous mitigation measures have been identified through the Habitats Directive Assessment which should be adopted into the final SIFP and form part of the SEA process. The appropriate assessment process involved four tiers of assessment which led to the development of mitigation measures which been adopted in the appropriate assessment process and documented in Natura Impact Report. Any future development within the estuary either related to one of the associated Plan themes or Strategic development locations and Areas of Opportunity will be subject to adherence with these mitigation measures and the findings of the NIR.

Tiers of assessment and associated mitigation measures;

- The inclusion of appropriate assessment criteria at the forefront of the site selection process through the 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.
- Appropriate Assessment of the Strategic Development Locations and Areas of Opportunity as outlined in **Tables 4.1 – 4.21** which provides mitigation on the qualifying interest features specific to each Strategic Development Location or Area of Opportunity. Please note corresponding figures for these tables can be found in Chapter 3 of the NIR. All figure and table references within these tables refer to the numbering of the NIR.
- Overarching mitigation measures arising from the appropriate assessment of the Plan in general as outlined in **Table 3.1 and from the SEA as outlined in Table 2.2**
- General mitigation measures per theme as outlined in **Table 3.2**
- Review of the Plan objectives in light of the AA process with suggested mitigation **Chapter 6 Section 6.3 Table 6.9 of the NIR**

The Habitats Directive Assessment aims to inform the future development of this site in terms of what should be avoided, future assessments that will be required, detailed mitigation measures in order to ensure no significant effect and compliance with Article 6(3) of the Habitats Directive. The AA tables are provided in Chapter 3 of the Natura Impact

Report. It should be noted that any future development of either a Strategic Development Location or Area or Opportunity will be subject to 3 levels of mitigation arising from the Natura Impact Report and the SEA process as follows:

1. Over-arching mitigation Table 2.2 and 3.1 (Table 11.2 of the SEA ER and Table 6.1 of the NIR)
2. Site specific mitigation measures Tables 2.3 and Tables 4.2 to 4.22 (As outlined in Table 11.3 of the SEA ER and Tables 3.21 – 3.41 of the NIR)
3. Mitigation measures per theme 3.2 – 3.8 (See Section 6.2.1 of the NIR)

Table 2.2 Over-arching Mitigation Measures

Measure Number	Mitigation Measure
	Biodiversity Flora and Fauna
BFF MM 1	As per objective SIFP ENV 1.6 the HDA and mitigation will ensure that proposed developments will not have an impact and take full account of the habitats and species, water quality, ecology, risk of disturbance and flood risk areas as per the Shannon CFRAMS. Provide for sufficient riparian buffer zones along the Natura 2000 site to maintain the integrity of the site.
BFF MM 2	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 MM 3	Requirements for consents and the design of project level mitigation for Strategic Development Locations should be covered in the overall assessment of the site.
BFF MM 4	While Strategic Development Locations have been put forward should issues arise under Article 6(3) of the Habitats Directive at a project level they may require assessment. Should this assessment produce a finding of potential adverse effects on the integrity of a Natura 2000 site, an alternative solution will be required.
BFF MM 5	In selecting the alternative solution it will be necessary to comply fully with Article 6(3) (and, if warranted, Article 6(4), including compensatory measures) of the Habitats Directive.
BFF MM 6	Pre-construction surveys should be conducted by suitable qualified ecologists in areas of future development which require the lost 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 MM 7	A “No net loss” principle for habitats which are priority in terms of their structure and function within the Natura 2000 site should be adopted for the Lower Shannon Estuary ecosystem.
BFF MM 8	The Steering Group structure established as part of the SIFP should continue to meet in order to facilitate dialogue between industrial operators and nature

	conservation bodies such as the NPWS and IFI.
	Flood Risk Mitigation Measures
BFF MM 9	Any proposal either within a Strategic Development Location or an alternative site at moderate or high risk of flooding this is considered acceptable in principle must demonstrate that appropriate mitigation measures can be put in place and that residual risks can be managed to acceptable levels.
BFF MM 10	Any development within a Strategic Development Location shall have regard to the site specific issues set out in the Shannon CFRAMS once available. • Development across the Strategic Development Location should be allocated sequentially, and within Flood Zone C, then B, then A preferentially, but should not be so rigidly applied that development is constrained to unsustainable levels or does not deliver the mix of development type required. • Within a Strategic Development Location or an alternative site a sequential approach to flood risk management based on avoidance, reduction and then mitigation of flood risk shall be adopted as the overall framework for assessing the location of new development. This relates largely to coastal flooding but in some cases may also relate to fluvial flooding. • The use of Sustainable Drainage Systems (SuDS) in accordance with best current practice to manage surface water runoff and water conveyancing routes free of barriers such as walls or buildings should be adopted where possible on Strategic Development Locations.
	Cultural Heritage Mitigation Measures
CAAH MM 1	Archaeological surveys should form part of the archaeological impact assessment for all planning applications for new development or redevelopment to inform appropriate design and mitigation of any potential impacts identified on terrestrial and/or underwater archaeological features. This assessment should utilise the archaeological and cultural heritage datasets generated by the SIFP project.
	Human Health related Mitigation Measures **Green Infrastructure**
PHH MM 1	Councils will provide for the long-term protection and improvement of the quality of the natural environment within the plan area and provide ecological and recreational linkages in order to enhance biodiversity, the conservation status of special habitats; air, water and soil quality as well as the amenity value of these areas.
PHH MM 2	Councils will create an integrated and coherent green infrastructure network to enhance biodiversity and quality of life, provide for sustainable water management and a green setting for the urban area.
	Water Related Mitigation Measures
W MM 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 MM 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 use the site will not be allowed.
W MM 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 for Strategic Development Locations.
W MM 4	Development proposed in this plan 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.
W MM 5	Councils should endeavour to carry out a review of existing licences/consents/permits operating around the Estuary.
	Material Assets
MA MM 1	Any development of strategic development locations will need to ensure sufficient capacity in the receiving water together with undertaking an assessment of the Assimilative Capacity of the receiving water in accepting future discharges. This should be undertaken in consultation with the Local Authority.
MA MM 2	Any future development will need to ensure a sufficient supply of freshwater or connection to a drinking water supply with sufficient capacity. Any future abstraction will need to ensure it complies with the requirements of the Water Framework Directive and takes into account ecological requirements of the associated waterbody.

In addition mitigation measures specific to each of the Strategic Development Locations have been identified through the SEA Assessment process in **Section 7.1.3** and are summarised in **Table 2.3** of the SEA Environmental Report.

Table 2.3 Site Specific Mitigation Measures

Strategic Development Location	Mitigation
Inishmurry, Cahiracon, Co.Clare	
BFF MM 11	To mitigate the potential impacts, an ecological assessment, particularly with regards to protected species, should be carried out prior to the commencement of works. The design and construction of the works should maintain current habitat where possible and should also consider the creation of habitat suitable to the location and prevailing species. It should also incorporate specific measures in relation to Bottlenose Dolphins and noise disturbance in terms of in-direct impacts; direct impacts are not envisaged at this site to this species. Small areas of Atlantic Salt Meadow have been documented through the Habitats Directive Assessment at the eastern end of the site and surrounding the western side of the old pier. The area of this habitat should remain stable or increasing with future development requiring site specific modelling depending on the proposal which is brought forward in order to maintain natural circulation of sediments and organic matter without any physical obstructions.
S MM 1	As per the requirements under BFF the sediment regime within this site should be modelled prior to development to ensure no loss of ASM or potential spread of *Spartina* sward. No further mitigation is proposed here.
W MM 6	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques and engineering design to negate impacts. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
CFAQ MM 1	Should future development require emissions to air which are considered hazardeous a licence may be required from the EPA or Local Authority to ensure it is within acceptable levels.
L MM 1	To mitigate the impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements.
Moneypoint, Co. Clare	**Mitigation**
BFF MM 12	To mitigate these potential impacts, an ecological assessment, particularly with regards to protected species, should be carried out prior to the commencement of works. The design and construction of

	the works should maintain current habitat where possible and should also consider the creation of habitat suitable to the location and prevailing species. It should also incorporate specific measures in relation to Bottlenose Dolphins given the frequency of detections at this location based on the SDWF rating report.
W MM 7	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
L MM 2	To mitigate the impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements.
MA MM 3	All works will be carried out in ongoing consultation with the relevant statutory bodies associated with this energy infrastructure including EirGrid, Bord Gáis and the ESB together with Clare County Council and will comply with their requirements (including health and safety) and all relevant codes of practice.
Foynes, Co. Limerick	**Mitigation**
BFF MM 13	To mitigate these potential impacts, an ecological assessment, particularly with regards to protected species, should be carried out prior to the commencement of works. The design and construction of the works should maintain current habitat where possible and should also consider the creation of habitat suitable to the location and prevailing species. It should also incorporate specific measures in relation to disturbance primarily to Bottlenose Dolphins given the frequency of detections at this location and to mitigation against temporary disturbance to feeding birds on the east of the island.
W MM 8	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing jetty rather than creating new structures. In-situ continuous water quality monitoring can be used on site during the construction process to ensure impact to water quality is kept to a minimum which will also assist in protecting fisheries and cetaceans in the area.
L MM 3	To mitigate the impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements.

MA MM 4	Any proposals for the installation of infrastructure or alteration to existing pieces of infrastructure will require SEA/EIS and HDA depending on the scale of the proposal.
Lands to the rear of Foynes Port, Co. Limerick	**Mitigation**
BFF MM 14	To mitigate these potential impacts, an ecological assessment, particularly with regards to protected species such as Otters and Bats which have been identified as present within the site, should be carried out prior to the commencement of works. The design and construction of the works should maintain current habitat where possible and should also consider the creation of habitat suitable to the location and prevailing species. It should also incorporate specific measures in relation to the temporary disturbance to feeding birds along the Robertstown River. Works at this site should not encroach on the SPA habitat at Robertstown and should ensure the flood embankments are maintained intact.
W MM 9	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing jetty rather than creating new structures. In-situ continuous water quality monitoring can be used on site during the construction process to ensure impact to water quality is kept to a minimum which will also assist in protecting fisheries and cetaceans in the area.
MA MM 5	The Askeaton Sewerage Scheme is included in the 2010-2012 Water Services Investment Programme by the Department of Environment, Heritage and Local Government. Currently the sewerage facilities in the town are inadequate and as part of the scheme the towns are to be provided with wastewater facilities to serve their existing and future requirements. The overall scheme will cater for a future population loading of 11000PE in 2032. The development of this site will need to consider the capaciity of this plant to ensure it does not compromise the facilities operation.
Askeaton Business Park. Co.Limerick	**Mitigation Measures**
BFF MM 15	It is proposed that the outline boundary of this site is altered to remove the portion of the site that is within the associated SAC and SPA boundary there by reducing the potential for impact from any future development. This does not negate the consideration for in-direct impacts at project level once a proposal is brought forward.

PHH MM 3	A number of residential properties are located directly beside the site with potential for direct and in-direct effects depending on the type, scale and exact location of any industrial type facility within this site. Careful consideration of the type and scale of facility which would be suitable for this site is needed prior to development.
S MM 2	Any sensitive agricultural enterprise would have to be facilitated through consultation with landowners to allow movement of animals prior to noise events.
W MM 10	Site development should (where possible) seek the implementation of rainwater harvesting, SUDS and best practice guidance for the collection and reuse or disposal and treatment of surface water from proposed land based developments. Such systems will be required to conserve water, protect water quality and regulate the rate of surface water runoff so as not to cause or exacerbate flooding on the relevant site or elsewhere.
CFAQ MM 2	Air quality should be maintained within World Health Organisation guidelines and IPC licence limits.
ACH MM 1	Any proposed development for this site should assess and mitigate any sites through avoidance. The implementation of this option is likely to have a direct, positive and permanent effect or neutral effect on cultural heritage within the site.
L MM 4	The land is relatively flat agricultural land, adjacent to a number of small residential dwellings and the village of Askeaton. Visual impacts will need to be taken into consideration in particular from the village of Askeaton and for the local community.
MA MM 6	The Askeaton Sewerage Scheme is included in the 2010-2012 Water Services Investment Programme by the Department of Environment, Heritage and Local Government. Currently the sewerage facilities in the town are inadequate and as part of the scheme the towns are to be provided with wastewater facilities to serve their existing and future requirements. The overall scheme will cater for a future population loading of 11000PE in 2032. The development of this site will need to consider the capaciity of this plant to ensure it does not compromise the facilities operation.
Aughnish Alumina Ltd, Co. Limerick	**Mitigation Measures**
BFF MM 16	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 and appropriate mitigation measures devised in consultation with both the SDWF and NPWS.
W MM 11	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with

	this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing jetty rather than creating new structures. In-situ continuous water quality monitoring can be used on site during the construction process to ensure impact to water quality is kept to a minimum which will also assist in protecting fisheries and cetaceans in the area. Should dredging be required an EIA and HDA will be required to ensure no significant impact to the qualifying interest features of the SAC and SPA. Consents and permits may also be required in terms of dumping of dredge spoil.
PHH MM 4	The preferred option for development of this site would add to the current provision of jobs at Aughinish Alumina and ancillary activities. It could assist in decreasing de-population of the rural environment assist families by cutting down the need to travel long distances to obtain work which has knock on effects in terms of human health
S MM 3	The detailed design of the construction work and associated method statement should not be left to build stage. The potential impacts and design of the detailed method statement need to be considered as part of the overall Habitats Directive Assessment.
CFAQ MM 3	Air quality should be maintained within World Health Organisation guidelines and IPC licence limits.
MA MM 7	Any sensitive agricultural enterprise would have to be facilitated through consultation with landowners to allow movement of animals prior to noise events.
Tarbert Power Station, Co. Kerry	**Mitigation Measures**
BFF MM 17	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. This should include land based activities which would require rock blasting, pile driving etc. also.
PHH MM 5	During any construction period through the incorporation of mitigation measures for reducing traffic, dust and noise impacts on the population and most importantly human health will be minimised in terms of any negative impacts on the receiving environment.
S MM 4	Any proposed development may require the remediation of the land where necessary to „fit for use" standards and the breaking of „pollution linkages". Appropriate remediation, where necessary, is to be ensured through the preparation of and adherence to, a Spoil and Contamination Management Plan in consultation with the relevant

	authorities.
W MM 12	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
CFAQ MM 4	Should future development require emissions to air which are considered hazardous a licence may be required from the EPA or Local Authority to ensure it is within acceptable levels.
Ballylongford Land Bank, Co. Kerry	**Mitigation Measures**
BFF MM 18	In terms of Bottlenose Dolphins 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. This should include land based activities which would require rock blasting, pile driving etc. 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
S MM 5	Any sensitive agricultural enterprise would have to be facilitated through consultation with landowners to allow movement of animals prior to noise events.
W MM 13	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing jetty rather than creating new structures. In-situ continuous water quality monitoring can be used on site during the construction process to ensure impact to water quality is kept to a minimum which will also assist in protecting fisheries and cetaceans in the area. All discharges should adhere to the Urban Waste Water Regulations, the Shannon International River Basin Management Plan and EU requirements and will take account of the drainage system and the quality and quantity of receiving waters in the area when assessing development proposals. Proposals will be required to comply with the

	development management standards set out in the Kerry County Development Plan.
CFAQ MM 5	Air quality should be maintained within World Health Organisation guidelines and IPC licence limits.
ACH MM 2	Any proposed development for this site should assess any sites and monuments and mitigate these through avoidance.
L MM 5	To mitigate the minimal impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements.
MA MM 8	Any proposals for the installation of infrastructure or alteration to existing pieces of infrastructure will require SEA/EIS and HDA depending on the scale of the proposal. There is sufficient hinterland available which is zoned accordingly however land acquisition may be required.
Limerick Docks, Co. Limerick	**Mitigation Measures**
BFF MM 19	There is a medium potential for impact to Lamprey species in particular juvenile lamprey together with European Smelt. These species should be taken into consideration should any works be under taken along the verges of the Shannon where suitable habitat exists. Lamprey are of high ecological value and can play an important role in processing nutrients, nutrient storage, and nutrient cycling in streams (O"Connor, 2004). Both Otters and Bat species have been recorded within or adjacent to this site and should be taken into consideration at project level to determine the potential for impacts depending on the type of project which is suggested here.
PHH MM 6	Any future development, expansion or material alteration of use of the site would need to be taken into consideration in terms of impacts to human health from any form of development at this site. The existing uses at the site and their compatibility with alternative uses and the potential for a health and safety risk would also need to be considered.
S MM 6	The end of this site is surrounded by embankments. These important flood embankments should be maintained along this site boundary to protect the site from soil erosion. The sediment regime within this site would require modelling prior to development to ensure no loss of mudflats through alteration of the flow regime at this site.
W MM 14	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying outworks during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing port rather than creating new structures. In-situ continuous water quality monitoring can be used on site during the construction process to ensure impact

	to water quality is kept to a minimum which will also assist in protecting fisheries and cetaceans in the area.
CFAQ MM 6	Should future development require emissions to air which are considered hazardous a licence may be required from the EPA or Local Authority to ensure it is within acceptable levels. The Annex VI regulations and the amendments contained in the Sea Pollution Miscellaneous Pollution Act, 2006 should reduce the potential for noxious emissions at ports.
ACH MM 3	Within the site boundary where any future development is proposed-no impact on archaeology or cultural heritage may occur.
L MM 6	To mitigate these impacts, any construction should be designed to minimise visual impacts during the detailed design phase, perhaps including landscape screening elements.
Tidal Energy - Moneypoint, Killimer, Co.Kerry	**Mitigation Measures**
BFF MM 20	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. This should include land based activities which would require rock blasting, pile driving etc. also. Dolphins are inquisitive by nature therefore depending on the structure and type of device used direct impacts may also be an issue.
S MM 7	A Habitats Directive Assessment will be required to accompany any proposals for dredging together with any dumping at sea permits which are required. These assessments should look at the available biomass within the site.
W MM 15	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
Tidal Energy - Carrig Island, Co. Kerry	**Mitigation Measures**
BFF MM 21	The FLOWBEC project aims to improve the understanding of how the physical behaviour of the water such as currents, waves and turbulence at tide and wave energy sites influences the behaviour of marine wildlife, and how tide and wave energy devices might alter the behaviour of such wildlife. The output from these

	site investigations which are being undertaken by DEFRA and the Natural Environment Research Council should inform the locating of such a device within the site together with the type of device.
PHH MM 7	Any proposal for the location of a tidal energy device at this site will be subject to EIA or Project Level Assessment the details of which will assess the impact to human health.
S MM 8	A Habitats Directive Assessment will be required to accompany any proposals for dredging together with any dumping at sea permits which are required. These assessments should look at the available biomass within the site.
W MM 16	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
MA MM 9	Any infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment for this site. The detailed design and any methods statements will need to be incorporated into this overall assessment and should not be differed to project level.
Tidal Energy - Kilcoony Point, Co. Kerry	**Mitigation Measures**
BFF MM 22	The FLOWBEC project aims to improve the understanding of how the physical behaviour of the water such as currents, waves and turbulence at tide and wave energy sites influences the behaviour of marine wildlife, and how tide and wave energy devices might alter the behaviour of such wildlife. The output from these site investigations which are being undertaken by DEFRA and the Natural Environment Research Council should inform the locating of such a device within the site together with the type of device.
W MM 17	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
S MM 9	A Habitats Directive Assessment will be required to accompany any proposals for dredging together with any dumping at sea permits which are required. These assessments should look at the available biomass within the site.
ACH MM 4	The underwater features such as the shipwreck which have been

	recorded at this site will require underwater archaeological assessment if proposals are brought forward in the vicinity of these features, subject to DAHG requirements
MA MM 10	Any infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment for this site. The detailed design and any methods statements will need to be incorporated into this overall assessment and should not be differed to project level.
Tidal Energy Tarbert Bay, Co. Kerry	**Mitigation Measures**
BFF MM 23	The FLOWBEC project aims to improve the understanding of how the physical behaviour of the water such as currents, waves and turbulence at tide and wave energy sites influences the behaviour of marine wildlife, and how tide and wave energy devices might alter the behaviour of such wildlife. The output from these site investigations which are being undertaken by DEFRA and the Natural Environment Research Council should inform the locating of such a device within the site together with the type of device.
PHH MM 8	Any proposal for the location of a tidal energy device at this site will be subject to EIA or Project Level Assessment the details of which will assess the impact to human health.
S MM 10	A Habitats Directive Assessment will be required to accompany any proposals for dredging together with any dumping at sea permits which are required. These assessments should look at the available biomass within the site.
W MM 18	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques. It could also involve improvement works where possible to the existing embankments rather than creating new quay walls or other structures.
ACH MM 5	The underwater features such as the shipwreck which have been recorded at this site will require underwater archaeological assessment if proposals are brought forward in the vicinity of these features, subject to DAHG requirements
MA MM 11	Any infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment for this site. The detailed design and any methods statements will need to be incorporated into this overall assessment and should not be differed to project level.
Aquaculture Ballylongford Bay, Co. Kerry	**Mitigation Measures**
BFF MM 24	A programme for the Appropriate Assessment of all aquaculture

	licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 9	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 11	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 19	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
MA MM 12	Any such infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment fort this site at project level. The detailed design and any methods statements will need to be incorporated into this overall assessment and should not be differed to project level.
Aquaculture Poulnasherry Bay, Co. Clare	**Mitigation Measures**
BFF MM 25	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)

PHH MM 10	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 12	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 20	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 6	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
Aquaculture Carrigaholt Bay, Co. Clare	**Mitigation Measures**
BFF MM 26	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 11	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 13	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 21	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.

ACH MM 7	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
Aquaculture Rinevella Bay, Co.Clare	**Mitigation Measures**
BFF MM 27	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 12	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 14	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 22	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 8	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
Greenish Island/Poularone – Aquaculture	**Mitigation Measures**
BFF MM 28	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into

	consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 13	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 15	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 23	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 9	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
MA MM 12	Existing local road network is insufficient to accommodate any future proposals within this bay. This may cause impact on the local environment and should be considered as part of the overall Habitats Directive Assessment for the licence application.
Long Rock – Aquaculture	**Mitigation Measures**
BFF MM 29	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 14	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 16	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the

	licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 24	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 10	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
MA MM 13	Existing local road network is insufficient to accommodate any future proposals within this bay. This may cause impact on the local environment and should be considered as part of the overall Habitats Directive Assessment for the licence application.
Aquaculture Killimer, Co.Clare	**Mitigation Measures**
BFF MM 30	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 15	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 17	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 25	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 11	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and

	mitigate these through avoidance.
MA MM 14	Some minor road improvements may be required. Any such infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment fort this site at project level.
Aquaculture Clonderalaw Bay, Co. Clare	**Mitigation Measures**
BFF MM 31	A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM's role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future development of the aquaculture industry at this location will need to take into consideration the findings of the AA for this site. Intensive aquaculture can lead to the increased discharge of suspended solids and nutrient and organic enrichment of recipient waters resulting in build-up of anoxic sediments, changes in benthic communities (alteration of seabed fauna and flora communities)
PHH MM 16	The impact on human health and location of local drinking water supplies would need to be considered for any proposed expansion or diversification.
S MM 18	The age and size of the licenced area will greatly affect the site in terms of production of large amounts of faeces and pseudofaeces in particular associated with mussels. The number and proximity of the licenced sites will need to be considered together with the in-combination effects of possible increases.
W MM 26	To mitigate potential impacts, the design of any facilities and maintenance regime should aim to limit the impacts associated with this option and should consider the achievement of WFD objectives outlined in the Shannon River Basin Management Plan. This could include carrying out works during specified periods and using environmentally sensitive techniques.
ACH MM 12	Any proposed development for this site should assess the potential for impact to underwater archaeology as per the DAHG guidelines and mitigate these through avoidance.
MA MM 15	Some minor road improvements may be required. Any such infrastructural requirements will need to be considered in the overall EIA and Habitats Directive Assessment fort this site at project level.

3.0 Mitigation (NIR)

3.1 Introduction

For the purposes of Article 6(3), an assessment does not, strictly speaking, need to look beyond the Plan 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 Plan will not adversely affect the integrity of the site. Alternatives have already been discussed and utilised to remove the potential for significant effects on the Natura 2000 sites located within the study area and to refine the site selection process through an evidenced based approach to identifying the most suitable locations. AA issues have been at the forefront of site selection from the onset through the use of the preliminary screening tables. While the 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 Development Locations 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.

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 Plan through the future development of key Strategic Development Locations or further investigations within Areas of Opportunity 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 SIFP, 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 Plan. 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 Plan 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 Plan 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 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.
- Appropriate Assessment of the Strategic Development Locations and Areas of Opportunity as outlined in **Chapter 3 of the NIR** provides mitigation on the qualifying interest features specific to each Strategic Development Location or Area of Opportunity.
- Overarching mitigation measures arising from the appropriate assessment of the Plan in general as outlined in **Table 3.1**
- General mitigation measures per theme as outlined in **Table 3.1 – 3.8**
- Review of the Plan objectives in light of the AA process with suggested mitigation is also outlined in **Chapter 6 Section 6.3 Table 6.9**

This assessment aims to inform the future development of the sites identified in the Plan in terms of what should be avoided, future assessments that will be required, detailed mitigation measures in order to ensure no significant effect and compliance with Article 6(3) of the Habitats Directive. The AA tables are provided in **Chapter 3** of the **Natura Impact Report.**

3.2 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 Plan (including cumulative impacts). The following mitigation measures have been identified to reduce the negative impacts identified. It is recommended that the mitigation measures (as listed in **Table 3.1**) are adopted as part of the final Plan. 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 Strategic Integrated Framework Plan. Detailed mitigation measures to those detailed within this chapter and integrated into the SIFP are likely to be required at individual project level, e.g. through habitat and Species survey, Ecological Impact Assessment and Habitats Directive Assessments. Any further changes to the Plan following consultation would require integration and evaluation in this Natura Impact Report. During the lifetime of the Plan and through the six yearly reviews regard should be had to future legislation, policies and guidelines.

Due to the nature of the Strategic Integrated Framework Plan in identifying suitable locations for potential future development across a number of key themes there still remains a considerable amount of uncertainty as to the exact scale, type and location of development within the Strategic Development Locations. However, by undertaken the appropriate assessment process and assessing the cumulative and in-combination effects of developing a large volume of sites throughout the estuary it is hoped that the most significant effects have been eliminated through avoidance and removal of sites 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.

Table 3.1 Mitigation Measures

Measure Number	Mitigation Measure
	Biodiversity Flora and Fauna
BFF MM 32	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 MM 33	Requirements for consents and the design of project level mitigation for Strategic Development Locations should be covered in the overall assessment of the site.
BFF MM 34	While Strategic Development Locations have been put forward should issues arise under Article 6(3) of the Habitats Directive at a project level they may require assessment. Should this assessment produce a finding of significant effects an alternative solution will be required.
BFF MM 35	In selecting the alternative solution it will be necessary to comply fully with Article 6(3) (and, if warranted, Article 6(4), including compensatory measures) of the Habitats Directive.
BFF MM 36	Pre-construction surveys should be conducted by suitable qualified ecologists in areas of future development which require the lost 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 MM 37	A “No net loss” principle for those habitats and species of conservation interest as identified through the conservation objectives should be adopted for the Lower Shannon Estuary ecosystem.
BFF MM 38	The Steering Group structure established as part of the SIFP should continue to meet in order to facilitate dialogue between industrial operators and nature conservation bodies such as the NPWS and IFI.
BFF MM 39	In relation to objective AV 1.5 any such development should ensure the protection of the structure and function of the Shannon Airport Coastal Lagoon as detailed and required by the conservation objectives for the Lower Shannon SAC qualifying interest feature 1150.
BFF MM 40	At project level any proposed development within a Strategic Development Location or Area of Opportunity will need to consider impacts to the Qualifying Interest features of surrounding Natura 2000 sites within an appropriate buffer zone and undertake as a minimum a Habitats Directive Assessment Screening Statement. This should include those Natura 2000 sites which were screened out of the SIFP where appropriate; • Barrigone • Kerry Head Shoal • Askeaton Fen Complex • Loop Head SPA • Stacks to Mullaghareirk Mountains, West Limerick Hills and Mount

Measure Number	Mitigation Measure
	Eagle SPA • Kerry Head SPA
	Water Related Mitigation Measures
W MM 27	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 MM 28	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 use the site will not be allowed.
W MM 29	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 for Strategic Development Locations.
W MM 30	Development proposed in this plan 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.

3.2.1 Overarching Mitigation Measures per Theme

General Mitigation Measures

A Habitat Directive Assessment will be required of any proposed developments coming forward for any of the Strategic Development Locations (or alternatives sites) or Areas of Opportunity likely to have an impact on the Natura 2000 site network. The undertaking of an Appropropriate 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 Tables 3.1 – 3.29.

Article 10 asks member states to: "endeavour, where necessary, in their land use planning and development policies, and with a view to improving the ecological coherence of the Natura 2000 network, to encourage the management of features of the landscape which are of major importance for wild fauna and flora." It then goes on to mention some specific features which can contribute to that coherence: "Such features are those which, by virtue of their linear and continuous structure or their function as stepping stones are essential for the migration, dispersal and genetic exchange of wild species." However, from an ecological perspective, implementing Article 10 isn't necessarily limited to just these specific features, but should encompass any features which may improve the coherence of sites

Implementation
It is recommended that there should be a greater harmonisation between the different ecological networks, such as e.g. Natura 2000, protected species located outside of Natura 2000 sites, in order to achieve maximum synergies. The use of the following common terminology for its components would be of advantage in terms of protection and mitigation within the SIFP:

Core areas are areas of high quality or conservation interest. They can be inside or outside Natura 2000 and can be of European, Community (EU-level), national, regional or local importance. Core Areas should be protected as far as possible. Core areas should be identified either within or adjacent to Strategic Development Locations or Areas of Opportunity in conjunction with local NPWS and IFI staff. For those species listed in Annex II of the Habitats Directive core areas include priority parts of the species habitat which must be protected under the Natura 2000 Network.

Nature restoration/creation areas are areas with a high potential to develop into valuable habitats. If they are situated inside Natura 2000 sites it is recommended that these areas be included in the Conservation Management Plan for these sites. These areas which may include for example a degraded section of habitat for which the SAC/SPA is designated as one of its qualifying interest features could be used as mitigation measures. If for example the proposed development involves the loss of a portion of habitat illustrating poor structure and function of the habitat type , nature restoration in another area could offset the loss of this habitat and meet the “No nett loss principle” within the site (site=Natura 2000 site)
Connecting structures Ecological coherence next to habitat quality has long been acknowledged as essential precondition to allow for long-term survival of many species and habitats (landscape features = linear structures and stepping stones) are connecting areas for specific species or habitats (See Article 10 of the Habitats Directive). Landscape mosaics may provide these functions. A long-term target for the implementation of Article 10 within the Shannon Estuary should be to identify the relationship between “Favourable Conservation Status” for the qualifying interest features within the associated Natura 2000 network and connectivity. In this context species and habitats occurring outside Natura 2000 sites also need to be considered.

3.2.2 General Mitigation Measures Per Theme

These mitigation measures relate to the Potential for Likely Significant Effects from the implementation of the Plan objectives and development of Strategic Development Locations and/or Areas of Opportunity per Theme arising from the Plan and in the absence of site specific details in terms of exact spatial location and design.

3.2.3 Theme – Shipping and Navigation – Associated with a variety of developments and other themes 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 Development Locations identified under the Marine Related Industry, Renewable Industry, Aviation or Marine Tourism and Leisure theme 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 interest1. 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. As part of an overall dredging management plan for the estuary which should be developed by the relevant members of the SIFP Steering Group a well thought out relocation plan could help rebuild the morphological structure of certain degraded areas of the estuary. The removal of 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 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 supplies/algal blooms.

[1] Under Article 86(2) of the Treaty

- 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.

Project Level mitigation measures outlined in T**able 3.2** 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 tidal energy device. The detailed project level mitigations outlined below should then be applied. The mitigation measures outlined in the following section per theme should be read in conjunction with the mitigation measures identified for the Strategic Development Locations and Areas of Opportunity tables. (See **Tables 3.1 to 3.21.)**

Table 3.2 Shipping and Navigation Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna **SN MM 1**	Direct physical loss / damage to habitats **Impacts at the dredge disposal site** **Key process: Physical damage (siltation &**	- Careful site selection within Strategic Development Locations and Areas of Opportunity avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry or the Renewable Energy themes. - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Strategic Development Locations or Areas of Opportunity

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	smothering) Toxic contamination 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.	- Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. - Use approved dump site only subject to licencing and consents process and in accordance with Marine Institute and EPA guidelines - 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	- Develop risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Energy 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 Development Locations or Areas of Opportunity to avoid sensitive

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		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 **SN MM 2**	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 Development Locations and Areas of Opportunity 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 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), Renewable Energy Areas of Opportunity (Construction, operation, decommissioning) 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. - Any new fishery, increase in current fisheries or fishing technique used in the Shannon Estuary should be subjected to an Environmental Impact Assessment and Habitats Directive Assessment to ensure they do not cause negative effects on the prey items of cetacean species in the estuary
	Indirect disturbance or	- Minimise the use of high noise emission activities such as impact pilling and blasting associated with

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	loss of species	shipping/navigation activities - Avoid installation during sensitive periods - 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 Waters[2] - 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 **SN MM 3**	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 **SN MM 4**	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) - Use of sound insulation on plant equipment and device deign.
Benthic Fauna **SN MM 5**	Direct physical damage to mobile species (Extraction through dredging	- Consider timing of dredge to avoid sensitive periods for benthic communities

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	causes the removal of benthic fauna at the dredge site)	
Water Quality **SN MM 6**	**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 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	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
	suspended sediments.	
Water Quality **SN MM 7**	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.

3.2.4 Theme – Marine Related Industry – Strategic Development Locations

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 at any of the Strategic Development Locations identified under the Marine Related Industry theme 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 interest[3]. While maintenance dredging is an existing (albeit intermittent) activity associated with Marine Related Industry at present in the estuary it

[3] Under Article 86(2) of the Treaty

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. As part of an overall dredging management plan for the estuary which should be developed by the relevant members of the SIFP Steering Group a well thought out relocation plan could help rebuild the morphological structure of certain degraded areas of the estuary. The removal of 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.

Project Level mitigation measures outlined in **Table 3.3** 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 in the following section per theme should be read in conjunction with the mitigation measures identified for the Strategic Development Locations tables.

Table 3.3 Marine Related Industry Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna **MRI MM 1**	Direct physical loss / damage to habitats **Impacts at the dredge disposal site** **Key process: Physical damage (siltation & smothering)** Toxic contamination 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	- Careful site selection within Strategic Development Locations avoiding sensitive features for construction and installation of structures associated with the Marine Related Industry identified for the Strategic Development Location within the Shannon Estuary - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Strategic Development Location - Avoid installation during sensitive seasons - Consider alternative beneficial use options to reduce amounts of material disposed at sea. For this theme 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.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	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	- 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 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 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 Development Location to avoid sensitive features. - Habitat surveys to characterise the seabed and identify sensitive habitat and species
Marine Mammals **MRI MM 2**	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 Development Location 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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		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 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 pilling and blasting - Avoid installation during sensitive periods - Soft starting pilling 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 Waters[4] - 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 **MRI MM 3**	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 **MRI MM 4**	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
	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	- Avoid construction in sensitive areas such as feeding and breeding areas

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	loss of habitats	- 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
	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 **MRI MM 5**	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 appropriate sensitive lighting suitable for bats
	Indirect disturbance or loss of species	- Avoid installation during sensitive periods
Birds **MRI MM 6**	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 Development Location - 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 deign.
Benthic	Direct physical	- Consider timing of dredge to avoid sensitive periods for

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Fauna **MRI MM 7**	damage to mobile species (Extraction through dredging causes the removal of benthic fauna at the dredge site)	benthic communities
Water Quality **MRI MM 8**	**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 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	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
	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.

3.2.5 Theme – Renewable Energy Areas of Opportunity

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. Site-specific surveys prior to the establishment of any test site or research associated with the renewable energy industry, primarily tidal energy devices, as indicated through the identification of areas of opportunity within the Plan will be required. The knowledge of marine mammal occurrence and distribution within the Shannon Estuary has increased substantially, with five population assessments of bottlenose dolphins in the Lower River Shannon cSAC since 1997 with the most recent in 2012 (see Berrow et al., 2012). These were carried out to fulfill monitoring requirements established within the EU Habitats Directive and covered the mid and some of the outer estuary between Tarbert, Co Kerry and Kilcloher Head, Co Clare. Despite this there are considerable data gaps and lack of baseline

information related to population distribution and abundance, especially upriver of Tarbert and along the North Kerry shore in the outer estuary, feeding, breeding and social habitats. Therefore there will be many circumstances where site-specific information is limited and the appropriate mitigation measures which have been developed by various regulatory bodies in Ireland are uncertain. In such cases properly conducted, site-specific baseline surveys carried out by suitable qualified marine scientists will be required to help inform the potential site specific effects and advise on mitigation measures. For major projects presenting a risk of significant anthropogenic noise, or potential for direct and in-direct impact baseline surveys of a minimum of one-year duration are likely to be required in order to provide effective coverage for all stages of the annual cycle within the estuary. Project Level mitigation measures outlined in Table 3.2 are only applicable following the completion of baseline data collection and gap filling within the estuary and once a detailed Environmental Impact Assessment at the Project Level has taken place taking into account the design specifics related to the tidal energy device. The detailed project level mitigations outlined below should then be applied. The mitigation measures outlined in the following section per theme should be read in conjunction with the mitigation measures identified for the renewable energy areas of opportunity tables.

Table 3.4 Theme - Renewable Energy Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats **RE MM 1**	Direct physical loss / damage to habitats	- Careful site selection within areas of opportunity avoiding sensitive features for devices and export cables within the Shannon Estuary - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the area of opportunity - Avoid installation during sensitive seasons
	Indirect disturbance or loss of habitats	- Avoid device / infrastructure placement within 500m of areas of known sediment contamination - Habitat surveys to characterise the seabed and identify sensitive habitat and species
	Toxic effects	- Design devises to minimise risk of leakage of pollutants - Risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Energy 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 investigation, research, construction, operation and decommissioning of renewable energy devices in the Shannon Estuary.
	Biological disturbance	- Careful site selection avoiding sensitive features for devices and export cables within the areas of opportunity - Habitat surveys to characterise the seabed and identify sensitive habitat and species
Marine Mammals **RE MM 2**	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 areas of opportunity identified in the Plan in order to fully understand and mitigate for this risk

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Avoid sites for sensitive species - Avoid installation during sensitive seasons - Design device for minimal impact - Avoid siting devices in sensitive areas such as feeding and breeding areas - Increase device visibility - 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 the renewable industry, construction and activities 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 the operation of devices to avoid impacting on marine mammals at vulnerable times of the year - Consider the use of acoustic deterrents such as pingers or acoustic harassment devices. - Soften collision by adding smooth edges or padding - Protect against entrapment by incorporating escape hatches into device design. - No marine mammal mortalities occur as a consequence of physical interaction with the tidal device components - The tidal device operates in such a way as to stop when marine mammals are within 50m of the device - Prior to the introduction of this measures further research would be required as to its effects on marine mammals in terms of noise impact. Establishment of an active sonar system which detects marine mammals at sufficient range from the turbine to a precautionary shut-down to occur automatically. The use of active sonar systems have been incorporated into trials such as SeaGen in Strangford Lough. The results for the SeaGen EMP and other such programmes should be reviewed to assess the potential effects prior to the adoption of this mitigation measure. - Any device should not present a barrier effect to the free passage of marine mammals within the estuary. - Relative abundance, or use of the site, of marine mammals in the Shannon Estuary should not be significantly modified by the operation of any tidal energy device. - Sub-surface noise generated by any tidal energy device 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 - Avoid installation during sensitive periods - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produce do allow mammals to move away from activities

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Underwater noise during the operation may be beneficial in alerting species to the presence of the device, reducing the risk of collisions. However, this requires further research as to the potential negative effects on marine mammals within the area - 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 and therefore will need to be first considered and appropriately mitigated. - Use of bubble curtains (this may only be effective in shallow water) - Prior to the introduction of this measures further research would be required as to its effects on marine mammals in terms of noise impact. The use of prototype devices which don't move could be considered to assess these effects. Use of acoustic deterrent or disturbance devices to scare sensitive species away - 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 Waters[5] - 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.
	EMF	- Cable configuration and orientation can reduce field strength - Cable burial, where possible to minimise field effect at the seabed
Fish and Freshwater RE MM 3	Direct physical damage to	- Design device for minimal impact - Do not site devices in particularly sensitive sites e.g. migratory routes feeding and breeding areas
Otters **RE MM 4**	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 - Design device for minimal impact on habitat
	Direct physical damage to mobile species	- Detailed otter surveys would be required in order to fully understand and mitigate for this risk - Underwater noise during the operation may be beneficial in alerting species to the presence of the device, reducing the risk of collisions. However, this requires further research.

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Avoid installation during the sensitive seasons - Increase device visibility, or use of acoustic deterrent devices - Use of protective netting or grids - Protect against entrapment by incorporating escape hatches into device design. - Seasonal restrictions on the operation of devices to avoid impacting on otters at vulnerable times of the year - Soften collision by adding smooth edges or padding
	Indirect disturbance or loss of habitats	- Avoid siting devices 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 insulation on equipment - Soft starting pilling activities / passive acoustic deterrents – gradually increasing noise produce do allow otters to move away from activities
	Toxic effects	- Design devises to minimise risk of leakage of pollutants - Risk assessment and contingency planning - Implementation of SOPEP (Shipboard Oil and Pollution Energy Plan)
Bats **RE MM 5**	Direct physical damage to mobile species	- Avoid siting the devices within sensitive sites - 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 appropriate sensitive lighting suitable for bats
	Indirect disturbance or loss of species	- Avoid installation during sensitive periods
Birds **RE MM 6**	Direct physical damage to mobile species	- Avoid siting the devices 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 area of opportunity - Appropriate siting of developments e.g. away from breeding colonies, important feeding and roosting areas, near shore areas and migration corridors - No construction of devices between resting and foraging areas

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Shut down of devices at night with bad weather / visibility and high migration intensity - Avoiding large-scale continuous illuminations - Measures to make wind turbines more recognisable to birds
	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 deign.

3.2.6 Theme – Aviation

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. Aviation and any future associated development within lands designated as "Airport Lands" which is located within and adjacent to the Lower Shannon SAC and the River Shannon and Fergus Estuaries SPA need to consider both direct and in-direct effects. The potential effects of the aviation related activities on the conservation objectives relate to physical, biological, visual and noise (disturbing) pressures that each activity may have on each of the qualifying interests and the particular biological features of those interests as outlined in **Table 3.5**.

As already mentioned through this report the SIFP is strategic in nature and as such, cannot contain precise details pertaining to what type of specific development proposal will take place within the plan area and in particular in relation to this theme. The policies and objectives of the Plan set the framework for the SIFP of the Shannon Estuary, but the plan does not have sufficient detail on each possible project which may come forward during the lifetime of the Plan to assess in detail.

A number of the policies and objectives in the Plan can actually be described as mitigation measures. These include, in particular, those pertaining to Archaeology and Cultural Heritage, Flood Risk, Coastal Management and Erosion, Environment, Landscape, SEVESO and SEA and in particular Strategic Objective 3 – Key Principle 3 in that it (and those under the Environment heading) deal with Article 6(3) and 6(4) of the Habitats Directive. These measures account for the fact that every plan or project (development) within the plan area, should not impact on and be subjected to a screening for appropriate assessment at the minimum under the Council Directive 92/42/EEC on the conservation of natural habitats and of wild flora and fauna (Habitats Directive).

Project Level mitigation measures outlined in **Table 3.5** 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 tidal energy device. The detailed project level mitigations outlined below should then be applied. The mitigation measures outlined in the following section per theme should be read in conjunction with the mitigation measures identified for the Strategic Development Locations and Areas of Opportunity tables. (See **Tables 3.1 to 3.21**)

Table 3.5 Aviation - Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna **A MM 1**	Direct physical loss / damage to habitats **Physical damage (siltation & smothering, scouring)** Toxic contamination Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment)	- Careful site selection for any future development within "Airport Lands" avoiding sensitive features of the Natura 2000 network for construction and installation of structures associated with the aviation industry - Avoid installation and/or construction during sensitive seasons in terms of habitat use by qualifying interest features of the SAC and SPA.
	Indirect disturbance or loss of habitats	- Avoid construction or disturbance within 500m of areas of known sediment contamination (Surveys may be required at the planning stage to determine the location if any) - Habitat surveys to characterise the seabed and identify sensitive habitat and species should construction works involve seabed alterations.
	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 associated with the development of this theme and in conjunction with any future development which would involve increased vessels docking at the oil jetty. The mitigation measures associated with "Shipping and Navigation" together with the "Marine Related Industry" measures should also be read in conjunction here. - 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 any future development on "Airport lands" with the potential for significant effects.
	Biological disturbance	- Careful site selection to avoid sensitive features. - Habitat surveys to minimize the impact to the seabed and identify sensitive habitat and species

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Marine Mammals **A MM 2**	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 areas of opportunity if not already known or insufficient research exists for the area in order to fully understand and mitigate for this risk. The outputs from the SIFP Static Acoustic Monitoring should be assessed at a project level to determine the potential for significant effects on this species. - 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 Shannon specific code of conduct to avoid disturbance to marine mammals during construction of any marine related infrastructure in particular but also any land based infrastructure which may require access via the estuary. This code of conduct should also apply to vessels in transit to construction area if entering areas of high abundance and should be developed in conjunction with other marine operations under the theme of Marine Related Industry, Renewable Energy, Commercial Fishing and Aquaculture and Shipping and Navigation. - 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 aviation 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	- Avoid installation during sensitive periods such as but not limited to breeding birds, fish migration periods and key foraging periods and usage by Bottlenose Dolphins (The key periods of use by Bottlenose Dolphins should be informed by the SIFP SAM study) - Adherence to the risk assessment and menu of management options outlined in the NPWS Draft

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		Guidance to manage the risk to Marine Mammals from Man-Made Sound Sources in Irish Waters[6] - 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. This should be developed in conjunction with the various responsible authorities under the Marine Related Industry, Commercial Fishing and Aquaculture, Shipping and Navigation and Renewable Energy sectors.
Fish and Freshwater **A MM 3**	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 **A MM 4**	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
	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 - Enforce speed limits for vessels used in construction of any aviation facilities 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 as determined through dedicated field surveys. - Avoid installation during sensitive periods
	Toxic effects	- Design construction and operation to minimize 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
Birds **A MM 5**	Direct physical damage to mobile species	- Avoid siting any structures, buildings or associated infrastructure within particularly sensitive parts of the Natura 2000 network. - Avoid installation during sensitive seasons (i.e. breeding and moulting) - Site specific surveys at project level to identify the

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		presence of key foraging hotspots and / or resting areas as and when project level developments are brought forward for consent. - 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 or mitigate where appropriate. - Avoid installation during sensitive period
Biological Disturbance **A MM 6**	**Invasive species;** escapes, vectors, facilitation of other introduced species	- Instigate appropriate bio-security measures to combat any potential introduction of invasive species through transportation or cargo
Visual Impact **A MM 7**		- Management of existing and future aviation operations to minimise visual impact to bird species in particular. - Use dark subdued or neutral colours where possible with a matt surface - Ensure design and colour continuity between operations in the surrounding areas - For new developments assess potential visual impact and avoid or mitigate as appropriate.

3.2.7 Theme –Commercial Fishing and Aquaculture – Areas of Opportunity

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. Aquaculture and any future development within the Areas of Opportunity identified will be located primarily within inter-tidal areas containing mudflats and sandflats not covered by sea water at low tide which is a primary habitat of the Lower Shannon SAC. They cover large areas of the estuary and are one of the most extensive habitats in the estuary. Species diversity may be low but these flats often support very dense populations of invertebrates so the overall biomass of the area can be extremely high. The potential effects of fishing and aquaculture activities on the conservation objectives relate to physical, biological and visual (disturbing) pressures that each activity may have on each of the qualifying interests and the particular biological features of those interests as outlined in **Table 3.6**

The significance of impacts of the various proposed activities depends to a degree on the sensitivities of the characterising species of the benthic communities defined in the conservation objectives (NPWS 2012). The pressures resulting from these activities are mainly physical (smothering, erosion of sediments, abrasion) and biological (extraction) in nature as outlined in the Natura Impact Report (**Table 3.6**). Sensitivities of the characterising species therefore provides a first step in assessing the potential significance of the impact of these activities to these communities and to the Conservation Objectives. Therefore an

analysis of benthic community composition and response to pressures will be required prior to any future expansion to the existing licenced aquaculture sites.

Sensitivity to a pressure is a composite of the resilience or resistance of the species to the pressure and its capacity to recover from the pressure. Resilience may be related to the degree to which the species encounters the activity and its physical form in relation to physical pressures applied to it. Recoverability is correlated with life history traits and population dynamics. Species with short generation times, high fecundity and strong dispersal capacity are likely to recover more quickly (Marine Institute, 2011).

The effects of aquaculture depend on the habitat, type and scale of cultivation. Changes in sediment composition and benthic community structure have been observed under long-lived cultures of *Mytilus edulis* for example. A three year study showed that faecal matter and detached mussels increased sedimentation under the lines at a rate of 10 cm/yr. The effects on the sediment under the culture were reduced grain size, high organic content and a negative Redox potential. Benthic fauna were replaced by opportunistic polychaetes and only limited recovery was observed when the site was re-sampled 6 months after harvesting.(Source; http://www.ukmarinesac.org.uk/activities/fisheries/f1_5_4.htm)

As outlined in the Birdwatch Ireland Marine Policy 2008, the aquaculture sector has grown significantly in Ireland since the 1970s with significant increases in granting licence applications, and moves to develop technologies in the inshore and offshore areas particularly in the finfish sector. This Marine Policy recommends a number of “Required actions” which should be adhered or the outcomes from associated work in relation to this actions adhered to for any future development under this theme within the estuary.

1. Robust assessments of the impacts of existing and proposed aquaculture developments (including cumulative effects), and enforced higher standards in this area to ensure informed decision making in advance of granting of further licences.
2. A strategic approach to the carrying capacity (in an ecological context) of inshore and offshore areas and potential cumulative impacts on an individual bay and regional scale. Including assessment of impacts on important bird populations, and zoning of sensitive areas.
3. Mandatory and enforced robust monitoring of during- and post-construction and operational impacts.
4. Recommendations of the Galvin (2000) report to be implemented in consultation with BirdWatch Ireland and other relevant NGOs in order to address the outcome of the European Court of Justice judgment which found against Ireland (2007). Included here are changes in licensing processes particularly for SPAs.

A programme for the Appropriate Assessment of all aquaculture licences and inshore fishing activities in and adjacent to Natura 2000 sites in Ireland is currently underway. Baseline data to inform these assessments and assist with the development of conservation objectives for the sites has been collected under the supervision of the Marine Institute. BIM’s role in this process is to carry out aquaculture profiling and develop Fisheries Natura Plans. Any future aquaculture development within the identified Areas of Opportunity for aquaculture should await the outcome of this assessment. This process will meet the requirements of some of the actions outlined above as part of Birdwatch Ireland Marine Policy.

The Shellfish Waters Directive – 2006/113/EC

The aim of the Shellfish Waters Directive is to protect or improve shellfish waters in order to support shellfish life and growth. It is designed to protect the aquatic habitat of bivalve and gastropod molluscs, which include oysters, mussels, cockles, scallops and clams. The Directive requires Member States to designate waters that need protection in order to support shellfish life and growth.

The Directive sets physical, chemical and microbiological requirements that designated shellfish waters must either comply with or endeavour to improve.

The Directive also provides for the establishment of pollution reduction programmes for the designated waters. Responsibility for the Shellfish Waters Directive lies with the Department of the Environment, Community and Local Government. All current licenced activities and any future developments should adhere to the measures and guidance outlined in the associated Pollution Reduction Programmes for the Areas of Opportunity identified in the Plan for Clare and Kerry. http://www.environ.ie/en/Environment/Water/WaterQuality/ShellfishWaterDirective/ShellfishWatersFinalCharacterisationReportsandPRPs/Clare-Kerry/

Table 3.6 Theme – Commercial Fishing and Aquaculture Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures*
Habitats & benthic fauna **CFA MM 1**	Direct physical loss / damage to habitats **Physical damage (siltation & smothering)** Toxic contamination Non-toxic contamination (suspended sediments, turbidity & organic/nutrient enrichment)	- Careful site selection within Areas of Opportunity avoiding sensitive features for construction and installation of structures associated with Aquaculture identified for the Areas of Opportunity within the Shannon Estuary - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Areas of Opportunity. - Avoid installation during sensitive seasons - Minimisation of use of any chemicals on site and use of biodegradable products where available - That aquaculture operators adhere to the following practice: - Notification of the relevant authorities (Coastguard, DCMNR, County Councils, Inland Fisheries Ireland Shannon, Shannon Dolphin and Wildlife Foundation and SEA-PT http://www.seapt.ie/) of any potential threat of pollution they observe and taking samples where necessary - That aquaculture operators adhere to the following practices: 1. Vehicle, vessel and equipment operators must have appropriate training and qualifications for proper and safe use of their equipment 2. Operation of all vehicles, vessels and equipment in safe and professional manner 3. Continuous care and maintenance of vehicles, vessels and equipment to minimise risk of spills or leakages of substances into the marine

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures*
		environment 4. Use of biodegradable products where possible, e.g. hydraulic fluid 5. Preparation of contingency plan in case of vehicle breakdown in intertidal zone 6. Proper disposal of all filters, oils, lubricants and other related materials
	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 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 investigation, research, construction, operation and decommissioning associated with the development of a Commercial Fishing and Aquaculture Areas of Opportunity in the Shannon Estuary.
	Biological disturbance	- Careful site selection with the Strategic Development Location to avoid sensitive features. - Habitat surveys to minimize the seabed and identify sensitive habitat and species
Marine Mammals **CFA MM 2**	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 areas of opportunity 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 Shannon specific code of conduct to avoid disturbance to marine mammals during construction of any aquaculture infrastructure and or commercial fishing 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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures*
		- 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 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	- Avoid installation 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 Mammals from Man-Made Sound Sources in Irish Waters[7] - 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 **CFA MM 3**	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 **CFA MM 4**	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
	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 - Enforce speed limits for vessels used in construction of any aquaculture facilities 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

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures*
	Toxic effects	- Design construction and operation to minimize 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
Birds **CFA MM 5**	Direct physical damage to mobile species	- Avoid siting the structures within particularly sensitive parts of the Area of Opportunity - 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 Area of Opportunity - 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 - Avoid installation during sensitive periods - Avoid disturbance through the use of vehicles (i.e. tractors etc.) during periods of high usage by feeding birds. (field surveys may be required in order to provide an indication of these critical periods)
Biological Disturbance **CFA MM 6**	**Invasive species;** escapes, vectors, facilitation of other introduced species	- Instigate appropriate bio-security measures - Adherence to the Invasive Species Ireland Aquaculture code of practice is recommended. The code provides advice and guidance on the appropriate methodologies to prevent the spread of invasive non-native species in the aquatic environment. The code also takes into account the use of boats and equipment by the sector and recommends guidelines to facilitate managing this vector of spread. Adherence to the guidelines in this code of practice will help limit the spread of some of Ireland's Most Unwanted invasive species.
Visual Impact **CFA MM 7**		- Management of existing aquaculture operations according to best practice principle outlined in the DCENR guidelines. - Use dark subdued or neutral colours where possible with a matt surface - Ensure design and colour continuity between operators in the same area - For new developments assess potential visual impact according to the guidelines published by the DCENR - Consult with North and South Shannon C.L.A.M.S. group and take part in any local C.L.A.M.S. initiatives in this regard

3.2.8 Theme – Marine Tourism and Leisure

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. The strategy is to encourage and facilitate expansion and redevelopment of existing facilities where possible to minimise the potential for harm to the prized environment and ensure that those settlements around the fringes of the Estuary profit from the economic, social and environmental benefits associated with a successful tourist strategy

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 interest[8]. 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. As part of an overall dredging management plan for the estuary which should be developed by the relevant members of the SIFP Steering Group a well thought out relocation plan could help rebuild the morphological structure of certain degraded areas of the estuary. The removal of 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 associated with any marine tourism or leisure development e.g. re-design or up-grade of an existing pier or jetty, installation of a new pier or jetty, development of marina's or associated infrastructure which would require 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.

[8] Under Article 86(2) of the Treaty

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.

Project Level mitigation measures outlined in **Table 3.7** 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 in the following section per theme should be read in conjunction with the mitigation measures identified for the Strategic Development Location or Areas of Opportunity as outlined in **Chapter 3** of the Natura Impact Report.

Table 3.7 Marine Tourism and Leisure Mitigation Measures

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
Habitats & benthic fauna **MTL MM 1**	Direct physical loss / damage to habitats **Impacts at the dredge disposal site** **Key process: Physical damage (siltation & smothering)** Toxic contamination	- Careful site selection avoiding sensitive features for construction and installation of structures associated with the Marine Tourism and Leisure industry within the Shannon Estuary - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Strategic Development Location - Avoid installation/construction works 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 theme 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 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 investigation, research,

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		construction, operation and decommissioning associated with the development of a Marine Tourism and Leisure activity within the Shannon Estuary.
	Biological disturbance	- Careful site selection to avoid sensitive features. - Habitat surveys to characterise the seabed and identify sensitive habitat and species
Marine Mammals **MTL MM 2**	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, areas selected for development 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 Tourism and Leisure 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 and also to all associated leisure/tourism vessels e.g. jet skies, power boats, tour operators etc. - 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 Tourism or Leisure Industry. - Sub-surface noise generated by any activity should not cause a level of disturbance to marine mammals sufficient to displace them from areas important for foraging and social activities. If the sub-surface noise level is unknown or its potential impact to marine mammals are unknown future development of any such activity will need to await the findings of further research into the potential effects before any future development can occur.
	Indirect disturbance or loss of species	- Minimise the use of high noise emission activities such as impact pilling and blasting for the development of these theme and its associated activities.

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
		- Avoid installation during sensitive periods - 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 associated with construction. - 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 Waters[9] - 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 **MTL MM 3**	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 **MTL MM 4**	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, feeing, foraging or commuting routes. (Refer to NPWS detailed Conservation Objectives, 2012)
	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 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)

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

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
	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 **MTL MM 5**	Direct physical damage to mobile species	- Avoid siting new structures, associated infrastructure or any ancillary features associated with this theme 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 appropriate sensitive lighting suitable for bats
	Indirect disturbance or loss of species	- Avoid installation during sensitive periods
Birds **MTL MM 6**	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 Development Location - 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 deign.
Benthic Fauna **MTL MM 7**	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)**	Select appropriate dredger to minimise re-suspension of sediments. Consider timing to dredge and disposal at most

Interested Features	Potential Effect	Suggested Project Level Mitigation Measures
MTL MM 8	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 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	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
	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.

3.2.9 Theme – 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 3.8 Archaeology and Cultural Heritage Mitigation Measures

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated 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 preceed 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. **ACH MM 1**	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations Vessel movement during 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.
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. **ACH MM 2**	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

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated objectives	Suggested Project Level Mitigation Measures
		with the investigations 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 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. **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	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 Mammals from Man-Made Sound Sources in

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated objectives	Suggested Project Level Mitigation Measures
ACH MM 3		Irish Waters[10] 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. **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	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations Operation of underwater and surface survey devices Lights on devices	These types of field surveys and investigations are controlled by the licencing and permitting procedures already set out by the statutory bodies together with best practice guidelines which serve to mitigate and prevent any direct and in-direct impact.

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

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated objectives	Suggested Project Level Mitigation Measures
survey equipment **ACH MM 4**		
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. **ACH MM 5**	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.	These types of field surveys and investigations are controlled by the licencing and permitting procedures already set out by the statutory bodies together with best practice guidelines which serve to mitigate and prevent any direct and in-direct impact.
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. **ACH MM 6**	Hydrographic Surveys Marine Geophysical Surveys Benthic investigations Archaeological excavations Vessel movement during investigations	These types of field surveys and investigations are controlled by the licencing and permitting procedures already set out by the statutory bodies together with best practice guidelines which serve to mitigate and prevent any direct and in-direct impact.
Biological disturbance Introduction of invasive alien species (IAS), or no-native species carried by vessels, etc. **ACH MM 7**	Introduction of vessels and equipment to the estuary which have originated in other waters containing invasive and alien species.	The forth coming EU Directive on the introduction of alien species should be adhered to during the consideration of any future marine related development. **<u>International obligations</u>** The threat of IAS to biodiversity and society has been recognised at global

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated objectives	Suggested Project Level Mitigation Measures
		level. Article 8(h) of the Convention on Biological Diversity (CBD) obliges Parties to the Convention to 'prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species'. The European Community (EC) is a party to the Convention and should therefore take actions to ensure its policies comply with that Article. Within the CBD framework, the key development in relation to IAS during the last five years was the adoption of 15 Guiding Principles for the prevention, introduction and mitigation of impacts of alien species that threaten ecosystems, habitats or species.The Principles provide an international framework for governments and other organisations to develop effective strategies to prevent the introduction of, and promote control and eradication of IAS. Other international agreements cover different groups of IAS or pathways of

Potential Effects	Potential activities associated with theme, development at Strategic Development Locations and associated objectives	Suggested Project Level Mitigation Measures
		their introduction and start to address IAS as a threat to biodiversity. Of particular relevance to the SIFP are; 1. The International Maritime Organisation (IMO) adopted the "International Convention for the Control and Management of Ships' Ballast Water and Sediments". The aim of the Convention is to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. 2. The Convention for the Control and Management of Ship's Ballast Water and Sediments under the International Maritime Organisation addresses ballast water as the main pathway for aquatic IAS.

Project Level mitigation measures outlined in **Table 3.8** 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 in the following section per theme should be read in conjunction with the mitigation measures identified for the Strategic Development Location or Areas of Opportunity as outlined in **Chapter 3.**

4.0 Detailed Appropriate Assessment of Themes related to Strategic Development Locations and areas of opportunity

Following the PST and Multi Criteria Analysis each of the Strategic Development Locations and Areas of Opportunity which were selected were then subject to a detailed appropriate assessment as per **Tables 4.1** – **Tables 4.21**. This level of assessment served to identify further any perceived impacts which may occur at a Strategic Development Location level or within an Area of Opportunity and was informed by the identification of potential effects from each of themes. It also served to identify alterations to site boundaries where possible in order to avoid certain quyalifying features and thereby removing the potential for direct impact or to identifiy mitigations measures which would serve to offset against potential impacts.

The AA tables are grouped per theme and provide an assessment of the potential for impact based on the best available information on the qualifying interest features of the Natura 2000 sites. Where sites have come through the PST process and appear to be located within an area containing a high potential impact rating from future development or a high priority area for a particular habitat or species the justification is provided in the assessment tables. This assessment aims to inform the future development of these Sites/Areas of Opportunity 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.

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 (July, 2013) and are based on the Qualifying Interest features of the SAC and SPA as this forms the basis of the focus of the Natura Impact Report as per the Habitats Directive. The associated figures corresponding to these tables of assessment are contained in Chapter 3 of the NIR. Figure and Tables references within Tables 4.1 – 4.21 refer to those contained in the NIR.

Marine Related Industry Appropriate Assessment of Strategic Development Locations

Please note these tables are best printed on A3 paper or viewed digitally.

The associated constraints mapping is based on the best available GIS layers and detailed conservation objectives at the time of the assessment (September 2013). The assessments in terms of the risk of adverse effects on the qualifying interest features is based on best judgement at the time of the assessment and on the availability of detailed site information from NPWS in particular, but also a range of other data sources in the absence of dedicated field surveys. At a project level dedicated field surveys may be required to confirm the presence or absence of some of the qualifying interest features and to inform the appropriate assessment in accordance with Part XAB of the Planning and Development Act. It should be remembered that while the available datasets and detailed conservation objectives from NPWS do contain a significant amount of information not all elements of the conservation interests may be recorded or mapped within the estuary to date and therefore any unmapped or new records for conservation interests of the Natura 2000 sites are also afforded the same protection as those which are mapped. The assessment which follows here under and the determination of "no potential effects" is based on a strategic level, desk based assessment. This will need to be assessed further at site and project level to determine whether potential impacts exist and will in some cases require dedicated field surveys. The estuary is dynamic ecosystem which is constantly undergoing morphological and hydrodynamic changes which will enevitably lead to changes in habitat structure and function over time in particular the lifetime of this plan.

The Lower River Shannon SAC designation includes five Annex I habitats as follows:

Large Shallow Inlets and Bays (1160)
Estuaries (1130)
Mudflats and sandflats not covered by seawater at low tide (1140)
Sandbanks which are slightly covered by sea water all the time (1110)
Reefs (1170)

These five Annex I habitats contain ten principal benthic communities which are outlined below. These benthic communities have not been mapped for each SDL or AoO in order to allow for greater clarity on the mapping, however details in relation to these principal communities are available to download through the NPWS web-site in the following documents;

- *"Lower River Shannon SAC (site code: 2165) Conservation objectives supporting document – marine habitats and species".*
- Lower River Shannon SAC 002165 Detailed Conservation Objectives
- The spatial extent can also be mapped for each of these strategic location or areas of opportunity by downloaded the associated GIS file also from the NPWS web-site.

Community type	Habitat Code				
	1110	1130	1140	1160	1170
Intertidal sand with *Scolelepis squamata* and *Pontocrates* spp. community			✓	✓	
Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex		✓	✓	✓	
Estuarine subtidal muddy sand to mixed sediment with gammarids community complex		✓			
Subtidal sand to mixed sediment with *Nucula nucleus* community complex		✓		✓	
Subtidal sand to mixed sediment with *Nephtys* spp. community complex	✓	✓		✓	
Fucoid-dominated intertidal reef community complex				✓	✓
Mixed subtidal reef community complex				✓	✓
Faunal turf-dominated subtidal reef community		✓		✓	✓
Anemone-dominated subtidal reef community		✓		✓	✓
Laminaria-dominated community complex		✓		✓	✓

This information should be utilised further at project level to inform the assessment process.

Health warning; in relation to the completeness/definitivesness of the available NPWS datasets supporting the site specific conservation objectives (SSCOs), it should be noted that qualifying interests for the European Sites may occur in locations other than those currently known/mapped and are also subject to the same level of protection as those which are mapped and documented with the SSCOs. Further information and guidance on this is provided in the associated NIR tables which follow.

Table 4.1 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Inishmurry, Cahiracon, Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site A Inishmurry, Cahircon Co. Clare**	**Estuaries** **Potential Impacts:** Habitat present (Lower Shannon Estuary) along the front of the site.	• 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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts*:*** Very small portion of habitat located on the verges of the sites boundary.	• Habitat loss - to land • Habitat change - to another marine habitat • Physical disturbance • Siltation rate changes • Loss of available prey items • In-direct effects	- Detailed site specific surveys must be undertaken to determine the structure and function of this area of habitat. - If deemed to be of unfavourable conservation status these areas must 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
	Coastal Lagoons **No Potential Impacts*:*** No Coastal Lagoons located within the vicinity of the opportunity			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts*:*** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts*:*** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts*:*** A number of areas of ASM were documented through the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG • The main areas containing this habitat are located either side of the large pier located within this site. The areas of salt marsh within the cSAC are of international importance due to this location, while those outside the designated site are of local importance. From previous survey work carried out as part of an EIS process the area of Salt Marsh was found to be degraded in some parts where it is dominated by non-native plant species, while its quality improves as it approaches the shoreline.	• 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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts*:*** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			
	Large shallow inlets and bays **Potential Impacts*:*** Large shallow inlets and bays present-Shannon Estuary	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this Strategic Development Location and at the chosen location for any future development once known. Any development associated with Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site	No residual impacts
	Reefs **Potential Impacts:** Present within centre of area of opportunity co-insiding with areas of Faunal turf dominated subtidal reef complex and mixed sub-tidal reef community along shoreline of site	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location impact on this reef habitat can be avoided through the careful selection of areas for development, type of infrastructure used, scale of project etc. The exact location must avoid this habitat. 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not present			
	River Lamprey **No Potential Impacts*:*** No records for this site			
	Brook Lamprey **No Potential Impacts*:*** No records for this site			
	Sea Lamprey **Potential Impacts*:*** Known records through out the Shannon Estuary and as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area indicates the presence of River Lamprey.	• 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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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)	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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.	proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Bottle-nosed Dolphin **Potential Impacts*:*** Bottle-nose dolphins are present in the greater Shannon Estuary The SDWF have been monitoring dolphin tour boats in the estuary since	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	- 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of high habitat priority however; this does not include the area within the Strategic Development Location boundary. 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.	increased discharges • Collison with any infrastructure associated with development, increased shipping	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 Waters[1] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - 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.Static Acoustic Monitoring was not carried out at this site under the SIFP. - 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 must 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 (March 2012) • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	While this site is not located within "critical habitat" as per the conservation objectives (NPWS,2012) for the Shannon Estuary it does border or provides access to suitable habitat therefore the species range within the site should not be restricted by artificial barriers to site use.			
	Freshwater Pearl Mussel **No Potential Impacts*:*** Not present			
	Otter **Potential Impacts** No records for this site from Biodiversity Ireland or through previous EIS surveys undertaken within the confines of the Cahiracon strategic development location. Part of the outer shoreline of this Strategic Development Location has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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[2]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Strategic Development Location** **Marine Related Industry** **Site A Inishmurry, Cahiracon, Co.Clare**	**Whooper Swan** **Shelduck** **Whimbrel** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Bar tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black Headed Gull** (***As listed in the NPWS Detailed Conservation Objectives 17th September 2012 sub-site information***) **Potential Impacts*:*** The sub-site OH534 which is within the River Shannon and runs along the front of the Cahiracon site covering the seaward portion of the site only (**See Figure 3.20)** has been given a high rating from the assessment of low-tide sub-sites based on the identification of 16 of the qualifying species being recorded at this site coupled with 1825 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH534 is highly sensitive to future development at a strategic level.	This rating may change at project level depending on the scale and detail of the project. The Cahiracon 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 in-direct impacts may occur through disturbance. Within the Strategic Development Location no inter-tidal mudflats are recorded as per the data set provided by NPWS and as per NPWS Conservation Objectives 2012. The habitats present within the deep water areas, identified in Figure 3.20 do not provide rich food resources for over-wintering birds similar to the large expanses of intertidal habitat in the inner estuary, east of Foynes Island. The rocky shoreline and open water will provide food for a limited number of species such as Cormorant, some gulls and small numbers of waders. However, due to the lack of intertidal habitats it is unlikely that these areas will ever contain significant number of birds. The habitats within these areas are not of significant value for most water birds in the context of the River Shannon and River Fergus Estuaries SPA. Interpretation of the habitats present within this Strategic Development Location shows these habitats to be of little value to all but a few species most notably Cormorant. Summary data and roost location maps from the roost survey (24th and 25th February 2010) (NPWS, 2012) indicate the presence of 5 roost locations within the subsite with one of these located within the Strategic Development Location. The following species are recorded roosting, Mallard, Teal, Curlew, Black Headed Gull, Greenshank and Wigeon. As roosts have been recorded near the existing pier careful consideration at a project level must take this roost into account and ensure no significant effects. Mitigation measures may be required to off-set any potential impact. It must 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. **Table 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must consider whether principal supporting habitat from another sub-site will also be effected or is currently being	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry at this location 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[2] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts[2]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	However, it should be noted that this subsite is quite large with the identified Strategic Development Location only covering a very small portion of the subsite.	development elsewhere with the SPA in order to make an assessment of the in-combination and cumulative impacts.		

Table 4.2 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Moneypoint & Adjacent Lands, Co.Clare from the SFIP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry at** **Site B Moneypoint & Adjacent Lands**	**Estuaries** **Potential Impacts:** Yes Habitat present within site	• 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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not Present			
	Coastal Lagoons **No Potential Impacts*:*** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts*:*** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts*:*** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts*:*** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts*:*** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			
	Large shallow inlets and bays **Potential Impacts*:*** Large shallow inlets and bays present-Shannon Estuary	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this Strategic Development Location and at the chosen location for any future development once known. Any development associated with Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Subtidal sand to mixed sediment with *Nucula nucleus* community complex.	No residual impacts
	Reefs **Potential Impacts*:*** Present on the verges of the Strategic Development Location boundary co-insiding with areas of Faunal turf dominated subtidal reef complex and mixed sub-tidal reef community along shoreline	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location impact on this reef habitat can be avoided through the careful selection of areas for development, type of infrastructure used, scale of project etc. The exact location must avoid this habitat. 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	of site		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	
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not present			
	River Lamprey **No Potential Impacts*:*** No records for this site			
	Brook Lamprey **No Potential Impacts*:*** No records for this site			
	Sea Lamprey **Potential Impacts*:*** Known records through out the Shannon Estuary and	• 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	• In the absence of detailed baseline data on fish communities in the Strategic Development Location a marine fish community composition and abundance survey will be required in the overall marine aquatic footprint for which the develop ment will take	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area indicates the presence of River Lamprey.	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.	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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Bottle-nosed Dolphin **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. As part of the SIFP process a scoring system for assessing the 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. This system which looked at key criteria such as slope, depth etc identified the marine environment directly infront of this site as being of intermediate habitat priority. In addition a programme of Static Acoustic Monitoring was undertaken as part of the SIFP project focusing on deep water berths within the estuary. The jetty at Moneypoint was one of these key sites. Overall, their occurrence is progressively less the further upriver but is significant at Moneypoint (c80% days with detections). Moneypoint has operated as an industrial site for a number of years with Bottlenose Dolphin activity maintained	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 • Collison 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 Waters[3] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - The findings from the Static Acoustic Monitoring undertaken at this site must 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 must 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 March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	throughout this time in the vicinity of the site indicating that the industrial site can operate in harmony with the resident group of bottlenose dolphins in the estuary. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of high habitat priority. This Strategic Development Location is also located within "critical habitat" as per the conservation objectives (NPWS, 2012) for the Shannon Estuary. 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. This must include land based activities which would require rock blasting, pile driving etc. also.			
	Freshwater Pearl Mussel **No Potential Impacts*:*** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	<u>Otter</u> **Potential Impacts** No records for this site from Biodiversity Ireland or through previous EIS surveys undertaken within the confines of the Cahiracon strategic development location. Part of the outer shoreline of this Strategic Development Location has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Strategic Development Location Marine Related Industry** **Site B Moneypoint & Adjacent Lands**	**Cormorant (Breeding and wintering)** **Whooper Swan (Wintering)** **Brent Goose (Wintering)** **Shelduck (Wintering)** **Wigeon (Wintering)** **Teal (wintering)** **Pintail (Wintering)** **Shoveler (Wintering)** **Scaup (Wintering)** **Golden Plover (Wintering)** **Grey Plover (Wintering)** **Lapwing (Wintering)** **Knot (Wintering)** **Dunlin (Wintering)** **Black-tailed Godwit (Wintering)** **Bar-tailed Godwit (Wintering)** **Curlew (Wintering)** **Redshank (Wintering)** **Greenshank (Wintering)** **Chroicocephalus ridibundus (Wintering)** **Wetlands and Waterbirds** (*As listed in the NPWS Detailed Conservation Objectives September 2012*) **Potential Impacts:** No I-WeBS subsite information is available for this Strategic Development Location. While the Strategic Development Location is located between intertidal areas used by wintering birds within other parts of the SPA the core of this site is located within a current industrial area. Despite this 13 of the 22 special conservation interests of the SPA were recorded in or near the site (Primarily within and around Ballymacrinan Bay, Ballymacrinian, Carrowdotia North and Killimar which lie outside of the Strategic Development Lcoation)	While the core of the Strategic Development Location is located within a current industrial area the fact that it is located adjacent to one of the most important SPAs in the country and directly between some of the most important parts of that SPA further detailed surveys to those previously carried out at this site may be required of the migratory and wintering wildfowl movements in the vicinity of the location as it largely lies within the flight path of Poulnasherry and Clonderlaw Bays. The scale of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. Given that this site is also within the pSPA boundary 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.	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[4] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO002165.pdf

Location	Qualifying Interests & Potential Impacts [4]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	through surveys carried out as part of the Moneypoint Wind Farm EIS, November 2011. The 2010/2011 winter survey found that wildfowl numbers peaked in January with areas primarily used by wildfowl including Killimer Quay, Ballymacrinan Bay and also fields immediately noth of Ballymacrinan Bay which were used by foraging gulls and waders such as Curlew and Lapwing.		from natural patterns of variation. • Reference must 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	

Table 4.3 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Foynes Island, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site C** **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 Development Locations 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 Development Location - 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 must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			mixed sediment with polychaetes, molluscs and crustaceans community complex" surrounding this Strategic Development Location. Any future development within this Strategic Development Location 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.	
	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 Development Location 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. 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). - If deemed to be of unfavourable conservation status these areas must 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
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Salicornia and other annuals colonizing mud and sand **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.			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **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.	• 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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. *Spartina* 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **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 Development Location.	
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Reefs **Potential Impacts*:*** Present on the verges of the Strategic Development Location boundary co-insiding with areas of Fucoid dominated inter-tidal reef complex along shoreline of site	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location 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 must 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	None anticipated
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Brook Lamprey **No Potential Impacts:** No records for this site			
	Sea Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			measures must 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)	Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Bottle-nosed Dolphin **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	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 • Collison 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 Waters[5] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - The findings from the Static Acoustic Monitoring undertaken at this site must be used to inform any future development	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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 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, *pers comm.*) . 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. This Strategic Development Location is not located within a "critical habitat" as per the conservation objectives (NPWS, 2012) for the Shannon Estuary.		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 must 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 March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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			
	Otter **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. Part of the outer shoreline of this Strategic Development Location has been indicated as part of the 10m 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 spcies from the site. Therefore, at project level an Otter survey must be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 [6]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Strategic Development Location Marine Related Industry** **Site C Foynes Island**	Sub-site OI440: **Shelduck** **Wigeon** **Teal** **Cormorant** **Lapwing** **Black tailed Godwit** **Bar tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black necked Grebe** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site information*) **Potential Impacts:** The sub-site OI440 surrounds the eastern side of Foynes Island and the area directly in front of Foynes Port. (**See Figure 3.23)** 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 must 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 actually usage and location of 227 waterbides recorded within this site the impact	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	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[6] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [6]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	may be more or less.		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 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 must not impact on these feeding areas.	

Table 4.4 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Land to the rear of Foynes, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site D** **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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Habitat present within Robertstown Creek not directly within Strategic Development Location	• 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 Development Location 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 unfavourable conservation status these areas must 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 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 on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• The permanent habitat area is stable or increasing, subject to natural processes. Please also refer to specific targets under estuaries. • Conserve the following communities' types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates spp* 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 *Scolelepis squamata* and *Pontocrates spp* 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.	
	Coastal Lagoons **No Potential Impacts*:*** *No Coastal Lagoons located within the vicinity of the* Strategic Development Location.			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts*:*** *No Vegetated sea cliffs of the Atlantic and Baltic Coasts*			
	Salicornia and other annuals colonizing mud and sand **Potential Impacts:** No site Salicornia and other annuals colonizing mud and sand within site boundary			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** Located adjacent to the site only and not within. Documented through Saltmarsh Monitoring 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.	• 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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 o common cordgrass (*Spartina anglica*), 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 must 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.	
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Large shallow inlets and bays **No Potential Impacts*:*** Not present			
	Reefs **No Potential Impacts*:*** Not present			
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not present			
	River Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• 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 must be considered at project level assessment.	
	Brook Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Sea Lamprey **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.	• In the absence of detailed baseline data on fish communities in the Strategic Development Location 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 Development Location across all seasons over a minimum 1-year period.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		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.	• The sampling season, sampling methods and reporting of results must 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 there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Atlantic Salmon</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"*	• 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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• 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)	
	Bottle-nosed Dolphin **Potential Impacts*:*** Bottle-nose dolphins are present in the greater Shannon Estuary but are not located within the Strategic Development Location or the adjacent Robertstown Estuary.			
	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 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. SDL does not contain area identified as part of the 10m commuting buffer as per 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	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	reporting within this site rather than an absence of the spcies from the site. Therefore, at project level an Otter survey must be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.			
	Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC) **Potential Impacts*:*** Daubenton's Bat, Soprano pipistrelle and Leislers 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 *et al,* 2011) species specific surveys will be required at this site.	

Location	Qualifying Interests & Potential Impacts [7]	Likely Potential Impacts from the Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Strategic Development Location** **Marine Related Industry** **Site D Land to the rear of Foynes Port**	***Shelduck*** ***Wigeon*** ***Teal*** ***Lapwing*** ***Knot*** ***Dunlin*** ***Bar-tailed Godwit*** ***Black-tailed Godwit*** ***Curlew*** ***Greenshank*** ***Black Headed Gull*** ***Redshank*** ***Cormorant*** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** The sub-site OI439 which is adjacent to the Robertstown Creek (**See Figure 3.25)** 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.	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.	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[7] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [7]	Likely Potential Impacts from the Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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. **Table 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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.	

Table 4.5 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Askeaton Business Park, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site E Askeaton**	**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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location will need to assess the impacts to water quality and how it will affect the WFD Status and	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			objectives together with the requirements arising from the Marine Strategy Framework Directive.	there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts*:*** Habitat present only on the boundary of the Strategic Development Location 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 Development Location 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 Development Location 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 must 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 with polychaetes, molluscs and crustaceans community complex” surrounding this Strategic Development Location.	None antiicipated
	Coastal Lagoons **No Potential Impacts*:*** *No Coastal Lagoons located within the vicinity of the opportunity*			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts*:*** *No Vegetated sea cliffs of the Atlantic and Baltic Coasts*			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts***: No record exists for this habitat within the area of interest.*			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* 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). • 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts***: No record exists for this habitat within the area of interest.*			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			
	Large shallow inlets and bays **No Potential Impacts*:*** Not present			
	Reefs **No Potential Impacts*:*** Not present			
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not present			
	River Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 must be considered at project level assessment.	Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Brook Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Sea Lamprey **No Potential Impacts:** No records for this site, no connection with marine environment			
	Atlantic Salmon			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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 Quercus are currently undertaking an National Otter Survey on behalf of NPWS. Following the publication of these results	• In-direct disturbance • Loss of habitat • Loss of access to feeding areas • Loss of breeding areas	- Site specific surveys will be required to determine the use of this use by Otters for either commuting, feeding or breeding in order to avoid adverse effects. - 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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 spcies from the site. Therefore, at project level an Otter survey must be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.		- 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	

Location	Qualifying Interests & Potential Impacts [8]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Strategic Development Location Marine Related Industry** **Site E Askeaton**	Sub-site 0I491: **Wigeon** **Teal** **Cormorant** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black-headed Gull** Sub-site OI458: **Shelduck** **Wigeon** **Teal** **Grey Plover** **Knot** **Black-tailed Godwit** **Curlew** **Greenshank** **Redshank** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** The sub-site OI491 which lies to the	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.	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[8] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [8]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	north of the Strategic Development Location nearest the estuary (**See Figure 3.27)** has 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 3.25).** 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		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. **Tables 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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 Development Location 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.	

Location	Qualifying Interests & Potential Impacts [8]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	part of the SPA designation.			

Table 4.6 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Aughinish Island, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site F Aughinish 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 Development Locations 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 Development Location - 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 must include an appropriate assessment. - The extent of estuarine communities within the area of potential needs to be determined. Any future development or discharges consents required at this site must not impact on the assimilative capacity of the receiving water. Early consultations with the Environment Section of Limerick County Council must be initiated to avoid delay and to establish capacity at this location. 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Habitat present surrounding Strategic Development Location within Robertstown and Poulaweala Creeks but not directly within Strategic Development 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 Development Location 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 must also be assessed. - 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	None antiicipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 *Scolelepis squamata* and *Pontocrates spp* 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 *Scolelepis squamata* and *Pontocrates spp* community and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	
	Coastal Lagoons **Potential Impacts:** No Coastal Lagoons located within the vicinity of the Strategic Development Location			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts***: No Vegetated sea cliffs of the Atlantic and Baltic Coasts*			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts***:* Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potnetial Impacts** Located surrounding the site to the west along the boundary with Robertstown Creek and to the estuary side of the site but not within the site itself. Documented through Saltmarsh Monitoring Project 2007-2008 and through desktop edits in 2009	• 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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts*:*** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			
	Large shallow inlets and bays **No Potential Impacts*:*** Not present			
	Reefs **Potential Impacts*:*** Present on the verges of the Strategic Development Location boundary co-insiding with areas of Fucoid dominated inter-tidal reef	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location impact on this reef habitat can be avoided through the careful selection of areas for development, type of infrastructure used, scale of project etc. The exact location must avoid this habitat. Through the use of the existing pier infrastructure potential damage to	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	complex along parts iof the shoreline of the site		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	
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not present			
	River Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 must be considered at project level assessment.	there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Brook Lamprey **Potential Impacts*:*** Unlikely that Brook Lamprey will be present. However, within the immediate site two streams traverse the sote 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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Sea Lamprey **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.	• In the absence of detailed baseline data on fish communities in the Strategic Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon)	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		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.	• 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.	should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Atlantic Salmon</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"*	• 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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			anthropogenic causes • Access to all water courses down to first order streams • At least Q4 at all sites sampled by the EPA (Freshwater)	the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. A C-POD was placed on the jetty at Aughinish Alumina to monitor Bottlenose Dolphin activity acoustically. Overall, their occurrence is progressively less the further upriver but is still significant at Aughinish (31% days with detections). Peak detections at Aughinish occurred during winter and at flood tides. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was	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 • Collison 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 Waters[9] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - The findings from the Static Acoustic Monitoring undertaken at this site must 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 must 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 March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. This Strategic Development Location is not located within "critical habitat" as per the conservation objectives (NPWS, 2012) for the Shannon Estuary. 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 and appropriate mitigation measures devised in consultation with both the SDWF and NPWS.			
	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 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	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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 shoreline of this Strategic Development Location has been indicated as part of the 100m 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 spcies from the site. Therefore, at project level an Otter survey must be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.		- 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	
	Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC) **Potential impacts:** Six Bat species have been recorded during the course of surveys carried out in 2003 within this site. Source; Aughinish Alumina EIS, 2005 Daubenton's Bat Soprano pipistrelle Common pipistrelle Leislers Bat Brown Long Eared Whiskered Bat	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.	This site holds semi-natural habitats that are likely to be of some value to feeding bats such as common pipistrelle, soprano pipistrelle and Leisler's bat. However, it does not hold suitable roost sites for these species (Source; Kelleher, 2003) Six species were found to occur in a 2003 survey carried out by Mr. C. Kelleher, including Daubenton's which was seen on the Robertstown River estuary. Whiskered and brown long-eared bats were detected along some hedgerows while the other species were soprano, common pipistrelle and Leisler's. Overall the scrub areas were considered the best bat habitat on site. All of these species are protected under the Wildlife Act of 1976 and the Wildlife (Amendment) Act of 2000. All are also protected under the Bern Convention and the Bonn Convention, both of which have been ratified by the Irish government. All are also listed under Annex IV of the EU Habitats Directive, which seeks to protect rare species, including bats, and their habitats, and requires that appropriate monitoring of populations be undertaken. The EU Habitats Directive Annex II species; lesser horseshoe bat, was not recorded from the site. It is however, known from sites 15km to the west of Aughinish and also 15km east of Aughinish and may therefore be an occasional visitor to the site.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			Any future development of this site would therefore require site specific surveys to establish disturbance to 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 six species.	

Location	Qualifying Interests & Potential Impacts [10]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Strategic Development Location Marine Related Industry** **Site F Aughinish Island**	**Sub-site OI439:** ***Shelduck*** ***Wigeon*** ***Teal*** ***Lapwing*** ***Knot*** ***Dunlin*** ***Bar-tailed Godwit*** ***Black-tailed Godwit*** ***Curlew*** ***Greenshank*** ***Black Headed Gull*** ***Redshank*** ***Cormorant*** **Sub-site OI436*:*** ***Wigeon*** ***Teal*** ***Cormorant*** ***Lapwing*** ***Black tailed godwit*** ***Curlew*** ***Greenshank*** ***Redshank*** ***Black-Headed Gull*** ***Sub-site OI437:*** ***Shelduck***	As this potential site (Aughinish Island) is located adjacent to the sub-sites OI439, OI436, OI437 and OI438 disturbance is the key impact	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[10] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [10]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Wigeon ***Teal*** ***Cormorant*** ***Grey Plover*** ***Lapwing*** ***Dunlin*** ***Black tailed Godwit*** ***Bar tailed Godwit*** ***Curlew*** ***Greenshank*** ***Redhshank*** ***Black-Headed Gull*** ***Sub-site OI438:*** ***Shelduck*** ***Wigeon*** ***Teal*** ***Cormorant*** ***Grey Plover*** ***Ringed Plover*** ***Dunlin*** ***Black tailed Godwit*** ***Bar tailed Godwit*** ***Curlew*** ***Greenshank*** ***Redhshank*** ***Black-Headed Gull*** ***Shoveler*** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012*) **Potential Impacts:** The sub-site OI439 which is adjacent to the Aughinish Alumina site on the Robertstown Creek side (**See Figure 3.29)** 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.		Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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 Strategic Development Location (Aughinish Island) is located adjacent to the four sub-sites and is within both the SPA and pSPA boundary therefore depending on the scale of the project potential direct or in-direct impacts may occur. The entire estuary is a continuum as used by the birds. It must 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. **Tables 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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.	

Location	Qualifying Interests & Potential Impacts [10]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	The sub-site OI436 which is adjacent to the Aughinish Alumina site on the Poulaweela Creek side (**See Figure 3.29)** site has 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 3111 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI436 is moderately sensitive to future development at a strategic level. To the front of the site on the estuarine side surrounding the existing jetty two further sub-sites are found OI437 & OI438. Sub-site OI437 Aughinish East has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 13 of the qualifying species being recorded at this site coupled with 1915 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI437 is moderately sensitive to future development at a strategic level. Sub-site OI438 Aughinish Island has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 15 of the qualifying species being recorded at this site coupled with 953 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI438 is moderately sensitive to future development at a strategic level.			

Table 4.7 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Tarbert, Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site G Tarbert**	**Estuaries** **No Potential Impacts:** Not present	• 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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Small portion of habitat located surrounding the existing pier within Tarbert Bay.	• 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 Development Location 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 must also be assessed. - Much of this site is bounded on the coastal side by embankments which serve to protect both the agricultural	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 *Scolelepis squamata* and *Pontocrates spp* 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 *Scolelepis squamata* and *Pontocrates spp* community and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (Glauco-Puccinellietalia maritime) **No Potential Impacts:**			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Not present			
	Mediterranean salt meadows (Juncetalia maritimi) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Present surrounding the site	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this Strategic Development Location and at the chosen location for any future development once known. Any development associated with Marine Related Industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Subtidal sand to mixed sediment with *Nucula nucleus* community complex, Fucoid and Faunal turf dominated community complex.	No residual impacts
	Reefs **Potential Impacts*:*** Present on the verges of the Strategic Development Location boundary co-insiding with areas of Faunal turf dominated subtidal reef	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location 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 must 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.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	complex and Fucoid dominatyed reef community along shoreline of site		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	
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinion caerulecae) **No Potential Impacts:** Not present			
	Alluvial forests with Alnus glutinosa and Fraxinus excelsior also Salix spp. And sometimes Quercus robur **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **No Potential Impacts:** No records for this site			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Sea Lamprey **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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon 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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must be developed in consultation with IFI.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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)	
	Bottle-nosed Dolphin **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. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those	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 must it be required • Impacts to water quality in the water Shannon Estuary as a result of increased discharges • Collison 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 Waters[11] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - The Static Acoustic Monitoring which was carried out at other sites throughout the estuary as part of the pilot study under the SIFP must be applied at this site. The findings from the Static Acoustic Monitoring undertaken at this site must be	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of intermediate habitat priority. In addition a programme of Static Acoustic Monitoring was undertaken as part of the SIFP project focusing on deep water berths within the estuary. The jetty at Moneypoint is the nearest deep water static acoustic monitoring site to Tarbert. Overall, their occurrence is progressively less the further upriver but is significant at Moneypoint (80% days with detections). Moneypoint has operated as an industrial site for a number of years with Bottlenose Dolphin activity maintained throughout this time in the vicinity of the site indicating that the industrial site can operate in harmony with the resident group of bottlenose dolphins in the estuary. This site is also located within a region of critical habitat for Bottlenose Dolphins as per the detailed conservation objectives (NPWS, 2012). Also, as part of the SIFP process a scoring system for		used to inform any future development and timing of any associated works. - 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 must 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 March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this Strategic Development Location as being of high habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction may cause disturbance, must 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. This must include land based activities which would require rock blasting, pile driving etc.			
	Freshwater Pearl Mussel **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Otter **Potential Impacts:** Evidence of Otter presence was detected during the course of surveys undertaken as part of the Endesa Ireland EIS,2009 The outer shoreline of Tarbert Island and along the mainland at Tarbert has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17. The natural lagoon has not been including as commuting habitat within this dataset. 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 spcies from the site. Therefore, at project level an Otter survey must be carried out prior to any development within the site and appropriate steps taken to prevent impact to this qualifying species.	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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
	Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC) **Potential Impacts*:*** The principal finding for bats at Tarbert from the 2009 Endesa EIS was that there were no roosting bats encountered during	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.	While the site itself does not hold suitable roost sites for these species three species were found and recorded previously foraging within the site. Adjacent areas to the site contain native woodland which provides roosting sites. All of these species are protected under the Wildlife Act of 1976 and the Wildlife (Amendment) Act of 2000. All are also protected under the Bern Convention and the Bonn Convention, both of which have been ratified by the Irish government. All are also listed under Annex IV of the EU Habitats Directive, which seeks to protect rare species, including bats, and their habitats, and requires that appropriate monitoring of populations be undertaken.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	daytime, dusk or pre-dawn observations. Three bat species (Soprano pipistrelle, Common pipistrelle and Leislers Bat) were recorded entering the site from adjacent lands and again exiting the site prior to dawn.		Any future development of this site would therefore require site specific surveys to establish disturbance to any feeding areas or habitat corridors utilised within the site.	

Location	Qualifying Interests & Potential Impacts [12]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Strategic Development Location** **Marine Related Industry** **Site G Tarbert**	**Sub-site OI425:** Teal Ringed Plover Dunlin Curlew Redshank Black headed Gull (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** Site is located within or adjacent to an SPA and pSPA The sub-site OH425 which is adjacent to the Tarbert Strategic Development Location (**See Figure 3.31)** site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 8 of the qualifying species being recorded at this site coupled with 562 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH425 is moderately sensitive to future development at a strategic level	As this potential site (Tarbert) is located adjacent to the sub-site OH425 disturbance is the key impact.	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must also be made to the relevant species specific targets for	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[12] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [12]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 While the core of the site is located within a current industrial area the fact that it is located adjacent to one of the most important SPAs in the country and directly between some of the most important parts of that SPA further detailed surveys to those previously carried out at this site may be required of the migratory and wintering wildfowl movements in the vicinity of the site as the site largely lies within the flight path of Tarbert Bay. The scale of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale 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. **Tables 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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.	

Table 4.8 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Tarbert - Ballylongford, Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site H** **Tarbert - Ballylongford**	**Estuaries** **Potential Impacts:** Yes Habitat present within marine element of site.	• 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 Development Locations 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 Development Location - 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 must 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 Development Location. Any future development within this Strategic Development Location 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (Glauco-Puccinellietalia maritime) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (Juncetalia maritimi) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **No Potential Impacts:** Not present			
	Reefs **Potential Impacts*:*** Present on the verges of the Strategic Development Location boundary co-insiding with areas of Faunal turf dominated subtidal reef complex and mixed sub-tidal reef community along shoreline of site	Potential for direct habitat loss and degradation of community type located within this Strategic Development Location	Depending on type, scale and location of development within this Strategic Development Location impact on this reef habitat can be avoided, mitigated or minimised through the careful selection of areas for development, type of infrastructure used, scale of project and type of construction methodology utilised. The exact location must avoid areas of uncommon, rare or protected marine benthic species associated with this feature. 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	None anticipated
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (Molinion caerulecae) **No Potential Impacts:** Not present		While no areas of Molinia Meadows on calcareous peaty or clay-silt-laden soils have been identified within the vicinity of this SDL the full distribution of this habitat is currently unknown and therefore further surveys may be required at project level to establish its presence or absence within the vicinity of any future development.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Alluvial forests with Alnus glutinosa and Fraxinus excelsior also Salix spp. And sometimes Quercus robur **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **Potential Impacts:** No records for this site as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* As part of the ecological surveys undertaken for the LNG EIS (p. 121 & 123) one fish was observed on the Killeaney River which was thought to be a Brook Lamprey but it was not definitively identified. This is unlikely to be a Brook Lamprey 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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 definitive records exist at this site it may be likely that they occur in most rivers that allow access to spawning and nursery areas from the sea. As part of the LNG proposal mitigation measures have already been identified for part of this strategic development location, should further additions to this facility or new facilities at this landbank be identified in the future further mitigation measures may be required.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Sea Lamprey **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"* the 10km national grid squares for this area indicates the presence of River Lamprey.	• 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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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 Development Location 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 Atlantic Salmon of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must be developed in consultation with IFI.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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)	
	<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. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for	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 • Collison 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 Waters[13] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector. - The Static Acoustic Monitoring which was carried out at other sites throughout the estuary as part of the pilot study under the SIFP must be applied at this site. The findings from the Static Acoustic Monitoring undertaken at this site must be used to inform any future development and timing of any associated works. - 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 must consider the findings of this	

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site it is located within a region of "critical habitat" for Bottlenose Dolphins as per the detailed conservation objectives (NPWS, 2012) therefore 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. This must include land based activities which would require rock blasting, pile driving etc.		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 March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Otter **Potential Impacts:** No evidence of otters was found in the study area during the course of the ecological surveys carried out as part of the LNG EIS however Otter sprainting sites and resting areas were noted on the boundary of the site (Ref. Figure 10.7 LNG EIS) As the proposed site goes beyond that which was investigated for the LNG facility further field studies may be required should developments arise outside of this key area. The shoreline of this Strategic Development Location has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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
	Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC) **Potential Impacts:** A roost of brown long-eared bats was recorded in a disused lodge during the course of field investigations carried out as part of	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.	All bat species are protected under the Wildlife Act of 1976 and the Wildlife (Amendment) Act of 2000. All are also protected under the Bern Convention and the Bonn Convention, both of which have been ratified by the Irish government. All are also listed under Annex IV of the EU Habitats Directive, which seeks to protect rare species, including bats, and their habitats, and requires that appropriate monitoring of populations be undertaken. While the LNG EIS identified site and project specific mitigations measures the potential site being assessed under the SIFP also contains additional hedgerows and potential roosting and feeding areas which were not assessed as part of that proposal. Therefore, any future development of this site would require site specific surveys to establish disturbance to any feeding areas or habitat corridors utilised within the site.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	the Shannon LNG Shannon Pipeline EIS. Both this species and pipistrelle were recorded feeding along a hedge which runs south from this lodge and which may be an important commuting route for this species. While the exact co-ordinates for this record have not been provided the proposed corridor is in close proximity to the Strategic Development Location. Records also exist from Biodiversity Ireland for Soprano pipistrelle roosting in a building at Coolnanoonagh which is directly within the development location. Pipistrelle spp Brown Long Eared			

Location	Qualifying Interests & Potential Impacts [14]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Imapcts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Strategic Development Location Marine Related Industry** **Site H Tarbert - Ballylongford**	**Sub-site: OK509** **Whooper Swan** **Light-Bellied Brent Goose** **Shelduck** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Bar-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Pintail** **Shoveler** **Black-headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** Site is located within or adjacent to an SPA and pSPA The Carrig Island sub-site OK509 covers a portion of the Tarbert - Ballylongford Strategic Development Location to the west nearest the Ballylongford estuary (**See Figure 3.32) and** has been given a high rating from the	The core of the site is not located within one of the sub-sites for which detailed bird monitoring information is available. Deep water areas are not as valuable for birds as intertidal areas and therefore not expected to contain as many species. Intertidal habitat contains soft sediments and may contain significant densities of invertebrates (worms, crustaceans, bivalve molluscs and gastropods such as *Hydrobia*), which comprise the staple diet of many species of wildfowl and wading birds. Beds of marine grasses, which only occur in shallow areas, are also important food resources for grazing wildfowl, especially during autumn and winter. The habitats present within the deep water areas, nearest to this site, do not provide rich food resources for over-wintering birds similar to the large expanses of intertidal habitat in the inner estuary, east of Foynes Island. The rocky shoreline and open water will provide food for a limited number of species such as Cormorant, some gulls and small numbers of waders. Surveys of the intertidal areas carried out as part of the LNG EIS show that there are significant numbers of water birds present on a regular basis in the intertidal area and neighbouring waters adjacent to the Shannon Development lands. Some of the species present show significant proportions of the total known populations in the entire SPA (e.g. Scaup, Oystercatcher, Lapwing). Nine of the species found on the coast adjacent to the Shannon Development lands are qualifying interests for the SPA and, as such, would be considered important reasons for designation. The lands above high water mark are not of great significance for birds with the exception of one observation of a flock of Curlew feeding on several fields in January 2007. (Note: Curlew range widely inland in mid-winter and may be found on a variety of grassland sites throughout the country). These fields were identified as being unsuitable for breeding Curlew. Development and any future zoning within the portion of the Strategic Development Location currently overlapping with the Carrig Island subsite on the land (and outlined in red within Figure 3.32) together with	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. Any development associated with Marine Related Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must also be made to the relevant species specific	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[14] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [14]	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Imapcts
	assessment of low-tide sub-sites based on the identification of 20 of the qualifying species being recorded at this site coupled with 7087 waterbirds recorded based on the sum of the peak counts over 2010/2011. NPWS have carried out an assessment of the species richness across the subsite level based on the 2010/2011 waterbird survey. The Carrig Island subsite was the top site scoring the highest species richness. This implies the sub-site OH516 is highly sensitive to future development at a strategic level.	the inter-tidal area must be avoided for this reason thereby removing the potential to impact directly on the qualifying interest features of the SPA/pSPA. Should future development take place in the areas outside of that which was incorporated into the LNG EIS further surveys may be required. The extent of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. Given that this site is also within the pSPA boundary 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	targets for ➢ Whooper Swan ➢ Light-Bellied Brent Goose ➢ Shelduck ➢ Wigeon ➢ Teal ➢ Cormorant ➢ Ringed Plover ➢ Golden Plover ➢ Grey Plover ➢ Lapwing ➢ Knot ➢ Dunlin ➢ Black-tailed Godwit ➢ Bar-tailed Godwit ➢ Curlew ➢ Greenshank ➢ Redshank ➢ Pintail ➢ Shoveler ➢ Black-headed Gull • as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives	

Table 4.9 Appropriate Assessment of Natura 2000 Sites against Marine Related Industry theme and site location at Limerick Dock, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Site Natura 2000 Site Code 2165 - Lower River Shannon **Theme/Strategic Development Location** **Marine Related Industry** **Site I** **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 Development Locations 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 Development Location - 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 must 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 must 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/	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 Development Location. Any future development within this Strategic Development Location 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.	all IROPI proposals,
	<u>Mudflats and sandflats not covered by seawater at low tide.</u> **Potential Impacts:** Small portion of habitat present on western portion of site only (Deel River Estuary to Ballynaclough River Estuary) as indicated through NPWS sediment shores GIS data set 1140.	• 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 Development Location 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 must also be assessed. - 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 *Scolelepis squamata* and *Pontocrates spp* 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 *Scolelepis squamata* and *Pontocrates spp* community and Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Coastal Lagoons **Potential Impacts:** No Coastal Lagoons located within the vicinity of the Strategic Development Location			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **Potential Impacts*:*** No record exists for this habitat within the area of interest.			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **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 Development Location 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 *Spartina anglica* and must not encourage the spread of *Spartina* 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,	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **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 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.	
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not present			
	Large shallow inlets and bays **No Potential Impacts*:*** Not present			
	Reefs **No Potential Impacts*:*** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*)			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur*			
	River Lamprey **Potential Impacts*:*** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* 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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 must be considered at project level assessment.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Brook Lamprey **Potential Impacts:** As per *"The Status of EU Protected Habitats and Species*	• 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,	• In the absence of detailed baseline data on fish communities in the Strategic Development Location 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment.

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	in Ireland, 2008" the 10km national grid squares for this area indicate current distribution for this site.	barriers to migration such as weirs, gross pollution and specific pollutants.	use (if any) by Brook Lamprey of this Strategic Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 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.	Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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 Development Location 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 Development Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Atlantic Salmon</u> **Potential Impacts:** Known records through out the Shannon Estuary and distribution mapped as present along this stretch in the *"The*	• 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 Development Location 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 Atlantic Salmon of this Strategic Development	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Status of EU Protected Habitats and Species in Ireland, 2008"		Location across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must be developed in consultation with IFI. Any development associated with the development of 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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	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 • Collison 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 Waters[15] - Development of similar guidance to the draft NPWS Guidance on Man-Made sounds specifically for the Shannon Estuary should be developed by the appropriate statutory authorities and adhered to in association with any future development at this location by all sector - 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 must consider the findings of this work. Any development associated with the development of a Marine Related	

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

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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-stream as Limerick Dock and therefore any direct impact is deemed to imperceptible. This Strategic Development Location is not located within "critical habitat" as per the conservation objectives (NPWS, 2012) for the Shannon Estuary. 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		Industry at this site must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	the estuary will also need to be considered.			
	<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)			
	<u>Otter</u> **Potential Impacts:** The closest record of Otters to this site is from 1980 (Source; Biodiversity Ireland) at Ballynaclough 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 Development Location has been indicated as part of the 10m 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 spcies from the site. Therefore, at	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 on associated attributes from the development of Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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.			
	Bat species (All bat species are protected where they occur under Annex IV of the Habitats Directive either within or outside an SAC) **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 Leislers 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 and therefore further ground truthing would be required should development of this SDL require alteration to existing buildings or structures.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts [16]	Likely Potential Impacts from the Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Strategic Development Location Marine Related Industry** **Site I 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 Sub-Site Information*) **Potential Impacts:** The sub-site OI447 which is within the River Shannon and runs along the front of the Limerick Dock site (**See Figure 3.34)** 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 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 200 site in the context of the sites conservation objectives. **Tables 5.1-5.7** of the NIR 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 Development Location an assessment of the % loss of principal supporting habitat should be undertaken, its ability to utilise	Potential effects from the theme Marine Related Industry and the associated activities which may lead to damaging effects are outlined in Tables 3.13 & 3.14 together with mitigation measures which are outlined in Tables 6.1, 6.2 & 6.3 which must be adhered to in relation to this site at project level. 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 Development Location - 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 deign. 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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,	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[16] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [16]	Likely Potential Impacts from the Strategic Development Location include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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.	Black-tailed Godwit, Curlew, Greenshank, Redshank, Black Headed Gull, as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives	

Appropriate Assessment of Aquaculture Areas of Opportunity

Table 4.10 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Carrig Island, Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity Aquaculture at** **Site N Carrig Island**	**Estuaries** **No Potential Impacts:** Not present			
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **Potential Impacts:** Yes small area of habitat present on the verge of Carrig island to the east of the site. While Salicornia was not recorded directly within the site boundary it was recorded just outside the boundary of the site through the Saltmarsh Monitoring Project 2007-2008 by	• 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. • Any future development within this Area of Opportunity will need to ensure it does not encroach on any recorded Salicornia 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the aquaculture industry must maintain the key targets associated with	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	NPWS/DEHLG. The habitat is found on Carrig island therefore any future development should not encroach on this habitat.		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. • No decline, subject to natural processes. • Maintain or where necessary restore natural circulation of sediments and organic matter, without any physical obstructions • Maintain natural tidal regime • Maintain/restore 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 proceeses including erosion and succession • Maintain structural variation within sward • Maintain more than 90% of area outside creeks vegetated • Maintain the presence of species-poor communities with typical species listed in Saltmarsh Monitoring Project (McCorry and Ryle, 2009) • No significant expansion of common cordgrass (*Spartina anglica*), with annual spread of less than 1%	None anticipated
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potnetial Impacts:** Located within the site. Documented through Saltmarsh Monitoring Project 2007-2008 and through desktop edits in 2009	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **Potential Impacts:** A number of areas of MSM were documented through the desktop survey element of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG Depending on the extent and location of future development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. The main areas containing this habitat are located in the inter-tidal area in-side Carrig island where it is unlikely any developments in relation to aquaculture will take place. As all areas of Mediterranean salt meadow habitat are within the cSAC they are therefore of international importance due to this location, Any future licence applicatiions within this area	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	of opportunity will need to ensure it does not encroach on MSM 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species.		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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not Present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not Present			
	Large shallow inlets and bays **Potential Impacts:** Present across entire site	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site	No residual impacts
	Reefs **Potential Impacts:** Present in small pockets co-insiding with areas of Fucoid-dominated intertidal reef community complex habitat surrounding Carrig Island according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Depending on type, scale and location of aquaculture related infrastructure within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid this habitat. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC.	No residual impacts

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• Ensure the distribution of Reefs is stable, subject to natural processes • The permanent habitat area is stable, subject to natural processes • Conserve the reef community types located within this area of opportunity.	
	Perennial vegetation of stony banks **Potential Impacts:** One record just outside the area of opportunity boundary.	• Disruption of sediment supply • Direct damage to create access to aquacutlure areas by vehicles • Removal of gravel to develop hard standing areas associated with aquaculture industry.	It is unlikely that any future aquaculture development at this site will impact on this habitat given its location outside of thearea of opportunity. In-direct impacts e.g. through obtaining access to the aquaculture site at low tide by growers Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Area stable or increasing subject to natural processes, including erosion and succession • No decline, or change in habitat distribution, subject to natural processes • Maintain the natural circulation of sediment and organic matter, without any physical obstructions • Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession • Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones • Negative indicator species must represent less than 5% cover	None anticipated
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not Present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not Present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **Potential Impacts:** No records for this site as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"*			
	Sea Lamprey **Potential Impacts*:*** Known records through out the Shannon Estuary and as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area indicates the presence of River Lamprey.	• 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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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 Area of Opportunity 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	Where appropriate mitigation measures cannot remove the potential for adverse

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			to determine the use (if any) by Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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. • 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)	effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Bottle-nosed Dolphin</u> **Potential Impacts:** Bottle-nose dolphins are present in the greater Shannon Estuary	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	Freshwater Pearl Mussel **No Potential Impacts*:*** Not present			
	Otter **Potential Impacts:** No evidence of otters was found in the study area during the course of the ecological surveys carried out as part of the LNG EIS. It is however likely that they are present within the catchment of the two main rivers, the Glencorbly and White rivers and they may periodically utilise smaller watercourses and drainage ditches. As the proposed site goes beyond that which was investigated for the LNG facility further field studies may be required should developments arise outside of this key area. The shoreline of this Area of	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.			

Location	Qualifying Interests & Potential Impacts [17]	Likely Potential Impacts from the Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/ Area of Opportunity** **Aquaculture** **Site N Carrig Island**	**Sub-site: OK509** **Whooper Swan** **Light-Bellied Brent Goose** **Shelduck** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Bar-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Pintail** **Shoveler** **Black-headed Gull** **Sub-site: OK508** **Light-Bellied Brent Goose** **Wigeon**	This site is located within sub-site OK508 & OK509. **Potential Impacts:** Site is located within or adjacent to an SPA and pSPA The Carrig Island sub-site OK509 covers a portion of the Carris Island site to the west nearest the Ballylongford estuary (**See Figure 3.36)** It has been given a high rating from the assessment of low-tide sub-sites based on the identification of 20 of the qualifying species being recorded at this site coupled with 7087 waterbirds recorded based on the sum of the peak counts over 2010/2011. NPWS have carried out an assessment of the species richness across the subsite level based on the 2010/2011 waterbird survey. The Carrig Island subsite was the top site scoring the highest species richness. This implies the sub-site OK509 is highly sensitive to future development at a strategic level. Sub-site OK508 Bunaclugga Bay covers the eastern portion of the site (**See Figure 3.36)** It has been given a high rating from the assessment of low-tide sub-sites based on the identification of 15 of the qualifying species being recorded at this site coupled with 1696 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OK508 is highly sensitive to future	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[17] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [17]	Likely Potential Impacts from the Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Teal **Cormorant** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Bar-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black-headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012*)	development at a strategic level.	- 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 deign. Any development associated with the Aquaculture Industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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 The key areas within this site which must be left intact are the inter-tidal feeding areas along the shoreline and between Carrig Island and the land.	

Table 4.11 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Poulnasherry Bay, Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity Aquaculture** **Site O Poulnasherry Bay**	**Estuaries** **No Potential Impacts:** Not present			
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Yes significant portion of site covered by mudflats and sandflats not covered by seawater at low tide according to NPWS 1140 sediment shores dataset. Any future development to the existing aquaculture industry or any additional new licence applications for aquaculture within this area of opportunity 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 corresponding SPA/pSPA.	• 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.	- Detailed site specific surveys must be undertaken to determine the structure and function of this area of habitat. - If deemed to be of unfavourable conservation status these areas must 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 Any development associated with the Aquaculture 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. Please also refer to specific targets under estuaries. • Conserve the following communities' types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates spp* 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.	None anticipated
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** A number of areas of ASM were documented as "potential" through the desktop survey element of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Mediterranean salt meadows (*Juncetalia maritimi*) **Potential Impacts:** A number of areas of brackish marsh/MSM mosaic were documented as "potential" through the desktop survey element of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG Depending on the extent and location of future development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. The main areas containing this habitat are located in the inner bay outside of the current licenced areas. As all areas of Mediterranean salt meadow habitat are within the cSAC they are therefore of international importance due to this location, Any future licence applicatiions within this area of opportunity will need to ensure it does not encroach on MSM 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species.	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex, Subtidal sand to mixed sediment with *Nucula nucleus* community complex and Fucoid-dominated intertidal reef community complex.	No residual impacts
	Reefs **Potential Impacts:** Present in small pockets co-insiding with areas of Fucoid-dominated intertidal reef community complex habitat surrounding the shoreline of the inner part of Poulnasherry Bay according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Depending on type, scale and location of aquaculture related infrastructure within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid this habitat. Any development associated with the aquaculture 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 reef community types located within this area of opportunity.	No residual impacts

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** Not present			
	Brook Lamprey **No Potential Impacts:** No records for this site. Highly unlikely they would be present in this area.			
	Sea Lamprey **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 Area of Opportunity 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 Area of Opporunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must ensure there is; No decline in extent and distribution of spawning beds (Surveys may be needed here to determine distribution of spawning areas, if	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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.	be required for all IROPI proposals,
	<u>Atlantic Salmon</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"*	• 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 Area of Opportunity 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 Atlantic salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must be developed in consultation with IFI. Any development associated with the Aquaculture 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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,	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	there is very little survey effort upriver of Tarbert, Co Kerry apart from Berrow (2009) but this was restricted to winter months. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low habitat priority. Poulnasherry Bay itself does not support habitat potential for the Bottlenose Dolphin and is therefore not considered further. The site is also outside the critical habitat area outlined in the NPWS 2012 Conservation Objectives.		While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	Freshwater Pearl Mussel **No Potential Impacts:** Not present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	Otter **Potential Impacts:** No records for this site. However, site this is most likely as a result of lack of survey or reporting within this site The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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)	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	the NPWS, 2012 Conservation Objectives Ref; Map 17.		- 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	
	Bat species **No Potential Impacts:** Not present			

Location	Qualifying Interests located within sub-unit associated with Areas of Opportunity [18]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Aquaculture** **Site O Poulnasherry Bay**	**Sub-site OH519:** **Whooper Swan** **Light-Bellied Brent Goose** **Shelduck** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Pintail** **Shoveler** **Black-headed Gull** **Scaup** **Sub-site OH520:** **Light bellied-Brent Goose** **Cormorant** **Black tailed Godwit** **Curlew** **Redshank** **Black headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** The sub-site OH519 covers the inner portion of the bay (**See Figure 3.37)** has been given a high rating from the assessment of low-tide sub-sites based on the identification of 20 of the qualifying species being recorded at this site coupled with 3682 waterbirds recorded based on the sum of the peak counts over 2010/2011.	Poulnasherry Bay is located within two sub-sites OH519 Poulnasherry Outer Bay and OH520 Poulnasherry Inner Bay have been give a high and moderate rating respectively indicating a high to moderate vulnerability from future development across the site.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

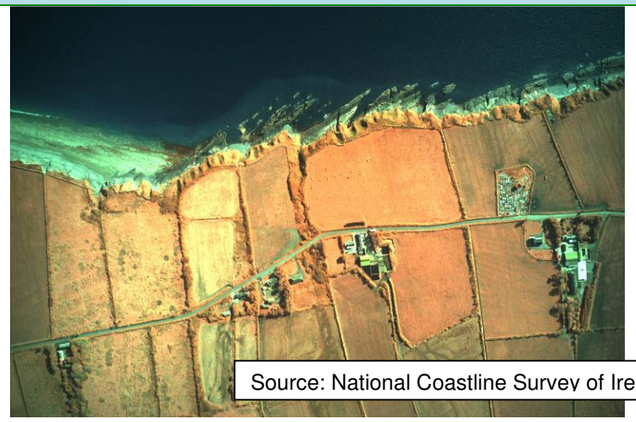
[18] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

	This implies the sub-site OH519 is highly sensitive to future development at a strategic level. NPWS have carried out an assessment of the species richness across the subsite level based on the 2010/2011 waterbird survey. The Poulnasherry outer bay subsite OH519 was the second highest site in terms of species richness. The sub-site OH520 covers the inner portion of the bay (**See Figure 3.37)** has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 8 of the qualifying species being recorded at this site coupled with 138 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH520 is moderately sensitive to future development at a strategic level.		This site contains active aquaculture licences primarily Oyster trestles. As Poulnasherry Bay is located directly within two sub-sites which contain high numbers of species there is potential for both direct and in-direct effects. In-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. It must 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 The Marine Institute carried out an investigation into the effects of inter-tidal Oyster culture on the spatial distribution of waterbirds which included Poulnasherry Bay. Oyster husbandry activity was observed during all three of the four counts at Poulnasherry Bay, minor impacts, involving birds being disturbed by husbandry activity but not being displaced was observed on two counts at Poulnasherry Bay, This disturbance effect would need to be investigated further at a project level should future applications be required for aquaculture within this site and would need to consider the in-combination and cumulative effect with current licences within the Area of Opportunity. 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. **Tables 5.1-5.7** of the NIR 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 these sub-sites have been given a High, Moderate and low ranking based on the site usage. Sub-site OH519 in particular has scored in the top ten sub-sites in the Lower Shannon Estuary in terms of species richness. Therefore the inner portion of this site is even more important than the other portion. As further details become available as to the exact type of proposals which will be brought forward for this Area of Opportunity an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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	

Table 4.12 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Carrigaholt Bay, Co.Clare from SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Aquaculture** **Site P Carrigaholt Bay**	**Estuaries** **No Potential Impacts*:*** Not Present			
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts*:*** Not Present			
	Coastal Lagoons **Potential Impacts:** Cloonconeen Pool IL034 Coastal Lagoon is located adjacent to the West of Carrigaholt Bay but not within the Area of Opportunity.	• Habitat loss - to land • Habitat change - to another marine habitat • Physical disturbance • Siltation rate changes • Water flow • Non synthetic & synthetic compounds • Removal or loss of target & non-target species	As Cloonconeen Pool is located outside of the Area of Opportunity no potential direct effects are envisaged once any future expansion if kept away from this area. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Area stable or increasing, subject to natural processes – Cloonconeen Pool – 3.9ha • Range – No decline, subject to natural processes • Salinity Regime – Euhaline for Cloonconeeno Pool • Hydrological regime – Annual water level fluctuations and minima with natural ranges (All lagoons located within the Shannon Estuary are considered shallow therefore even small changes in water depth can cause significant losses in habitat area) • Barriers: Appropriate hydrological connections between lagoons and sea, including appropriate management where necessary. For Cloonconeen the barrier type is cobble superimposed on peat. • Water quality – Annual median chlorophyll a within natural ranges and less than 5µg/l • Water quality- Molybdate Reactive Phosphorus (MRP) – Annual median MRP within natural ranges and less than 0.1 mg/l • Water quality – Dissolved inorganic nitrogen – Annual median DIN within natural ranges and less than 0.15mg/l • Depth of macrophyte colonisation – Macrophyte colonisation to maximum depth of lagoons • Typical plant species – Maintain number and extent of listed lagoonal specialists, subject to natural variation as per Lower River Shannon SAC Conservation objectives supporting document – lagoons http://www.npws.ie/publications/archive/002165_Lower%20River%20Shannon%20SAC%20Lagoons%20Supporting%20Doc_V1-1.pdf • Negative indicator species – Low salinity, shallow water and elevated nutrient levels increase the threat of unnatural encroachment by reedbeds.	None Anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			All coastal lagoons in Ireland were assigned an overall assessment of bad conservation status through the 2008 status of EU protected habitats and species in Ireland report. The NPWS Conservation Objectives 2012 supporting documents have provided an "Unfavourable – inadequate" status as per Oliver 2007. Any expansion to aquaculture activities within Carrigaholt bay must not cause damage or impact either directly or in-directly to the Cloonconeen Pool coastal lagoon priority habitat. In-direct damage caused by activities within the adjacent Area of Opportunity which may lead to erosion or damage to the cobble barrier due to an alteration of the hydrological regime at the Cloonconeen Pool must be avoided. In-combination and cumulative effects of significantly developing the aquaculture industry at Carrigaholt Bay and Rinevalle bay would need to take into consideration the potential for impact on the Cloonconeen lagoon. As lagoons are priority habitat any future licence applications within this bay will need to determine whether it will impact on the habitat within the SAC.	
	<u>Vegetated sea cliffs of the Atlantic and Baltic Coasts</u> **Potential Impacts*:*** Present within area of opportunity at two locations; Lisheencrony and Moyarta as per NPWS undocumented 1230 vegetated sea cliffs of the Atlantic and Baltic coasts dataset. .	• Habitat loss • Physical disturbance • Removal of target & non-target species	Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Area stable or increasing subject to natural processes including erosion (Moyarta – 0.9km, Lisheencrony – 1.1km) • Habitat distribution – No decline, subject to natural processes. • Physical structure – No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures • Vegetation structure; zonation: Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession • Vegetation structure; Maintain structural variation within sward • Vegetation composition: Maintain range of sub-communities with typical species listed in the Irish Sea cliff survey (Barron et al, 2011) • Vegetation composition: Negative indicator species (including non-natives) to represent less than 5% cover • Vegetations composition: Cover of bracken on grassland and/or heath to be less than 10%. Cover of woody species on grassland and/or heath to be less than 20% While the vegetated cliffs located within this area of opportunity have not been documented or surveyed as part of the Irish Sea Cliff Survey (ISCS) (Barron et al., 2011) they are annotated in the NPWS 2012 Conservation Objectives for the Lower River Shannon SAC. While it is unlikely that any aquaculture development at this site will impact on this feature the presence of the habitat must be taken into consideration. Access points, trampling, erosion can all cause impact as documented in Barron et al, 2011 therefore access from these cliffs must be avoided and the specific conservation objectives adhered to.	None Anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			 Source: National Coastline Survey of Ireland	
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not Present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** Areas of ASM documented along Moyarta River which flows into the carrigaholt Bay through desktop edits carried out as part of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts*:*** Not Present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not Present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not Present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex, Subtidal sand to mixed sediment with *Nucula nucleus* community complex and Fucoid-dominated intertidal reef community complex.	No residual impacts
	Reefs **Potential Impacts:** Present in small pockets co-insiding with areas of Fucoid-dominated intertidal reef community complex and Anemone-dominated subtidal reef community habitat surrounding the shoreline of the inner part of the Carrigaholt Area of Opportunity according to Lower River Shannon SAC Conservation Objectives Ref:	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Depending on type, scale and location of aquaculture related infrastructure within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid this habitat. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC.	No residual impacts

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Map 9 (NPWS, 2012)		• Ensure the distribution of Reefs is stable, subject to natural processes • The permanent habitat area is stable, subject to natural processes • Conserve the reef community types located within this area of opportunity.	
	Perennial vegetation of stony banks **Potential Impacts:** Present at one point on the site boundary – Carrigaholy Bay	• Disruption of sediment supply • Direct damage to create access to aquacutlure areas by vehicles • Removal of gravel to develop hard standing areas associated with aquaculture industry.	Any future development related to the aquacutlure industry must avoid the area of Perennial vegetation of stony banks located within the area of opportunity. In-direct impacts e.g. through obtaining access to the aquaculture site at low tide by growers must also be avoided. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Area stable or increasing subject to natural processes, including erosion and succession • No decline, or change in habitat distribution, subject to natural processes • Maintain the natural circulation of sediment and organic matter, without any physical obstructions • Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession • Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones • Negative indicator species must represent less than 5% cover	None anticipated
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not Present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not Present			
	River Lamprey **No Potential Impacts*:*** As per "*The Status of EU Protected Habitats and Species in Ireland, 2008*" the 10km national grid squares for this area does not indicate the presence of River Lamprey.			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Brook Lamprey **No Potential Impacts*:*** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey.			
	Sea Lamprey **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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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"*	• 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 Area of Opportunity 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 Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon) • Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must be	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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. • 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)	effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of intermediate habitat priority in terms of habitat suitability for Bottlenose dolphins. Any future expansion to licenced aquaculture sites within this bay will need to carry out an assessment as to the direct or in-direct impacts to the resident group of Bottlenose dolphins in the	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	estuary. As per of the NPWS Conservation Objectives 2012 this area is located outside of the critical habitat area			
	Freshwater Pearl Mussel **No Potential Impacts*:*** Not Present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	Otter **Potential Impacts:** No records for this site. However, site this is most likely as a result of lack of survey or reporting within this site The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 [19]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity** **Aquaculture** **Site P Carrigaholt Bay**	**Potential Impacts:** No waterbird counts exist for this site but does contain Non Estuarine Coastal Waterfowl survey information.	Direct physical damage to mobile species Indirect disturbance or loss of species Direct or in-direct impacts to foraging and feeding areas.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[19] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [19]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained*)	Residual Impacts
			Fergus Estuaries SPA Conservation Objectives The Carrigaholt site is not located within one of the River Shannon and Fergus Estuaries sub-sites for which counts have been undertaken. This may mean there is no risk of direct impact as it has not been identified as a priority area, however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. 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. Dedicated site counts throughout the summer and winter months may be required for this licence application at a project level to establish the use, if any, of the inter-tidal for feeding by birds.	

Table 4.13 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Rinevella Bay, Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Aquaculture** **Site Q** **Rinevella Bay**	**Estuaries** **No Potential Impacts*:*** Not Present			
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts*:*** Not Present			
	Coastal Lagoons **Potential Impacts:** Cloonconeen Pool Coastal Lagoon is located adjacent to the Rinevella Bay site.	• Habitat loss - to land • Habitat change - to another marine habitat • Physical disturbance • Siltation rate changes • Water flow • Non synthetic & synthetic compounds • Removal or loss of target & non-target species	As Cloonconeen Pool is located outside of the Area of Opportunity no potential direct effects are envisaged once any future expansion if kept away from this area. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • Area stable or increasing, subject to natural processes – Cloonconeen Pool – 3.9ha • Range – No decline, subject to natural processes • Salinity Regime – Euhaline for Cloonconeeno Pool • Hydrological regime – Annual water level fluctuations and minima with natural ranges (All lagoons located within the Shannon Estuary are considered shallow therefore even small changes in water depth can cause significant losses in habitat area) • Barriers: Appropriate hydrological connections between lagoons and sea, including appropriate management where necessary. For Cloonconeen the barrier type is cobble superimposed on peat. • Water quality – Annual median chlorophyll a within natural ranges and less than 5µg/l • Water quality- Molybdate Reactive Phosphorus (MRP) – Annual median MRP within natural ranges and less than 0.1 mg/l • Water quality – Dissolved inorganic nitrogen – Annual median DIN within natural ranges and less than 0.15mg/l • Depth of macrophyte colonisation – Macrophyte colonisation to maximum depth of lagoons • Typical plant species – Maintain number and extent of listed lagoonal specialists, subject to natural variation as per Lower River Shannon SAC Conservation objectives supporting document – lagoons http://www.npws.ie/publications/archive/002165_Lower%20River%20Shannon%20SAC%20Lagoons%20Supporting%20Doc_V1-1.pdf • Negative indicator species – Low salinity, shallow water and elevated nutrient levels increase the threat of unnatural encroachment by reedbeds.	None Anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			All coastal lagoons in Ireland were assigned an overall assessment of bad conservation status through the 2008 status of EU protected habitats and species in Ireland report. The NPWS Conservation Objectives 2012 supporting documents have provided an "Unfavourable – inadequate" status as per Oliver 2007. Any expansion to aquaculture activities within Rinevella bay must not cause damage or impact either directly or in-directly to the Cloonconeen Pool coastal lagoon priority habitat. In-direct damage caused by activities within the adjacent Area of Opportunity which may lead to erosion or damage to the cobble barrier due to an alteration of the hydrological regime at the Cloonconeen Pool must be avoided. In-combination and cumulative effects of significantly developing the aquaculture industry at Carrigaholt Bay and Rinevalle bay would need to take into consideration the potential for impact on the Cloonconeen lagoon. As lagoons are priority habitat any future licence applications within this bay will need to determine whether it will impact on the habitat within the SAC.	
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts*:*** Not Present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** A number of areas of ASM were documented surrounding the Rinevalla Bay area primarily to the east of the site through the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG. The habitat is not located directly within the Area of Opportunity boundary but lies adjacent to it. Depending on the extent and location of future development within this site further surveys will be required to determine the impact (if any) to this habitat as required	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	under the Habitats Directive. The main areas containing this habitat are located to the east surrounding Cloonconeen point which is outside of the current licenced areas. As all areas of potential salt marsh habitat are within the cSAC they are therefore of international importance due to this location,		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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts*:*** Not Present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts*:*** Not Present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts*:*** Not Present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Subtidal sand to mixed sediment with *Nucula nucleus* community complex and Fucoid-dominated intertidal reef community complex.	No residual impacts
	Reefs **Potential Impacts:** Present in small pockets co-insiding	Potential for direct habitat loss and	Depending on type, scale and location of aquaculture related infrastructure within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	with areas of Fucoid-dominated intertidal reef community complex and Anemone-dominated subtidal reef community habitat surrounding the shoreline of the of the Rinevella Area of Opportunity according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	degradation of community type located within this area of opportunity.	avoid this habitat. Any development associated with the aquaculture 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 reef community types located within this area of opportunity.	No residual impacts
	Perennial vegetation of stony banks **No Potential Impacts*:*** Not Present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not Present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts*:*** Not Present			
	River Lamprey **No Potential Impacts*:*** As per "*The Status of EU Protected Habitats and Species in Ireland, 2008*" the 10km national grid squares for this area does not indicate the presence of River Lamprey.			
	Brook Lamprey **No Potential Impacts*:*** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey.			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Sea Lamprey **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"* Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater	• 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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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"*	• 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 Area of Opportunity 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 Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must be developed in consultation with IFI. Any development associated with the development of Aquaculture 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. Rinevella Bay itself does not support habitat potential for the Bottlenose Dolphin and is not classified as critical habitat in the NPWS Conservation Objectives supporting documentation therefore not considered further.	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	None anticipated
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	<u>Otter</u> **Potential Impacts:** No records for this site. However, site this is most likely as a result of lack of survey or reporting within this site. The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 [20]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Aquaculture** **Site Q Rinevella Bay**	No waterbird counts exist for this site but does contain Non Estuarine Coastal Waterfowl survey information.	Direct physical damage to mobile species Indirect disturbance or loss of species Direct or in-direct impacts to foraging and feeding areas.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must 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,	None anticipated

[20] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [20]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			Greenshank, Redshank, Black Headed Gull, as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must also be made to the relevant species specific targets for the species listed under qualifying interests as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives The Rinevella site is not located within one of the River Shannon and Fergus Estuaries sub-sites for which counts have been undertaken. This may mean there is no risk of direct impact as it has not been identified as a priority area, however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. 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. Dedicated site counts throughout the summer and winter months may be required for this licence application at a project level to establish the use, if any, of the inter-tidal for feeding by birds.	

Table 4.14 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Greenish, Co. Limerick from the SIFP

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Aquaculture** **Site R** **Greenish 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 area of opportunity avoiding sensitive features - Habitat surveys to characterise the seabed and identify sensitive habitat and species within the Area of Opportunity - 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 must include an appropriate assessment. Any development associated with the aquaculture 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 Area of Opportunity. Any future development within this area of opportunity will need to assess the impacts to water quality and how it will affect the WFD Status and objectives	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			together with the requirements arising from the Marine Strategy Framework Directive. The extent of estuarine communities within the area of potential needs to be determined. Any future development or discharges consents required at this site must not impact on the assimilative capacity of the receiving water. Early consultations with the Environment Section of Limerick County Council must be initiated to avoid delay and to establish capacity at this location.	
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Habitat present but only on the extreme verges of the Area of Opportunity boundary. Any future development within this area of opportunity 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. 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. Should future developments within this site	• 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.	- Detailed site specific surveys must be undertaken to determine the structure and function of this area of habitat. - If deemed to be of unfavourable conservation status these areas must 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 Any development associated with the Aquaculture 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. Please also refer to specific targets under estuaries. • Conserve the following communities' types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates spp* 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.	None anticipated

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	require disturbance to or loss of habitat an assessment on the actual loss of foraging habitats to wader and waterfowl populations at or adjacent to the site will also need to be assessed. As the extent of this habitat present within the site is minimal impact potential is deemed low, mitigation measures in terms of avoidance must negate the risk of impact at this site.			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** A very small portion of ASM habitat was located within on the verge of this Area of Opportunity through	• 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 Area of Opportunity 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 *Spartina*	

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	the Saltmarsh Monitoring Project 2007-2008, NPWS, DEHLG.		*anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Large shallow inlets and bays **No Potential Impacts:** Not present			
	Reefs **No Potential Impacts:** Not present			
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** Not present			
	Brook Lamprey **No Potential Impacts:** Not present			
	Sea Lamprey **Potential Impacts:** Known records through out the Shannon Estuary and distribution mapped as present	• 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	• In the absence of detailed baseline data on fish communities in the Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	along this stretch in the *"The Status of EU Protected Habitats and Species in Ireland, 2008"*. Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater	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.	• The sampling season, sampling methods and reporting of results must 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 must 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.	site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Atlantic Salmon</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"*	• 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 Area of Opportunity 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 Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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. • 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Bottle-nosed Dolphin</u> **Potential Impacts:** Bottle-nose dolphins are present in the greater Shannon Estuary The SDWF have	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • Disturbance through dumping of dredge spoil at sea should it be required • Impacts to water quality in the water Shannon Estuary	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey	None anticipated

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	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. A C-POD was placed on the jetty at Aughinish Alumina to monitor Bottlenose Dolphin activity acoustically. Overall, their occurrence is progressively less the further upriver but is still significant at Aughinish (c26% days with detections). Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no	as a result of increased discharges	data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. 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 and appropriate mitigation measures devised in consultation with both the SDWF and NPWS.			
	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:** Quercus are currently undertaking an National Otter Survey on behalf of NPWS. Following the publication of	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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	None anticipated

Natura 2000 Site	Qualifying Interests	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	these results records may exist for this site. The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.		- 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	

Location	Qualifying Interests & Potential Impacts [21]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Aquaculture** **Site R Greenish Island**	**Sub-site OI437:** **Shelduck** **Wigeon** **Teal** **Cormorant** **Grey Plover** **Lapwing** **Dunlin** **Black tailed Godwit** **Bar tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black-Headed Gull** **Sub-site OI458:** **Shelduck** **Wigeon** **Teal** **Grey Plover** **Knot** **Bkack-tailed Godwit** **Curlew** **Greenshank** **Redshank** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012*) **Potential Impacts** The site (Greenish Island) is surrounded by two sub-sites Sub-site OI437 Aughinish East has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 13 of the qualifying species being recorded at this site coupled with 1915 waterbirds recorded based on the sum of the peak counts over 2010/2011.	Direct physical damage to mobile species Indirect disturbance or loss of species Direct or in-direct impacts to foraging and feeding areas. As this potential site (Greenish Island) is located within sub-site OI437 & OI458 disturbance is the key impact.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must also be made to the relevant species specific targets for Whooper Swan, Shelduck, Whimbrel, Teal, Cormorant, Ringed Plover, Golden Plover, Grey	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[21] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

	This implies the sub-site OI437 is moderately sensitive to future development at a strategic level. Sub-site OI458 Askeaton has 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 OI458 is moderately sensitive to future development at a strategic level.		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 This rating may change at project level depending on the scale and detail of the project. The site(Greenish Island) is located within two sub-sites and is within both the SPA and pSPA boundary therefore depending on the scale of the project potential direct or in-direct impacts may occur. The entire estuary is a continuum as used by the birds. It must 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	

Table 4.15 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Long Rock, Co.Limerick from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity Aquaculture** **Site S Long Rock**	**Estuaries** **No Potential Impacts:** Not present			
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex, Subtidal sand to mixed sediment with *Nucula nucleus* community complex and Fucoid-dominated intertidal reef community complex.	No residual impacts
	Reefs **No Potential Impacts:** Not present			
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	River Lamprey **No Potential Impacts:** As per "*The Status of EU Protected Habitats and Species in Ireland, 2008*" the 10km national grid squares for this area does not indicate the presence of River Lamprey.			
	Brook Lamprey **No Potential Impacts:** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey.			
	Sea Lamprey **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".* Sea Lamprey may use the section of the Shannon Estuary adjacent to this site for migration from the Sea into Freshwater	• 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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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"*	• 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 Area of Opportunity 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 Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			must 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 must 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. • 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)	an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low habitat priority. The area surrounding this aquaculture site itself does not support habitat potential for the Bottlenose Dolphin as it is inter-tidal however the grid square surrounding the site has been given an intermediate score in terms of habitat potential to Dolphins therefore in-direct effects may need to be considered.			
	Freshwater Pearl Mussel **No Potential Impacts:** Not present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	Otter **Potential Impacts:** No records for this site. However, for this site this is most likely as a result of lack of survey or reporting within this site. The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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[22]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity** **Aquaculture** **Site S** **Long Rock**	**Sub-site OI443:** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Lapwing** **Dunlin** **Curlew** **Greenshank** **Redshank** **Black headed gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** The sub-site OI443 which is within the River Shannon covers the aquaculture site at Long Rock (**See Figure 3.43)** 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 662 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI443 is moderately sensitive to future development at a strategic level.	Direct physical damage to mobile species Indirect disturbance or loss of species Direct or in-direct impacts to foraging and feeding areas. As this potential site (Long Rock) is located within sub-site OI443 there is high vulnerability from future development.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must 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,	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[22] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts[22]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			Greenshank, Redshank, Black Headed Gull, as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives The Long Rock Area of Opportunity is located within the sub-site and takes into account the inter-tidal area at the front of the site. The actual footprint of the aquaculture site is very small and therefore 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 200 site in the context of the sites conservation objectives. **Tables 5.1-5.7** of the NIR 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 Area of Opportunity an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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. While the sub-site count information does indicate 662 waterbirds were recorded using the sub-site this would need to be looked at further to determine where exactly within the sub-site the birds are utilising as it covers a considerably larger area than that of the Area of Opportunity.	

Table 4.16 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Killimer Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity Aquaculture** **Site T Killmer, Co. Clare**	**Estuaries** **No Potential Impacts:** Not present			
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Subtidal sand to mixed sediment with *Nucula nucleus* community complex.	No residual impacts
	Reefs **No Potential Impacts:** Not present			
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	River Lamprey **No Potential Impacts:** As per "*The Status of EU Protected Habitats and Species in Ireland, 2008*" the 10km national grid squares for this area does not indicate the presence of River Lamprey.			
	Brook Lamprey **No Potential Impacts:** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey.			
	Sea Lamprey **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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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"*	• 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 Area of Opportunity 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.	

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• These detailed fishery surveys will be required to determine the use (if any) by Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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. • 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low habitat priority. The area surrounding this aquaculture site itself does not support habitat potential for the Bottlenose Dolphin as it is inter-tidal however the grid square surrounding the site has been given a high score in terms of habitat potential to Dolphins therefore in-direct effects may need to be considered.		While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) 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. This must include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	<u>Otter</u> **Potential Impacts:** No records for this site. However, site this is most likely as a result of lack of survey or reporting. The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Bat species **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts [23]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Aquaculture** **Site T Killmer, Co.Clare**	***Cormorant* (Breeding and wintering)** ***Whooper Swan* (Wintering)** ***Light-bellied Brent Goose* (Wintering)** ***Shelduck* (Wintering)** ***Wigeon* (Wintering)** ***Teal* (wintering)** ***Pintail* (Wintering)** ***Shoveler* (Wintering)** ***Scaup* (Wintering)** ***Golden Plover* (Wintering)** ***Grey Plover* (Wintering)** ***Lapwing* (Wintering)** ***Knot* (Wintering)** ***Dunlin* (Wintering)** ***Black-tailed Godwit* (Wintering)** ***Bar-tailed Godwit* (Wintering)** ***Curlew* (Wintering)** ***Redshank* (Wintering)** ***Greenshank* (Wintering)** ***Black-headed Gull* (Wintering)** **Wetlands and Waterbirds** (*As listed in the NPWS Detailed Conservation Objectives September 2012 Sub-Site Information*) **Potential Impacts:** No waterbird counts exist for this site	Direct physical damage to mobile species Indirect disturbance or loss of species Direct or in-direct impacts to foraging and feeding areas. The Killimer site is not located within one of the River Shannon and Fergus Estuaries sub-sites for which counts have been undertaken. This may mean there is no risk of direct impact as it has not been identified as a priority area, however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must 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,	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[23] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf

Location	Qualifying Interests & Potential Impacts [23]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			Greenshank, Redshank, Black Headed Gull, as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives It must 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. **Tables 5.1-5.7** of the NIR 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 Area of Opportunity an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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.	

Table 4.17 Appropriate Assessment of Natura 2000 Sites against Aquaculture theme and site location at Clonderlaw Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Aquaculture** **Site U Clonderlaw Bay**	**Estuaries** **No Potential Impacts:** Not Present			
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** A significant portion of site covered by mudflats and sandflats not covered by seawater at low tide according to NPWS 1140 sediment shores dataset. Any future development within this area of opportunity 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. 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. Should future developments within this site require disturbance to or loss of habitat an assessment on the actual loss of foraging habitats to wader and waterfowl populations at or adjacent to the site will also need to be assessed. As the extent of this habitat present within the site is minimal impact potential is deemed low, mitigation measures in terms of avoidance must negate the risk of impact at this site. It is recommended that this portion of the Area of Opportunity containing mudflats must be	• 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.	- Detailed site specific surveys must be undertaken to determine the structure and function of this area of habitat. - If deemed to be of unfavourable conservation status these areas must 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 Any development associated with the Aquaculture 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. Please also refer to specific targets under estuaries. • Conserve the following communities' types in a natural condition: Intertidal sand with *Scolelepis squamata* and *Pontocrates spp* 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.	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	removed from the Area of Opportunity boundary in order to avoid direct impact.			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not Present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **Potential Impacts:** A number of areas of ASM were documented as "potential" through the desktop survey element of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species. Any development associated with the Aquaculture 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	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	
	Mediterranean salt meadows (*Juncetalia maritimi*) **Potential Impacts:** A number of areas of brackish marsh/MSM mosaic were documented as "potential" through the desktop survey element of the Saltmarsh Monitoring Project 2007-2008 NPWS, DEHLG Depending on the extent and location of future development within this site further surveys will be required to determine the impact (if any) to this habitat as required under the Habitats Directive. The main areas containing this habitat are located in the inner bay outside of the current licenced areas. As all areas of Mediterranean salt meadow habitat are within the cSAC they are therefore of international importance due to this location, Any future licence applicatiions within this area of opportunity will need to ensure it does not encroach on MSM 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 *Spartina anglica* and must not encourage the spread of *Spartina* or any alien or invasive species.	• 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 Area of Opportunity 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 *Spartina anglica* and must not encourage the spread of *Spartina* 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 o common cordgrass (*Spartina anglica*), with an annual spread of less than 1%	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not Present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not Present			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any future development once known. Any development associated with the aquaculture industry must maintain the key targets associated with this habitat as per the NPWS detailed Conservation Objectives for this SAC. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Subtidal sand to mixed sediment with *Nucula nucleus* community complex.	No residual impacts
	Reefs **No Potential Impacts:** Not Present			
	Perennial vegetation of stony banks **No Potential Impacts:** Not Present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts*:*** Not Present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp*. And sometimes *Quercus robur* **No Potential Impacts:** Not Present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	River Lamprey **No Potential Impacts:** As per "*The Status of EU Protected Habitats and Species in Ireland, 2008*" the 10km national grid squares for this area does not indicate the presence of River Lamprey.			
	Brook Lamprey **No Potential Impacts:** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey.			
	Sea Lamprey **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 Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must 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 must 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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"*	• 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 Area of Opportunity 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 Atlantic Salmon of this Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results	Where appropriate mitigation measures cannot remove the potential for adverse

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			must 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 must 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. • 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)	effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of	As this site is not directly located within the greater Shannon Estuary where the Bottlenose Dolphins "critical habitat" and "Habitat" (*Re; Map 16: Lower River Shannon SAC Conservation Objectives Bottlenose Dolphin, June 2012*) are identified the potential impacts arising from this site may include the following: • Disturbance through construction works • 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	• Human activities must occur at levels that do not adversely affect the harbour porpoise community at the site The SDWF have been monitoring dolphin tour boats in the estuary since 2000 and carrying out systematic and opportunistic transects since 1993. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low to intermediate habitat priority. While no direct impact is envisaged from any future development of this site in-direct impacts such as noise from construction (although this is perceived as being minimal) may cause disturbance, must 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. This should include land based activities which would require rock blasting, pile driving etc. also. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition	None anticipated

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	intermediate habitat priority. As per the NPWS Conservation Objectives 2012 this area is located outside of the critical habitat area.		• Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not Present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	<u>Otter</u> **Potential Impacts:** No records for this site. The shoreline of this Area of Opportunity has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17	While no records exist for Otters within this SDL at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 [24]	Likely Potential Impacts from the Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Aquaculture** **Site U Clonderlaw Bay**	**Sub-site OH521:** **Wigeon** **Teal** **Cormorant** **Grey Plover** **Lapwing** **Dunlin** **Curlew** **Redshank** **Greenshank** **Scaup** **Black-headed Gull** **Sub-site OH522:** **Shelduck** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Grey Plover** **Golden Plover** **Lapwing** **Knot** **Dunlin** **Black tailed Godwit** **Curlew** **Redshank** **Greenshank** **Black Headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*)	**Potential Impacts:** The sub-site OH521 covers the inner portion of the bay (**See Figure 3.47)** 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 1017 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH521 is moderately sensitive to future development at a strategic level. The sub-site OH522 covers the inner portion of the bay (**See Figure 3.47)** has been given a high rating from the assessment of low-tide sub-sites based on the identification of 16 of the qualifying species being recorded at this site coupled with 4878 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH522 is highly sensitive to future development at a strategic level.	Potential effects from the theme Aquaculture and the associated activities which may lead to damaging effects are outlined in Tables 3.17 together with mitigation measures which are outlined in Table 6.6 which must be adhered to in relation to this site at project level. 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 Area of Opportunity - 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 deign. Any development associated with the aquaculture industry 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 must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. Reference must 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 This site contains active aquaculture licences primarily bottom mussels. As Clonderlaw Bay is located directly within one sub-sites and adjacent to another	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[24] http://www.npws.ie/publications/archive/004077_River%20Shannon%20and%20River%20Fergus%20Estuaries%20SPA%20Supporting%20Doc_V1.pdf

Location	Qualifying Interests & Potential Impacts [24]	Likely Potential Impacts from the Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			which contain high numbers of species there is potential for both direct and in-direct effects. 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. **Table 5.1-5.7** of the NIR 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 Area of Opportunity an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix C**) 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 must 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. Clonderlaw Bay Inner OH522 has also ranked in the top ten subsites in terms of species richness from the NPWS review of waterbird surveys. It is therefore recommended that the small portion of this subsite which is located within the Area of Opportunity boundary is removed in order to avoind direct impacts to the qualifying interest features of the SPA.	

Appropriate Assessment of Tidal Energy Areas of Opportunity

Table 4.18 Appropriate Assessment of Natura 2000 Sites against Tidal Energy theme and site location at Tarbert Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Tidal Energy** **Site M Tarbert Bay, Co. Kerry**	**Estuaries** **Potential Impacts:** Set within Lower Shannon Estuary	• Habitat loss - to any future development or installation of device • Physical disturbance • Siltation rate changes • Water flow • Toxic effects from the introduction of Non synthetic & synthetic compounds	Initially any development or testing of devices within this part of the area of opportunity must avoid the area of estuarine habitat. In relation to in-direct effects any future development within this area of opportunity 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. The future investigation, trialling or use of this site in any way for the testing of renewable energy devices must ensure the following targets are maintained: • 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 Area of Opportunity.	No residual impacts
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Yes habitat present along the shoreline within the area of opportunity.	Potential for direct effect on this habitat is low as the installation or location of any tidal energy device is likely to be in the centre of the area of opportunity where the tidal energy is greatest.	Careful site selection within area of opportunity to avoid this habitat feature for location of devices and export cables and any associated onshore infrastructure	No residual impacts
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Present Shannon Estuary	• Water pollution or toxic effects associated with release of contaminants directly or from indirect disturbance of sediments due to underwater pressure waves, changes in hydrodynamics, scouring, etc	• Design devises to minimise risk of leakage of pollutants • Risk assessment and contingency planning • Implementation of SOPEP (Shipboard Oil and Pollution Energy Plan) in line with MARPOL 73/78 • 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 of renewable energy devices in the Shannon Estuary	No residual impacts
	Reefs **Potential Impacts:** Section of habitat present along verge of site co-insiding with areas of Anemone-dominated subtidal reef community according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	• Device presence coupled with energy removal effects could cause changes in the habitat in the vicinity of the installation, depending on the nature of the device and proximal habitat. • Device presence can directly displace benthic plants and animals or change their habitats by altering flow, wave structure, water quality, or substrate composition. Resulting plant and animal population changes (declines in some, increases in others) would be expected. • Tidal energy generation structures	Depending on type, scale and location of device within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid priority elements of the reef community. Prior to any installation further research and testing will be require with prototype devices to assess the potential effects within the Shannon Estuary and this area of opportunity. 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. • 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	No residual impacts

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		would supplant existing habitats possibly adding to the amount of hard - bottom habitat available to benthic algae, invertebrates, and fish. This substrate change could attract a rocky reef community of fish and invertebrates not previously present at the site, which could either increase biodiversity at the site or enable the introduction of invasive species.		
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **No Potential Impacts:** No records for this site			
	Sea Lamprey **Potential Impacts:** Known records through out the Shannon Estuary and as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area indicates the presence of River Lamprey.	• 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	• In the absence of detailed baseline data on fish communities in the Area of Opportunity 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 Area of Opportunity across all seasons over a minimum 1-year period. • The sampling season, sampling methods and reporting of results must be agreed with Inland Fisheries Ireland (Shannon)	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		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.	• 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 must 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.	undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must be developed in consultation with IFI. 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. • 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<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. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of intermediate habitat priority. In addition a programme of Static Acoustic	Due to the unknown potential impact associated with tidal devices and marine mammals in Ireland significant research work will first be required to determine the behaviouoral impact of any such tidal devices on Bottlenose Dolphins. 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 key sites as there use may changes with changes in fish distribution throughout the year. The applicant/developer will first need to undertake detailed surveys and research into the potential for significant effects of tidal devices on the behaviour of dolphins both in terms of noise disturbance and potential for collision. Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS Any future development of tidal devices within this area would need to take into consideration both direct and in-direct impacts to the Bottlenose Dolphin. Depending on the exact location of any such device within this area of opportunity further consultation	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
		Monitoring was undertaken as part of the SIFP project focusing on deep water berths within the estuary. The jetty at Moneypoint is the nearest deep water static acoustic monitoring site to Tarbert. Overall, their occurrence is progressively less the further upriver but is significant at Moneypoint (80% days with detections). Moneypoint has operated as an industrial site for a number of years with Bottlenose Dolphin activity maintained throughout this time in the vicinity of the site indicating that the industrial site can operate in harmony with the resident group of bottlenose dolphins in the estuary. This site is partially located within a region of critical habitat for Bottlenose Dolphins as per the detailed conservation objectives (NPWS, 2012). Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this Area of Opportunity as being of high habitat priority. 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. This must include land based activities which would require rock blasting, pile driving etc.	with the Shannon Dolphin and Wildlife Foundation would be required to determine the potential impact. Both direct impact through moveable parts of the device and in-direct impacts through disturbance and noise would also need to be considered. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Otter **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts [25]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Tidal Energy** **Site M Tarbert Bay**	**Sub-site OI426:** **Shelduck** **Wigeon** **Teal** **Cormorant** **Lapwing** **Knot** **Dunlin** **Bar tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black headed Gull** **Sub-site OI425:** **Teal** **Ringed Plover** **Dunlin** **Curlew** **Redshank** **Black headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012*) **Potential Impacts:** Site is located within or adjacent to an SPA and pSPA The sub-site OI426 covers almost half of the Tarbert Bay site (**See Figure 3.48)** has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 8 of the qualifying species being recorded at this site coupled with 562 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OI426 is moderately sensitive to future development at a strategic level.	• As this potential site (Tarbert) is located adjacent to the sub-site OH516 & OH425 disturbance is the key impact • Loss of available prey items • Displacement and disturbance during construction, operation and decommisioning	Potential effects from the theme Renewable Energy and the associated activities which may lead to damaging effects are outlined in Tables 3.12 together with mitigation measures which are outlined in Table 6.4 which must be adhered to in relation to this site at project level. Any development or works carried out at this site will need to ensure the key targets from the conservation objectives are maintained: • Long term population trend stable or increasing • The permanent area occupied by the wetland habitat must be stable and not significantly less than the area of 32,261ha, other than that occurring from natural patterns of variation. • Reference must also be made to the relevant species specific targets for Shelduck ➢ Wigeon ➢ Teal ➢ Cormorant ➢ Lapwing ➢ Knot ➢ Dunlin ➢ Bar tailed Godwit ➢ Curlew ➢ Greenshank ➢ Redshank ➢ Black headed Gull • as per the River Shannon and River Fergus Estuaries SPA Conservation Objectives While the core of the site is located within a current industrial area the fact that it is located adjacent to one of the most important SPAs in the country and directly between some of the most important parts of that SPA further detailed surveys to those previously carried out at this site may be required of the migratory and wintering wildfowl movements in the vicinity of the site as the site largely lies within the flight path of Tarbert Bay. The scale of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. Given that this site is also within the pSPA boundary 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 The scale of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. It must 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. **Tables 5.1-5.7** of the NIR provides the relative importance of each sub-site based on the broad habitat and the proportional use of sub-	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[25] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf

Location	Qualifying Interests & Potential Impacts [25]	Likely Potential Impacts on associated attributes from the development within an Area of Opportunity include	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	The sub-site OH425 which also covers approximately half of the site (**See Figure 3.48)** site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 8 of the qualifying species being recorded at this site coupled with 562 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OH425 is moderately sensitive to future development at a strategic level		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 Area of Opportunity an assessment of the % loss of principal supporting habitat must be undertaken, its ability to utilise alternative habitats as outlined in **Table 5.8** of the NIR together with reference to the waterbird distribution discussion notes from the conservation objectives supporting documents (See **Appendix A**) 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 must 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.	

Table 4.19 Appropriate Assessment of Natura 2000 Sites against Tidal Energy theme and site location at Moneypoint, Co.Clare from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Tidal Energy** **Site J Adjacent to Moneypoint, Co. Clare**	**Estuaries** **Potential Impacts:** Set within Lower Shannon Estuary	• Habitat loss - to any future development or installation of device • Physical disturbance • Siltation rate changes • Water flow • Toxic effects from the introduction of Non synthetic & synthetic compounds	Initially any development or testing of devices within this part of the area of opportunity must avoid the area of estuarine habitat. In relation to in-direct effects any future development within this area of opportunity 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. The future investigation, trialling or use of this site in any way for the testing of renewable energy devices must ensure the following targets are maintained: • 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 Area of Opportunity.	No residual impacts
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			
	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **Potential Impacts:** Present Shannon Estuary	• Water pollution or toxic effects associated with release of contaminants directly or from indirect disturbance of sediments due to underwater pressure waves, changes in hydrodynamics, scouring, etc	• Design devises to minimise risk of leakage of pollutants • Risk assessment and contingency planning • Implementation of SOPEP (Shipboard Oil and Pollution Energy Plan) in line with MARPOL 73/78 • 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 of renewable energy devices in the Shannon Estuary	No residual impacts
	Reefs **Potential Impacts:** Present within centre of area of opportunity co-insiding with areas of Faunal turf dominated subtidal reef complex according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	• Device presence coupled with energy removal effects could cause changes in the habitat in the vicinity of the installation, depending on the nature of the device and proximal habitat. • Device presence can directly displace benthic plants and animals or change their habitats by altering flow, wave structure, water quality, or substrate composition. Resulting plant and animal population changes (declines in some, increases in others) would be expected. • Tidal energy generation structures would supplant existing habitats possibly adding to the amount of hard - bottom habitat available to benthic algae, invertebrates, and fish. This substrate change could attract a rocky reef community of fish and invertebrates not previously present at the site, which could either increase biodiversity at the site or enable the introduction of invasive species.	Depending on type, scale and location of device within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid priority elements of the reef community. Prior to any installation further research and testing will be require with prototype devices to assess the potential effects within the Shannon Estuary and this area of opportunity. 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. • 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	No residual impacts
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **No Potential Impacts:** No records for this site			
	Sea Lamprey **Potential Impacts:** Known records through out the Shannon Estuary and as per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area indicates the presence of River Lamprey.	• Loss of migration route • Artificial barriers can block lampreys' upstream migration, 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.	Detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this area of opportunity across all seasons over a minimum 1-year period. 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 must 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 must 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Atlantic Salmon **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. 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 must be developed in consultation with IFI. 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	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)	should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Bottle-nosed Dolphin</u> **Potential Impacts:** Bottle-nose dolphins are present in the greater Shannon Estuary.	As part of the SIFP process a scoring system for assessing the 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. This system which looked at key criteria such as slope, depth etc identified the marine environment directly infront of this site as being of intermediate habitat priority. In addition a programme of Static Acoustic Monitoring was undertaken as part of the SIFP project focusing on deep water berths within the estuary. The jetty at Moneypoint was one of these key sites. Overall, their occurrence is progressively less the further upriver but is significant at Moneypoint (80% days with detections). Moneypoint has operated as an industrial site for a number of years with Bottlenose Dolphin activity maintained throughout this time in the vicinity of the site indicating that the industrial site can operate in harmony with the resident group of bottlenose dolphins in the estuary. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of high habitat priority. This Area of Opportunity is also located within “critical habitat” as per the conservation objectives (NPWS, 2012) for the Shannon Estuary. While the direct impact from any future development of this site is unknown and must be investigated further 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. This must include land based activities which would require rock blasting, pile driving etc. Also.	Due to the unknown potential impact associated with tidal devices and marine mammals in Ireland significant research work will first be required to determine the behaviouoral impact of any such tidal devices on Bottlenose Dolphins. 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 key sites as there use may changes with changes in fish distribution throughout the year. The applicant/developer will first need to undertake detailed surveys and research into the potential for significant effects of tidal devices on the behaviour of dolphins both in terms of noise disturbance and potential for collision. Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS. As is shown from the results of the SIFP scoring system, the results of the analysis of the tour boat sightings and the NPWS detailed conservation objectives this area is a very important foraging site for bottlenose dolphins, especially on a flood tide and any tidal energy device with moving parts could cause a fatal collision. Collision risk between marine mammals and tidal devices increases with ambient noise and the detection distance decreases with increased noise levels. This area is therefore flagged as having <u>potentially</u> serious implications for the bottlenose dolphins however this is dependant on the type of device used. Any future development of tidal devices within this area would need to take into consideration both direct and in-direct impacts to the Bottlenose Dolphin. Depending on the exact location of any such device within this area of opportunity further consultation with the Shannon Dolphin and Wildlife Foundation would be required to determine the potential impact. Both direct impact through moveable parts of the device and in-direct impacts through disturbance and noise would also need to be considered. Any development associated with tidal energy at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
			• Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	
	Freshwater Pearl Mussel **No Potential Impacts:** Not present			
	Otter **No Potential Impacts:** Not present			

Location	Qualifying Interests & Potential Impacts [26]	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity** **Tidal Energy** **Site J Adjacent to Moneypoint, Co. Clare**	***Cormorant* (Breeding and wintering)** ***Whooper Swan* (Wintering)** ***Light Bellied Brent Goose* (Wintering)** ***Shelduck* (Wintering)** ***Wigeon* (Wintering)** ***Teal* (wintering)** ***Pintail* (Wintering)** ***Shoveler* (Wintering)** ***Scaup* (Wintering)** ***Golden Plover* (Wintering)** ***Grey Plover* (Wintering)** ***Lapwing* (Wintering)** ***Knot* (Wintering)** ***Dunlin* (Wintering)** ***Black-Tailed Godwit* (Wintering)** ***Bar-tailed Godwit* (Wintering)** ***Curlew* (Wintering)** ***Redshank* (Wintering)** ***Greenshank* (Wintering)** ***Black-headed Gull* (Wintering)** **Wetlands and Waterbirds** (*As listed in the NPWS Detailed Conservation Objectives September 2012*) **Potential Impacts** While the site is located between intertidal areas used by wintering birds within other parts of the SPA the core of this site is located within a current industrial area which is not utilised by the qualifying features of this SPA	While the core of the site is located beside a current industrial area the fact that it is located adjacent to one of the most important SPAs in the country and directly between some of the most important parts of that SPA further detailed surveys to those previously carried out at this site may be required of the migratory and wintering wildfowl movements in the vicinity of the site as the site largely lies within the flight path of Poulnasherry and Clonderlaw Bays. However, depending on whether the structure will have any aerial features or not no direct or in-direct impacts may arise. The scale of these surveys will depend on the scale of the project. No potential impact may occur depending on the scale however in-direct impacts may occur through disturbance. The entire estuary is a continuum as used by the birds. Given that this site is also within the pSPA boundary 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	Potential effects from the theme Renewable Energy and the associated activities which may lead to damaging effects are outlined in Tables 3.12 together with mitigation measures which are outlined in Table 6.4 which must be adhered to in relation to this site at project level. 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[26] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf

Table 4.20 Appropriate Assessment of Natura 2000 Sites against Tidal Energy theme and site location at Carrig Island, Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Tidal Energy** **Site K Carrig Island, Co. Kerry**	**Estuaries** **Potential Impacts:** Small portion of site contains estuarine habitat to the west of the site boundary	• Habitat loss - to any future development or installation of device • Physical disturbance • Siltation rate changes • Water flow • Toxic effects from the introduction of Non synthetic & synthetic compounds	Initially any development or testing of devices within this part of the area of opportunity must avoid the area of estuarine habitat. In relation to in-direct effects any future development within this area of opportunity 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. The future investigation, trialling or use of this site in any way for the testing of renewable energy devices must ensure the following targets are maintained: • 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 Area of Opportunity.	No residual impacts
	Mudflats and sandflats not covered by seawater at low tide. **No Potential Impacts:** Not present			
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **No Potential Impacts:** No Vegetated sea cliffs of the Atlantic and Baltic Coasts			
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not present			

	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not present			
	Sandbanks which are slightly covered by sea water all the time **No Potential Impacts:** Not present			
	Large shallow inlets and bays **No Potential Impacts:** Not present			
	Reefs **Potential Impacts:** Present within centre of area of opportunity co-insiding with areas of Faunal turf dominated subtidal reef complex according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Depending on type, scale and location of device within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid this habitat. 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. • 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	No residual impacts
	Perennial vegetation of stony banks **No Potential Impacts:** Not present			

	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp.* And sometimes *Quercus robur* **No Potential Impacts:** Not present			
	River Lamprey **No Potential Impacts:** No records for this site			
	Brook Lamprey **No Potential Impacts:** No records for this site			
	Sea Lamprey **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"* however this is based on small scale mapping and therefore the exact potential location of this species within this area of opportunity is unknown.	• Loss of migration route • Artificial barriers can block lampreys' upstream migration, 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.	Detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this area of opportunity across all seasons over a minimum 1-year period. 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 must 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 must 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory

				measures will be required for all IROPI proposals,
	Atlantic Salmon **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. 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 must be developed in consultation with IFI. 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. • 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	Bottle-nosed Dolphin **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. As part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by	. As this area of opportunity is located within the Shannon Estuary the following potential impacts may arise in relation to Bottlenose Dolphins; It is unknow whether there will be direct impacts 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. This must include land based activities which would require rock blasting, pile driving etc. also. In addition as dolphins are inquisitive by nature there is a risk of direct impact from movable parts as the dolphins explore these devices • Disturbance through construction, operational and decomissioning 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 • Collison with tidal devices and associated infrastructure, increased shipping	Due to the unknown potential impact associated with tidal devices and marine mammals in Ireland significant research work will first be required to determine the behaviouoral impact of any such tidal devices on Bottlenose Dolphins. 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 key sites as there use may changes with changes in fish distribution throughout the year. The applicant/developer will first need to undertake detailed surveys and research into the potential for significant effects of tidal devices on the behaviour of dolphins both in terms of noise disturbance and potential for collision. Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS Any future development of tidal devices within this area would need to take into	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura

	the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of intermediate habitat priority.		consideration both direct and in-direct impacts to the Bottlenose Dolphin. Depending on the exact location of any such device within this area of opportunity further consultation with the Shannon Dolphin and Wildlife Foundation would be required to determine the potential impact. Both direct impact through moveable parts of the device and in-direct impacts through disturbance and noise would also need to be considered. Any development associated with Aquaculture at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Freshwater Pearl Mussel</u> **No Potential Impacts:** Not present			
	<u>Otter</u> **Potential Impacts** No records for this site from Biodiversity Ireland or through previous EIS surveys undertaken within the confines of the Cahiracon strategic development location. Part of the outer shoreline of this Strategic Development Location has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 [27]	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity Tidal Energy** **Site K Carrig Island, Co. Kerry**	**Sub-site: OK509** **Whooper Swan** **Light-Bellied Brent Goose** **Shelduck** **Wigeon** **Teal** **Cormorant** **Ringed Plover** **Golden Plover** **Grey Plover** **Lapwing** **Knot** **Dunlin** **Black-tailed Godwit** **Bar-tailed Godwit** **Curlew** **Greenshank** **Redshank** **Pintail** **Shoveler** **Black-headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-site Information*) **Potential Impacts:** Site is located within or adjacent to an SPA and pSPA The Carrig Island sub-site OK509 covers a portion of the Bsllylongford site to the west nearest the Ballylongford estuary (**See Figure 3.52) It** has been given a high rating from the assessment of low-tide sub-sites based on the identification of 20 of	This rating may change at project level depending on the scale and detail of the project. This Area of Opportunity (Carrig Island) is located within sub-site OK509 therefore depending on the scale of the project potential impact may occur in-direct impacts may also occur through disturbance. The entire estuary is a continuum as used by the birds. It must 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 While this site has been identified as being highly sensitive to future development however this sub-site not only covers the identified tidal energy site the core of which is located within deep water it also covers the inter-tidal areas on the landward side of Carrig Island where most of the important bird feeding areas are located. Deep water areas are not as valuable for birds as intertidal areas and therefore not expected to contain as many species. Intertidal habitat contains soft sediments and may contain significant densities of invertebrates (worms, crustaceans, bivalve molluscs and gastropods such as *Hydrobia*), which comprise the staple diet of many species of wildfowl and wading birds. Beds of marine grasses, which only occur in shallow areas, are also important food resources for grazing wildfowl, especially during autumn and winter. The habitats present within the deep water areas, nearest to this site, do not provide rich food resources for over-wintering birds similar to the large expanses of intertidal habitat in the inner estuary, east of Foynes Island. Should development of a tidal device take place on the estuary side of Carrig island the level of impact is deemed to be low.	Potential effects from the theme Renewable Energy and the associated activities which may lead to damaging effects are outlined in Tables 3.12 together with mitigation measures which are outlined in Table 6.4 which must be adhered to in relation to this site at project level. 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. Further detailed analysis of the sub-site information and the distribution and feeding, foraging, breeding useage within this area is required prior to any works. 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[27] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf

Location	Qualifying Interests & Potential Impacts [27]	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	the qualifying species being recorded at this site coupled with 7087 waterbirds recorded based on the sum of the peak counts over 2010/2011. NPWS have carried out an assessment of the species richness across the subsite level based on the 2010/2011 waterbird survey. The Carrig Island subsite was the top site scoring the highest species richness. This implies the sub-site OK509 is highly sensitive to future development at a strategic level. Sub-site OK508 Bunaclugga Bay covers the eastern portion of the site (**See Figure 3.52)** It has been given a high rating from the assessment of low-tide sub-sites based on the identification of 15 of the qualifying species being recorded at this site coupled with 1696 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OK508 is highly sensitive to future development at a strategic level.			

Table 4.21 Appropriate Assessment of Natura 2000 Sites against Tidal Energy theme and site location at Kilconly Point, Co.Kerry from the SIFP

Location	Qualifying Interests & Potential Impacts	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts

Natura 2000Site Code 2165 – Lower River Shannon **Theme/Area of Opportunity** **Tidal Energy** **Site L** **Kilconly Point**	**Estuaries** **No Potential Impacts:** Not Present			
	Mudflats and sandflats not covered by seawater at low tide. **Potential Impacts:** Yes habitat present along the shoreline on the eastern portion of the area of opportunity.	Potential for direct effect on this habitat is low as the installation or location of any tidal energy device is likely to be in the centre of the area of opportunity where the tidal energy is greatest.	Careful site selection within area of opportunity to avoid this habitat feature for location of devices and export cables and any associated onshore infrastructure	No residual impacts
	Coastal Lagoons **No Potential Impacts:** No Coastal Lagoons located within the vicinity of the opportunity			
	Vegetated sea cliffs of the Atlantic and Baltic Coasts **Potential Impacts:** Present - Vegetated sea cliffs of the Atlantic and Baltic Coasts (Ballybunion Site ID: 06001)	Impact to this habitat is unlikely as access to this site either for construction or servicing of any renewable device would be facilitated by boat.	Connections to land or installation of onshore infrastructure must avoid this area of habitat along the coastline **Key targets which must be maintained:** • Area stable or increasing subject to natural processes including erosion (Ballybunion 15.6km) • Habitat distribution – No decline, subject to natural processes. • Physical structure – No alteration to natural functioning of geomorphological and hydrological processes due to artificial structures • Vegetation structure; zonation: Maintain range of sea cliff habitat zonations including transitional zones, subject to natural processes including erosion and succession • Vegetation structure; Maintain structural variation within sward • Vegetation composition: Maintain range of sub-communities with typical species listed in the Irish Sea cliff survey (Barron et al, 2011) • Vegetation composition: Negative indicator species (including non-natives) to represent less than 5% cover • Vegetations composition: Cover of bracken on grassland and/or heath to be less than 10%. Cover of woody species on grassland and/or heath to be less than 20%	No residual impacts
	Salicornia and other annuals colonizing mud and sand **No Potential Impacts:** Not Present			

	Atlantic salt meadows (*Glauco-Puccinellietalia maritime*) **No Potential Impacts:** Not Present			
	Mediterranean salt meadows (*Juncetalia maritimi*) **No Potential Impacts:** Not Present			
	Watercourses of plain to montance levels with the Rannunculion fluitantis and Callitricho-Batrachion vegetation **No Potential Impacts:** Not Present			
	Sandbanks which are slightly covered by sea water all the time **Potential Impacts** Not present within Area of Opportunity boundary			
	Large shallow inlets and bays **Potential Impacts:** Habitat present	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Surveys to determine the extent, structure, function and condition of the marine community structure within this area of opportunity and at the chosen location for any tidal energy device once known. 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. • To permanent habitat areas is stable or increasing, subject to natural processes. • Conserve the community type located at this site – Intertidal sand to mixed sediment with polychaetes, molluscs and crustaceans community complex, Subtidal sand to mixed sediment with *Nucula nucleus* community complex and Faunal turf dominated subtidal reef complex	No residual impacts
	Reefs **Potential Impacts:** Present within centre of area of opportunity co-insiding with areas of Faunal turf dominated subtidal reef complex and mixed sub-tidal reef community according to Lower River Shannon SAC Conservation Objectives Ref: Map 9 (NPWS, 2012)	Potential for direct habitat loss and degradation of community type located within this area of opportunity	Depending on type, scale and location of device within this area of opportunity impact on this reef habitat can be avoided through the careful selection of the site within the area of opportunity. The exact location must avoid this habitat. 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. • 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:	No residual impacts

			Faunal turf dominated subtidal reef complex	
	Perennial vegetation of stony banks **No Potential Impacts:** Not Present			
	Molinia meadows on calcareous, peaty or clay-silt-laden soils (*Molinion caerulecae*) **No Potential Impacts:** Not Present			
	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* also *Salix spp*. And sometimes *Quercus robur* **No Potential Impacts:** Not Present			
	River Lamprey **No Potential Impacts:** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of River Lamprey.			
	Brook Lamprey **No Potential Impacts:** As per *"The Status of EU Protected Habitats and Species in Ireland, 2008"* the 10km national grid squares for this area does not indicate the presence of Brook Lamprey			
	Sea Lamprey **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"* however this is based on small scale mapping and therefore the exact potential location of this species within this area of opportunity is unknown.	• Loss of migration route • Artificial barriers can block lampreys' upstream migration, 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.	Detailed fishery surveys will be required to determine the use (if any) by Sea Lamprey of this area of opportunity across all seasons over a minimum 1-year period. 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 must 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	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate

			significant effects an alternative solution must 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.	assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,
	<u>Atlantic Salmon</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"*	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. Suitable mitigation measures would be required specifically for Atlantic salmon must 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 must be developed in consultation with IFI. 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. • 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 adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed.

				Satisfactory compensatory measures will be required for all IROPI proposals,
	Bottle-nosed Dolphin **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. Also, as part of the SIFP process a scoring system for assessing the importance of sites for Bottlenose Dolphins was developed by the Shannon Dolphin and Wildlife Foundation. This was developed in order to objectively assess sites for their importance for bottlenose dolphins, and to assess those sites upriver with no survey data. This system which looked at key criteria such as slope, depth etc identified the marine environment directly in front of this site as being of low habitat priority. The area surrounding this tidal energy site itself supports an area of high habitat potential for the Bottlenose Dolphin with frequent use by the Bottlenose Dolphins in this area.	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 decomissioning 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 • Collison with tidal devices and associated infrastructure, increased shipping	Due to the unknown potential impact associated with tidal devices and marine mammals in Ireland significant research work will first be required to determine the behaviouoral impact of any such tidal devices on Bottlenose Dolphins. 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 key sites as there use may changes with changes in fish distribution throughout the year. The applicant/developer will first need to undertake detailed surveys and research into the potential for significant effects of tidal devices on the behaviour of dolphins both in terms of noise disturbance and potential for collision. Background noise assessments would be required in any project level appropriate assessment or licencing for such an activity by the NPWS Any future development of tidal devices within this area would need to take into consideration both direct and in-direct impacts to the Bottlenose Dolphin. Depending on the exact location of any such device within this area of opportunity further consultation with the Shannon Dolphin and Wildlife Foundation would be required to determine the potential impact. As is shown from the results of the SIFP scoring system, the results of the analysis of the tour boat sightings and the NPWS detailed conservation objectives this area is a very important foraging site for bottlenose dolphins, especially on a flood tide and any tidal energy device with moving parts could cause a fatal collision. Collision risk between marine mammals and tidal devices increases with ambient noise and the detection distance decreases with increased noise levels. This area is therefore flagged as having <u>potentially</u> serious implications for the bottlenose dolphins however this is dependant on the type of device used. Both direct impact through moveable parts of the device and in-direct impacts through disturbance and noise would also need to be considered. Any development associated with tidal energy at this Area of Opportunity must maintain the key targets associated with this species as per the NPWS detailed Conservation Objectives for this SAC March 2012. • Species range within the SAC must not be restricted by artificial barriers to SAC use • Critical areas, representing habitat used preferentially by Bottlenose Dolphins must be maintained in a natural condition • Human activities must occur at levels that do not adversely affect the bottlenose dolphin population within the SAC.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

	Freshwater Pearl Mussel **No Potential Impacts:** Not present (nearest populations are located downstream in the Cloon and Doonbeg catchments in County Clare)			
	Otter **Potential Impacts** No records for this site from Biodiversity Ireland or through previous EIS surveys undertaken within the confines of the Cahiracon strategic development location. Part of the outer shoreline of this Strategic Development Location has been indicated as part of the 10m commuting buffer in the NPWS, 2012 Conservation Objectives Ref; Map 17.	While no records exist for Otters within this AoO at a strategic assessment level, NPWS have identified a 10m terrestrial buffer along the shoreline which has been identified as critical for otters. Therefore at a project level the potential exists for: • In-direct disturbance • Loss of commuting habitat • Loss of access to feeding areas	- Site level assessment to determine Otter use if any. - 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 given any future proposals for this site will largely be contained in the deeper waters of the AoO

Location	Qualifying Interests & Potential Impacts [28]	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
Natura 2000 Site Code 4077- River Shannon and River Fergus Estuaries SPA **Theme/Area of Opportunity** **Tidal Energy** **Site L Kilconly Point**	**A small portion of this Area of Opportunity is located within Sub-site OK507:** **Light bellied Brent Geese** **Cormorant** **Ringed Plover** **Grey Plover** **Golden Plover** **Lapwing** **Knot** **Dunlin** **Black tailed Godwit** **Bar Tailed Godwit** **Curlew** **Greenshank** **Redshank** **Black Headed Gull** (*As listed in the NPWS Detailed Conservation Objectives Supporting Document September 2012 Sub-Site Information*) **Potential Impacts:** The sub-site OK507 which is within the River Shannon covers only a portion of the Kilconly Point site (**See Figure 3.54)** The sub-site has been given a moderate rating from the assessment of low-tide sub-sites based on the identification of 13 of the qualifying species being recorded at this site coupled with 1335 waterbirds recorded based on the sum of the peak counts over 2010/2011. This implies the sub-site OK507 is moderately sensitive to future	Kilcony Point is located within the Doneen Point sub-site and takes into account the inter-tidal area at the front of the site. The actual footprint of the tidal energy site is quite large and it is highly unlikely that the device will be located near shore within this sub-site therefore the impact to the birds using this site is deemed to be very low. The majority of the site is located in the deeper water off-shore. Deep water areas are not as valuable for birds as intertidal areas and therefore not expected to contain as many species. Intertidal habitat contains soft sediments and may contain significant densities of invertebrates (worms, crustaceans, bivalve molluscs and gastropods such as *Hydrobia*), which comprise the staple diet of many species of wildfowl and wading birds. Beds of marine grasses, which only occur in shallow areas, are also important food resources for grazing wildfowl, especially during autumn and winter. The habitats present within the deep water areas, nearest to this site, do not provide rich food resources for over-wintering birds similar to the large expanses of intertidal habitat in the inner estuary, east of Foynes Island. The entire estuary is a continuum as used by the birds. It must be noted that the ranking system is to be used as a guide at a strategic level only.	Potential effects from the theme Renewable Energy and the associated activities which may lead to damaging effects are outlined in Tables 3.12 together with mitigation measures which are outlined in Table 6.4 which must be adhered to in relation to this site at project level. 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.	Where appropriate mitigation measures cannot remove the potential for adverse effects on the integrity of a Natura 2000 site an alternative solution should be found which will also need to undergo appropriate assessment. Where there are no alternatives for avoiding adverse effects on the integrity of a Natura 2000 site the applicant must demonstrate that there are Imperative Reasons of Overriding Public Interest (IROPI) for the project to proceed. Satisfactory compensatory measures will be required for all IROPI proposals,

[28] http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationobjectives/CO004077.pdf

Location	Qualifying Interests & Potential Impacts [28]	Likely Potential Impacts on associated attributes from future investigation or development of Area of Opportunity include:	Mitigation (*to ensure key targets are maintained – targets are also outlined below as per detailed conservation objectives*)	Residual Impacts
	development at a strategic level			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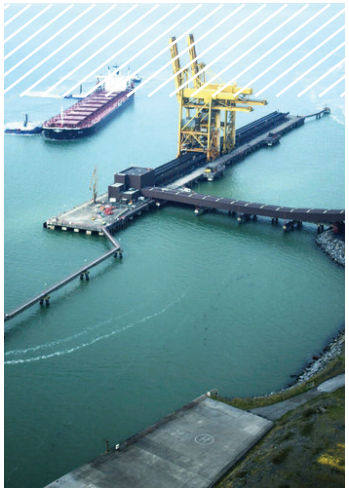


SILVER WHISPER