MAGHERAROARTY PIER EXTENSION

ENVIRONMENTAL IMPACT STATEMENT



MARCH 2001

Comhairle Chontae Dhún na nGall
Donegal County Council

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PART I BACKGROUND INFORMATION

1.0 INTRODUCTION

1.1 Project Summary

Magheraroarty pier on the north-west coast of Donegal is the main summer access point for the Tory Island ferry as well as providing facilities for local fishing boats and access to Inishbofin. The ferry to Tory Island has been improved in recent years and now with the construction of a new all tide berth at West Town, Tory Island there is a need for increased berthing on the mainland. To provide the facilities required, Donegal County Council are proposing to extend the pier at Magheraroarty and dredge an access channel.

It is envisaged that the pier extension will enable a regular ferry service to Tory Island to be scheduled. The pier will also provide safer berthing facilities for local fishing vessels. The proposed pier extension coincides with the development of a marine/tourism/enterprise centre in Magheraroarty by Údarás na Gaeltachta. This development will enhance the tourism potential of the area and in turn provide local employment in the area.

The coastal areas adjacent to Magheraroarty pier (Dooey peninsula and Ballyness Bay) are environmentally important because of their varied habitat and specific wildfowl and botanical interest. These areas have been designated both as a proposed Natural Heritage Area and proposed Special Area of Conservation. The beach is also important for recreation and amenity. It is important that the new pier extension will not endanger the integrity of these important ecological and recreational sites.

The proposed new pier at Magheraroarty has been designed with respect to the following two criteria:

- to provide safe berthage at the pier at all states of the tide;
- to ensure that the pier extension will have no impact with regard to the stability of the adjoining beach and dune system at the Dooey peninsula.

The new pier extension will be 50 m long with a return at the end of 30 m to provide protection from storm waves.

The pier deck will be approximately 6 m wide and will be of concrete deck construction as the existing pier deck. The approach channel and turning basin which is an integral part of the project will be dredged to a depth of –1.5m OD. The refurbishment of the existing pier is necessary to provide complementary access to the new pier head and also provides the opportunity to deepen the draught available for berthing. The existing pier will be strengthened by the use of new quay walls on each side and a refurbished deck. A wave wall protection will be added to the seaward face to minimise overtopping and provide safe access to the new head of the pier. The use of new walls on each side of the existing structure will result in the widening of the existing pier.

The material to be dredged is suitable for land reclamation and will be used to form a marshalling area which can be used for car parking, boat storage and as a queuing area for cars/people waiting for the ferry. The new Údarás na Gaeltachta centre will incorporate the ticket office for the ferry as well as providing other amenities for visitors such as a craft shop, coffee shop and rest room facilities. The main components of the proposed pier extension are illustrated in Figure 1.1

The estimated cost of providing the pier refurbishment and extension is in the order of £2 million. Donegal County Council will be funding part of the cost of the development. Substantial funding is also being sought from the Department of Arts, Heritage, Gaeltacht and the Islands.

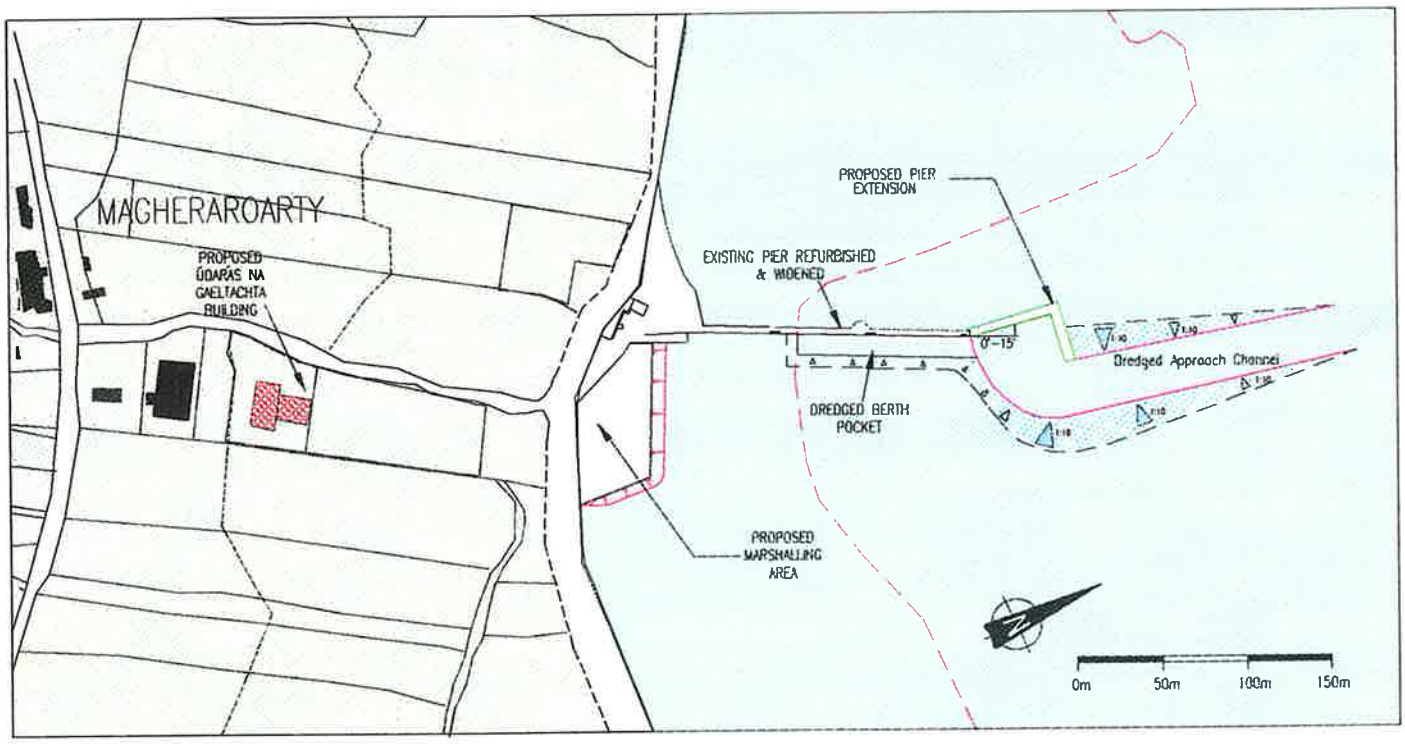


Figure 1.1 Proposed Pier Extension and Refurbishment, Magheraroarty, Co. Donegal

This report details the Environmental Impact Assessment (EIA) of the pier extension and refurbishment including the reclamation area which will become a marshalling area. The EIA was carried out to ensure that the development is properly integrated with the overall development of Magheraroarty and that safeguards are put in place to protect the natural environment.

1.2 Project Justification

The existing pier at Magheraroarty, which was constructed in the late 1970's on the site of a former pier, is in need of repair and does not provide the required berthing at all states of the tide.

The pier is the main summer access point for the Tory Island Ferry as well as providing facilities for local fishing boats and access to Inishbofin.

Magheraroarty Pier is the operators preferred location for the summer ferry service. The operator requires a berth accessible at all stages of the tide and with a degree of shelter so that the ferry can operate from Magheraroarty most of the time in summer.

To provide the facilities required, the pier at Magheraroarty must be extended and refurbished and, depending upon the length of the extension, a dredged access channel provided.

At present the Tory Island Ferry can only schedule arrivals and departures at Magheraroarty at times of High Water. This situation is unsatisfactory for a number of reasons:

- It is not possible to schedule regular ferry times every day as the ferry is tidal dependent;

- If there is an emergency on the island e.g. the need to take someone off the island for immediate medical attention, it may not be possible to launch a boat from Magheraroarty pier if it is at a time of low water;

- If the ferry arrives at Magheraroarty at low water it is necessary to send a smaller boat out and transfer passengers and goods onto this boat to bring them ashore at the pier. This procedure is considered to be unsafe and time consuming.

The provision of an all tidal berth at Magheraroarty would alleviate the above problems.

The ability to schedule regular crossings to Magheraroarty during summer months would be beneficial to regular users of the service and in promoting tourism in the area. Up until now, the times of the ferry crossings have been different every day to suit the tides which has made it difficult for tourism promoters to advertise the service. A more definite summer timetable would greatly enhance the opportunities to attract tourists to north-west Donegal including Tory Island.

The provision of the all tide berth in Magheraroarty may also encourage touring yachts to tie up at the pier which in turn would benefit local businesses such as shops and pubs in the area.

The new pier as well as improving ferry services and tourism has also been designed to provide more shelter for fishing boats berthing at the pier. At present significant swells in the vicinity of the pier make it impossible for attracting boats to berth at certain times and makes it necessary to remove boats from the water. The new pier will provide more shelter for these boats and only in severe north westerly storms will it be necessary to remove boats.

1.3 Consideration of Alternatives

A number of alternative sites were considered for additional berthing facilities prior to arriving at the decision to extend the existing pier at Magheraroarty. A location map showing the sites considered is presented in Figure 1.2. The sites considered were:

(i) Bunbeg

Bunbeg is the main ferry base for the Tory Island ferry. It is presently used for normal ferry services during the winter months.

Advantages: the existing berthing facilities are satisfactory to run a regular summer service. No additional expenditure would therefore be required.

Disadvantages: the ferry route to Tory Island is almost twice as long compared to using Magheraroarty Pier. Users of the ferry are also unable to see their destination until half way through their journey.

(ii) Curran Port

Curran Point is a small semi-enclosed bay situated to the west of Magheraroarty and represents the shortest route to Tory Island.

Advantages: a new pier at Curran Port would provide a much shorter travelling time when compared to Bunbeg and a similar travelling time compared to Magheraroarty Pier. Users of the ferry would also be able to see their destination for the entire journey.

Disadvantages: There is no existing berthing facilities at Curran Port. There is also little benefit to be gained in terms of shelter offered by the embayment due to the swell nature of the wave climate. The landside infrastructure is also poor in terms of available facilities and approach

roads. This option would therefore be less cost-effective.

(iii) **Port na Blagh Port**

The pier at Port na Blagh is occasionally used by the Tory Island ferry.

Advantages: Port na Blagh is an existing tourist destination and may encourage more visitors to Tory Island. Landside facilities and approach roads are good.

Disadvantages: The pier at Port na Blagh is not accessible at all stages of the tide and the site is exposed to northerly gales Works to the pier and approach channel would therefore be required. The required journey time to Tory Island is only marginally shorter than from the main ferry base at Bunbeg.

(iv) **Magheraroarty Pier**

Magheraroarty pier is currently used by the Tory Island ferry during the summer months.

Advantages: Magheraroarty pier offers much shorter journey time compared to the main ferry base at Bunbeg and is therefore favoured by the ferry operators. Users of the ferry are able to see their destination for the majority of the journey and also from the roads as they approach Magheraroarty during normal visibility. There are also existing landside facilities at Magheraroarty.

Disadvantages: Significant works need to be undertaken at the pier and approach channel in order to provide a safe berth for the ferry at all stages of the tide.

Preferred Site

Following consideration of the alternatives, works to Magheraroarty pier was considered to be the preferred option to secure a safe berthing facility for the Tory Island ferry which also offered opportunities to enhance the tourism potential of the area.

The next step was to consider a range of options for providing safer berthage at Magheraroarty pier whilst ensuring the stability of the adjoining beach and dune system at the Dooey Peninsula. Five options were considered, Figures 1.3 – 1.7 as described below:

The main requirement considered in developing these five options was the adequate provision of all tide berthing at the pier. By raising the level of the outer 60m of existing pier and/or considering new pier extensions at varying positions, the requirements of all tide berthing could be satisfied. In addition however, it should be noted that some repair and refurbishment of the inner length of the existing pier head would also be required.

Option 1 Deepen berth at existing pier

- Renovate the outer 60 m of the existing pier;
- Raise the deck level to +6.0 m OD;
- Sheet pile the outer 60 m to permit dredging to –1.5 m OD;
- Dredge approximately 33,000 m^3 in a 30 m wide entrance channel with 1:10 side slopes.

Option 2 Deepen berth at existing pier and provide 30m linear extension

- Renovate the outer 60 m of existing pier;
- Raise the deck level to +6.0 m OD;
- Sheet pile the outer 60 m to permit dredging to –1.5 m OD;
- Construct 30 m linear extension of pier to allow dredging to –1.5 m OD;
- Dredge approximately 33,000 m^3 in a 30 m wide entrance channel with 1:10 side slopes.

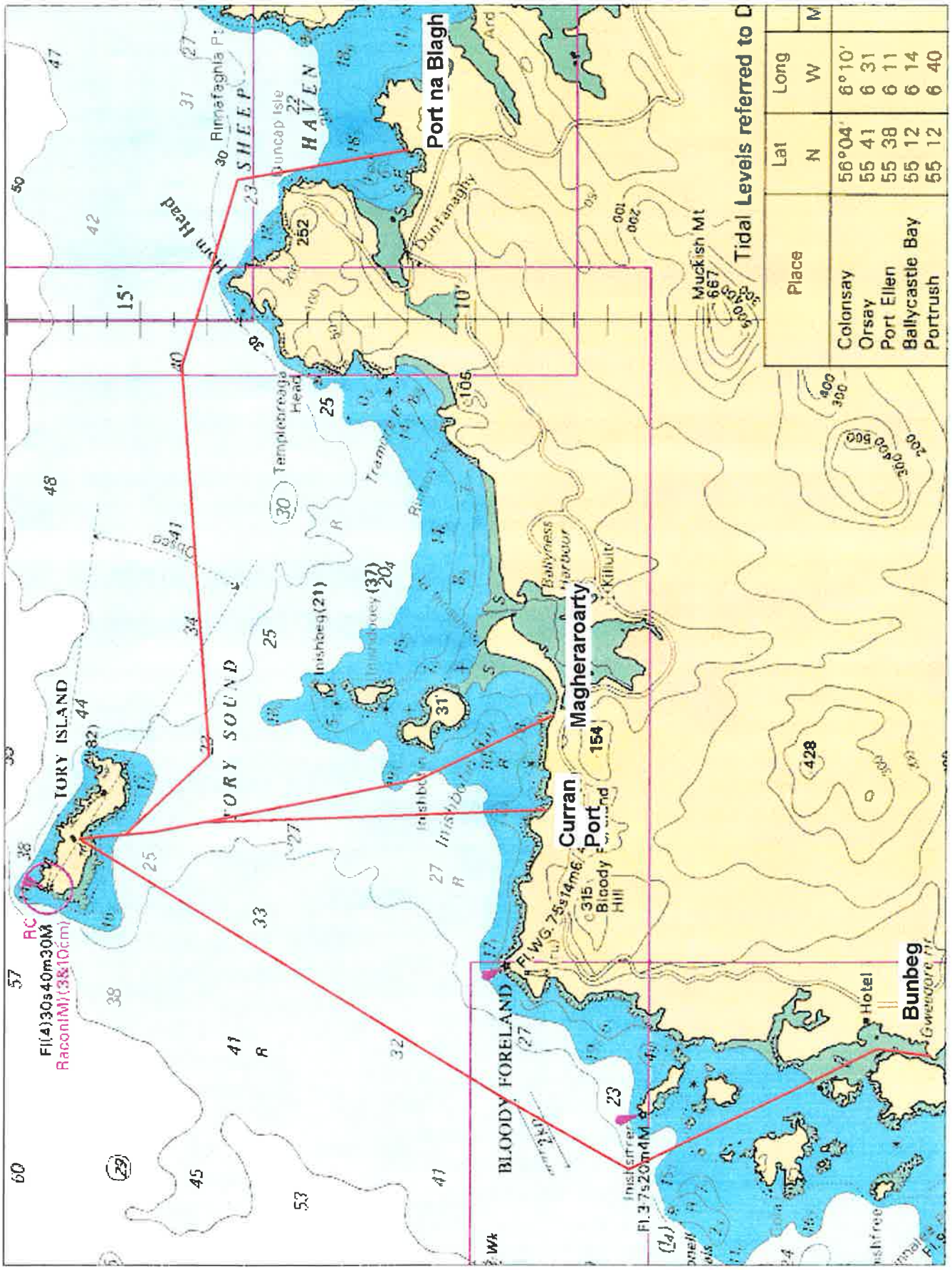


Figure 1.2 Consideration of Alternatives

Option 3 Deepen berth at existing pier and provide 30m angled extension

- Renovate the outer 60 m of existing pier;
- Raise the deck level to +6.0 m OD;
- Sheet pile the outer 60 m to permit dredging to –1.5 m OD;
- Construct 30m pier extension at an angle to the existing pier to provide enhanced protection and permitting dredging to –1.5 m OD;
- Dredge approximately 36,000 m^3 in a 30 m wide entrance channel with 1:10 side slopes.

Option 4 Provide 50m linear extension

- Raise the deck level of the outer 60 m of existing pier for access only. No further dredging permitted alongside;
- Construct 50m linear extension of pier to allow dredging to –1.5 m OD;
- Dredge approximately 24,000 m^3 in a 30 m wide entrance channel with 1:10 side slopes.

Option 5 Provide 50m angled extension with a 30m return

- Raise the deck level of the outer 60 m of existing pier for access only. No further dredging permitted alongside;
- Construct 50m extension of pier with a 30m return to provide enhanced protection and permitting dredging to –1.5m OD;
- Dredge approximately 21,000 m^3 in a 30 m wide entrance channel with 1:10 side slopes.

Dredging Levels

All construction options have been based on a dredged level of –1.5 m with an allowance of over-dredge to –2.0 m OD. This allows for some siltation in the entrance channel and periodic maintenance dredging. It is assumed that siltation alongside the pier would be at a slower rate and that the dredged depth of –1.5 m OD could be maintained more easily than in the channel.

The depth of –1.5 m OD gives a navigable draught of 1.8 m at LAT (Lowest Astronomical Tide) and a draught of 2.3 m at MLWS (Mean Low Water Springs).

Identification of the Preferred Option for Pier Extension

To identify the preferred option for extending the pier, a number of factors were taken into consideration:

- costs;
- shelter provided by pier extension;
- ability of vessels to berth at the pier at all stages of tide;
- the impact of the pier on stability of the adjoining beach and dune system of Dooey peninsula and rate of channel siltation.

Options 1 and 4 are the least expensive options but they also provide the shortest berthages (dredged depths -1.5 m OD) at 60 m and 50 m respectively. Options 2, 3 and 5 provide 90 m, 90 m and 80 m of berthage respectively.

Of the five options, Option 5 provides the most protection from waves to vessels. In Option 5 the berth for the ferry would be along the outer L where it would be sheltered from direct wave action.

The wave climate is such in the area that the dredged channel for all the options will silt up in a relatively short period of time. However Options 1 and 3 will silt up faster as the dredged channels would be in the path of the main littoral currents feeding into Inishbofin Bay.

Option 5 requires the least amount of dredging with only 21,000 m^3 of material being removed compared to 33,000 m^3 for Options 1 and 2 and 36,000 m^3 for Option 3. The reuse of the dredged material to form the marshalling area is an integral part of the project. From cut and fill calculations it has been determined the amount of dredged material required to form the marshalling area matches the amount of dredged material to be recovered from Option 5. As the dredged material would be encompassed in the marshalling area there would be no requirement to dispose of the dredged material at a dump at sea site or landfill.

Mathematical modelling techniques were used to assess the impact of each of the five pier options on coastal processes which in turn affect the stability of the Dooey Peninsula. This aspect of the EIA is covered in detail in Chapter 6 – Coastal Processes of the EIS. In summary, each of the options considered had no significant impact on the beach and dune system of the Dooey Peninsula.

Taking the above into consideration it was decided that Option 5 (Figure 1.7), provision of a 50m angled extension with a 30m return is the preferred option for pier extension at Magheraroarty.

The refurbishment of the existing pier to provide complementary access would also be required to provide a safe access for vehicles and pedestrians onto the pier. For instance as a wave wall would be incorporated into the new pier extension providing shelter from wave overtopping it would also be necessary to provide a similar level of wave wall and protection along the existing pier.

Figure 1.8 indicates the overall layout of the pier refurbishment together with the pier extension. Following the further public consultation meeting held in Magheraroarty Community Centre on 8 November 2000, the refurbishment and advantageous use of the existing pier was reviewed. As shown in Figure 1.8 it was concluded that the majority of fishermen and locals wished to avail of deeper draught alongside the existing pier. This work is complementary to the repair of the existing pier.

Furthermore, the final alignment of the pier extension was considered in light of pier refurbishment. Given that boats would be able to berth alongside the existing pier it was considered prudent to examine a straight berthing face for the pier extension. Although the study of coastal processes was carried out using a pier extension at 15° it has been concluded that the same conclusions may be drawn for a pier extension at 0° (i.e. straight berthing face).

Indeed, as noted in paragraph 6.3, the use of a longer pier than the 50m proposed would begin to impact on the coastal processes influencing the dynamic stability of the southern section of the Dooey peninsula.

Bearing this in mind and being cognisant of the financial constraints for a 50m extension, the use of a straight pier extension is beneficial. Thus, if only 35m or 40m of pier extension may economically be afforded, the use of a straight berthing face tying into the current pier would allow for continuous face berthage rather than the spoiling effect from a 15° kink.

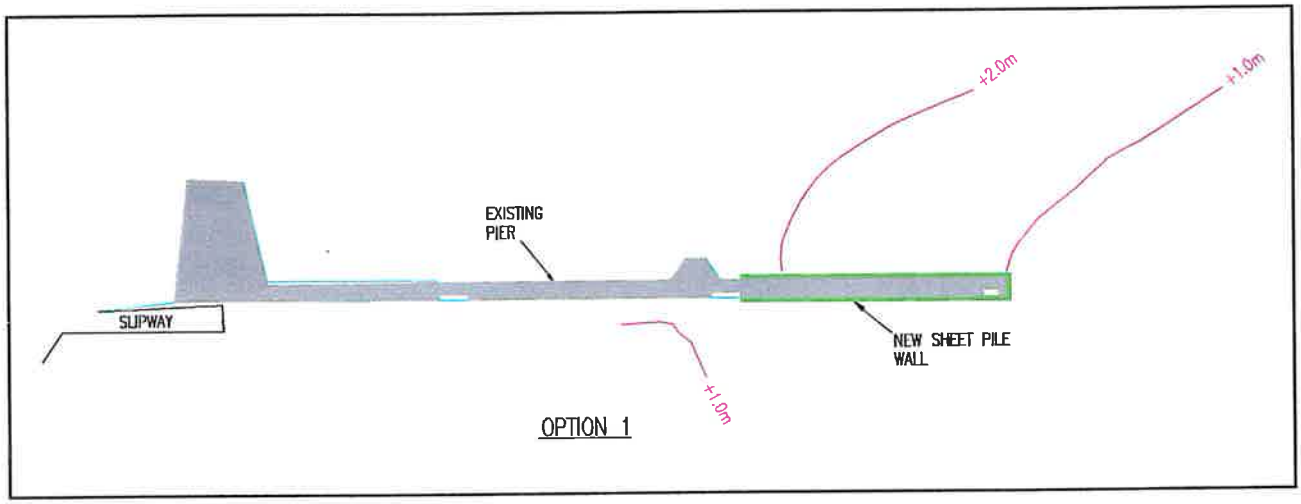


Figure 1.3 Option 1 – Deepen Berth at Existing Pier

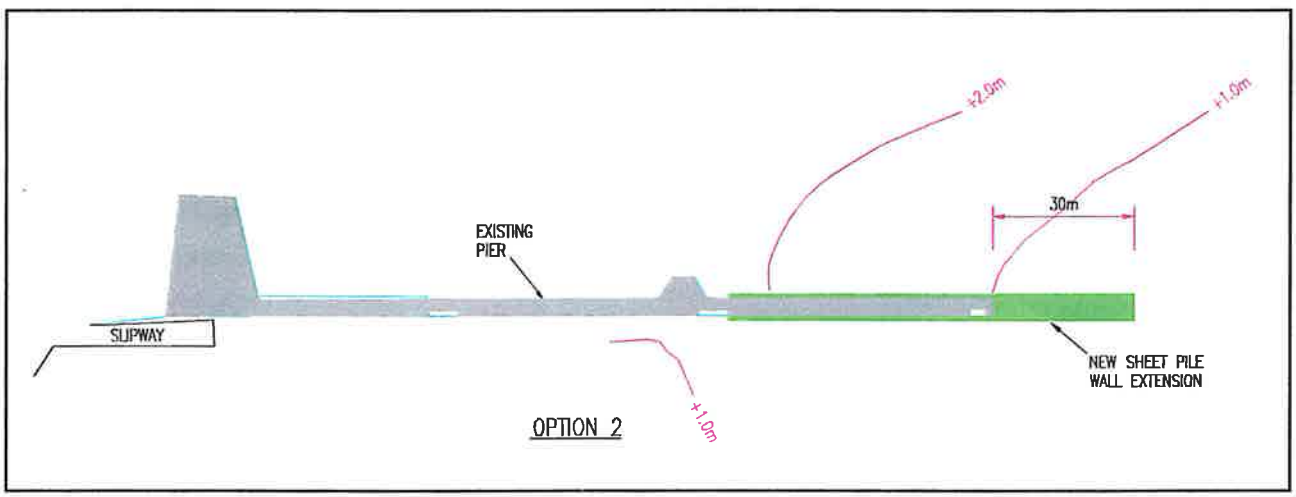


Figure 1.4 Option 2 – Deepen Berth at Existing Pier and provide 30m Linear Extension

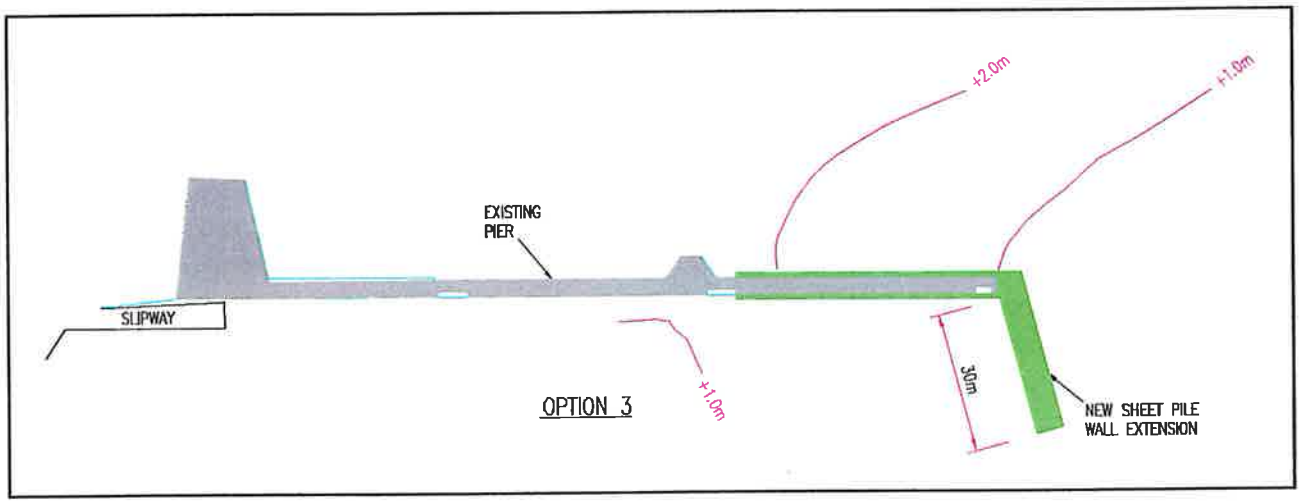


Figure 1.5 Option 3 – Deepen Berth at Existing Pier and provide 30m Angled Extension

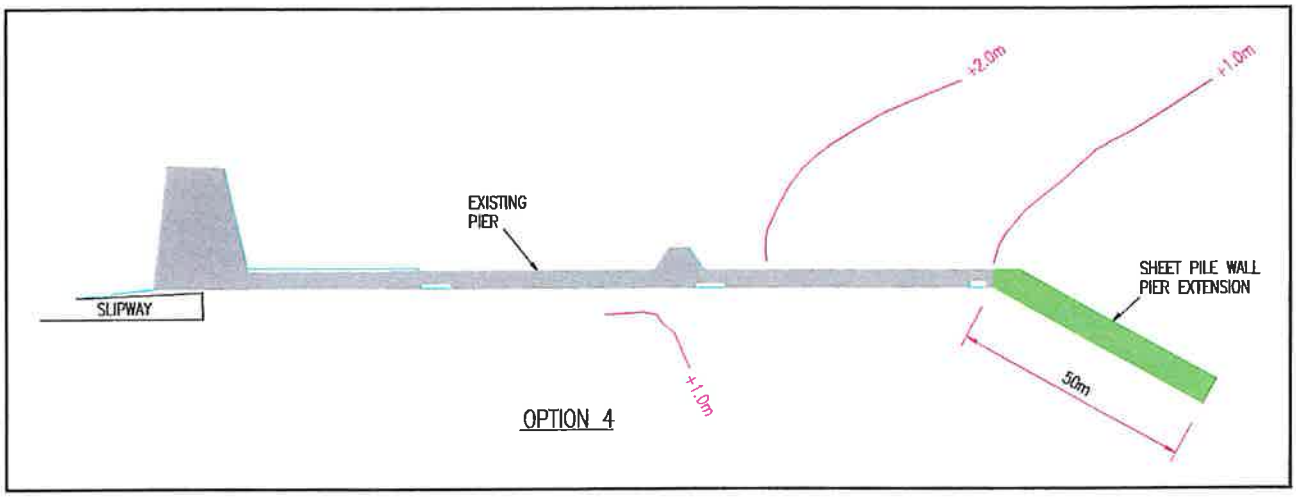


Figure 1.6 Option 4 – Provide 50m Linear Extension

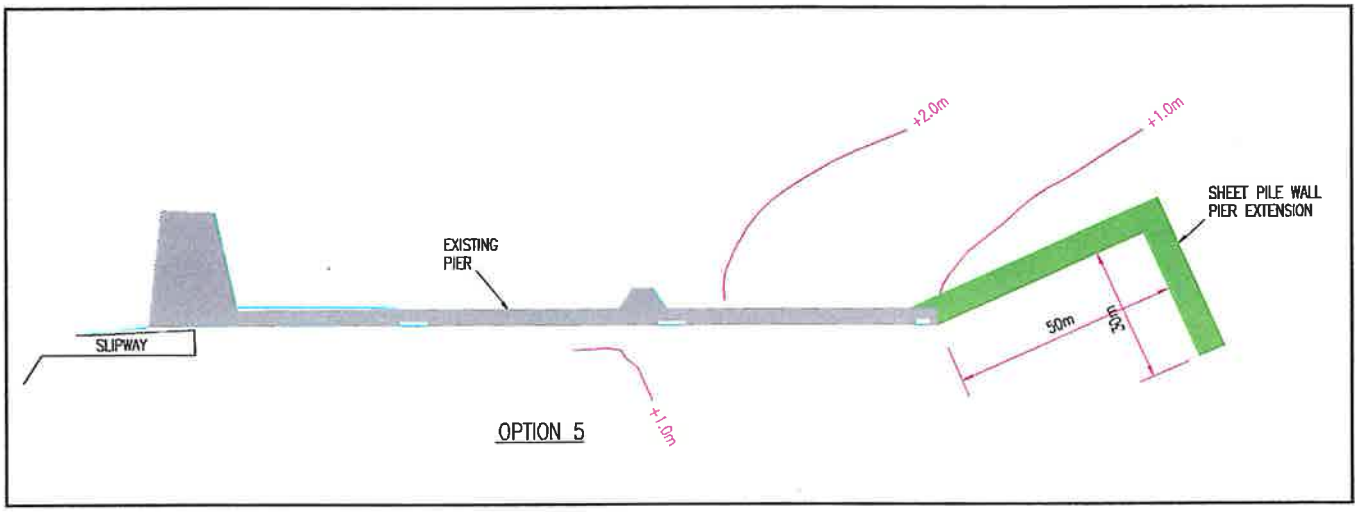


Figure 1.7 Option 5 – Provide 50m Angled Extension with a 30m Return

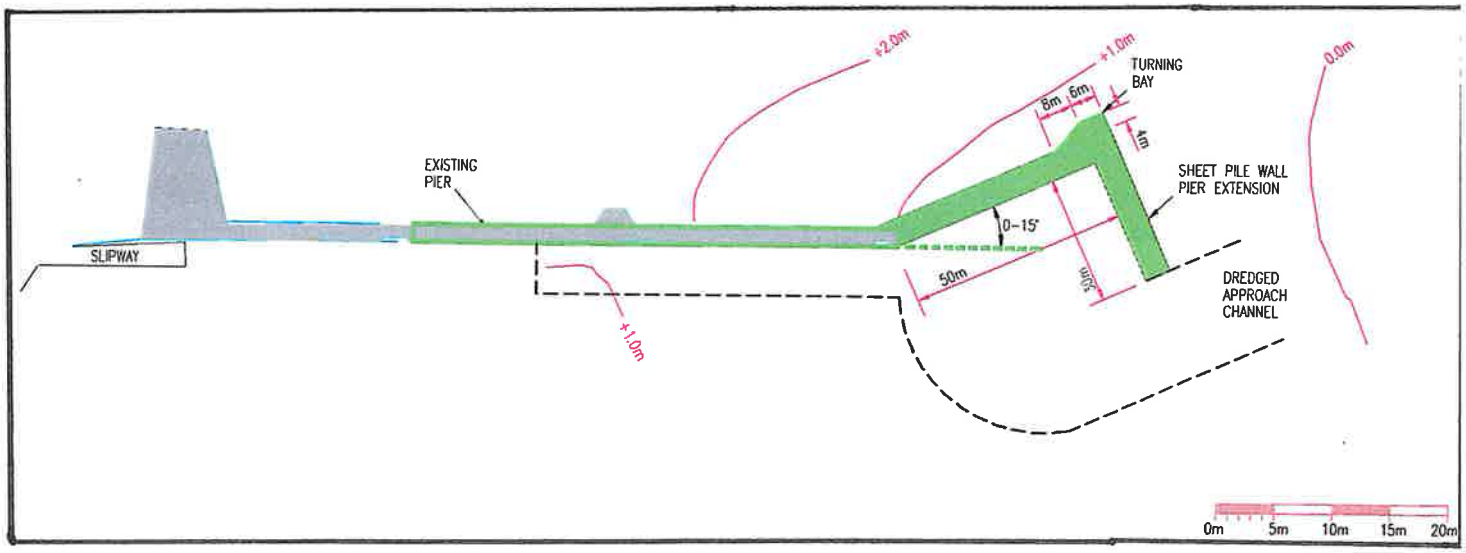


Figure 1.8 Preferred Layout for Pier Extension and Refurbishment

1.4 The Planning Process

The proposed development at Magheraroarty is a Donegal County Council initiative and therefore a formal planning application will not be required. Provision is however made for certain Local Authority developments under Parts IX and X of the Local Government (Planning and Development) Regulations 1994. Part IX of the Regulations apply to those developments which are required to be accompanied by an Environmental Impact Statement in accordance with the Environmental Impact Assessment Regulations.

In such case the decision to permit the development to proceed or not, lies with the Minister for the Environment and Local Government. An Environmental Impact Statement is not a mandatory requirement in respect of the proposed development at Magheraroarty.

The proposed development at Magheraroarty comes within the confines of Part X of the Local Government (Planning and Development) Regulations and as such the requirements as set out in the said Part X must be complied with by the Council. In this case, the decision to proceed with the development, or not, lies with the Elected Members of Donegal County Council.

The Environmental Impact Assessment Regulations (SI No. 93 of 1999) enact European environmental assessment legislation in Ireland. In June 1985, the European Communities adopted Directive 85/337/EEC which made the assessment of the environmental effects of a project a mandatory requirement for those projects likely to have a significant effect on the environment. An amendment of the Directive was made in 1997, EU Directive 97/11/EC, which widened the range of projects to be considered and increased the scope of the environmental impact assessment to include consideration of alternatives.

The Environmental Impact Assessment Regulations specify a series of thresholds above which an Environmental Impact Statement is mandatory for a development. The thresholds which apply to marine works are as follows:

(i) Trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes;

(ii) Reclamation of land from the sea, where the area of reclaimed land would be greater than 10 hectares;

(iii) Construction of car parks providing more than 400 spaces;

(iv) New or extended harbours and port installations, including fishing harbours, not included in Part I of the Schedule, where the area, or additional area, of water enclosed would be 20 hectares or more, or which would involve the reclamation of 5 hectares or more of land, or which would involve the construction of additional quays exceeding 500 m in length;

(v) Coastal work to combat erosion and maritime works capable of altering the coast through the construction, for example, of dikes, moles, jetties and other sea defence works, where the length of coastline on which works would take place would exceed 1 km, but excluding the maintenance and reconstruction of such works or works required for emergency purposes;

(vi) Sea water marinas where the number of berths would exceed 300 and fresh water marinas where the number of berths would exceed 100.

The proposed development at Magheraroarty falls below the threshold levels specified in the Environmental Impact Assessment Regulations. The preparation of an Environmental Impact Statement in support of the planning application is therefore not a mandatory requirement.

Donegal County Council, being a responsible Local Authority, nevertheless decided to appoint Consultants to undertake a full environmental impact assessment of the development for the following reasons:

(i) To fully consult with the local community in order to take on board their views and concerns at an early stage in the design process;

(ii) To ensure the development would be fully integrated with Magheraroarty bearing in mind other ongoing initiatives;

(iii) To ensure that safeguards are put in place to protect the environment.

As already stated the Council are obliged to comply with the requirements as set out under Part X of the Local Government (Planning and Development) Regulations 1994 and these are generally summarised as followed:

- Donegal County Council will publish notice of the proposed development in local newspapers circulating in the area in which the proposed development is situated;
- a site notice will be erected at the site of the proposed development (this is not a mandatory requirement);
- the plans including the Environmental Impact Statement will be on display for a period of four weeks during which time observations can be made on the proposal;
- submissions and observations on the proposal can be made for a further period of two weeks after the four week period during which the plans will be on display;
- relevant Statutory Consultees will be sent a copy of the supporting documentation including the Environmental Impact Statement for their comment;
- after the expiration of the period during which submissions or observations can be made, Donegal County Council will prepare a report in relation to the proposed development. This report will take on board the submissions and observations made on the proposed development. The report will make a recommendation as to whether the development should proceed, proceed with modifications or not proceed;
- the report will then be presented to the Elected Members of Donegal County Council who will ultimately decide if the development is to proceed.

Other consents will be required to cover specific aspects of the development, for example a Foreshore License will be required from the Department of the Marine and Natural Resources in accordance with the Foreshore Acts 1933-92. The Environmental Protection Agency (EPA) have deemed that a Waste License in respect of the dredged material will not be required.

1.5 Planning Policies

The proposed pier extension at Magheraroarty was reviewed with regard to relevant planning and environmental policy. In particular, the following document was consulted:

(i) County Donegal Development Plan 2000

The key strategic objectives and aims of this policy documents are summarised as follows:

- to protect and enhance the natural and man-made environment;
- to meet the future development needs of the community;
- to accommodate change, while maintaining the character of the countryside;
- to promote a high quality of design in new development;

- to pursue conditions and standards, which will be beneficial not only to specific areas but to the entire County;

- to provide a framework of land use proposals and policies which will enable continued development in an efficient, economic and orderly fashion aimed at achieving a high standard of urban physical environment whilst protecting natural resources and the innate quality of the area;

- to ensure that nature conservation policies contribute to conservation of the abundance and diversity of the Irish wildlife and its habitats;

- to minimise the adverse effects on wildlife, where conflict of interest is unavoidable;

- to meet international responsibilities and obligations for nature conservation.

The importance of protecting proposed Natural Heritage Areas (pNHAs) is recognised in the County Donegal Development Plan 2000. It is stated in the plan that Dúchas will be informed of any planning applications or proposed service works likely to impact on the designated sites. Until the amendment to the Wildlife Act 1976 is passed, the Council cannot make more general policy guidelines in relation to developments within pNHAs.

In relation to developments within Special Areas of Conservation (SACs) which are classified pursuant to the EU Habitats Directive, the Council understands its obligations in regard to Planning Applications as set out in the European communities (Natural Habitats) Regulations 1997.

Specific reference to developments of this type (marine works) in 1998 County Donegal Draft Development Plan are outlined below:

- The development is consistent with the objectives of the 2000 County Donegal Development Plan mainly in Section 2.10 The Marine Resource. In this section it is stated that among the Council's objectives are:

  - to support island communities through access and infrastructural development and management of resources and activities;

  - to maintain and improve a network of piers and harbours and associated shore facilities.

The pier extension at Magheraroarty will make a positive contribution to fulfulling the strategic objectives and aims of this policy document in a manner consistent with present planning and environmental policies.

1.6 Scope and Format of the EIS

Scope of the EIS

Prior to work commencing on an EIS, it is important that the scope is effectively defined. The scoping exercise will confirm the nature of the development, the breadth of the environmental assessment, the range of key issues and the extent to which each environmental issue needs to be addressed.

A scoping exercise was carried out at the outset of this project to determine the issues that needed to be addressed in the EIS. The scoping exercise involved the following main elements:

- preliminary consultation with the principal statutory and non-statutory consultees;

- preliminary site visits to assess the likely environmental impacts at first hand;

- a desktop study where information about the site from a number of sources was examined.

Once the key issues were identified, baseline studies/surveys were carried out. The studies enabled the prediction of the likely environmental impacts arising from the proposed development.

These impacts were then evaluated in terms of their significance and their nature and magnitude.

A fundamental aim of the environmental assessment as part of the design process is to ensure that any potentially damaging effects are avoided or minimised and that the beneficial aspects of the project are enhanced. The most satisfactory means of impact mitigation is to avoid it at source either through site selection or re-design. Reduction involves lessening the degree of an impact which cannot be entirely avoided. Reduction acknowledges that some degree of adverse impact will arise but provides the means by which the conditions can be improved or compensated for.

Although the scoping exercise was carried out at the beginning of the Environmental Impact Assessment, the scoping continued throughout the project and in particular during the main consultation phase as outlined in Chapter 2 of the EIS.

Format of the EIS

The EPA have produced guidelines on the production of an EIS in line with the Environmental Impact Assessment Regulations and these guidelines have been followed in the production of this report.

The EIS has been structured in what the EPA term a Grouped Format Structure, which examines each topic as a separate section referring to the existing environment, the proposed development, impacts and mitigation measures.

The EIS is divided into four Parts as follows:

Part I: provides the background information on the project, including the need for the project, the alternatives considered and the policy background.

Part II: describes the project, from site development through to site operations.

Part III: describes the existing environment, the predicted impact of the proposed pier extension and puts forward mitigation measures to lessen the degree of the impacts.

Part IV: provides a summary of impacts and mitigation measures.

2.0 CONSULTATION PROCESS

2.1 Introduction

The consultation phase of the Environmental Impact Assessment (EIA) is of utmost importance as it enables all concerned and interested parties to have their opinions on the project heard during the initial stages of the project. This can allow changes to be made during the design stage of the development taking on-board comments and ideas from the consultation process.

Project Information Leaflet
A major feature of the consultation process was the production of a project information leaflet (Plates 2.1 and 2.2). The aim of the leaflet was to provide information on the development and invite written submissions about concerns and views relating to the project.

2.2 Statutory Consultation

Consultation meetings were held with the principle statutory consultees such as the Environmental Protection Agency and Donegal County Council at the outset of the project. In addition a letter and project information leaflet was sent to all relevant statutory and non-statutory consultees. The statutory and non-statutory consultees who were consulted about the proposed development are listed in Appendix IA. The written responses received from the consultees are also summarised in Appendix IA.

2.3 Public Consultation

The public consultation phase of the EIA commenced in June 2000. In this phase of the consultation the residents of Magheraroarty and Tory Island and other interested parties were provided with information on the proposed development and offered an opportunity to make comment. The project information leaflet was distributed to every household and business in the area by means of a door drop service by An Post. The total number of leaflets delivered by An Post was 700.

A summary of the written responses received as a result of the project information leaflet is presented in Appendix IB.

Public Consultation Meetings
To coincide with the distribution of the project information leaflet, a presentation on the project was given at an open public meeting. The meeting was held on 22 June 2000 in the Loch Altan Hotel, Gortahork and approximately 50 people attended.

The meeting was chaired by a local Donegal County Council Councillor. At the meeting a representative from Kirk McClure Morton gave a presentation on the background to the project and the current status of the EIA. The Powerpoint presentation used at the meeting is presented in Appendix IC. The meeting was then opened to the floor where the audience were invited to make their views and concerns about the project known. The concerns and questions were noted by the Consultants. It was found to be a very worthwhile exercise with many valuable contributions being made. A record of this meeting is presented in Appendix ID.

A further public consultation meeting on the project was held in Magheraroarty Community Centre on 8 November 2000. The purpose of this meeting was to present further information on the design and proposed construction of the pier.

The format of this public meeting was similar to the first public meeting held in Gortahork on 22 June 2000. A representative from Kirk McClure Morton gave a presentation on the current status of the project and then the meeting was opened to the floor for discussion and questions/comments. The meeting was again found to be very beneficial with a wide range of views and observations on the proposed development expressed. A record of this meeting is presented in Appendix IE.

As a result of this meeting the layout of the pier changed slightly from what is presented on the project leaflet as presented in Plate 2.2

2.4 Conclusions

The various submissions and comments made in relation to the proposed pier extension at Magheraroarty have been fully considered by the Consultants in the preparation of the Environmental Impact Statement and in the design of the pier extension. Every effort has been made to address all of the concerns raised and where possible, mitigation measures have been proposed to reduce the environmental impact of the proposed development.

Protection of the Environment

An Environmental Statement is being prepared to ensure that the pier extension is fully integrated with the overall development of Magheraroarty and that safe-guards are put in place to protect the environment.

The following key issues will be addressed by the study:

- impact of the pier extension on the beach and dune systems on Dooey strand;
- impact on the sediment supply to Dooey Strand;



- impact on the local community in terms of noise and traffic interference;



- impact on the nature conservation status of the area.

The Environmental Statement will address all likely significant effects that the Project may have on the environment and is being developed by one of Ireland's leading Consulting Engineers, Kirk McClure Morton.



Your views are important

The views and concerns of interest groups and individuals are welcome and those interested in making comment or observation are invited to forward their written submissions on all matters of relevance to the project. All submissions received will be fully considered in the preparation of the Environmental Statement.

Queries and submissions in relation to the project labelled 'Magheraroarty Pier Extension' may be forwarded to:

The Implementation Unit
Donegal County Council
Three Rivers Centre
Lifford
Co Donegal

Magheraroarty Pier

Proposed Pier Extension



Project Information

Comhairle Chontae Dhún na nGall
Donegal County Council

Magheraroarty Pier

Magheraroarty pier on the north-west coast of Donegal is the main summer access point for the Tory Island ferry as well as providing facilities for local fishing boats and access to Inishbofin. The ferry to Tory Island has been improved in recent years and now with the construction of a new all tide berth at West Town, Tory Island there is a need for improved berthing on the mainland. To provide the facilities required, Donegal County Council are proposing to extend the pier at Magheraroarty and dredge an access channel.

It is envisaged that the pier extension will enable a regular ferry service to Tory Island to be scheduled. The proposed pier extension coincides with the development of a marine/tourism/enterprise centre in Magheraroarty by Údarás na Gaeltachta. This development along with the proposed pier extension will enhance the tourism potential of the area and in turn provide local employment in Magheraroarty.

The areas adjacent to Magheraroarty pier (Dooey Peninsula and Ballyness Bay) are environmentally important because of their varied habitat and specific wildfowl and botanical interest. The beach is also important for recreation and amenity. It is important that the new pier extension will not endanger the integrity of this important ecological and recreational site.

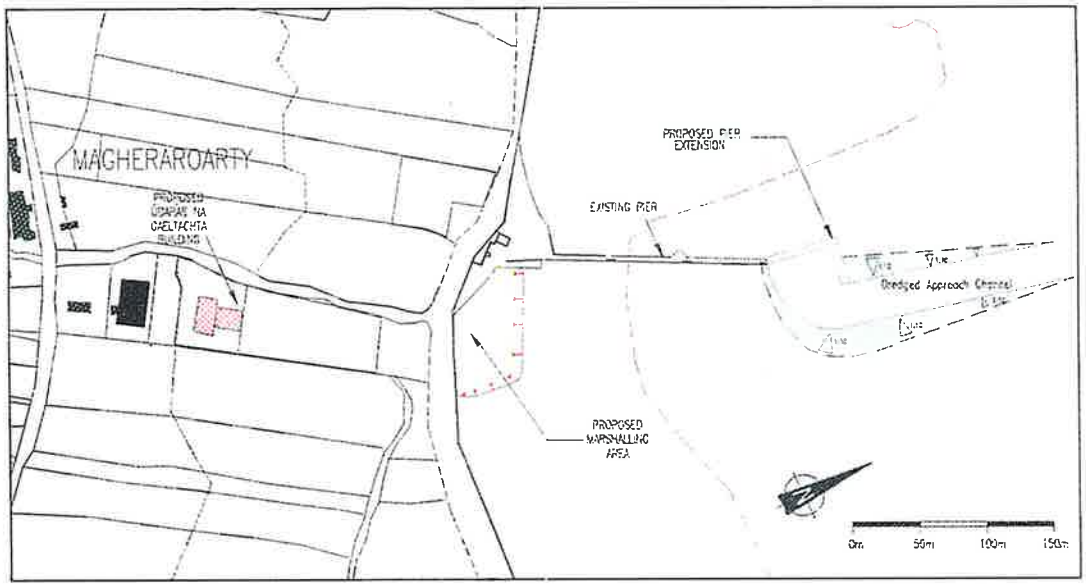
Project Description

The proposed new pier at Magheraroarty will be designed with respect to the following two criteria:

- to provide safe berthage at the pier at all states of the tide;
- to ensure the stability of the adjoining beach and dune system at Dooey strand.

The new pier extension will be 50 m long with a return at the end of 30 m to provide protection from storm waves.

The pier deck will be approximately 6 m wide and will be of similar construction to the existing pier deck. The approach channel and turning basin which is an integral part of the project will be dredged to a depth of -1.5 m CD. The material to be dredged is suitable for land reclamation and will be used to form a marshalling area which can be used for car parking, boat storage and as a queuing area for cars/people waiting for the ferry. The new Údarás na Gaeltachta centre will incorporate the ticket office for the ferry as well as providing other amenities for visitors such as a craft shop, coffee shop and rest room facilities.



Proposed Pier Extension, Magheraroarty, Co Donegal

Plate 2.2 Project Information Leaflet

3.0 SITE DESCRIPTION

3.1 Site Location

The existing pier at Magheraroarty is located on the southern shore of Inishbofin Bay and at the southern end of the Dooey Peninsula. Magheraroarty is located in the Gweedore Gaeltacht approximately 50 km north west of Letterkenny. Road access from Letterkenny is via the N56 passing through the towns of Creeslough, Dunfanaghy, Falcarragh and Gortahork and then the R257 from Gortahork to Magheraroarty. The pier is located at the end of a minor road off the R257.

The location of the proposed development is presented in Figures 3.1 and 3.2.

3.2 Site Context

Magheraroarty pier is located in Inishbofin Bay. Inishbofin Bay is formed between the northerly facing coast of North Donegal east of Bloody Foreland, Inishbofin Island and the barrier beach/dune system of the Dooey Peninsula. The Dooey Peninsula which is located east of the pier is composed of aeolian sand. The west facing beach is a wide shallow beach backed by a complex sand dune system which varies considerably along its length.

Ballyness Bay lies behind the Dooey Peninsula. Ballyness Bay is a sheltered inlet protected by the barrier beach with its tidal entrance, running north between the Hook and Drumatinny Point. To the north-east of Magheraroarty, the Dooey Peninsula sweeps round to the Otter Beg Spit and the Cloghan or Ford where access can be gained to Inishbofin at a very low spring tide.

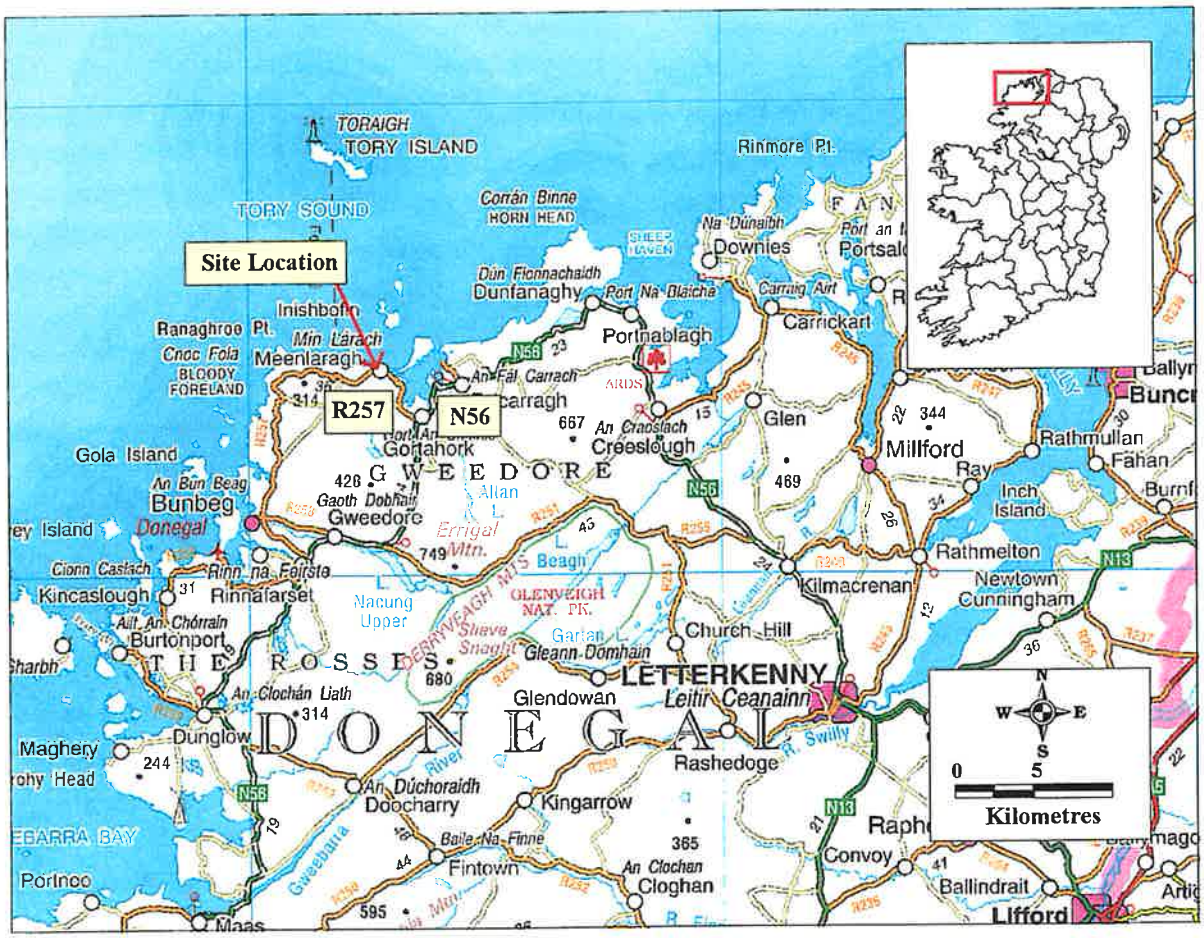


Figure 3.1 Site Location – Regional Context

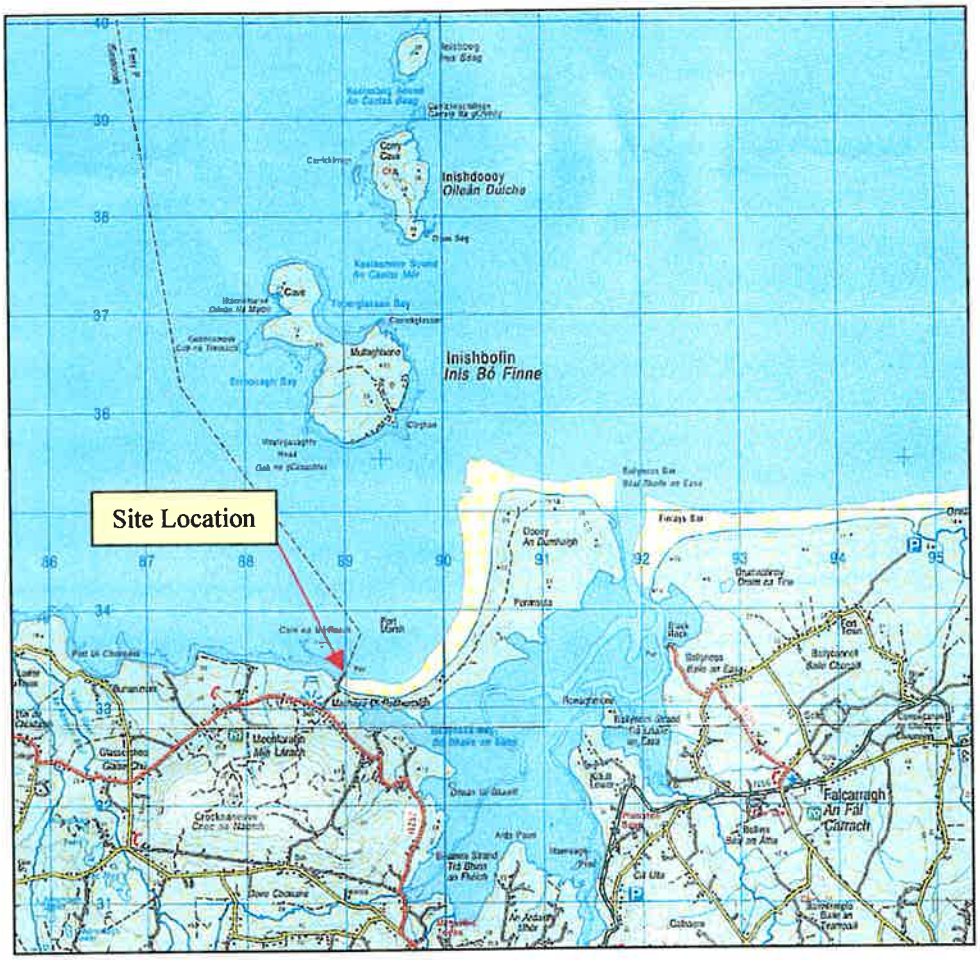


Figure 3.2 Site Location – Local Context

The coastline to the west of Magheraroarty Pier is rocky with discontinuous gravel storm beaches fronting eroded stoney till cliffs.

3.3 Present Land Use

Magheraroarty pier (Plate 3.1) is used as a berthing platform for the Tory Island ferry during the summer period. The ferry timetable varies daily due to tidal restrictions, the ferry only being able to berth around High Water. The pier is also used by fishing boats and occasional recreational vessels.

There is a slipway (Plate 3.2) to the east of the pier which is used for launching and removing boats from the bay. The area immediately landward the pier is poorly surfaced and is used as an informal carpark where boats, lobster pots etc. are stored (Plate 3.3). There is also an old toilet block located in this area.

Dooey Strand (also known as Magheraroarty Beach) situated to the east of Magheraroarty pier is a popular bathing beach during the summer months (Plate 3.4) and is also used for water-sports including sail-boarding and surfing.



Plate 3.1 Magheraroarty Pier



Plate 3.2 Slipway adjacent to Magheraroarty Pier



Plate 3.3 Informal Parking and Storage Area at Magheraroarty Pier



Plate 3.4 Dooey Strand

PART II PROJECT DESCRIPTION

4.0 PROJECT DESCRIPTION

4.1 Introduction

This chapter of the EIS describes the main components of the proposed pier extension at Magheraroarty. Consideration is given to the pier layout, construction activities and operation and maintenance of the complete facility.

4.2 Pier Extension Layout

The pier extension at Magheraroarty extends 50m seawards with a return at the end of 30m. As part of the pier extension it is also proposed to carry out substantial renovations to the existing pier. These renovations are essential for the following reasons:

- to stablise the structure of the pier and prevent it from undermining;
- to ensure the existing pier matches the construction of the proposed pier extension in height and width;
- to provide sufficient and complementary access to the new pier extension particularly regarding width and permissible vehicle weights;
- to permit dredging of a berth pocket alongside the existing quay to maximise the benefit from the pier works in providing draught at all tidal stages.

The pier will be extended by 50 m with a return at the end of 30m as shown in Figure 4.1. Although this figure indicates the pier with 50m straight extension the initial studies of a pier extension were carried out using a 15° offset angle. The study of coastal processes in Chapter 6 of this EIA examined the pier extension at 15°. This analysis found it to be acceptable in terms of impact on wave climate and sediment transport. It has also been concluded that the same conclusions may be drawn for a pier extension of 0° (i.e. straight berthing face). The final alignment of the pier extension was considered in light of requirements from local fishermen and also being cognisant of the financial constraints for a 50m extension. Thus, if only 35m or 40m of pier extension may economically be afforded, the use of a straight berthing face tying into the current pier would allow for continuous face berthage rather that the spoiling effect from a 15° link.

It is proposed to install a steel sheet pile wall along both sides of the existing pier as indicated on the cross sections in Figure 4.2. The void between the sheet piles and existing pier will be infilled with backfill and concrete. The sheet piles on each side of the pier will be connected with tie rods to ensure structural integrity.

A reinforced concrete deck will be used to cap the pier and a concrete wave wall will be provided along the exposed sides of the pier to western and northern faces.

At present the outer end of the existing pier slopes downwards at 1:12 gradient over 35m and has a low level deck of 15m length at a height of 3.10m OD Poolbeg. This low level deck facilitates loading/unloading at low tide and is particularly used by local fishermen from small fishing boats. It is proposed to maintain this low level deck in the refurbished pier over similar lengths and gradients (15m horizontal deck and 1:12 gradient) as currently exist. The width of the low level deck/platform would be approximately 3m. The remaining 3m width of pier would provide conventional deck level access to the 50m pier extension and 30m return.

The deck level of the remainder of the pier is approximately 6.0 m OD Poolbeg. When the refurbishment is complete the existing pier will have an increased width of 6 m. The above proposed works to the existing pier will reinforce the present structure and provide a firm basis for connection of the pier extension

The pier extension will be a solid structure with steel sheet pile walls. It will be of a consistent width and height as the refurbished pier at 6 m wide and 6 m OD Poolbeg respectively. A typical section through the pier extension is presented in Figure 4.3. The sheet piles will again be

connected by tie rods between each face and a reinforced concrete wave wall and deck will cap the pier. The berthing face of the refurbished and extended pier will have the sheet pile "in-pans" filled with concrete to bring them into alignment with the "out-pans" and thus providing a smooth and straight berthing face. Boats may then provide their own fenders which will bear onto a straight wall rather that the indented face of normal sheet piling.

Access ladders and concrete steps will be re-constructed along the re-formed line of the berthing face in the existing pier. Two sets of steps and a further ladder will be provided in the pier extension.

Dredging will be carried out to a depth of –1.5 m OD in the areas indicated on Figure 4.1 The dredging will provide berthing at the pier throughout the tidal cycle and the 30m wide approach channel will permit access to the pier from deeper water . The dredged material will be used to form a marshalling area of 3000m^2 as well as used to provide infilling between sheet piling in forming the pier extension

The marshalling area will initially be surfaced with hardcore to permit final settlement of the infilled sand core and will have carparking space for approximately 20 cars. Future provision of concrete or bitmac surfacing would be envisaged following final settlement.

4.3 Construction Activities

This section describes the construction activities associated with the proposed pier refurbishment and extension.

Construction work is expected to take place in late spring, summer and autumn when weather conditions are amenable. It is expected that all the work could not economically be completed within one year. The construction is likely to move onto site in early summer 2001, so that completion by the autumn 2002 can be achieved. The length of the construction period is designed to allow ongoing use of the pier (by locals, fishing vessels, ferry etc) whilst construction is underway. The contractor must therefore allow for some disruption to construction activities which precludes completion within one year i.e. before autumn/winter storms disrupt construction activity.

Access and Accommodation

Access to the site will be through the existing pier access area. It will be anticipated that parking restrictions will be imposed at the approaches to the site entrances to ensure that the normal flow of public traffic can be maintained throughout the construction period.

Public access to the pier will have to be maintained during the construction period at certain times e.g. to accommodate the ferry and fishermen. By careful control of the works sections made available to the contractor and by phasing the works it will be possible to maintain public access to the pier throughout the construction period. The Contractors and Engineers office accommodation and plant and materials compound will most likely be established within the informal parking area near the root of the existing pier.

Construction Techniques

The construction works will involve Civil and Marine Engineering works and Mechanical and Electrical works. The Contractor's working hours on site will be related to the time of year and tidal conditions. In common with most maritime works. All machinery used in the project, especially the dredger, will be in good working order and file from oil/hydraulic fluid leakages. If machinery maintenance has to take place, it will be carried out at least 100m away from waters. Fuel for machinery etc will be stored in a secure and bounded area.

Dredging

Dredging is proposed to provide sufficient water depth at the pier at all stages of the tidal cycle. The total volume of material to be removed will be in the order of 22,000 m^3. It is anticipated that

dredging will be carried out using suction dredging equipment or hydraulic backhoe depending on availability. Given the nature of the material to be dredged (generally sands and gravels with typically less that 8% silt), both techniques would yield minimal turbidity at the dredging head.

Land Reclamation

Dredged material will be re-used on site as fill between the sheet pile walls and to provide the marshalling area. This raised area (approximately 3000m^2) will be protected by the construction of rock armour revetments. Materials will be trucked from suitable quarries to the site, then placed into position by crane and hydraulic machinery. The anticipated tonnage of rock armour and underlayer is approximately 1600 tonnes. Dredged material will be deposited directly on to the area to be filled. The armoured revetments will likely be constructed before this operation to provide a lagoon for deposition of the dredged material.

Several stages of bunding may be used depending on the rate of production and timing of the dredging operations. Although the bunds will be permeable, a geotextile fabric will be provided to prevent the loss of fines. The lagoon area will be drained through a weir box and turbidity monitoring at the discharge will be carried out during the dredging and filling operations. Once drained, the fill material will be spread in layers and compacted using normal construction plant.

Refurbishment of Existing Pier and Construction of Extension to Pier

It is likely that the sheet piling will be carried out using a piling rig supported on a jack-up barge or from deck level of the existing quay. Concrete pouring and placement of the new reinforced concrete deck would take place from the pier itself. During construction of the pier it will not be permitted to allow concrete/cement into waters.

Site Safety

Safety will be of prime importance during the construction works. The works will be subject to the Safety, Health and Welfare at Work Act 1989 and the Safety, Health and Welfare at Work (Construction) Regulations, 1995. All aspects of design construction will be reviewed with regard to health and safety and a risk assessment will be carried out. A project supervisor (design stage) will be appointed to produce a pre-tender Health and Safety Plan for the project. The principal contractor will be responsible for the control and co-ordination of health and safety during the works and will be appointed as the project supervisor (construction stage).

Waste Disposal

Contractors working on site during the works will be responsible for the collection, control and disposal of all wastes generated by the works. An indication of the types of waste likely to be generated by the works and the most appropriate method of disposal are presented in Table 4.1 below.

Table 4.1 Typical Wastes generated by Construction Works

Activity	Waste Generated	Disposal/Treatment Recommendations
General Construction Waste	Waste Oils	Collected by waste recycling contractor
	Other Waste	Collected in skips for disposal by licensed wasted contractor
General Office/Messing	Paper, packaging, canteen etc	Collected in covered skips/large bins for disposal by a licensed waste contractor.
Temporary Site Toilets	Sewage	Emptied under contract for disposal at an appropriate facility

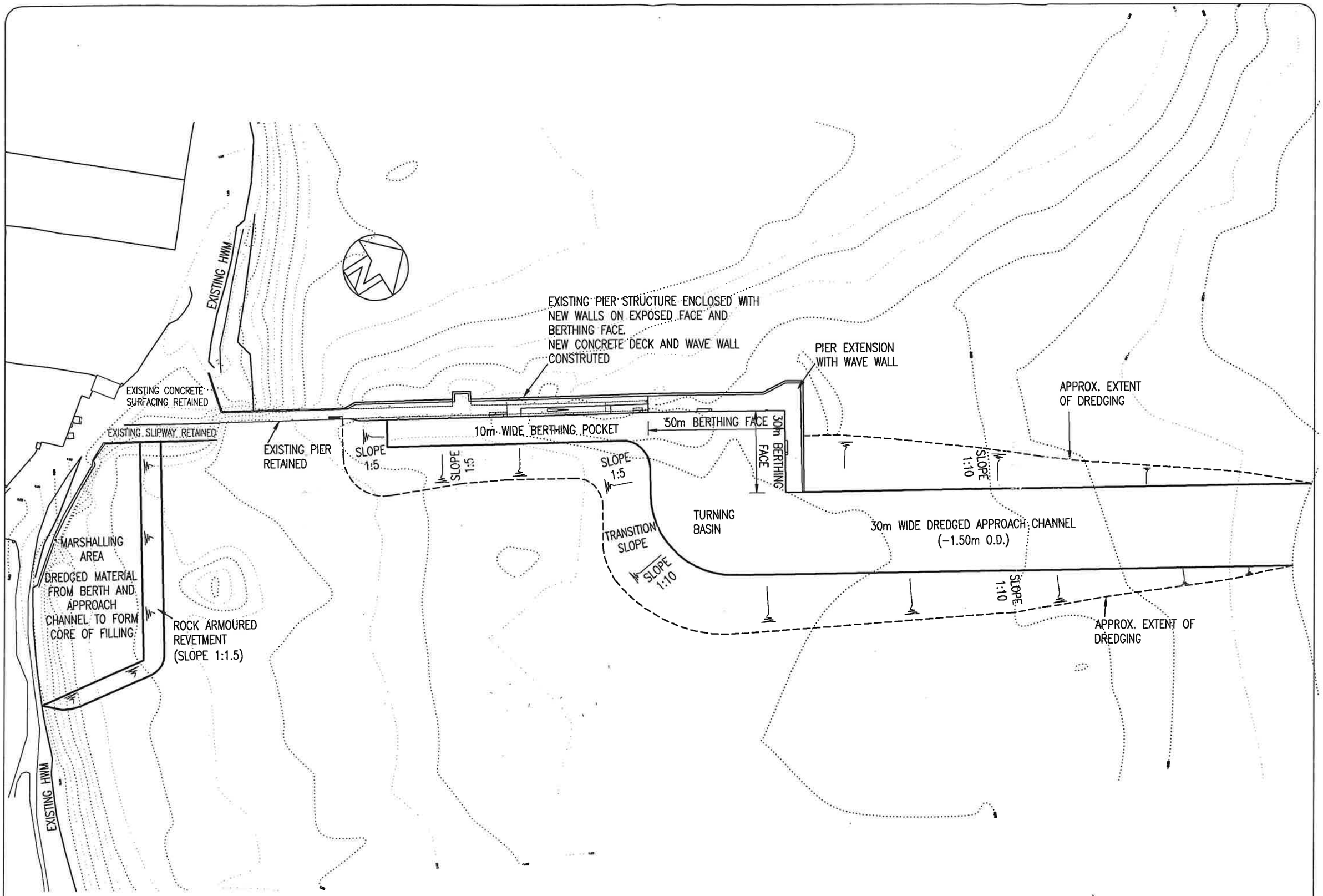


Figure 4.1 Layout of Proposed Pier Extension and Refurbishment, Magheraroarty

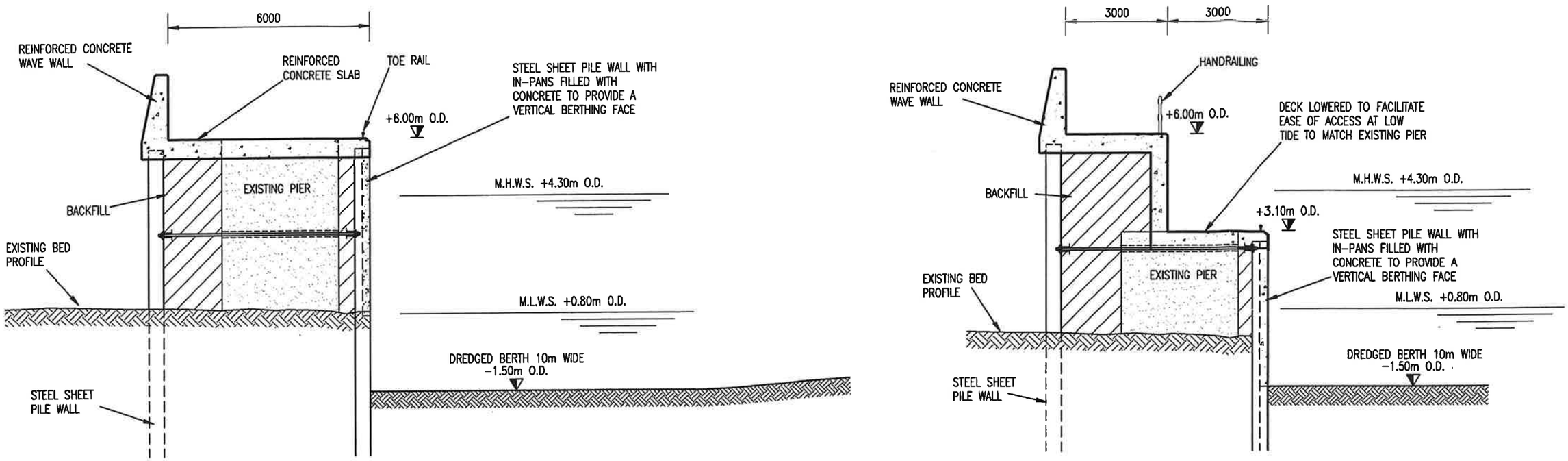


Figure 4.2 Sections through Refurbished Pier at High Level Deck and Split Level Deck

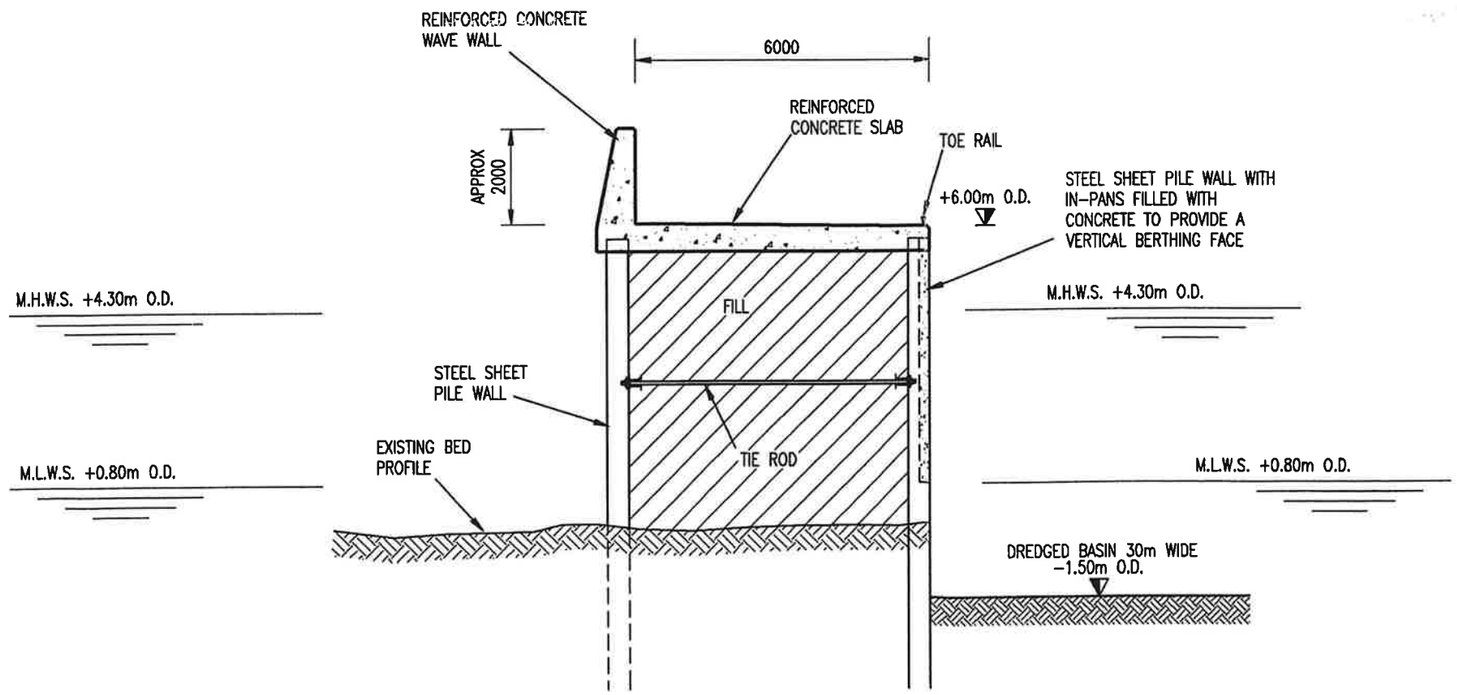


Figure 4.3 Section through Pier Extension

PART III THE ENVIRONMENT, IMPACTS AND MITIGATION MEASURES

5.0 FLORA AND FAUNA

5.1 Introduction

The main objective of this Chapter of the EIS is to describe and evaluate the existing flora and fauna of the site and surrounding area, to provide an assessment of the impact of the proposed pier extension on flora and fauna and, where possible, to put forward mitigating measures to reduce the impact of the proposed development.

5.2 Conservation Status of the Area

The site of the proposed pier extension falls within the Ballyness Bay proposed Natural Heritage Area (pNHA), (Figure 5.1). Ballyness Bay is designated a pNHA for a variety of reasons. The fixed dunes, machair, marram dunes and embryonic dunes found on the site are important habitats which are listed on Annex I of the EU Habitats Directive. The succession of vegetation types across the spit and the topographical features make this area of special interest. Ballyness Bay is of importance for waterfowl with regionally important numbers of birds occurring. Ringed Plover and Greenshank are both found in the area and are listed in the Red Data Book as being rare and threatened respectively. The Dúchas site synopsis which provides details on the Ballyness Bay pNHA is presented in Appendix IIA. Ballyness Bay is also designated a candidate Special Area of Conservation under the EU Habitats Directive.

The area landward of the site is also an Important Bird Area (IBA) which was created for the Corncrake, a species listed under Annex I of the EU Birds Directive.

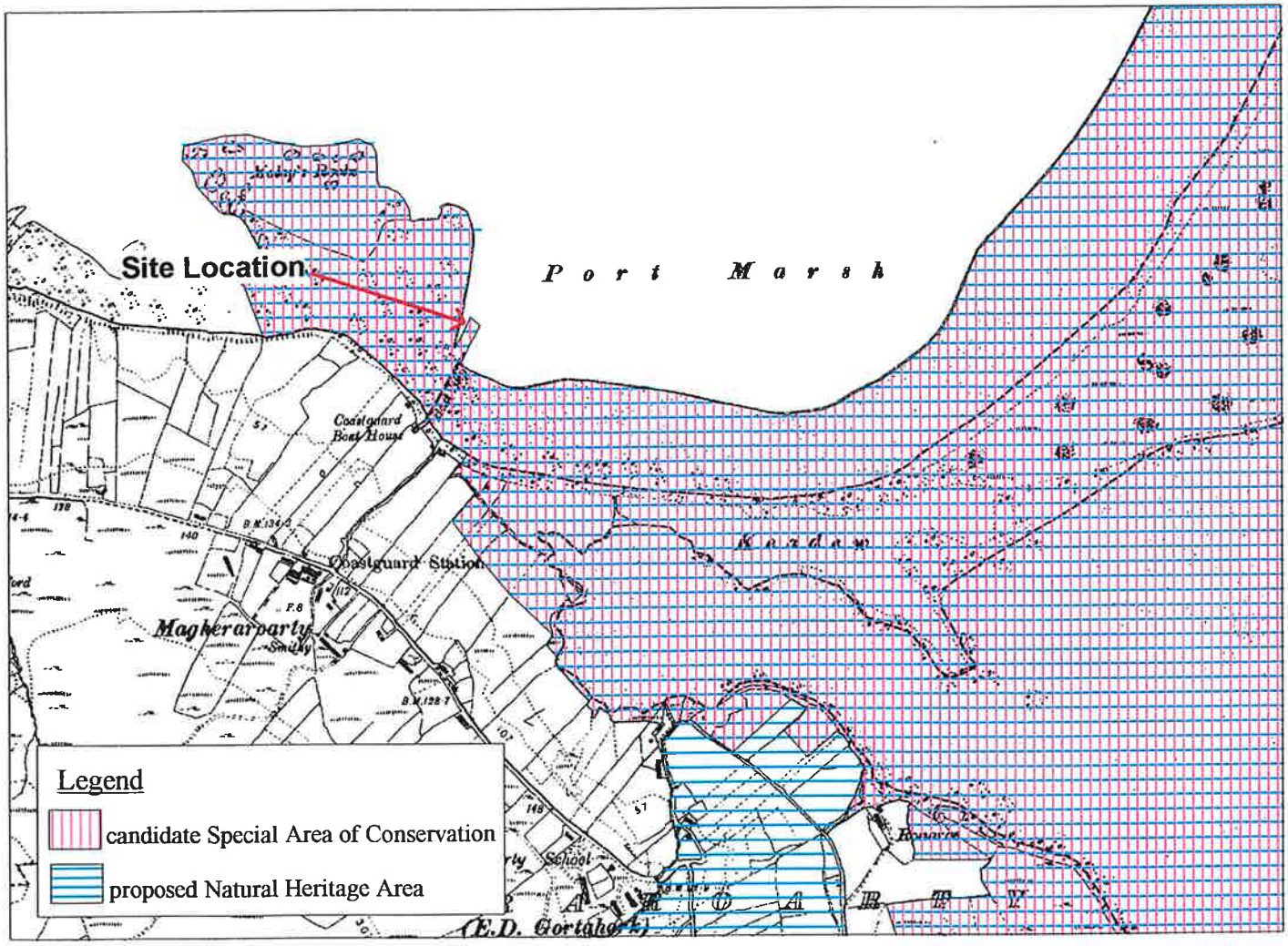


Figure 5.1 Ballyness Bay – Conservation Designations

The hay meadows in this area have supported corncrakes as recently as 1998 and Birdwatch Ireland conduct annual surveys of this area.

5.3 Study Area

The flora and fauna impact assessment was carried out by Aqua-Fact Ltd. The study area for the purposes of the flora and fauna impact assessment includes the site of the proposed pier extension and the area of sea frontage east and west of the pier. The extent of the study area together with field sampling locations are presented in Figure 5.2.

5.4 Methodology

Field surveys at Magheraroarty were undertaken on 23 February 2000.

The terrestrial habitats in the vicinity of the proposed development were noted by undertaking walk-over surveys and included an assessment of their likely use by birds for feeding and/or breeding. Use was made of existing information to supplement these observations.

Visual observations of the flora and fauna within the marine environment – littoral zone were made. Two replicate core samples were taken at three locations in order to identify faunal compositions. The samples were preserved in formalin on site in jars labelled both externally and internally with date, location, sample number and an ISO job number in order to facilitate quality assurance procedures. On return to the laboratory, all samples were washed to remove the formalin and they were then preserved in 70% alcohol for later identification and enumeration.

The standard range of taxonomic keys were used to identify the faunal material (see References and Bibliography for list of keys used).

The flora and fauna within the marine environment – sublittoral zone was assessed by divers who collected three replicate core samples at one location for subsequent analysis in the laboratory. The same procedures were used as for the littoral zone core samples. The sampling was restricted to one location due to the hard nature of the seabed substrate.

5.5 Existing Environment

5.5.1 Terrestrial Environment

The area in the vicinity of the pier was characterised by poor pasture land. This area was densely populated with the common rush *Juncus effusus* (Plate 5.1). There was a small stream of freshwater running from the hillside and flowing directly onto the shore east of the pier via a culvert. The outfall from this stream at the top of the intertidal area is visible in Plate 5.2.

The habitats of high conservation status associated with the Ballyness Bay proposed Natural Heritage Area and candidate Special Area of Conservation were not present within the study area.

Species of shore bird observed in the vicinity of the pier on the day of sampling included Curlew *(Numenius arquata)*, Ringed Plover (*Charadrius hiaticula*), Oystercatcher (*Haematopus ostralegus*), Dunlin (*Calidris alpina*) and Cormorant *(Phalacrocorax carbo)*.

5.5.2 Marine Environment – Littoral Habitat

The littoral area to the west of the pier was characterised by shingle and rocks (Plate 5.3) while the east side directly next to the pier was a mixture of rocks with small areas of interspersed sand (Plate 5.4). A wide sandy patch stretched from the upper to the lower shore along the pier as a result of earlier dredging works. Two replicate core samples were taken at three stations in the vicinity of the pier (Figure 5.2), the results of which are presented in Appendix IIB, Table 5.1. Chironimid larvae which are freshwater organisms were recorded in a core from the upper shore. Their presence is due to the freshwater outfall at the top of the shore.

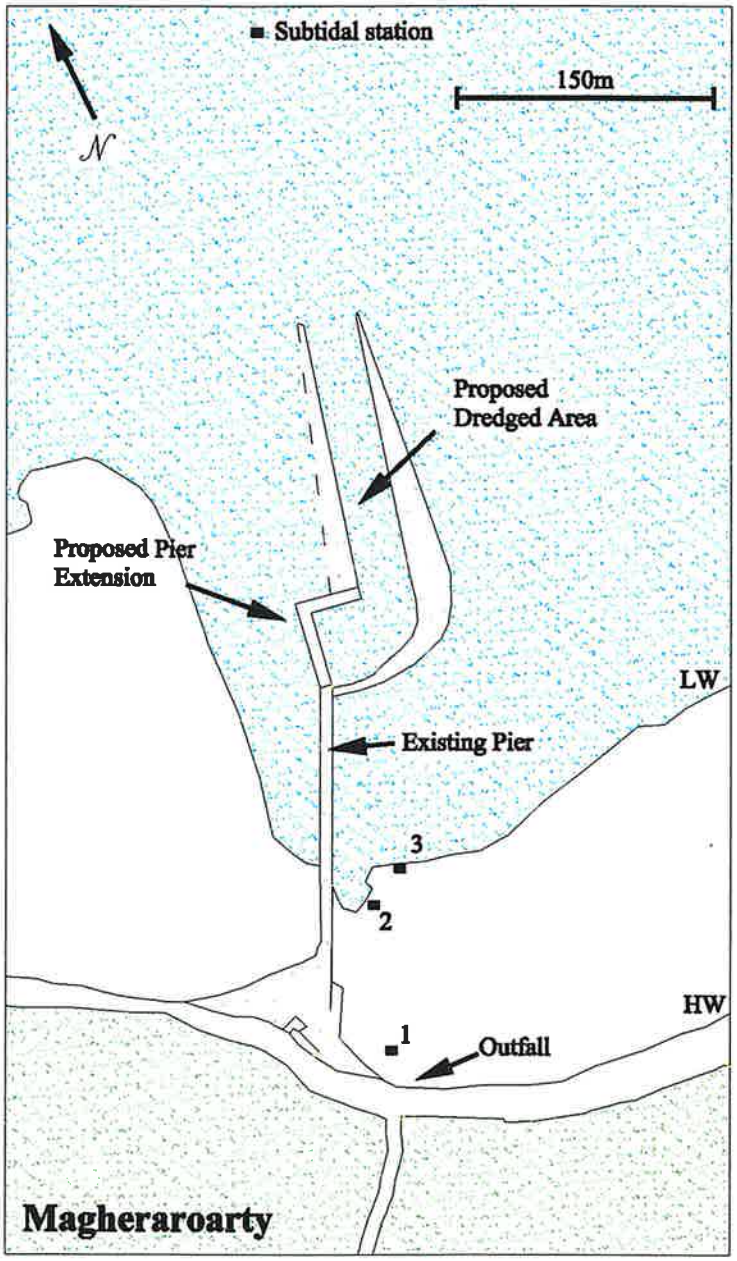


Figure 5.2 Location of Sampling Stations, Magheraroarty, Co. Donegal

The shore to the west of the pier was not sampled using cores because of the hard nature of the substrate (Plate 5.5). However, visual observations were made as follows: the upper shore flora consisted of small patches of channel wrack *Pelvetia canaliculata* and spiral wrack *Fucus spiralis* was common. *Laminaria digitata* was recorded on small rocks washed up on the upper shore. The small periwinkle *Littorina neritoides* was abundant on the upper shore rocks. Barnacles *Chthamalus stellatus* were recorded on the upper shore rocks giving way to *Semibalanus balinoides* moving towards mid-shore. The flat periwinkle *Littorina littoralis* was common in this area along with *Monodonta lineata* and *Gibbula umbilicalis*. Limpets *Patella vulgata* were rare and only one juvenile specimen of the common shore crab *Carcinus maenas* was observed.

Moving from upper to mid-shore, dog whelks *Nucella lapillus* became more abundant as did the topshell *Monodonta lineata.*

Of the brown seaweed observed, *Fucus vesiculosis* became more common and patches of *Ectocarpus sp.* were recorded. The encrusting red coraline alga *Coralina* sp. was observed on the rocks of the mid-lower shore. Dog whelks were more common in this area and one specimen of a clam *Tapes rhomboides* was recovered under a rock. It is likely that this sand dwelling bivalve was washed ashore during high energy wave movement. *Littorina littorea* were common on the lower shore and *Gibbula umbilicalis* were abundant. *Fucus serratus* was recorded attached to the rocks of the lower shore.

The littoral habitat to the east of the existing pier comprised a mixture of rocks and cobbles interspersed with sand patches (Plate 5.6). The green seaweed *Enteromorpha* sp. was recorded in this area and can be attributed to the input of freshwater closeby. *Porphyra umbilicalis* was recorded on the rocks of the upper shore and *F. spiralis* and *Chondrus chrispus* were observed on the mid to lower shore. Limpets were abundant on this side of the pier.

5.5.3 Marine Environment – Sublittoral

The sublittoral zone in the vicinity of the proposed pier extension and dredged area is comprises a hard substrate almost exclusively of cobbles and boulders. One station was sampled seaward of the limit of the dredging works where sand was found. Three replicate cores were taken at this location. Sampling was attempted along the transect of the proposed development, however, it was not possible closer to the shore and proposed development site due to the hardness of the substrate.

The macrofaunal species recovered in the replicate sublittoral cores are presented in Appendix IIB, Table 5.2. The results show that the species numbers and numbers of individuals are very low in the sublittoral zone off the pier at Magheraroarty.

5.6 Mitigation and Conclusions

The construction of the pier extension will not directly impact the hay meadows which support the corncrake. Fencing will however by used to prevent these important habitats from being trafficked or used for stockpiling of equipment or materials during the construction works.

The species observed within the littoral zone and others later identified in the lab are all ubiquitous in their distribution around the Irish coast. The proposed development will therefore not have any significant impact on either the habitat or the species.

The construction of the marshalling area will however result in a small loss of littoral feeding area to wading birds. These birds will relocate to areas immediately adjacent to the site where similar feeding habitat is available. Bird numbers are not expected to be significantly affected. No additional mitigation measures are therefore recommended.

The impact of the proposed development on the sublittoral benthic community will have no significant negative impact on the fauna as it is sparse and the species there are not rare or endangered.

The dredging of the approach channel will remove a section of the littoral and sublittoral habitat and their fauna. However over time, these areas will naturally be recolonised. No additional mitigation measures are therefore recommended.



Plate 5.1 Terrestrial Environment – Poor Pasture Land



Plate 5.2 The Upper Shore – East of the Pier





Plates 5.3 and 5.4 Littoral Environment – East of the Pier





Plates 5.5 and 5.6 Littoral Environment – West of the Pier

6.0 COASTAL PROCESSES

6.1 Introduction

The objective of this Chapter of the EIS is to describe the existing coastal processes in the area and to assess the impact of the pier extension on these processes. It is essential that the proposed works do not undermine the stability of the adjoining beach and dune system of the Dooey peninsula and Ballyness Bay.

A detailed study of the coastal processes was undertaken by Kirk McClure Morton (1997). The study was commissioned by the Department of the Marine and Natural Resources on behalf of Donegal County Council. This Chapter of the EIS summarises the main findings of the study.

6.2 Existing Coastal Processes

The Dooey peninsula and Ballyness Bay, Figure 6.1, form a particularly important ecological area and are designated a proposed Natural Heritage Area and Special Area of Conservation.

The Dooey Peninsula is composed of aeolian sand deposited on a gravel basement. The west facing beach is wide and shallow with a narrow zone of ephemeral dune in front of the main ridge. The nature of the frontal ridge of the dune system varies along the shore. Close to Magheraroarty Pier, the gravel basement is exposed and the dune ridge is a low machair like zone which is dissected by shallow blowouts resulting from human recreational activities. The frontal ridge of the dunes increases in height north-eastwards out towards Peninsula Point. There are several significant blowouts which are distributing sand into the backland areas. The dune structure behind the frontal ridge is complex. The dominating feature is a giant bare sandhill which rises to about 30m OD. The western face of the sandhill has a mild slope while the eastern face is steep.

Ballyness Bay lies to the east of Dooey Peninsula and comprises a well developed flood delta system leading to extensive flat sandy intertidal areas with pronounced ebb tidal channels. Erosion on the eastern side of the Dooey peninsula has resulted in embayments and the formation of dune islands at high tide. To the east of the entrance to Ballyness Bay, the frontal ridge of dunes is well formed without any significant blowouts. The beach is narrower and less dissipative than the west facing beach in Inishbofin Bay. The dunes at Drumnatinny Point are considerably lower than the Dooey Sandhill.

The sediment transport regime is complex but in general sediments move along the shoreline from the west and are carried onto the beach at the Dooey peninsula, particularly at its outer part towards the Otter Beg Spit. The prevailing westerly winds blow sand which has been deposited on the beach into the dune system of the Dooey peninsula. Sand from the peninsula is carried from the dune system into the ebb channels in Ballyness Bay and transported to the ebb delta system from where it is transferred to the beach.

The line of the frontal ridge of the dunes in Inishbofin Bay has been relatively stable over recent years. However, there are significant blowouts along the ridge. In the northerly section of the ridge, these blowouts have possibly resulted from the harvesting of marram in former times when the material was used for roofing. These blowouts feed sand from the beach to the rear area of the dunes. At the southerly section of the dune system, dune ridge blowouts have resulted from human recreational pressure. Vehicle access and pedestrians are causing damage to the vulnerable parts of the dunes which is leading to erosion in this area.

Significant changes to the beach profile are predicted to occur during extreme storm events. Model simulations of the changes in beach profile during an extreme 1 in 50 year storm event have shown that sand would be drawn away from the dune and upper beach and deposited in the near shore area. It is predicted that some 10m of dunes would be eroded during such an event.



Key

1 Inishbofin

2 Dooey Penninsula

3 Ballyness Bay

4 Drumatinny Point

5 The Hook

6 Otter Beg Spit

Figure 6.1 Aerial View – Magheraroarty Pier and Dooey Peninsula

The lowering of the beach levels would however be restricted by the gravel basement which would become exposed with the loss of sand. At the southern end of the beach, the gravel basement is already exposed. During extreme storm events, the low dunes on top of the shingle beach may be eroded and gravel washed over the ridge. In the event of global warming increasing the intensity of storms and causing a rise in sea level, it is expected that erosion of the dune line will occur as the system adjusts to the variations in wave climate.

Magheraroarty pier is currently acting as a groyne and retaining gravels on the storm beach to the west of the pier. Model simulations have shown that some 1,100 m^3/year would be transported eastwards along the upper beach if the pier structure was not in place. The effect of the pier has been to cause local erosion to the east of the pier due to the loss of shingle supply to the area.

Major coastal protection works to prevent the erosion processes taking place at the Dooey peninsula would be counter productive in that they would almost certainly upset the dynamic sediment transport regime that governs the habitats of the area. However, in the areas where human activity is resulting in erosion, compensation measures can be considered. The construction of Magheraroarty pier has obstructed the movement of shingle along the upper beach. It is therefore recommended that shingle should be mechanically bypassed and placed on the storm beach to the east of the pier so that the supply of shingle to the gravel ridge in the area is maintained. Human recreational activity is damaging the dunes particularly the low dunes at the Magheraroarty end of the system. Vehicular access should be prevented from this fragile environment and consideration should be given to making specific pedestrian access points onto the beach with timber walkways to prevent further damage to the dunes.

6.3 Impact of the Magheraroarty Pier Extension and Approach Channel

The impact of the proposed Magheraroarty pier extension and dredged approach channel was established using computational modelling techniques. The physical processes controlling the distribution and movement of sediments at Magheraroarty and Inishbofin Bay are the wave climate and the tidal flow regime.

Site Location and Exposure

The admiralty chart for the area, Figure 6.2, shows that Inishbofin Bay is open to the west and north-west, however due to the effects of wave refraction and diffraction, waves approaching the Irish Coast from the south-west through to the north-east can enter the Bay.

Wave Climate – Offshore Conditions

Data from the UK Meteorological Office wave data model for a point 55.25° North and 08.46° West was used to establish the offshore wind and wave climate. Swell and wind wave heights, periods and directions together with wind data were obtained for every three hours 1994 to 1996.

A statistical analysis of the wave records was also undertaken to determine the extreme wave conditions. Based on the three years of data it is calculated that at the offshore point the 1 in 50 year wave climate would have a significant wave height of 12.5m and period of approximately 16 seconds. A typical annual storm would have a significant wave height of 8.7m and period of 12 seconds.

Wave Climate – Inshore Conditions

The wave climate expected in Inishbofin Bay was calculated using the latest spectral analysis techniques in conjunction with a fully computerised combined refraction and energy dissipation analysis. Three dimensional transformation matrices were developed to enable the three hourly inshore wave records to be established from the offshore dataset.

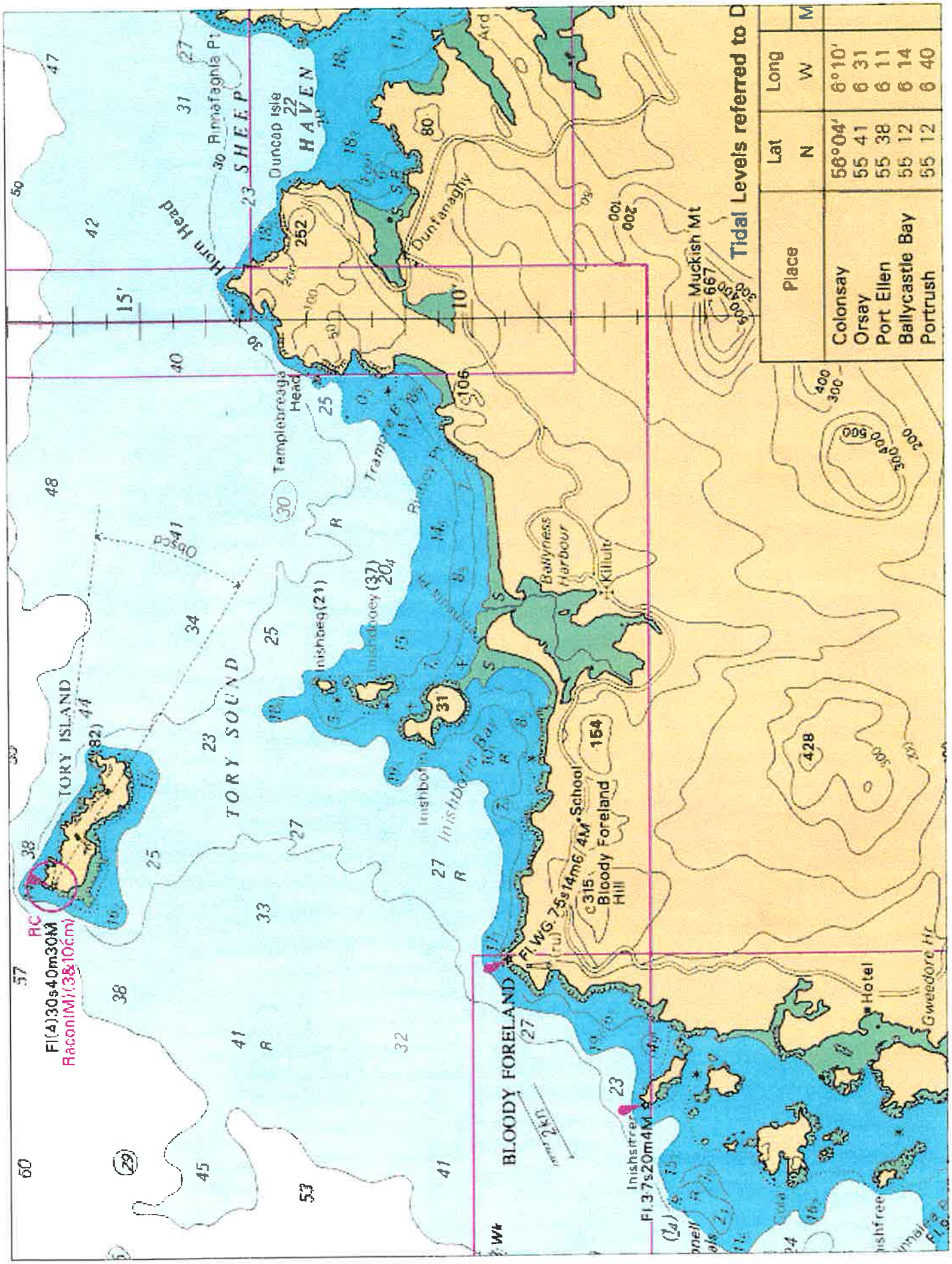


Figure 6.2 Site Location

The bathymetry used in the model simulations of the proposed Magheraroarty pier extension and dredged approach channel is presented in Figure 6.3. The wave patterns and wave heights expected at the pier during an extreme gale from the western to north-westerly sector with a return period of 1 in 1 years are presented in Figures 6.4 and 6.5 respectively.

The following conclusions were drawn from the wave climate assessment:

- the proposed pier extension will significantly improve the shelter provided at Magheraroarty Pier;
- the berth will however not be tenable during gales generated from the west to north-westerly sector;
- access to the berth will be available for most of the time, however, the approach channel will not be suitable at low tide when there is a significant swell running.
- the proposed pier extension will not affect the surf along the western facing beach of the Dooey peninsula.

Tidal Flow Regime

The tidal flow regime of the coastal study area is complicated by the presence of Inishbofin Island and Ballyness Bay. Tidal flows of 2 knots are noted on the chart to the north of Bloody Foreland, Inishbeg Island and Temlebreaga Head. In the entrance channel to Ballyness Bay tidal currents approach velocities of about 4 knots. In Inishbofin Bay the currents are generally weak.

The tidal flow regime was established using hydrodynamic modelling techniques. This required an accurate digital ground model of the bathymetry of the study area to be developed. Information was obtained from Admiralty Charts, Admiralty Source Data Sheets and the results of a hydrographic survey of Inishbofin Bay compiled by Kirk McClure Morton in 1996. A detailed hydrodynamic model of the coastal study was developed based on this information and verified using the results of a current meter survey, completed as part of the study.

The tidal currents predicted from the hydrodynamic model were combined with the wave currents expected during storm conditions to quantify the littoral currents which give rise to sediment movements.

Sediment Transport

The sediment movements expected along the mobile coastline within Inishbofin Bay were assessed using a suite of littoral zone process computer models, MIKE 21/LITPACK developed at DHI, Denmark.

The sediment transport models utilise the results of the hydrodynamic models describing the nearshore wave climate and tidal flow regime together with beach survey data and particle size analysis of the sediments present within the study area.

The predicted littoral currents which give rise to sediment movements in the vicinity of the proposed Magheraroarty pier extension and dredged approach channel during westerly to north-westerly gale conditions are presented in Figure 6.6. A comparison of the littoral currents expected along the western shoreline of the Dooey peninsula during the same conditions, with and without the pier extension is also presented in Figure 6.7.

The following conclusions were drawn from the sediment transport assessment:

- the dominant wave direction is from the west to north-westerly sector which produce similar wave driven currents in Inishbofin Bay, irrespective of the offshore wave direction;
- during storm conditions from the west to north-westerly sector, a strong wave driven current is generated along the southern shoreline moving eastward which sweeps

around Inishbofin Bay towards the Otter Beg Spit. The drift around the Bay then flows westwards along the southern side of the Spit. At the same time, wave driven currents are generated along the southern shoreline of Inishbofin Island moving eastwards which, at high water, passes by the northern side of the Otter Beg Spit;

- The littoral currents in the vicinity of Magheraroarty pier are influenced by Stoney Point. A back eddy is formed around High Water which over time will tend to silt up the berth. The material will be fine and easily removed by excavator;

- The approach channel is in the path of the main littoral currents feeding into Inishbofin Bay and is therefore liable to silt up in a relatively short space of time. The integrity of the channel is however expected to be reasonably stable with the finer material easily moved by waves. The larger stones will tend to armour the slopes. The profile of the channel may however be altered during major storm events;

- The proposed pier extension and approach channel will have no impact on coastal processes except during storm conditions, coinciding with high water. The impact during these conditions will be limited and restricted to the immediate area to the east of the pier;

- The proposed pier extension and dredging will have no impact on the main beach and dune system of the Dooey peninsula;

- A longer pier extension than that proposed would begin to impact on the coastal processes influencing the dynamic stability of the southern section of the Dooey peninsula and is therefore not recommended.

6.4 Conclusions

The sediment transport regime of the coastal area of Magheraroarty, Inishbofin Bay and Ballyness Bay was established using computer modelling techniques.

A series of simulation runs were undertaken to determine the impact of a number of pier extension and dredging approach channel options on the dynamic stability of the Dooey peninsula.

The results of the assessment showed that a pier extension of 50m with limited dredging, as proposed, could be provided to improve facilities for Tory Island Ferry and local fishing boats without impacting on the stability of the beach and dune system of the Dooey peninsula.

The assessment also identified that ongoing maintenance dredging would be required to maintain the required depth of the berth and within the approach channel.

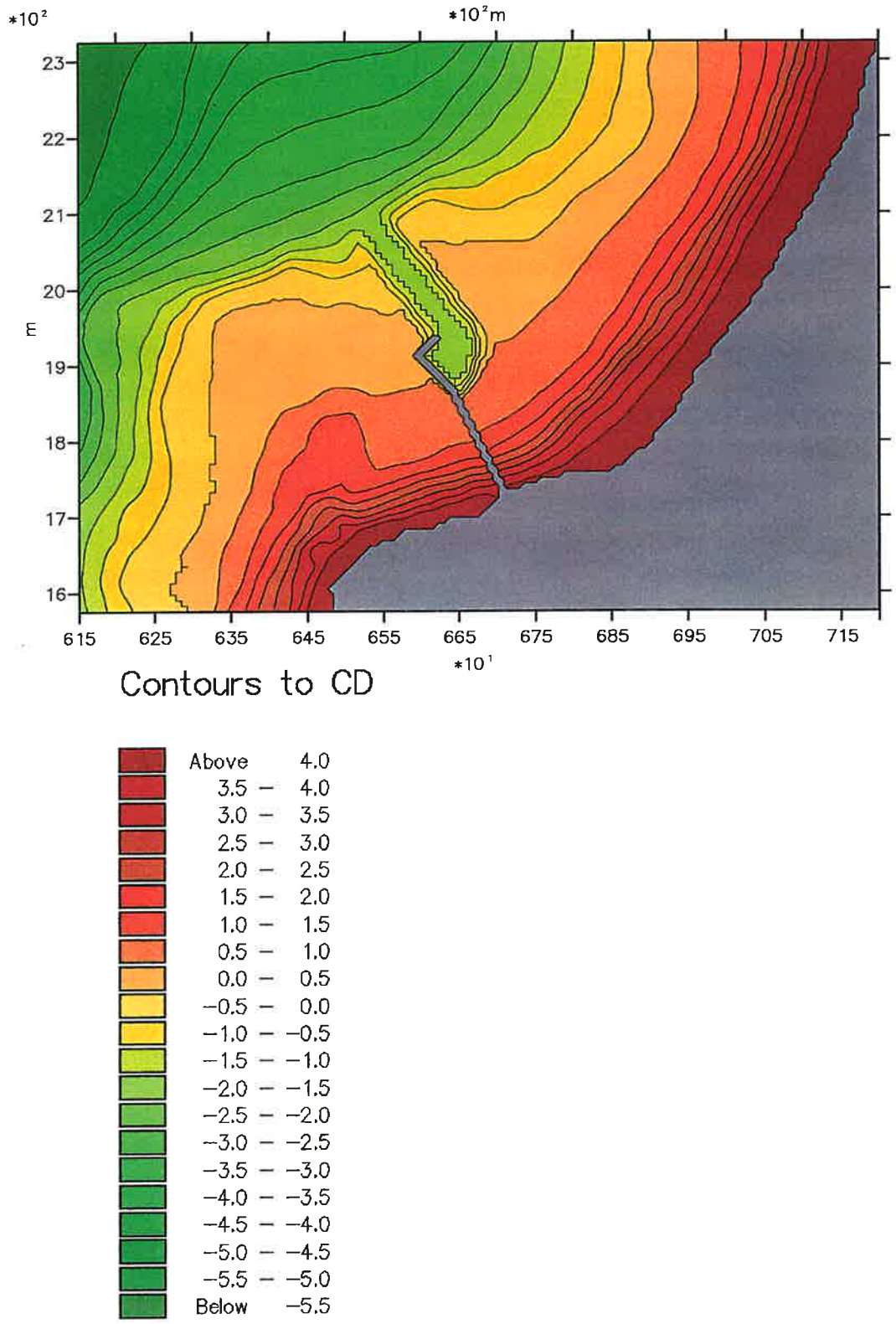
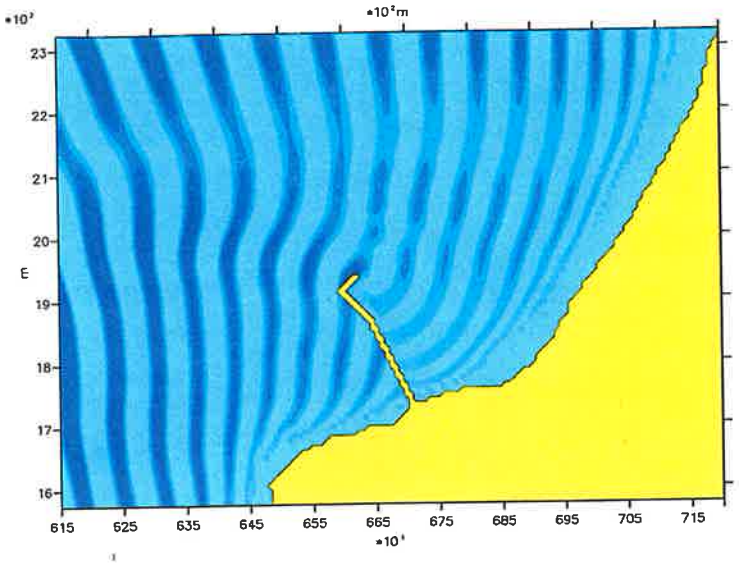
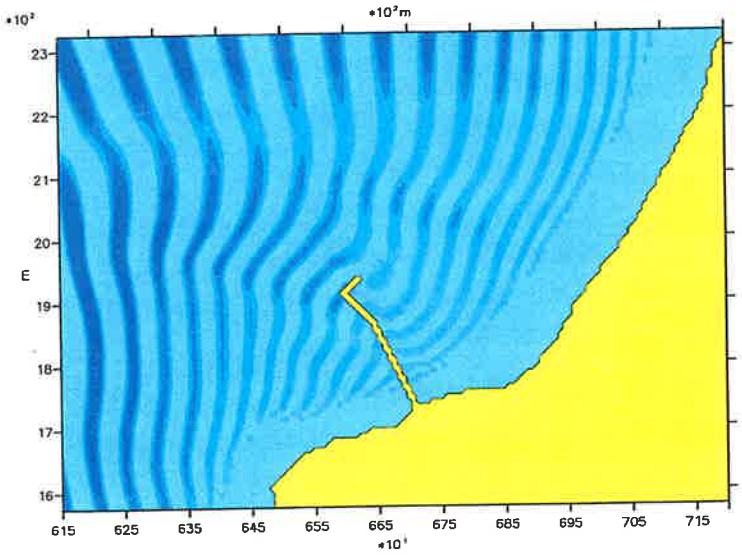


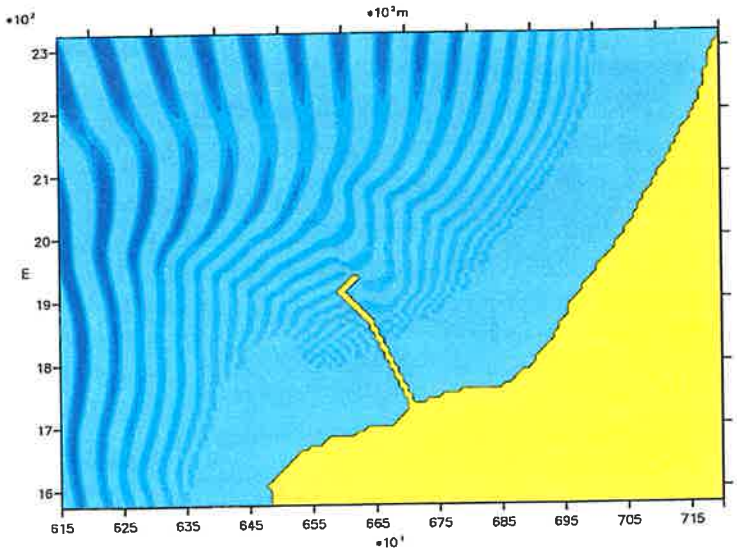
Figure 6.3 Model Bathymetry of Magheraroarty Pier Extension and Dredged Approach Channel



Wave Pattern at High Tide

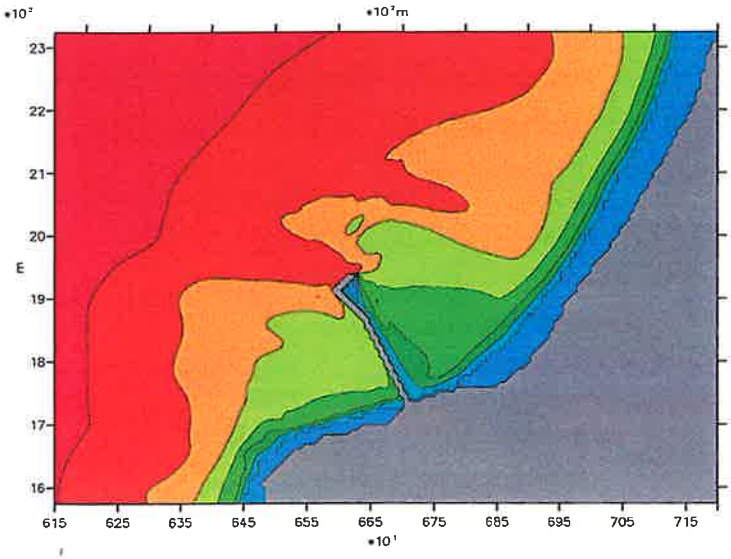


Wave Pattern at Mid Tide

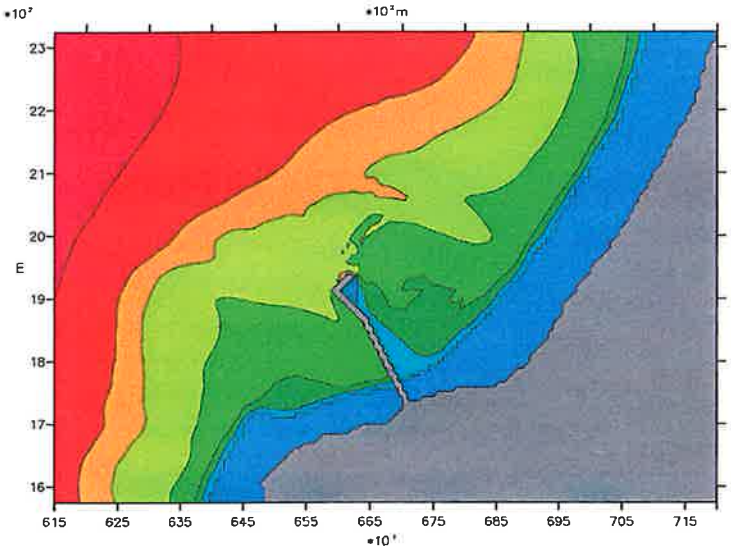


Wave Pattern at Low Tide

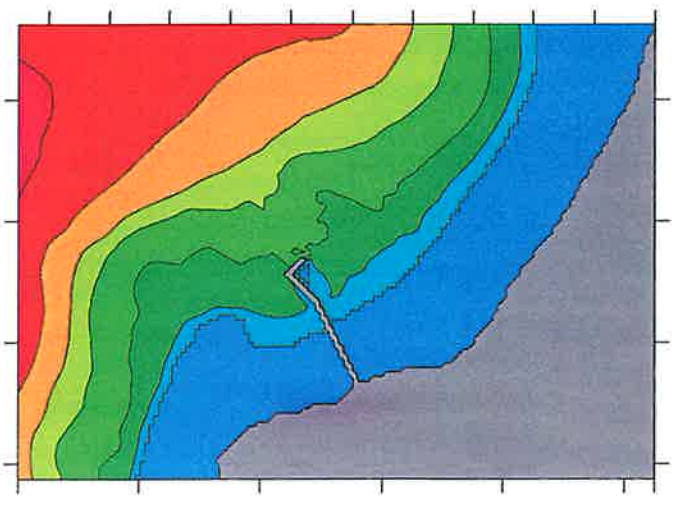
Figure 6.4 Predicted Wave Patterns during a Westerly to North-Westerly Gale



Wave Heights at High Tide



Wave Heights at Mid Tide



Wave Heights at Low Tide

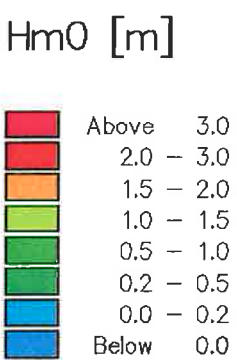
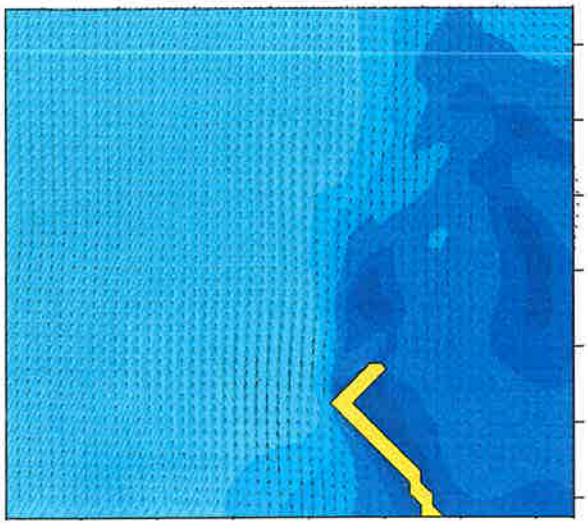
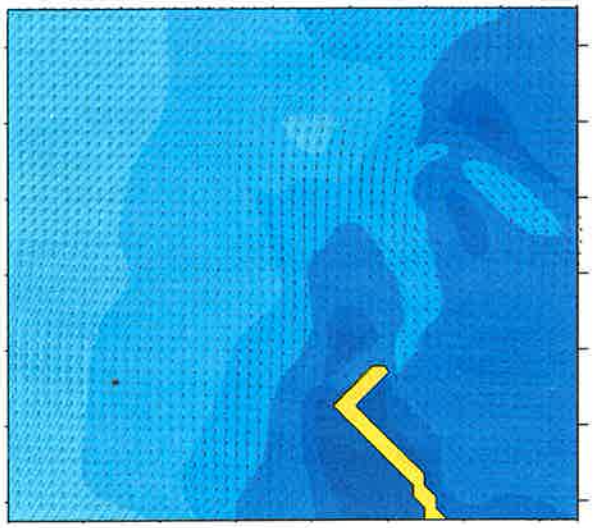


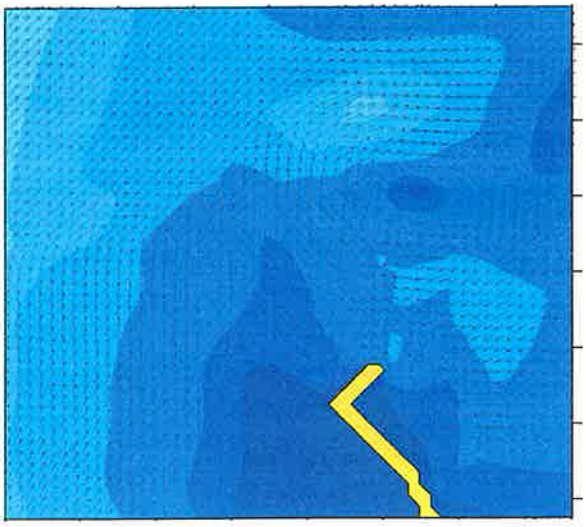
Figure 6.5 Predicted Wave Heights during a Westerly to North-Westerly Gale



Littoral Current at High Tide



Littoral Current at Mid Tide



Littoral Current at Low Tide

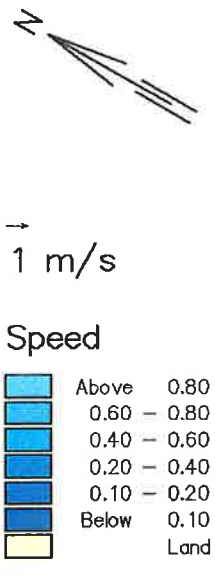
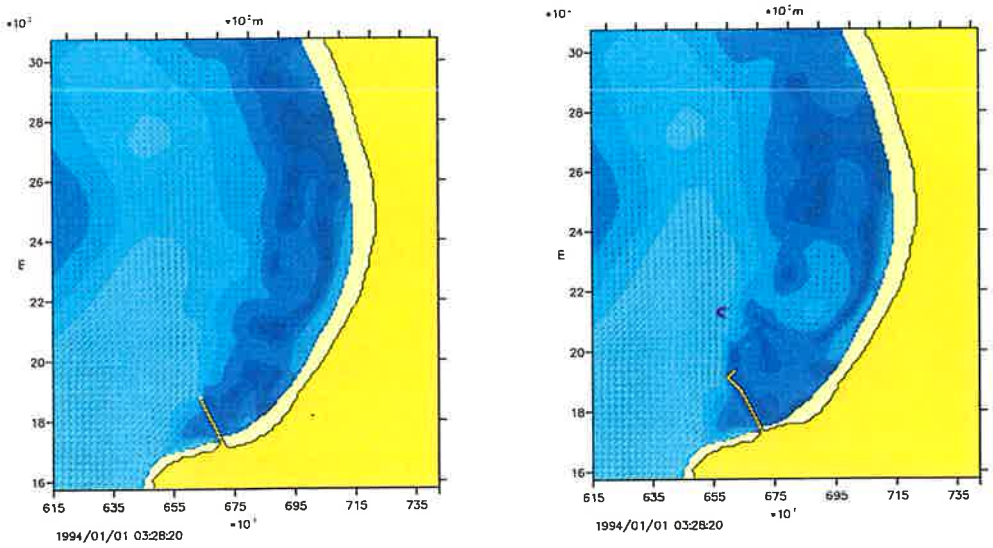
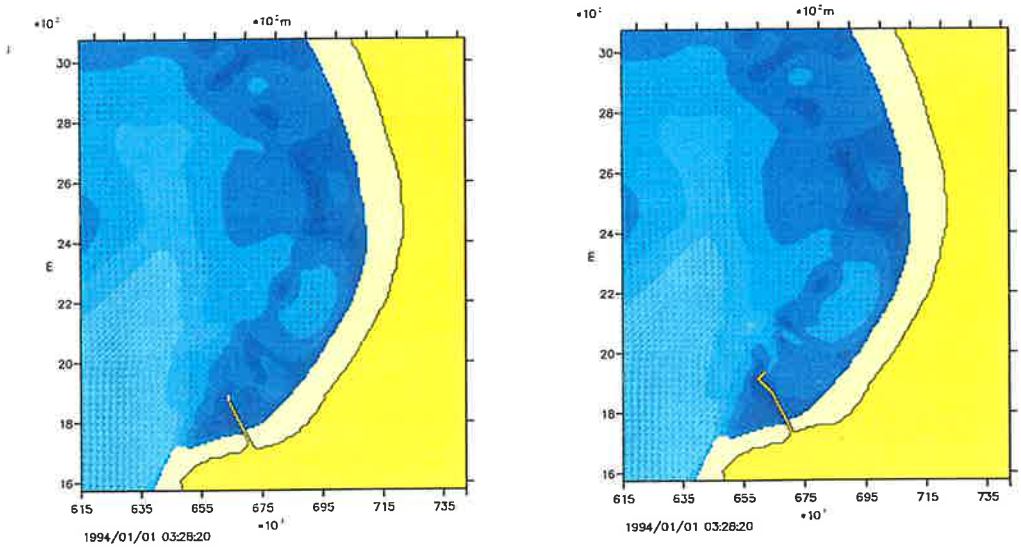


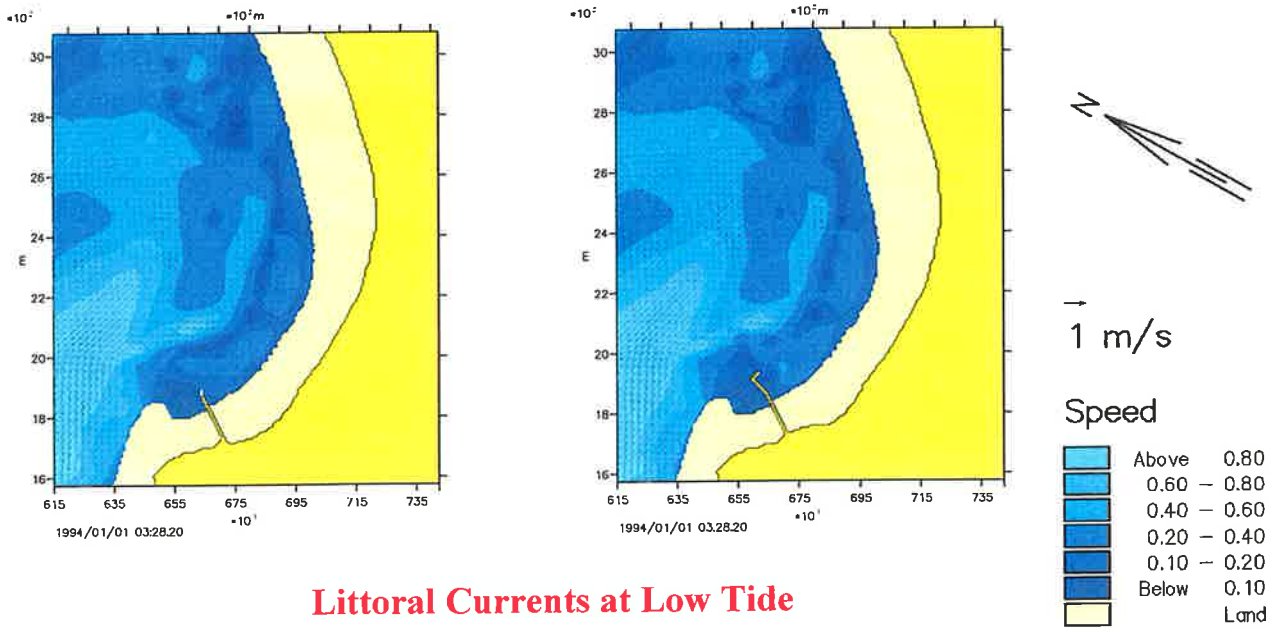
Figure 6.6 Predicted Littoral Currents during a Westerly to North-Westerly Gale



Littoral Currents at High Tide



Littoral Currents at Mid Tide



Littoral Currents at Low Tide

Figure 6.7 Predicted Impact of Proposed Pier Extension on Littoral Currents during a Westerly to North-Westerly Gale

7.0 MATERIAL ASSETS

7.1 Introduction

This Chapter of the EIS describes the existing infrastructure of Magheraroarty in terms of water supply, sewerage and roads, provides an assessment of the impact of the proposed pier extension and where possible, puts forward mitigating measures to reduce the impact of the proposed development.

7.2 Water and Sewerage Infrastructure

Water Supply

Magheraroarty presently receives its water supply from the Gortahork/Falcarragh water supply scheme. The scheme is currently supplying 64m^3/hr to the area, however in summer months the demand rises and some areas are supplied from an adjacent scheme. The treatment works will be upgraded in late 2001 and will then provide a capacity of 80m^3/yr. This will then enable the works to supply all the area at peak demand.

There is an existing water supply to the pier at Magheraroarty. The existing tap will be replaced as part of the development works at the pier, however, there is not expected to be any significant increase in water demand as a result of the proposed works.

Sewerage Infrastructure

At present there is no formal sewerage network in Magheraroarty i.e. there is no collection system and Wastewater Treatment plant. The nearest town with a scheme is Gortahork where the treatment consists of a septic tank. The Meenlaragh sewerage scheme is priority twenty eighth in the Gaeltacht area grouped schemes for upgrade. It is not known at this stage when this upgrade will take place. The households and businesses in the Magheraroarty area have their own septic tank systems in place to deal with wastewater arising from their premises. The existing toilet in the vicinity of the pier is also connected to a septic tank.

The proposed pier extension is not expected to result in a significant increase in the usage of public facilities and will therefore not have any significant impact on the water quality of the immediate receiving waters of Inishbofin Bay.

The proposed pier extension will provide a sheltered berth for the Tory Island ferry. The discharge of wastewater from the ferry will be prohibited alongside the berth. It is not envisaged to provide pump out facilities at the pier in Magheraroarty. This will eliminate the need for tankers to periodically empty the associated on-land storage tank and prevent the risk of odours arising close to the proposed marshalling area and beach.

7.3 Roads and Traffic

This section of the Environmental Statement deals with the traffic impact of the proposed development. An assessment is carried out on the existing and projected traffic flows using the local road network in the vicinity of the proposed pier extension at Magheraroarty, Co. Donegal.

The assessment considers existing traffic flows and derives an estimate for the additional traffic generated as a result of the construction of the pier extension. Overall the total traffic volumes are not unduly changed however the level of heavy goods vehicles (HGVs) in the area is likely to increase during the construction phase. Therefore the assessment will concentrate on HGV traffic as this is the principal traffic generated by the proposed construction and represents the greatest Environmental Impact from the development proposals. Estimates of construction traffic will be compared with the existing HGV traffic to determine the relative impact of the proposals and the ability of the local road network to carry the additional traffic. At this stage it is important to

highlight that the impact of the construction traffic will be temporary as the construction period is finite and traffic volumes will increase in the short-term only. The operational phase will not have a significant impact on the local road network given that the ferry service will not generate any notable additional traffic, hence existing traffic volumes are representative of the likely situation when the construction of the new pier is complete. The environmental implications of the increased traffic have also been assessed in relation to their impact on noise and air quality.

Site Location

Magheraroarty is a small rural community situated on the north-west Donegal coastline. The village lies approximately 50 km north-west of Letterkenny and is approached by the R257. A ferry service from the existing pier serves Tory Island twice a day during the summer period as well as providing facilities for local fishing vessels and access to Inishbofin.

Existing Traffic Volumes

In order to determine the impact of the proposed development it is necessary to establish the existing traffic using the local road network. Kirk McClure Morton carried out a traffic survey on Tuesday 20 June 2000 at the access to the pier from the R257 (refer to Figure 7.1 for location).

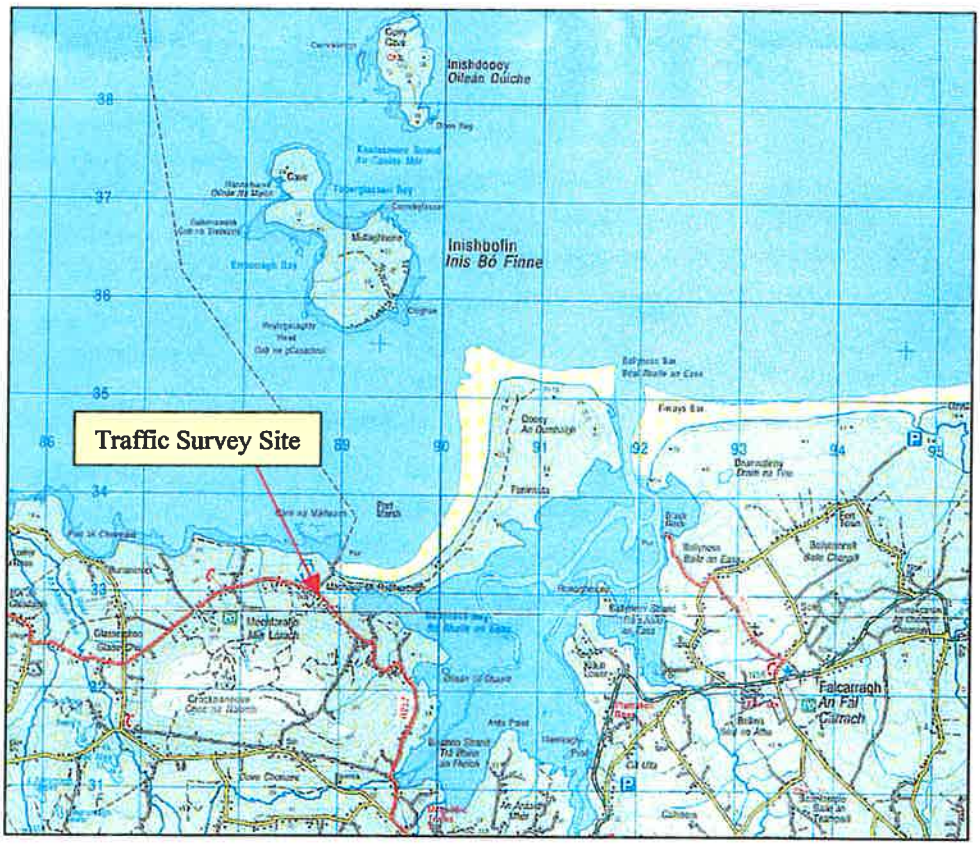


Figure 7.1 Location of the Traffic Survey Site

The volume of traffic using the road during this period includes the school traffic generated from the nearby schools hence the overall flow on the local road network during this time of the year is assumed to be indicative of the daily flows. The existing traffic volumes throughout the working day are displayed in Figure 7.2. These figures represent the two-way flow on the R257 on the Letterkenny approach to the pier, i.e. east of the pier access.

Figure 7.2 shows the profile of the existing flow on the R257 passing the access to the existing pier. The graph illustrates that the two-way traffic flow through the relevant section of the local road network is relatively consistent throughout the day, however there are times when the traffic demonstrates peak flow particularly during mid morning and in the afternoon between 2pm and 4pm.

Site observations revealed that the AM peak can be attributed to the arrival of the Tory Island ferry whilst the PM peak is consistent with the end of the school day. A closer examination of the figures reveals that the AM and PM peak hours occur between 11:00 and 12:00 and 14:45 and 15:45 respectively.

Proposed Development

The pier extension will be 50 m long with a return at the end of 30 m to provide protection from storm waves. Dredging is required to provide 'all-tide' berthing facilities for the ferry service. The development will also include a marshalling area which is an integral part of the scheme. The marshalling area will facilitate cars/people waiting for the ferry.

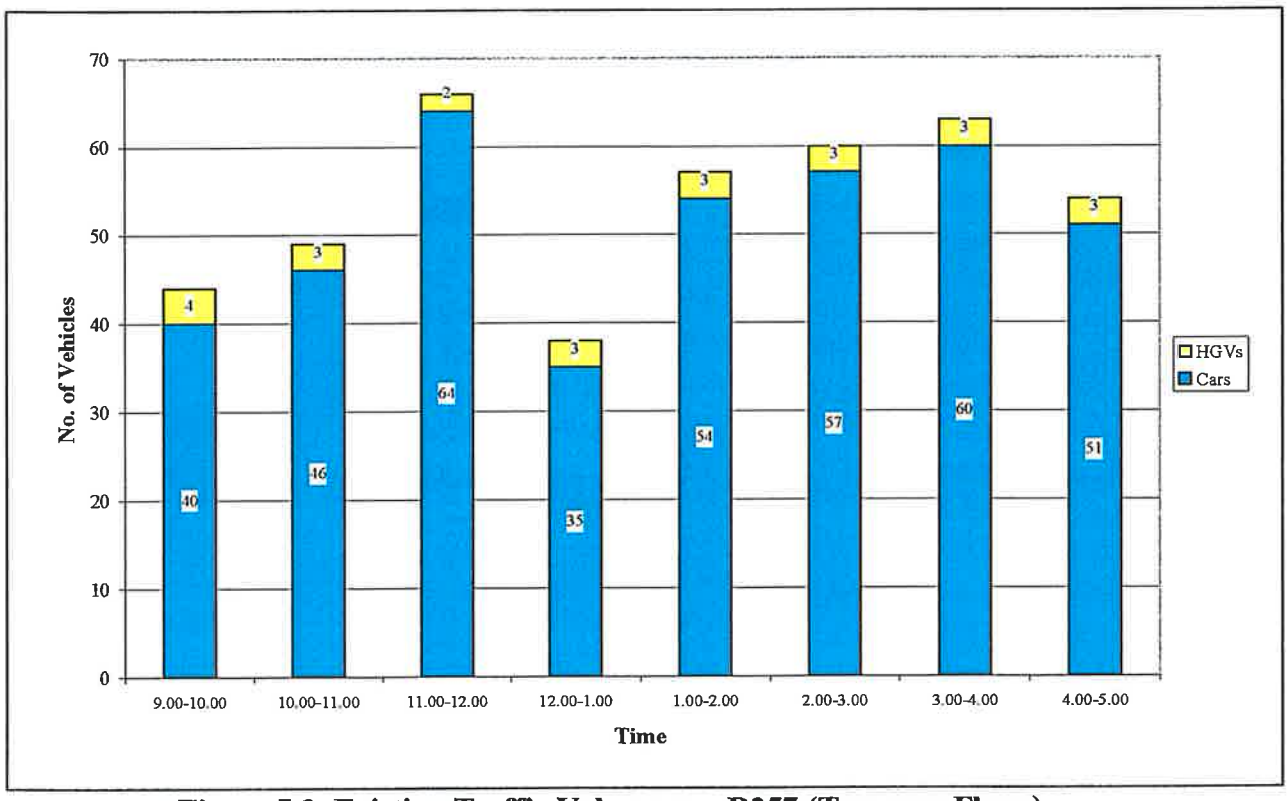


Figure 7.2 Existing Traffic Volumes on R257 (Two-way Flows)

The construction of the deep berth necessitates dredging an access channel. The material to be dredged is suitable for land reclamation and will be used to form a significant part of the service area cutting down on the volume of construction traffic required to transport fill material to the site.

There are two options available for the reclamation area. The first option involves the use of a tractor and trailer to transport the dredged spoil from the head of the pier to the reclamation area. This method of reclamation will generate internal trips within the curtilage of the site but will not impinge on the local road network hence no further assessment of this traffic is required. The second method is to pump the dredged spoil in suspension directly to the reclamation area, which will eliminate the need for vehicle transportation on-site.

Assessment Methodology

Additional Traffic from the proposed construction works must be assessed in two ways. The first method of assessment is to determine the capacity of the local roads and their ability to carry the additional traffic without causing undue congestion. This is likely to occur at morning and evening peak periods and the assessment methodology is set out in the Guidelines for the preparation of Traffic Impact Assessment prepared by the Institution of Highways and Transportation. These guidelines recommend a threshold level for detailed study where additional traffic exceeds 10% of the existing traffic flows or in areas that are sensitive to additional traffic at a threshold level of 5%.

The second method of assessment is to establish the maximum change in existing traffic volumes or in the make-up of the existing traffic. This is likely to occur at off peak periods when existing traffic volumes are lower and development traffic will have a higher percentage impact. For this proposal where the construction traffic will be primarily heavy goods vehicles, which have a greater environmental impact, it is necessary to consider the impact of the HGV element of the overall traffic. The threshold levels for further assessment are recommended in the Guidelines for the Environmental Assessment of Road Traffic prepared by the Institution of Environmental Assessment. These guidelines recommend more detailed assessment where traffic flows are increased by more than 30 % or for especially sensitive areas a threshold level of 10% is recommended.

The guidelines justify this threshold level by stating that the day to day variation of traffic on the road is frequently plus or minus 10% and that it should therefore be assumed that the projected changes in traffic of less than 10% create no discernible environmental impact.

The assessment of additional traffic generation is based on the comparison of anticipated traffic from the proposed development with the existing traffic on the road network. By the nature of the proposed development, the pier will see the retention of the existing vehicular activity together with an increase resulting from the construction activities. The construction of the pier extension will require a variety of materials, most of which will be transported by heavy goods vehicles. This will give rise to a more significant increase in the HGV traffic content than would be apparent from a comparison of total traffic volumes only.

Traffic Generation

Based on the available layouts of the proposed extension an estimate of the construction traffic accessing the site has been derived. A maximum of 4 HGVs per day is forecast in order to transport the construction material to the site. However a peak flow of 6 vehicles per day during certain construction phases has been estimated. The figures quoted above assume a construction period of between 4 and 5 months and a working day of 8 hours.

For the purposes of this assessment the peak flow during construction has been used to assess the effects of the construction traffic, this allows for a more robust assessment to be achieved throughout the construction phase. With 6 vehicles accessing the site daily this gives a two-way flow of 12

HGVs and equates to an hourly two-way flow of less than 2 vehicles. In addition to this there will be traffic generated from the arrivals and departures of construction workers. It has been assumed that a maximum of 3 vehicles carrying construction workers will arrive and depart from site during the AM and PM peak respectively. This number is considered adequate as the workers will most likely par-take in car sharing or will travel to the site via a contractor's mini-bus. The construction traffic has been added to the existing flow to give an overall estimate of the proposed traffic flow during the construction phase.

Traffic Impact of the Construction Phase

When assessing the impact of the development in relation to traffic it is necessary to assess the ability of the local road network to carry the additional traffic without causing any significant congestion. As identified earlier the most appropriate information to scrutinise when assessing the traffic impact is the peak hour traffic flows. Tables 7.2 and 7.3 summarise the existing and proposed traffic volumes during the AM and PM peak hours respectively.

In terms of the traffic impact the increase in total traffic does not exceed the guidelines laid down by the IHT, i.e. a 10 % increase. The 10 % threshold is applicable in this instance as the area is not congested and is unlikely to become congested during the construction phase. These figures relate to the peak hour flow when the traffic impact will be greatest. The figures quoted in Tables 7.2 and 7.3 establish that a more detailed assessment for the impact of the additional traffic on the road network is not required.

Traffic Mitigation Measures

The ability of the road to carry large HGVs must also be considered in terms of road width and the road surface. The main haulage route will include the N56 and the R257. The N56, a national secondary route, will have adequate width to accommodate the passing of two HGVs in opposite directions.

Table 7.2 Existing traffic at Magheraroarty and Proposed Traffic during the AM peak hour for the construction phase at Magheraroarty Pier.

Approach Route	Existing Traffic 2000				Proposed Traffic 2001				% Increase
	car	HGV	total	%HGV	car	HGV	total	%HGV	Total Traffic
R257 - East of Pier Access	64	3	67	4	67	5	72	7	7.5
R257 - West of Pier Access	64	4	68	6	67	6	73	8	7.4

Table 7.3 Existing traffic at Magheraroarty and Proposed Traffic during the PM peak hour for the construction phase at Magheraroarty Pier.

Approach Route	Existing Traffic 2000				Proposed Traffic 2001				% Increase
	car	HGV	total	%HGV	car	HGV	total	%HGV	Total Traffic
R257 - East of Pier Access	70	3	73	4	73	5	78	6	6.8
R257 - West of Pier Access	70	3	73	4	73	5	78	6	6.8

In addition to this an examination of the NRA's publication National Roads and Traffic Flows 1998 reveals that at the junction with the R257 the Annual Average Daily Traffic (AADT) on the N56 is 3,921 with a HGV composition of 22%. This equates to approximately 863 HGVs per day and as such the volume of construction traffic generated from the pier extension will not have a significant impact on the N56.

As highlighted previously there will not be any notable impact on the R257 in terms of traffic. With regard to the road width the carriageway has been measured at regular intervals between the pier and the N56. Figure 7.3 displays these road widths and illustrates that the width of the road is less than the 5.5 metres in certain locations.

This width is normally considered appropriate for the safe passage of two HGVs on a carriageway. However given that the actual volume of HGVs during peak periods of construction is very low and that the road width falls below 5.5 in a limited number of areas the occurrence of any conflict between construction traffic will be minimal. It can therefore be concluded that any measures in relation to traffic management should not be necessary. In addition to this the road width is adequate in strategic locations to allow the safe passage of goods vehicles and in some areas existing lay-bys can be used. These sections of the road are considered sufficient to counter any problems associated with the manoeuvring of HGVs.

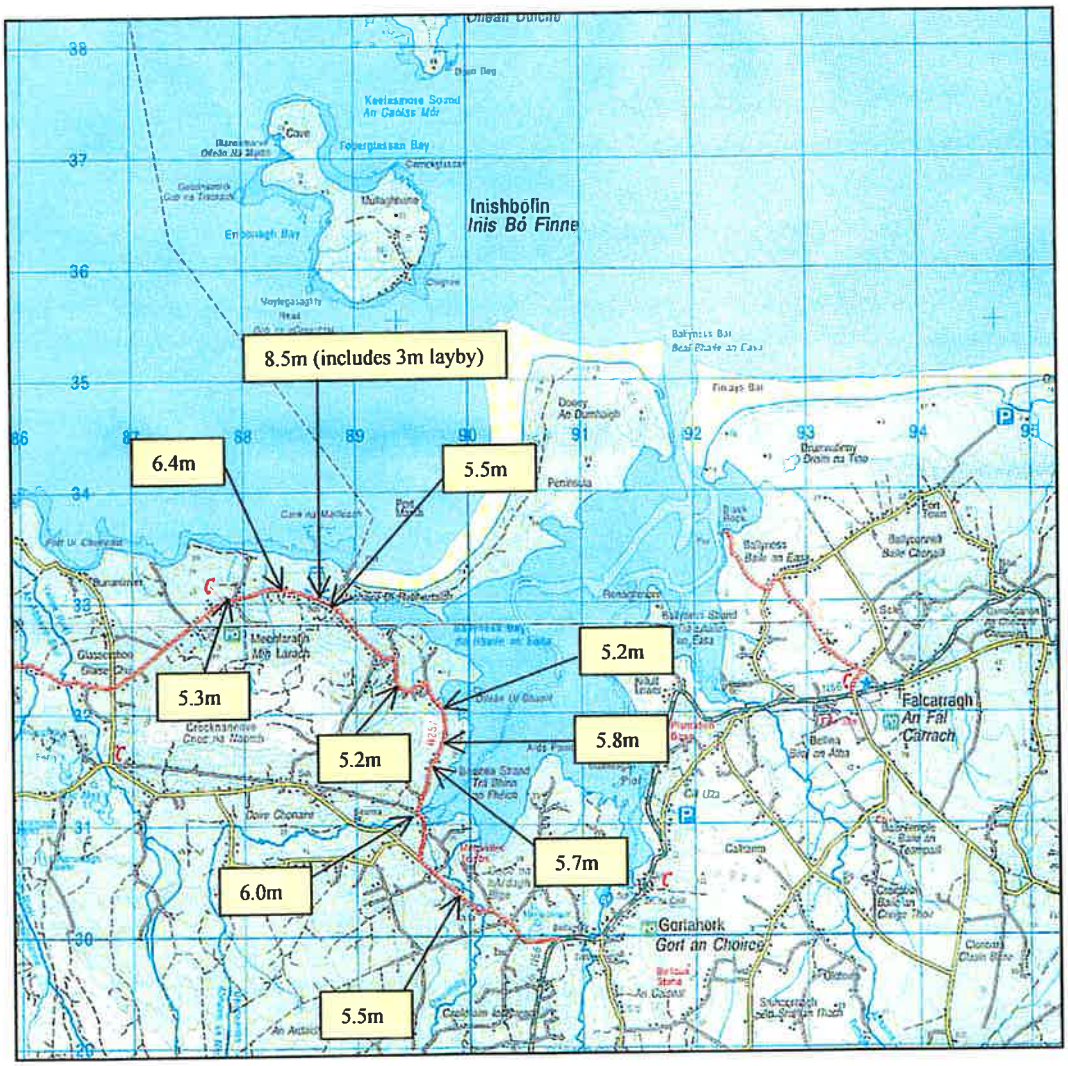


Figure 7.3 Road widths on the R257 as measured on-site

An examination of the road surface reveals for the most part that the road is in good structural condition. In terms of the effects on the road surface, any damage caused by the movements of HGVs to and from the site should be made good by the contractor.

A traffic plan will be implemented during the construction and will aim to control traffic movements, minimise possible impacts and maintain road safety during construction. The traffic plan will be binding on the contractor who will ensure that the requirements of the plan are enforced throughout the construction. Any significant alteration in HGV movements will be agreed with the relevant authorities before these activities take place.

The main features of the traffic plan are:

- All construction traffic restricted to routes agreed in advance with the Council;
- Access to the pier from public highways only at existing entry/exit points agreed with the Council;
- Designated parking areas to be utilised by construction traffic to avoid parking on roadside verges;
- Roads to be kept clean of mud and debris at all times using mechanical road brushes or other appropriate means;
- Any deviation from the Traffic Plan required by the contractor to be agreed in advance with the Council;
- An agreement with the Council will be made in respect of the assessment of damage to the public highways caused by construction activities. Reinstatement of such will be to the Council's satisfaction.

With the implementation of the Traffic Management Plan it is considered that the passage of HGVs to and from the site will not significantly impact the local road network or compromise road safety.

Environmental Assessment of Construction Phase

The guidelines for environmental assessment indicate that a significant change in the composition of the traffic should be considered in relation to the environmental effects. The pier extension lies within a proposed Natural Heritage Area (NHA) and Special Area of Conservation (SAC) indicating that the area contains habitats of National and European importance. Although the R257 does not impinge on the SAC and only traverses the NHA for a short distance the area under consideration has been classed as a sensitive area for the purposes of this assessment. For this reason an increase greater than 10 % in relation to the composition of HGV should be considered as significant and an environmental assessment should be carried out. From Table 7.4 it can be seen that the increase in HGV content is greater than 10 % on all links hence an environmental assessment has been prepared.

A study of the site reveals that there are a number of residential dwellings and a school adjacent to the carriageway in the vicinity of the proposed site access. These dwellings are considered to be the most appropriate location for the environmental assessment.

Table 7.4 Existing and Proposed Traffic during the Working Day for the Construction Phase at Magheraroarty Pier Extension

	Existing Traffic 2000				Proposed Traffic 2001				% Increase	
	car	HGV	total	%HGV	car	HGV	total	%HGV	Total Traffic	HGV Traffic
R257 - East of Pier Access	407	30	437	7	413	36	449	8	2.7	20.0
R257 - West of Pier Access	417	30	447	7	417	36	453	8	1.3	20.0

Noise Level Assessment

This assessment was carried out for an 18-hour period in order to obtain an indication of the noise levels throughout the duration of a typical day. In addition to this the barrier effects of certain obstacles such as walls and hedges were not taken into consideration, hence the noise results of this assessment are likely to be greater than the actual situation. Table 7.5 summarises the results of the noise level analysis. The total noise levels do not exceed the threshold value of 68 dB(A) above which mitigation measures with regard to noise insulation are required. The increase in noise resulting from construction traffic is less than 3 dB(A) and therefore will not be perceptible to the local residents.

The construction period will last for 4-5 months hence any increase in noise due to traffic will occur on a temporary basis with noise levels returning to normal on completion of the works.

It can therefore be concluded that the proposed extension of the pier will not result in a significant environmental impact with regard to noise levels.

Air Quality Assessment

The air quality during the construction phase was analysed at the same location as the noise level assessment. Four different parameters were assessed: carbon monoxide, hydrocarbons, nitrogen oxides and particulate matter. Table 7.6 summarises the results of the air quality assessment. In all cases the concentrations fell below the standards set out in the Design Manual for Roads and Bridges, Volume 11, Section 3, Air Quality. The traffic generated from the proposed extension will not cause any notable deterioration in the local air quality. Pollutant levels will not exceed the standards identified in the Design Manual for Roads and Bridges.

Operational Phase

It has been assumed that the traffic generated by the operation of the pier will not increase substantially from the existing volumes. Consultations with the Roads Section of Donegal County Council have revealed that the existing ferry service runs on average twice a day from the pier during the summer months.

Table 7.5 Summary of Noise Level Assessment

Location	Total Noise dB(A)	Increase dB(A)
R257 East of Pier Access (Existing)	56.8	N/A
R257 East of Pier Access (Proposed)	57.7	0.9

Table 7.6 Summary of Air Pollution Assessment (Peak Hour)

Location	Carbon Monoxide (mg/m^3) Max 8 hr	Hydrocarbons ($\mu g/m^3$) Annual Ave. Benzene	Oxides of Nitrogen ($\mu g/m^3$) 98^{th}%ile of Hourly NO_2	Particulate Matter ($\mu g/m^3$) 95^{th}%ile of daily average
R257 East of Pier Access (Existing)	1.88	0.96	80.06	30.81
R257 East of Pier Access (Proposed)	1.89	0.97	82.84	30.90
Standards	**10.44**	**5.00**	**200.00**	**50.00**

In terms of car-parking the reclamation area will be used as a marshalling area and it is recommended that a component of this area will be the provision of a clearly designated parking area for patrons wishing to avail of the ferry service. The parking bays and road markings shall be designed to the required standards and will result in the organised loading of the ferry.

Conclusions

This assessment looked at the likely impact resulting from the construction of the pier extension. The total traffic volumes were analysed to obtain an indication of the traffic impact on the road network. The increase in traffic was less than the recommended threshold hence it can be concluded that there will be a negligible impact with regard to the traffic movements and congestion. The ability of the road network to accommodate the large delivery vehicles was also determined and it can be concluded that goods vehicles can access the site without any significant safety implications. Notwithstanding this a Traffic Management Plan will be implemented to ensure the proper management of the construction traffic.

The increase in HGVs was considered in order to determine if an Environmental Assessment of the construction traffic was required. The increase was greater than 10 % the threshold applicable to sensitive areas. The detailed assessment of the impact on noise levels and selected air pollutants revealed that the construction would not have a significant impact on the environment. The operational phase of the pier will not see any intensification of use hence an assessment of the traffic is not required as the existing volumes are indicative of the situation on completion of the pier.

As Magheraroarty is a coastal village, providing access to Tory Island, the traffic volumes will fluctuate seasonally. However there are schools located in the area and as the traffic counts were carried out in June, when school traffic can be accounted for, the counts are considered to be representative of the worse case scenario.

8.0 AIR AND CLIMATE

8.1 Introduction

The main objective of this Chapter of the EIS is to describe the existing environment in terms of climate and emissions to the air, with particular reference to dust and noise. An assessment is provided of the likely impact of the proposed pier extension on emissions to air and where possible, mitigation measures are put forward to reduce the impact of the proposed development.

8.2 Climate

The climate at Magheraroarty is influenced mainly by its coastal location and low elevation.

Wind

The prevailing wind is from the south-west and this tends to be the main rain bearing wind. The wind characteristics recorded at the meteorological station at Malin Head are presented in Figure 8.1

Rainfall

The spatial distribution of rainfall in Co. Donegal is shown in Figure 8.2. The average rainfall at Magheraroarty is 1687 mm, Figure 8.3 with the wettest months normally expected during the winter months. The driest months on average are April and May.

There are no long term gaseous emissions associated with the proposed pier extension which may impact on climate. The proposed development will therefore have no impact on climate either locally or regionally.

8.3 Dust

This section assesses the impact of potential dust emissions from the proposed pier extension. The main possible sources of dust during the construction phase of the development are as follow:

(i) site preparation works;

(ii) infilling of dredged material;

(iii) importation of materials;

(iv) general construction work.

There are no long term issues associated with dust once the pier extension has been constructed.

Construction activities, by their nature, will be of relatively short duration. The prevailing south-westerly winds will for the majority of the time tend to blow dust arising from the works seawards, nevertheless, all practicable steps should be taken to prevent dust nuisance. The following measures will be specified within the contract documents relating to the works:

(i) wastes shall not be disposed off by open burning;

(ii) bulk material on site and internal access roads shall be sprayed with water during periods of dry weather;

(iii) vehicle wheels shall be washed prior to entering public roads.

These measures should reduce the degree of nuisance likely to be caused by dust to an acceptable level.

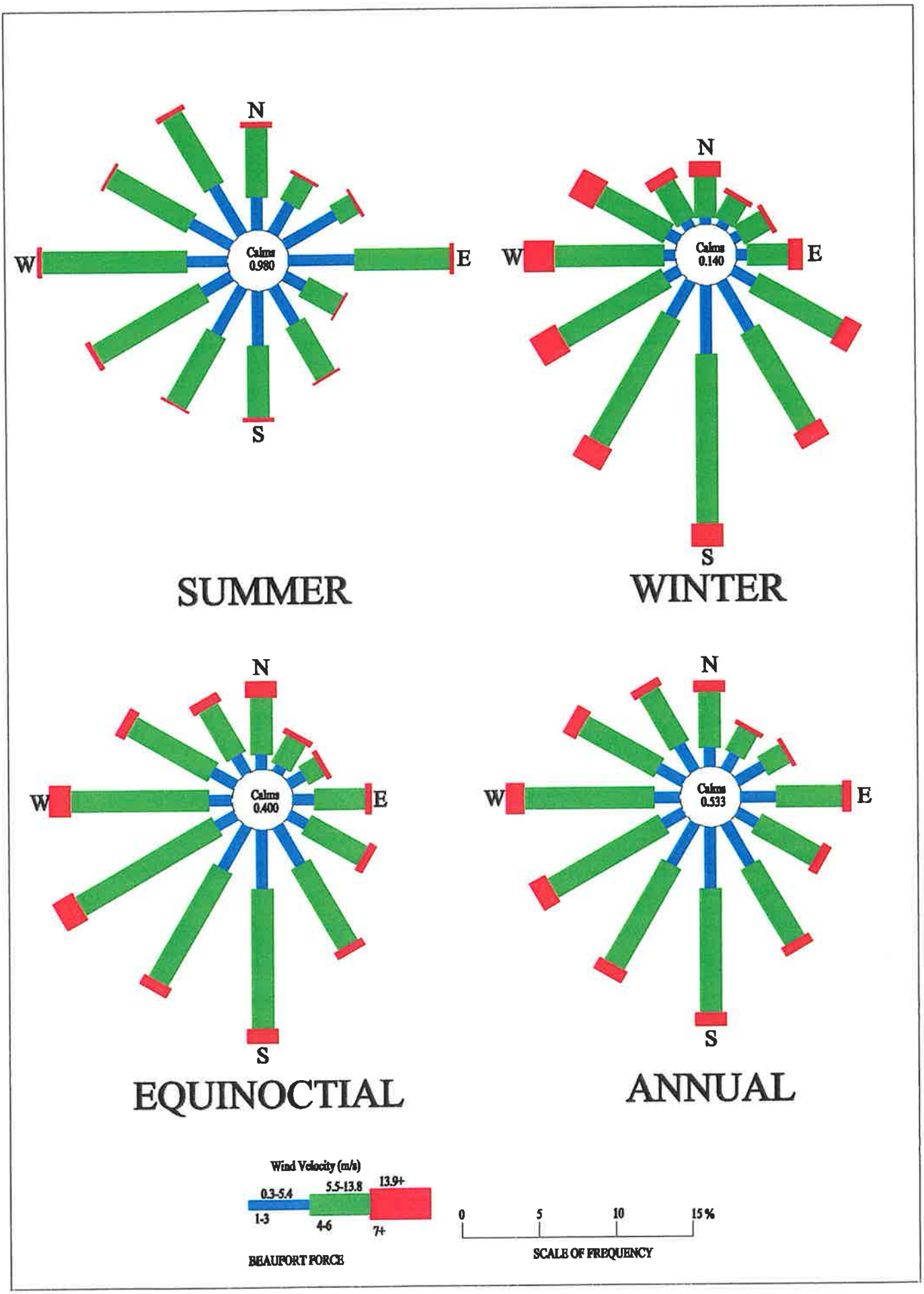


Figure 8.1 Wind Characteristics (Malin Head)

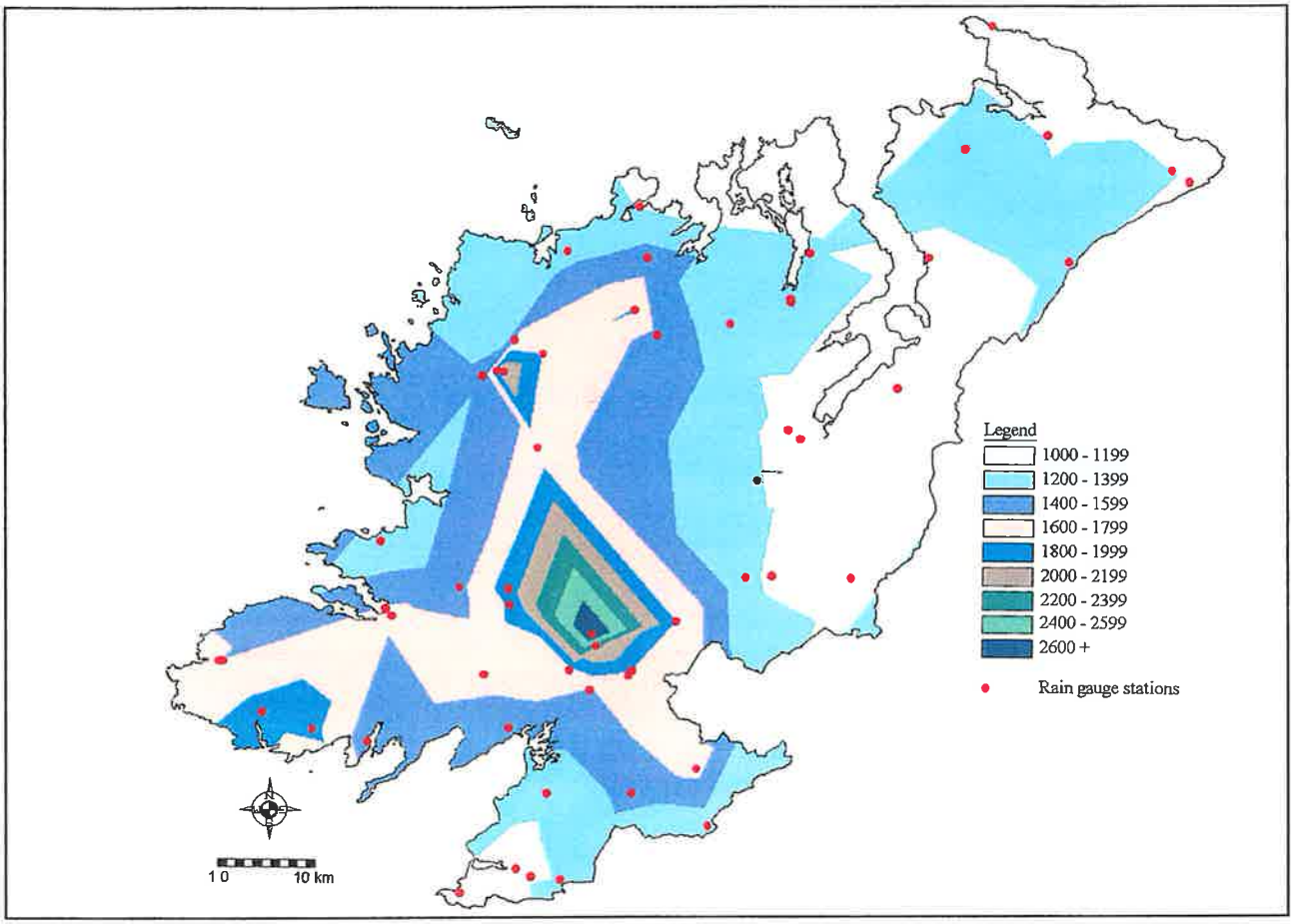


Figure 8.2 Spatial Variation of Rainfall, County Donegal

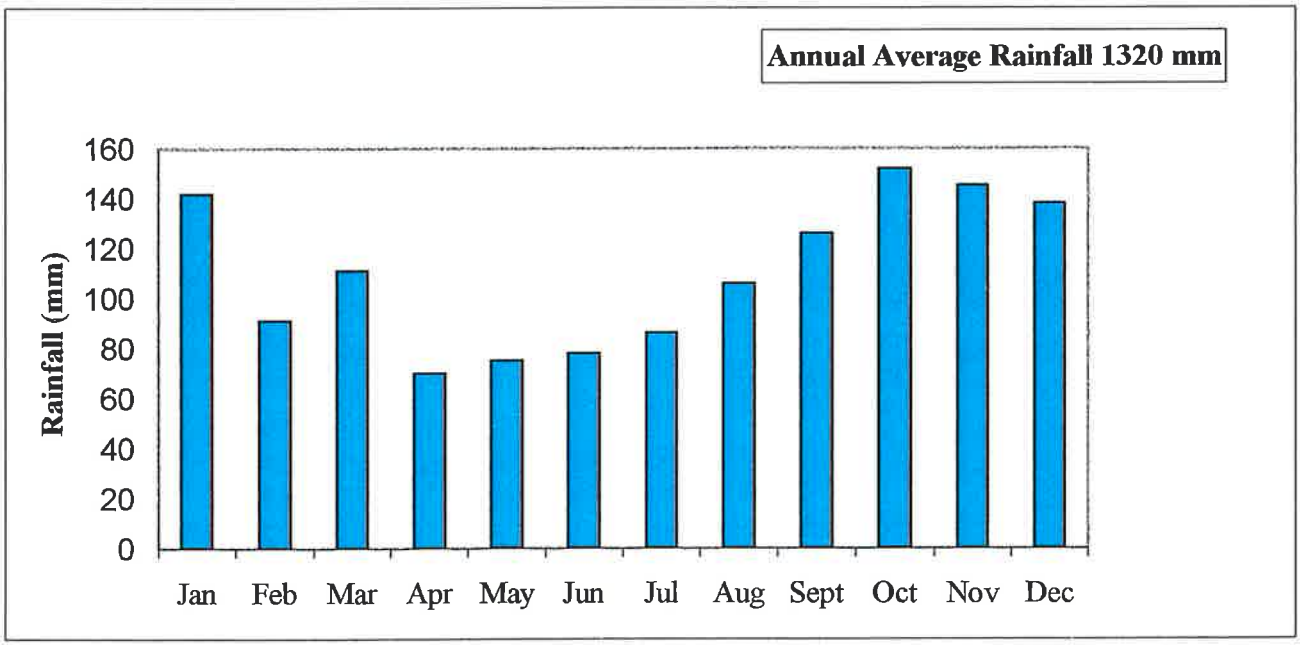


Figure 8.3 Monthly Rainfall Characteristics (Falcarragh Recording Station)

8.4 Noise

Introduction and Methodology

The proposed development is an extension to the existing pier at Magheraroarty and also involves dredging of the approach channel and berthing area.

The construction works associated with the proposed development have the greatest capacity for noise impact, although this will be only temporary in nature. It would involve possible demolition or repair works, construction of the pier extension, access roads, parking areas and buildings, with associated dredging and landscaping.

There is also the potential of some noise impact from the completed development from ferry operations and associated traffic.

All of these works have the potential to create noise impact in and around the site particularly at noise sensitive locations. The locations noted at Magheraroarty are residential properties to the south of the harbour. In all assessments of impact, the nearest noise sensitive locations have been used in calculating the magnitude of the potential noise impact.

The immediate area is a coastal environment with existing noise sources including occasional traffic on local roads.

Existing Environment

Measurements of existing background noise levels have been recorded at the nearest noise sensitive locations on 1 February 2000 during late evening. Due to the remote location of the development, it is proposed to use the measured levels to represent both daytime and night-time conditions.

At the times of measurement, weather conditions were favourable with all readings being recorded in dry conditions with low or moderate wind speeds. All measurements presented in this report were obtained using Type 1 instrumentation, calibrated as required by the appropriate international standards.

During the measurement survey, the existing pier was not in use and measurements were typified by coastal sea noise.

The times and results of the measurements are summarised in Table 8.1 while the measurement positions are shown on the location plan in Figure 8.4.

Evaluation Criteria

The noise impact potential from the proposed development can be usefully split into three discrete sources which are subject to separate noise impact criteria.

(1) Construction Noise

The impact of the temporary works associated with the site preparation and subsequent construction, including general construction, HGV movement and dredging.

This has been assessed using BS5228 (1997), "Noise and Vibration Control on Construction and Open Sites". Reference is also made to the "State of the Environment in Ireland" document (EPA, 1996) in the assessment of HGV movement.

(2) Facility Noise

The impact of the use and function of the ferry service.

This has been assessed with regard to BS4142 (1997), "Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas".

(3) Vehicle Noise

The impact of traffic movement on roads approaching and within the boundaries of the site including the impact of ferry customer vehicles.

Table 8.1 Noise Measurement Results

Location	Date	Time	L_{Amax}	L_{Aeq}	L_{A10}	L_{A50}	L_{A90}
1	1/2/00	01:20-01:45	73.9	49.4	50.0	43.8	40.4
2	1/2/00	01:50-02:10	83.1	51.6	45.2	38.2	36.1

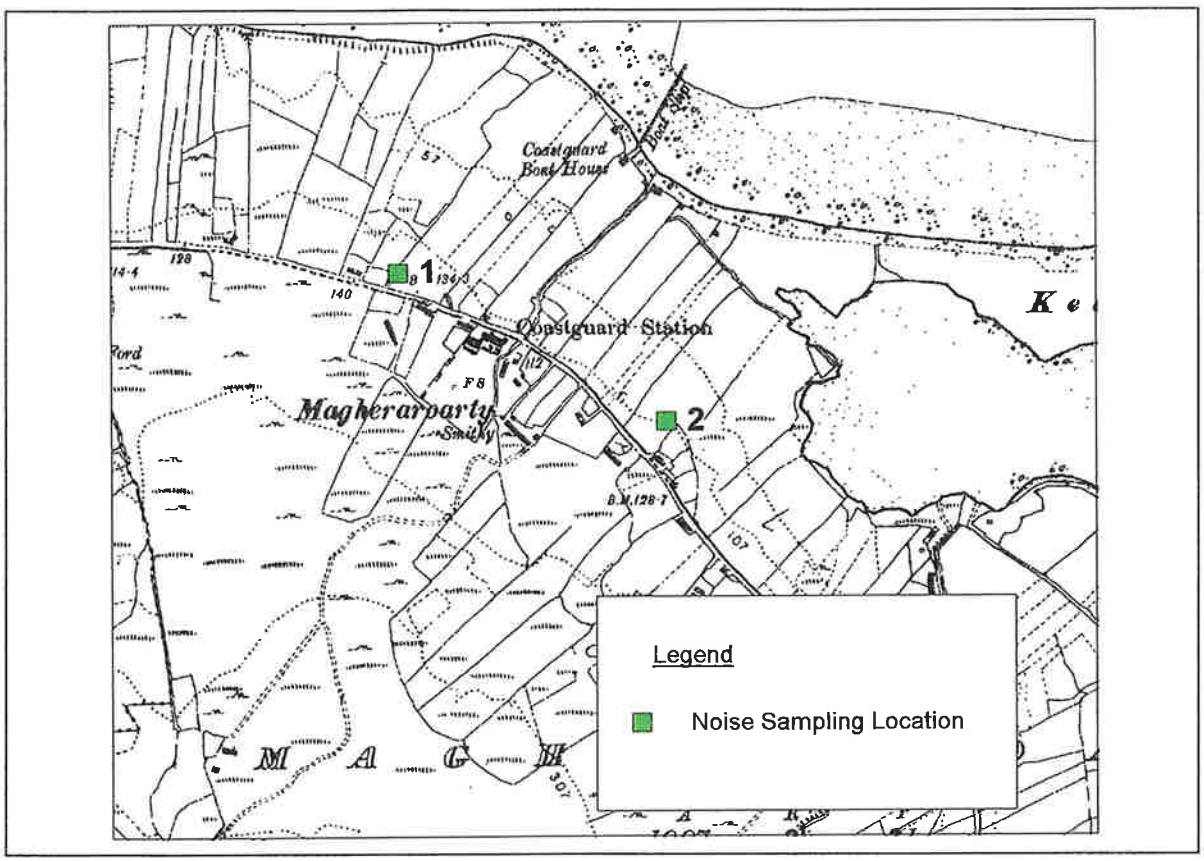


Figure 8.4 Location of noise measurement sites

This has been assessed using the methodology detailed in the "Calculation of Road Traffic Noise" (UK DOT, 1990) and "Design Manual for Roads and Bridges" documents and with regard to the "State of the Environment in Ireland" document (EPA, 1996), where possible.

Prediction of Temporary Construction Noise Impact

There is a potential for noise impact of construction works associated with the proposed development although this is temporary in nature. The prediction of noise levels due to construction have been calculated for each significant stage of work using data from BS5228.

It will ultimately be the responsibility of the nominated contractor to specify the plant used and the most efficient methodology, however the following operations are deemed as typical of potential usage.

- Removal of any existing structures / road surfacing;

- Unloading and placing of stone for rock armouring and pier repair;
- Transport and removal of any waste material from site;
- Construction works involving cast in situ reinforced concrete or pre-cast units to construct pier extension, associated structures etc.;
- Dredging at harbour as necessary;
- General construction work for rebuilding of walls, walkways, road works, hardstanding and asphalt areas.

It would be expected that most, if not all, construction works will take place during daylight hours and, if extending to summer months, from 06:45 until 21:00 as typical daily time limits. Tidal variations at the site do not appear, at this stage, to warrant any unusual works outside of these hours. However, some dewatering operations involving pumping may occasionally be required to continue through the night-time.

BS5228 states typical noise levels (either as sound power level or as L_{Aeq} at 10m) appropriate for the above works and these are tabulated below in Table 8.2.

Table 8.2 Noise Levels from Construction Works (ref: BS5228)

Activity	Plant	L_{Aeq} at 10m
Site clearance/excavation Removal of waste and rubble	Lorries (driveby) Cranes Dozers HGV and tippers	70 dB to 80 dB 87 dB 84 dB
Use of cranes for construction and repair of pier and armour	Lorries and Cranes in use unloading and placing	to 80 dB
Dredging of basin and disposal (Table 14, BS5228)	HGV and tipper Tracked Crane	80 dB to 87 dB
Additional construction works associated with repairs to walls	Compressor Water Pump Concrete Pour Place and vibrate concrete (cycle) (Table 9/29, BS5228) Cement Mixers Placing and Repairing (general construction) Cutting Tools	81 dB to 80 dB to 86 dB 80 dB 74 dB 70 dB 90 dB
Concrete Frame or other components of precast units which may be used in pier construction	Large Crane operations Place and Vibrate	86 dB 80 dB
General construction works	Surfacing General bricklaying, joinery etc. General construction (walkways)	to 85 dB 70 dB 70 dB
Road works/landscaping (Compilation of data in Table 12, BS5228)	Surfacing/Rolling	76 - 86 dB

For prediction purposes, it is assumed that at any one stage in construction several activities may occur together. Therefore, at equal unscreened distances from a receiver, the 'worst case' construction activity level may become:

Combined maximum activity level (during site preparation) = 90 dB L_{Aeq} at 10m.

This would typically include movement of cranes, dredging and general construction/demolition works and it would be expected that this represents the 'worst case' circumstance. Rock armour construction would not generate levels exceeding circa 85 dB L_{Aeq} at 10m as it would involve simple re-arrangement and placement of stone. There is some variation in noise levels from dredging works depending on the system chosen so this is detailed separately.

Assessment of Temporary Construction Noise Impact

The nearest residential properties to the site are at least 300m from the extents of works, at circa 360m from the centre of works and at circa 420m from the extent of dredging.

The impact of construction is assessed by considering the 'worst case' combined maximum activity level predicted above, and correcting for the minimum distance from source to receiver (that is, combined maximum noise level – 20 log d/10). The attenuation provided by ground absorption, estimated as at least 7dB, has been neglected to provide a margin of safety.

The impact of construction on these properties may be up to 60 dB $L_{Aeq,1h}$ for continuous construction activity at the extent of works.

Presently, in Ireland, there are no fixed noise limits for construction noise and the control of such sources is outside the remit of the EPA. In general it is left to the discretion of the local council authority and An Bord Pleanála determine if fixed limits are appropriate; such restrictions are rare, and there is little precedent. In Fingal Council Area discussions are underway with the Construction Industry Federation to agree time limits of Monday to Friday daytime, and Saturday morning – but with no restriction on noise levels.

In Northern Ireland, common Environmental Health Officers' practice would be to recommend maximum allowable noise levels at noise sensitive properties close to the site during construction as follows:

Monday to Friday	*Maximum at Measurement Points*
07:00 - 19:00	75 dB L_{Aeq12h}
19:00 - 22:00	65 dB L_{Aeq1h}
22:00 - 07:00	No noise audible

Saturday	*Maximum at Measurement Points*
08:00 - 13:00	75 dB L_{Aeq12h}
13:00 - 22:00	65 dB L_{Aeq1h}
22:00 - 07:00	No noise audible

Sunday
No Operations

Comparing the computed impact with this criteria, it therefore follows that it will be possible to control noise from construction works to within reasonable levels at noise sensitive locations for the duration of the contract. Some mitigating measures are included to provide additional instruction to the contractor.

Mitigating Measures for Temporary Construction Works

BS5228 includes a number of guidelines and recommendations which are considered appropriate and of good working practice for all construction contracts. These are summarised below.

General Measures

The contractor should take note of the control measures for relevant plant listed in BS5228 and apply the appropriate measures where practicable, including temporary screening or enclosure of noisy plant, control of "on times" for noisy plant, and positioning of plant as far as possible from noise sensitive locations and properties. Also:

- Use of good well maintained plant and where possible new plant manufactured under recent EC guidelines for manufacturers;
- Substitution of unsuitable plant;
- Maintenance of silencers and moving components.

Screening

At locations where extensive works, for example, might result in an exceedance of the noise limits presented above, the contractor should endeavour to sequence operations such that the activities are adequately screened from the nearest noise sensitive location. Some static machinery may also require screening.

For example, if the use of dewatering pumps is required throughout night-time, then it is likely that some temporary screening will be required. Suitably located plywood screens or storage of armouring which screen such plant can provide up

to 15 dB attenuation and therefore help to meet the target criteria. Such measures can be best assessed during the contract by noise level monitoring.

Monitoring
Given the limited impact it would not be appropriate to require regular noise monitoring of the site. However occasional measurement of noise levels generated using a Type 2 or better sound level meter should be conducted to check on the continuing impact of the works.

Responsible Person
It is recommended that the contractor delegate a responsible person who will be present on site and who will be willing to answer and act upon queries from the local public.

Night Works
It is not anticipated that the contract will require any construction works to take place outside normal hours. However there may be items of plant (e.g. dewatering pumps and similar) in use during night-time hours. They should be chosen, sited and enclosed such that levels at the nearest properties do not exceed 45 dB $L_{Aeq,1h}$. This level is based on the World Health Organisation criteria for undisturbed sleep, and assumes minimum attenuation through a partially open window. Sound reduction by barrier walls of up to 15 dB(A) is possible and hence any plant could be controlled to within the guidelines indicated.

The inclusion of these mitigation measures will ensure that whilst the impact may exceed existing background levels at the nearest noise sensitive locations, maximum daily L_{Aeq} levels can be controlled by the good working practice of the contractor.

Comment on Noise Associated with Construction Traffic
During the early part of the contract there may be increased movement of HGV vehicles approaching and leaving the site with the materials required for rock armouring. It has been estimated that up to 6 HGVs may access the site per day, as a 'worst case'. This is based on best estimates by the scheme planning and traffic consultants.

The impact of HGV movements is best assessed by the *Haul Road Method* of BS5228, which assesses the impact of heavy goods traffic at the nearest property. This assessment method includes considerations of variation in individual HGV Sound Pressure Level, frequency profile, and duration of impact.

For assessment purposes, it will be assumed that screening is not possible and all HGVs will access the site along a single route, close to existing properties at circa 5m from the road. Actual haul routes are yet to be established, but this assessment assumes a 'worst case' scenario.

As detailed above, there may be up to 12 trips over 8 hours with vehicle speed estimated at 20-30 km/h. This would equate to a noise level of 47 dB L_{Aeq} at the façades of the nearest properties.

Given existing daytime ambient levels of at least 49 dB L_{Aeq} and 36 dB L_{A90} at locations close to the access road, it follows that while this impact may be perceptible at the nearest noise sensitive properties, it is unlikely to result in excessive noise impact.

With reference to the EPA "State of the Environment in Ireland" document, this impact is typical of noise levels on a quiet country road.

Comment on Noise Associated with Dredging
Due to the extent and duration of dredging, it is appropriate to also consider these works as a discrete noise impact.

Dredging will occur at least 420m from the nearest properties.

As detailed in Table 8.2, and with reference to BS5228 Table 14, noise levels of dredging works are typically 80 dB L_{Aeq} at 10m but may be up to 87 dB L_{Aeq}, depending on the plant used.

Empirical data of cutter suction dredging of 77 dB L_{Aeq} at 15m equates to 80 dB L_{Aeq} at 10m.

Measurement and assessment of specific 'state of the art' dredging equipment (cutter suction rig type) used at Cushendall, Co. Antrim was conducted on 9 July 1999 by the Noise Consultants. During normal operations, dredging activity resulted in a specific activity level of 49.4 dB L_{Aeq} at 108m (typically over hard ground or water). Assuming a point source, with no soft ground absorption, this equates to 70 dB L_{Aeq} at 10m.

It can be seen that there is wide variation of noise level from dredging plant, dependant on the specific plant used. However, typical levels are circa 80 dB L_{Aeq} at 10m and this value will be used for assessment purposes.

Neglecting any ground absorption or possible screening but considering a point source, and assuming that dredging is at extent of works, the resulting noise level at the façades of the nearest property would be 48 dB L_{Aeq}.

It can be seen that continuous dredging at the extent of works is within the maximum allowable daytime exposure for construction noise at the most proximate properties.

Due to time constraints during the construction process, and the dependency on suitable weather conditions for dredging, it may be necessary for these works to continue throughout the night. In these circumstances, appropriate target levels will be sought from the local Council's Environmental Health department and used to obtain a minimum distance of night-time dredging works to the most proximate property. Due to the variation of noise levels from specific dredging forms, it would also be appropriate to take measurements of dredging at the site prior to the commencement of night-time works to ensure accuracy in assessment.

For illustration purposes; it is typical for night-time exposure levels to be set at 45 dB L_{Aeq} at the façade of any property, to be within WHO guidelines for undisturbed sleep. Using the prediction method as above, and considering cutter suction dredging noise levels as those measured at Cushendall, the potential noise level at nearest property façades would be 38 dB L_{Aeq}.

Therefore, it is possible for dredging to continue throughout the night at the extent of works while remaining within target levels, using appropriate plant.

Prediction of Facility Noise

It would not be expected that the number of sailings per day will change greatly as a result of the pier extension, however the new all-tide berth will allow times of ferries to be scheduled. Therefore, it would be expected that there would continue to be two return sailings per day to Tory Island during summer months, reducing to one sailing per day in early spring, late autumn and winter months. At present winter sailings are typically reduced to 2-3 sailings per week due to adverse weather conditions.

The proposals for the site do not include any other static facilities which would be generally recognised as significantly potential "noise sources". The facilities proposed in this submission include the extension of the pier and a marshalling area.

Therefore, impact is restricted to the ongoing normal operations of the ferry service, such that the only change in noise climate would be during winter months when a sailing would otherwise have been cancelled.

Measurement of ferry operations at Portaferry, Co. Down were conducted on 20 and 21 July 2000 by the Noise Consultants and indicate activity levels of 56 dB L_{Aeq} at 20m from the slipway, over 15 minutes. Measurements included the approach, unloading and loading of the ferry, idling of the ferry until departure and general activity of patrons waiting for a ferry. Given that the Portaferry/Strangford ferry has a capacity of 18 cars (or HGV equivalent) it is submitted that

the measured activity levels would be representative of ferry operations at Magheraroarty.

Based on the above information, it is estimated that a noise level of 26 dB $L_{Aeq,1h}$ would be experienced at the nearest property which is at least 300 m from the ferry queue.

Assessment of facility Noise

With reference to BS4142, a target exposure level (L_{Aeq}) at noise sensitive properties is chosen which is within 5 dB of the lowest recorded L_{A90} value at the site. Therefore:

Daytime Target Level = 41 dB L_{Aeq}

The predicted noise impact of the ongoing ferry operations resulted in impact of up to 26 dB L_{Aeq} at the nearest properties, and is less than the target level.

For all noise sensitive properties, no excessive impact from existing or proposed ferry operations is likely and it follows that no mitigating measures are necessary.

Prediction and Assessment of Vehicle Noise

Approach Route Traffic Noise Increase

Traffic impact data for approach routes has been assessed and is presented Section 7.3 of the EIS. The traffic impact assessment has incorporated predictions for changes in peak hour at the most critical times. The general opinion of the traffic consultant is that ferry traffic will, as a 'worst case', increase the traffic in the area by 2-11% during any hour.

It is generally accepted, based on the principles of the *Calculation of Road Traffic Noise* (CRTN) document and most current texts, that an increase of 3 dB(A) on existing traffic noise is required before it is noticed by the public. This is equivalent to a 100% increase in road traffic. The *Design Manual for Roads and Bridges* (DMRB) document most recently suggested that a 1dB increase in traffic might be perceptible. A 1dB increase is approximately equivalent to a traffic number increase of 25%, where all other factors remain equal.

Therefore, with reference to CRTN and DMRB it is expected that increases in traffic flow will not be perceptible, on occasions of peak usage by the patrons of the facilities.

Patron Traffic

Movement and activity of vehicles and their passengers within the car park area may also generate some circulation noise levels. This is a source which already exists at the site as there is a parking area at present. Nevertheless it is important to assess the impact of the new car parking. Measurements have been taken by the Noise Consultants in other facilities with much greater numbers of vehicles than the provision at Magheraroarty. Levels measured close to source (within 2m of vehicle and patron activity) rarely exceeded 70 dB(A) and were more typically, on average, around 63 dB L_{Aeq}.

The nearest noise sensitive properties are at circa 300m from the centre of the car parking area. Neglecting any ground absorption or possible screening, the potential noise level at property facades would be 26 dB L_{Aeq}.

The potential impact is 10 dB less than the lowest background level measured at the site. It is well within an acceptable daytime level for traffic and falls within the 55 dB L_{Aeq} external noise level limit proposed by the World Health Organisation as acceptable for residential development. With reference to the EPA "State of the Environment in Ireland" document, this impact is lower than that typical at an isolated house.

It follows that noise typical of car park usage will not cause undue disturbance to any noise sensitive location.

Conclusions

The potential noise impact from the proposed development on the nearest noise sensitive locations has been assessed and appropriate evaluation criteria and target noise levels have been ascertained.

Whilst there are no fixed noise limits for construction noise presently in Ireland, it has been shown that noise from temporary construction works can be controlled to within reasonable levels at noise sensitive locations.

Mitigating measures have been included to provide additional instruction to the contractor. Individual HGV traffic movements may be noticeable during the contract but overall impact is not significant.

On completion of the project, no significant noise impact from normal activity on noise sensitive properties will occur.

Changes to traffic noise on roads around the site even on occasions of peak usage by the patrons of the facility, are unlikely to be perceptible.

9.0 CULTURAL HERITAGE

9.1 Introduction

Magheraroarty pier, on the north-west coast of Donegal is the main summer access point for the Tory Island ferry as well as providing facilities for local fishing boats and access to Inishbofin. It is proposed to extend the existing pier and dredge an approach channel to provide safe berthage at all stages of the tide.

Prior to construction an inter-tidal survey was required to ensure that no features of archaeological significance, within that zone, would be destroyed by the proposed development. The survey was carried out on Thursday 16th November 2000 by ADS Ltd.

9.2 Archaeological Study

Sites & Monuments and Maritime Records

An inspection of the Sites & Monuments Records and the Maritime Record was carried out prior to the inter-tidal survey. This revealed nothing of archaeological significance in the immediate area of the proposed development and no known sites in the vicinity which may be impacted upon. The closest site recorded to the area in question is DG024:002. This is a described as a cashel located on Boyle's Island.

The Archaeological Survey of Co. Donegal states that

'*the 3rd edition of the OS map shows an oval enclosure taking up most of the area of Boyle's Island in Ballyness Bay*'.

The report continues that the site was not visited but that it was possible that the monument resembled the other island cashels in the county.

Only one wreck is specifically recorded in the Maritime Record in the vicinity of the development area. It was a forty year old, 12 tonne, wooden yawl, *Blue Jacket*, of Belfast. It was owned and mastered by J. Duffy of Belfast and was wrecked on 18/04/1880, *off Inishbofin Island*, with no loss of life.

Further afield, a number of wrecks are recorded off Tory Island and Bloody Foreland. These, however, are far beyond the scope of the proposed area of development.

Inspection of surrounding terrain

A series of disused field boundaries were noted in the fields behind the pier and proposed marshalling area, extending from the road down towards the shore. The land in this area descends steeply from the road to the shore. These boundaries which are now no longer in use are grassed over and survive as slight bumps in the terrain. If they are contemporary with those which still exist it would indicate a greater number of very narrow, long properties. They will not be directly affected by the development.

A natural lagoon or harbour is formed in the area behind the Dooey peninsula. This can be reached from the sea by sailing around Dooey peninsula. This area, which is known colloquially as the 'back beach' would have offered a safe, calm haven to boats in the past. Interestingly, several boats were noted 'pulled up' at the side of the inlet into the lagoon. While nothing of archaeological significance could be identified within this natural feature, it remains possible that boats may have used this area in antiquity. This feature will however, not be affected by the proposed development.

A series of low lying walls was identified between the dunes and the edge of the lagoon. In total, 11 such walls were recorded. All consisted of medium sized and small stones with concrete visible in several of them. It may be that these walls are related to a kelp industry, and may have been used to dry seaweed using the dunes as shelter. These, like the natural lagoon will not be adversely affected by the proposed development.

Inter-tidal Survey

The inter-tidal zone adjacent to the proposed development was investigated for evidence of archaeologically significant features. The zone, which was inspected at low tide, was walked in corridors, no more than 1m apart.

The surface of the area of shore closest to the existing pier and slipway consisted of medium and large sized boulders with occasional bedrock outcrops noted. Moderate seaweed cover was identified. Evidence of previous attempts at rock armouring was noted in the area of the proposed marshalling area. An outflow pipe was evident on the upper shore in this area.

To the east, the shore curves out to sea. This area, known as Dooey Peninsula, is characterised by sand dunes at the high water mark and just beyond. When inspected they were covered by coarse grasses and evidence of erosion was visible. This area to the east of the existing pier becomes increasingly sandier as one moves along the Dooey Peninsula, with a corresponding decrease in seaweed cover. Nothing of archaeological importance was noted during the survey.

The area to the west was also inspected. This consisted of an area of shingle and small and medium sized stones with sparse seaweed cover. To the far west several large bedrock outcrops were noted. The area of the pier extension was not visible, remaining below the low water mark at low tide. Nothing of archaeological significance could be identified from the walk over survey of this area.

Sub-Tidal Survey

The sub-tidal area in the vicinity of the existing pier will be investigated by a dive survey prior to construction.

9.3 Conclusions

While nothing of potential archaeological importance can be identified from the historical records or the inter-tidal survey, which will be directly affected by the proposed development, it is recommended that an archaeological presence be required to monitor the dredging works associated with the works. This recommendation is made subject to the approval of the relevant statutory bodies.

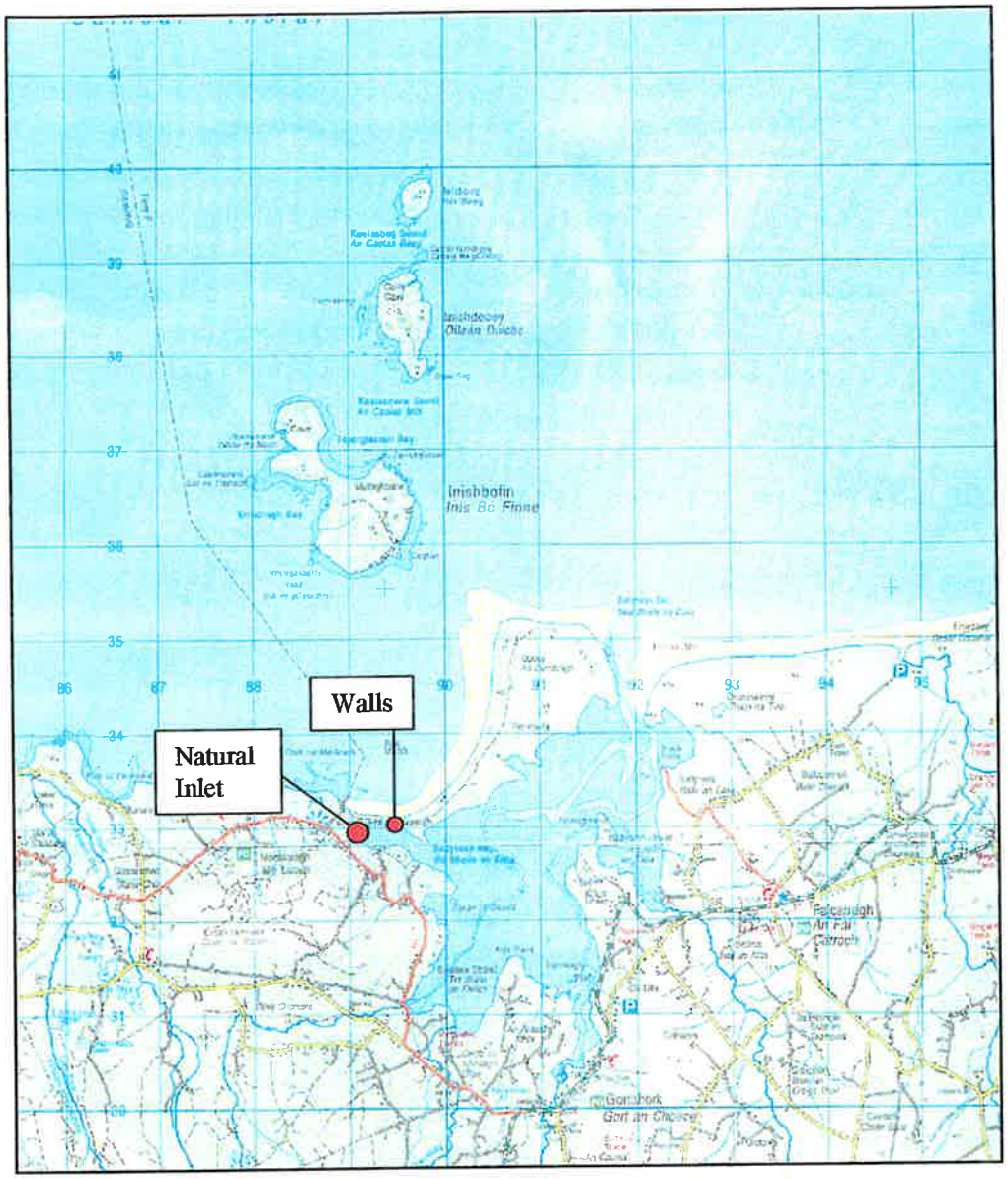


Figure 9.1 Site Location showing Areas of Potential Archaeological Interest

10.0 GEOLOGY AND SOILS

10.1 Introduction

This Chapter of the EIS describes the natural characteristics of the site in terms of geology, hydrogeology and the nature of the marine sediments. An assessment is made of the likely impact of the proposed pier extension on these natural resources and where possible, mitigating measures are put forward to reduce the impact of the proposed development.

10.2 Solid Geology

The geology of northern Donegal is varied and complex with a history spanning almost 2000 years. The geology of County Donegal was first mapped and described in detail by the Geological Survey of Ireland in the latter part of the 19th century. Two aspects have since attracted widespread interest. The works of W S Pitcher and his various co-authors and research students between 1955 and 1970, have made the area internationally famous as a field laboratory for the study of granite intrusion. The work is summarised and updated in the book "The Geology of Donegal: a study of granite emplacement and unroofing" (Pitcher and Berger 1972). More recently studies of geological deformation in the metamorphic rocks, particularly by D H W Hutton, have enjoyed international interest and recognition.

Like most of Donegal, Magheraroarty is underlain by low to medium grade metamorphic rocks of the Dalradian Supergroup, Figure 10.1. The Dalraidian Supergroup is a distinctive and varied sequence of meta sediments with some basic igneous volcanics and intrusions. The commonest rocks are quartzite, schist and marble (i.e. the metamorphic equivalents of sandstone, mudstone/shale and limestone respectively).

These Dalradian rocks have been deformed in a very complex fashion by several generations of folds and faults. The proposed site of the pier extension at Magheraroarty is underlain by the Ards Quartzite Formation of the Creeslough Succession. A brief description of this rock type is described as follows: Well-bedded and massive feldspathic quartzites of variable grain size predominate throughout the Ards Quartzite Formation, the base of which is marked by the upward disappearance of pelitic, semi-pelitic and psammitic schists. Pebble beds and lenses with clasts of opalescent vein quartz, feldspar (mainly microline) and quartzite are fairly common, though may be difficult to discern in regions of high strain. Heavy mineral bands, feldspathic streaks, pelitic intercalations particularly in the west, semi-pelitic laminae, graded bedding, cross bedding, ripple marks, washouts and small scale slump structures are preserved locally.

There are no significant outcrops of the bedrock unique to the area at the site. The site is therefore considered to be of little geological interest.

10.3 Hydrogeology

Groundwater in Ireland is protected under European Community legislation (Groundwater Directive 80/68/EEC) and national legislation, namely the Local Government (Water Pollution) Acts of 1977 and 1990, which make it an offence to pollute groundwater.

The Dalradian bedrock underlying Magheraroarty is essentially impermeable. As a result, the bedrock contains only minor to poor aquifers. Groundwater resources are therefore more generally associated with the drift overlying the bedrock. The drift (quaternary) deposits overlying Magheraroarty were essentially derived from glacial activity.

The site of the proposed development at Magheraroarty does not lie on either a regionally or locally important aquifer. There are no borehole sites in the vicinity of Magheraroarty Pier where the potential for groundwater abstraction is considered poor.

In addition the dredged material which will be used to infill the marshalling area has very low levels of contaminants (refer to Section 12.4) and will not pose a threat to groundwater in the area over which it will be placed. The proposed pier extension will therefore have no impact on groundwater resources.

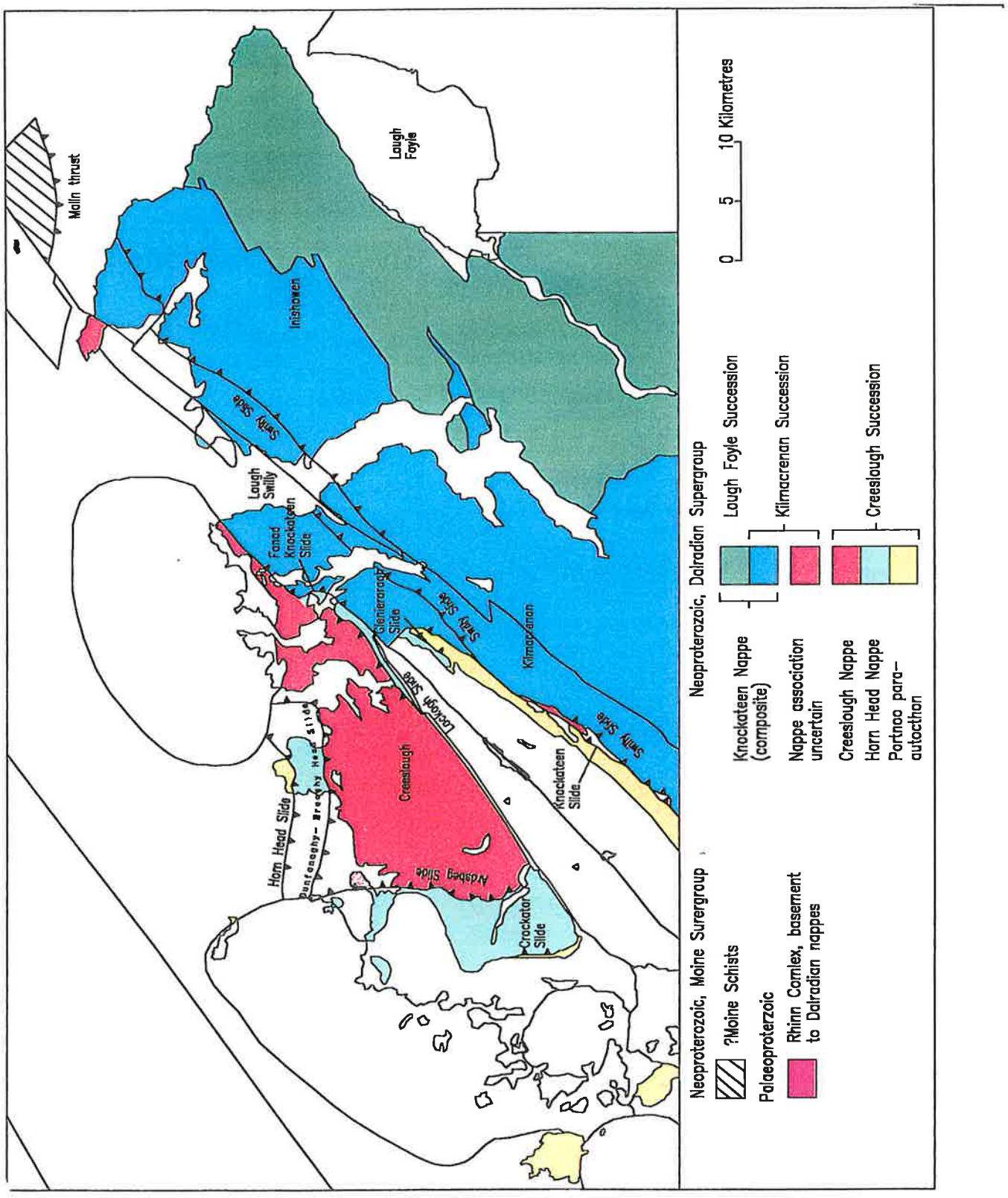


Figure 10.1 Solid Geology

10.4 Ground Conditions

A site investigation was carried out in the vicinity of the pier extension to determine the ground conditions likely to be encountered during construction of the pier extension. A total of eight boreholes were sunk to a maximum depth of 16.75m in the positions shown in Figure 10.2.

Subsoil Properties and Profiles

With the exception of Borehole 1, the investigation encountered entirely granular subsoils. These deposits are generally classified as either very gravelly sand or very sandy gravel throughout the site. The bed/surface layer extends to between 1.2m and 2.7m deep and consists of loose or medium coarse grained deposits. Beneath this layer lie further strata of similarly classified material with relative densities ranging from medium dense to very dense.

In Borehole 1, however soft or soft to firm cohesive subsoils occur to a depth of 5.4m which directly underlie a 1.4m thick granular surface stratum. The last 0.5m of this material includes traces of peat with the final 100 mm comprising entirely peat.

The relatively density of the predominant granular subsoils generally increases with depth with borehole terminations occurring in dense or very dense strata. The only minor exceptions to this general trend are found in Boreholes 2, 3 and 4 where denser material occurs immediately below the surface layer.

Cobbles are found throughout Borehole 7 as well as from 5.4 m and 1.2 m to the termination depths in Boreholes 1 and 8 respectively. All boreholes were terminated in dense or better subsoils. Borehole 1 was terminated at a depth of 16.75m while the other Boreholes were terminated at depths ranging from 5.2m to 9.7m below the seabed.

Conclusions

The granular material encountered by the investigation will provide suitable founding strata for the proposed structure. While the subsoils encountered will provide good foundation strata, cobbles and/or boulders are found in all boreholes. These may cause penetration difficulties or generally interfere with pile driving operations.

Very dense strata are found between 1.3 m and 3.1m below the seabed in Boreholes 3 and 4. These strata overlie less dense material and foundations should therefore be taken to the underlying very dense deposits at a depth of 6.9m and 4.9m below surface respectively.

With increasing chainage along, and beyond the pier, the investigation indicates that the very dense strata are found progressively closer to bed level. In Borehole 1 the soft or soft to firm material should not be considered as load bearing. Any foundations required in this area should be taken to suitable underlying granular strata.

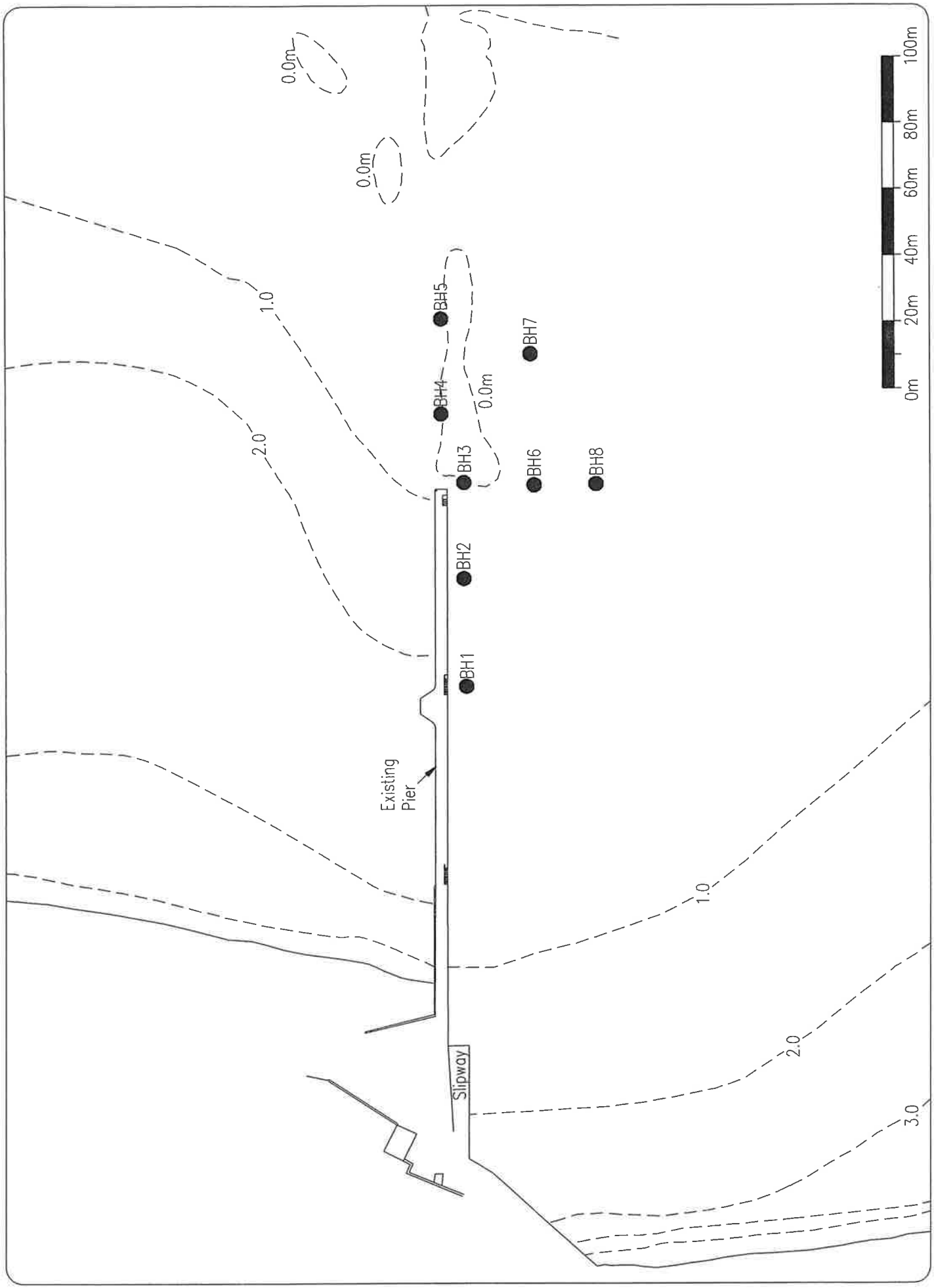


Figure 10.2 Borehole Locations

10.4 Nature of the Dredged Material

The recovery and reuse of dredged material to create the marshalling area is a fundamental part of the overall development. Chemical sediment analysis was carried out on the sediment in order to determine if any contaminants were present in the material to be dredged which may be potentially released into the marine environment as a result of the proposed development.

Sampling techniques

Sediment samples were taken at three sites (Figure 10.3). Each site was positioned using a differential GPS to within ± 5m. Sediment samples were collected using a stainless steel Van Veen grab (0.025m^2) deployed from a boat (Site 1) and with a plastic scoop on foot at low tide at Sites 2 and 3 (7 March 2000). The samples were thoroughly mixed in a clean HDPE bucket with a plastic spatula to form a well-mixed sample. A kilo-sized sub-sample was transferred from each mixed sample to a HDPE tub for chemical analysis and a further kilo was placed in a polythene bag for organic matter measurements and granulometry. These were sent on the same day as sampling by overnight courier to a NAMAS/UKAS accredited laboratory (Geochem Ltd.) for the bulk of analyses, and from there to the Environment Agency National Laboratory Service in Wales for low-level tin, cadmium and mercury analysis. Granulometry and organic measurements were undertaken in the Aquatic Services Unit laboratory in University College Cork.

Sampling Difficulties

It was originally planned to take all three samples from sites within the area to be dredged. However due to the particularly hard nature of the sediments at 2 of the sites and adverse weather conditions on the day of sampling, it was only possible to take one sample (site 1) within the area to be dredged. In the interests of adequate testing, therefore, the other two samples were taken just outside the sampling area in similar coarse sandy substrate as the sample from Site 1. The co-ordinates for samples taken at the other two sites reflect this change in position. It was clear from the sampling difficulties that the area in question is subject to strong wind and tide-induced scour.

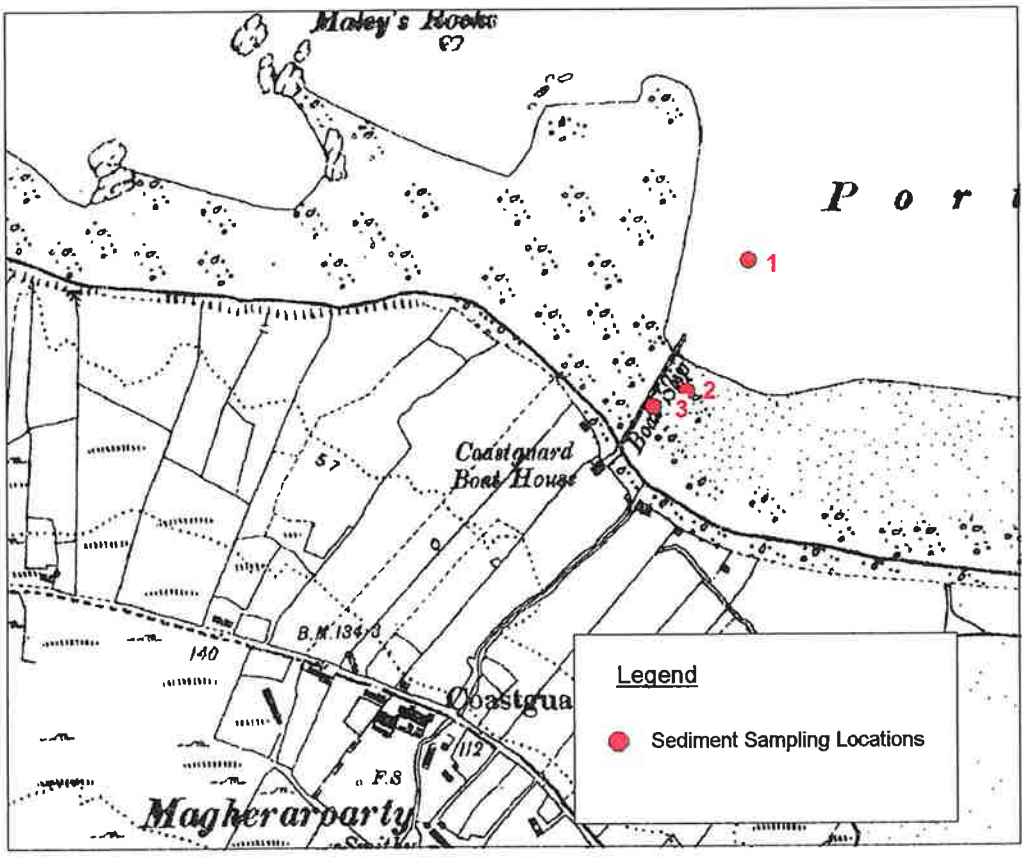


Figure 10.3 Sample Locations for Chemical Sediment Analysis

Parameters tested

The sediment was analysed for the following parameters in the sand-mud (<2mm) fraction:

(1) Moisture Content
(2) Density
(3) Carbonate
(4) Organic Carbon
(5) Heavy metals including aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc and tin
(6) Solvent extractable matter
(7) Tributyltin (TBT) and Dibutyltin (DBT)
(8) PCB Congeners
(9) Chlorinated Pesticide
(10) Granulometry

The detection limits utilised in the analyses are outlined in Table 10.1 below:

Table 10.1 Detection Limits used in Sediment Analyses

Determinant	Concentration	Units as dry wgt.
Mercury	0.05	mg/kg
Cadmium	0.1	mg/kg
Copper	5.0	mg/kg
Lead	5.0	mg/kg
Zinc	10	mg/kg
Chromium	5.0	mg/kg
Nickel	15	mg/kg
Solvent Extractable Matter	10	mg/kg
PCB's & Pesticides	0.001	mg/kg
TBT & DBT	0.02	mg/kg

Test methods

The following test methods were employed for the analyses on samples which were first passed through a 2 mm sieve and, unless otherwise stated, dried at 60°C for 24 hours:

Heavy Metals

All of the samples were initially digested in Hydrofluoric acid in PTFE crucibles on a hotplate followed by ICP detection. In the case of lead and arsenic, repeat samples were ashed at 500°C and digested on hot-plate with concentrated Analar Nitric acid (AR). Mercury was measured on dried samples, which were digested with Hydrochloric acid (HCl) in a microwave digester, and determined by PSA Merlin with Varian VGA 76 vapour accessory and fluorescence detector.

Tributyltin/Dibutyltin

The sample is treated with borohydride to convert organotin to the corresponding hydride form. The latter was then solvent extracted and the concentrated solvent extract analysed by capillary GCMS for the particular organotin hydride species.

PCB's and Pesticides

Detector is a Hewlett Packard GC/MS using a SIM (selective ion monitoring). The sample was extracted using a closed vessel microwave extraction system with a 1:1 acetone/hexane extractant for PCB's and a 3:2 acetone/hexane mix for pesticides.

Extractable Hydrocarbon

Analysed as Solvent Extractable Matter using a Soxtec extraction (DCM-pentane solvent).

Organic Matter

Analysed as the % loss in weight of the dried sediment (100°C) after ignition in a muffle furnace at 550°C.

Acid Soluble Carbon

Gravimetric, before and after neutralisation with concentrated HCl.

Moisture Content

Drying at 100°C followed by weighing.

Density

Drying at 100°C followed by gravimetric testing in a density bottle.

Quality Assurance

Certified reference material (Low and High Range) consisting of marine sediment from the

National Research Council of Canada was analysed with each set of samples for heavy metals.

Results

Sediment Visual Appearance and Colour

All three samples were of clean sand with no bad smell.

Sediment General Analysis and Granulometry

The results of general sediment analyses are presented in Table 10.2 and granulometry results are presented in Table 10.3.

Sediment Metal Results

Results of sediment metal analysis including those for TBT and DBT are presented in Table 10.4.

Sediment PCB and Chlorinated Pesticide Results

Results of the sediment PCB and chlorinated pesticides are presented in Tables 10.5 and 10.6 respectively.

Conclusions

Each of the three samples taken at Magheraroarty has very low levels of contaminants with low levels of heavy metals (cadmium, lead, mercury, arsenic etc.) and non detectable levels of PCBs, pesticides and organotin compounds. The results indicate that the dredge spoil from this area can be safely disposed of either on land or at sea.

Table 10.2 General Sediment Chemistry

Site	Water Content %	Particle Density mg/m^3	Acid Soluble Carbonate %	Organic Matter % TOC (dry wgt.)	Solvent Extractable Matter (mg/kg) dry wgt.
1	20.8	2.68	36.7	0.07	175
2	26.6	2.64	42.7	0.12	195
3	32.4	2.55	73.8	0.12	296

Table 10.3 Granulometry

Sites	Granulometry % Gravel >2mm	Granulometry % Sand 63µm-2mm	Granulometry % Silt/Clay <63µm
1	3.4	96.5	0.1
2	17.6	83.3	0.1
3	0.1	99.8	0.1

Table 10.4 Sediment Metals Levels – Magheraroarty

Metals	Units	Sites		
		1	2	2
Aluminium	mg/kg	14980	7834	1507
Arsenic	mg/kg	2.1	<1	<1
Cadmium	mg/kg	0.07	0.08	0.12
Chromium	mg/kg	42	38	33
Copper	mg/kg	7	7	8
Lead	mg/kg	1.8	2.6	1.2
Manganese	mg/kg	118	101	54
Iron	%	0.79	0.79	0.35
Mercury	µg/kg	<5	5	6
Nickel	mg/kg	17	13	19
Tin	mg/kg	<1	<1	2
Zinc	mg/kg	39	31	42
Tributyltin	µg/kg	<20	<20	<20
Dibutyltin	µg/kg	<20	<20	<20

Table 10.5 Sediment PCB Levels

CAS-No.	Parameter	Units	Sites		
			1	2	3
7012-37-5	PCB Congener 28	µg/kg	<1	<1	-
35693-99-3	PCB Congener 52	µg/kg	<1	<1	-
37680-73-2	PCB Congener 101	µg/kg	<1	<1	-
31508-00-6	PCB Congener 118	µg/kg	<1	<1	-
35065-28-2	PCB Congener 153	µg/kg	<1	<1	-
35065-27-1	PCB Congener 138	µg/kg	<1	<1	-
35065-29-3	PCB Congener 180	µg/kg	<1	<1	-

Table 10.6 Sediment Chlorinated Pesticide Levels

CAS-No.	Parameter	Units	Sites		
			1	2	3
72-55-9	DDE pp	µg/kg	<0.1	<0.1	<0.1
50-29-3	DDT pp	µg/kg	<0.1	<0.1	<0.1
72-54-8	DDD pp	µg/kg	<0.1	<0.1	<0.1
60-57-1	Dieldrin	µg/kg	<0.1	<0.1	<0.1
58-89-9	Lindane	µg/kg	<0.1	<0.1	<0.1
118-74-1	HCB	µg/kg	<0.1	<0.1	<0.1

11.0 HUMAN BEINGS

11.1 Introduction

This Chapter in the EIS describes how the proposed improvement works to the pier facilities at Magheraroarty will impact on the tourism potential and on the socio-economic profile of the area.

11.2 Tourism

Tourism figures from Bord Fáilte are not available at county level, but they are disaggregated to regional level. The North-West region covers counties Donegal, Cavan, Leitrim, Monaghan and Sligo. However, according to the Donegal County Marketing Strategy, over 50% of the tourism revenue base (Hotels, B&B's, Self-Catering etc.) within the North-West region is located in Donegal. In the absence of other data, trends applicable to the North-West are used as a proxy for those for Donegal.

The main issues to arise from an analysis carried out by the Donegal County Enterprise Board of the tourism performance of Donegal and the North-West region are as follows:

- The North-West region is the smallest of Ireland's seven regions in terms of visitor numbers (Table 11.1); it has a much larger share of visitors from Northern Ireland than any other region, and Donegal accounts for easily the largest proportion of visitors to the region;

- Between 1994 and 1997, the number of visitors to the region fell, when visitor numbers to the State as a whole increased. In spite of the fall in visitor numbers tourism revenues increased in the Region by almost one third, (Table 11.2), fuelled by large increases in revenue from Northern Ireland, Mainland Europe and North America;

- The largest source of Overseas visitors to the region is Britain; British visitors, along with those from Mainland Europe, spend more nights in the region than the average North American visitor;

- The main purpose of visits to the region is for holidaymaking; the share of Overseas visitors on holiday in the region exceeds the State average; however, the small share of business visitors explains at least part of the differential between the area's tourism achievements and the national performance.

Table 11.1 Visitor Numbers by Region (1997)

Region	Total	Overseas Tourists	Northern Ireland	Domestic
	(000's)	%	%	%
Dublin	3685	70.2	3.0	26.8
Midlands-East	1686	46.4	2.4	51.2
South-East	2107	40.5	0.5	59.0
South-West	2834	52.9	0.7	46.4
Shannon	1857	54.4	1.1	44.5
West	2297	49.4	3.9	46.7
North-West	1479	37.3	19.6	43.1
Source: Perspectives on Irish Tourism				

Table 11.2 Tourism Revenue by Region

Region	Total	Overseas Tourists	Northern Ireland	Domestic
	£M's	%	%	%
Dublin	565.5	83.9	2.5	13.6
Midlands-East	228.5	66.0	1.9	32.2
South-East	242.7	56.3	0.6	43.1
South-West	466.4	66.1	1.8	32.1
Shannon	283.0	66.2	1.3	32.5
West	343.3	64.3	6.3	29.4
North-West	231.9	47.6	20.8	31.6
Source: Bord Fáilte				

Donegal has a very mixed range of tourism amenities and huge natural advantages for its tourism sector in terms of scenery, culture and people. The pier at Magheraroarty commands fine views of the surrounding landscape including

Mount Errigal, Inishbofin and Tory Island. Magheraroarty is close to an established tourist base comprising of the towns of Dunfanaghy and Falcarragh which attract large numbers of visitors particularly from Northern Ireland during the summer months.

The development of an all tide berth at Magheraroarty will benefit regular scheduling of the ferry to Tory Island. This will benefit tourism in the area as visitors will be able to plan trips to the island as part of their holiday itinerary. The increase in tourists visiting the area to visit Tory Island would in turn benefit hotels, shops, pubs etc both on the mainland and on the island itself.

Water sports are very popular in Magheraroarty with many people visiting the area to participate in windsailing and surfing amongst other sports. The provision of an all tide berth at Magheraroarty pier will not impact on the enjoyment or quality of these leisure activities in the area.

There is also potential for the use of Magheraroarty pier as a sea angling centre as the pier extension will provide more shelter for fishing vessels than that currently provided at the existing pier.

11.3 Socio-economic profile

Donegal is the most northerly and most peripheral (in economic, social and spatial terms) of Ireland's counties. It is one of the six counties which comprise the 'Border Region' – the others being Sligo, Leitrim, Cavan, Monaghan and Louth. The population of the overall 'Border Region', in 1996, was 406,300 persons, or approximately 11% of the State's population.

The overall Border Region currently suffers from a range of structural problems including:

- High employment;
- Low population growth (primarily as a result of out-migration);
- Low urbanisation;
- Below-average service sector employment;
- Low output per person;
- Poor educational attainment.

The upsurge in the national economy in recent years has by-passed the Border Region to a greater extent than any other area of the State, and, as a result, there has been a widening of the gap between regions. The Border Regional Authority (1998), in making its case for the retention of Objective 1 status within the European Union, highlighted the recent poor performance of the Region. Using six indicators for the period 1993-97, they discovered that the performance of the Border Region (although seeing an improvement in the main indicators in absolute terms) lagged behind the rest of the country. Objective 1 status for the region was subsequently granted.

Bounded entirely by coastline to the North and North-West, and by a land frontier with counties Derry, Tyrone, Fermanagh and Leitrim to the East and South-East, Donegal has suffered more than most border counties from its proximity to Northern Ireland. The vast majority of its adjoining hinterland is comprised of the three northern counties – in clockwise direction (North to South) Derry, Tyrone and Fermanagh. As a result, the problem of peripherality, endemic to the border Region generally, is especially acute in Donegal, and the political unrest in the North of Ireland, over the past three decades in particular, has undoubtedly contributed to both the direct and indirect economic consequences suffered by the County's population.

In terms of population, Donegal's demographic position can be summarised as follows:

- The population of Donegal declined steadily between 1926 and 1971; since then, it has grown by almost 20% and has remained relatively stable since 1986;

- Between 1991 and 1996, the population of Donegal increased by 1.5%, which was significantly lower than that of the State as a

whole, but higher than the average for the Border Region; the stabilisation of out-migration from the County was the major factor in this relatively good performance, in regional terms;

- The County is sparsely populated; its population density of 26.4 persons per km^2 in 1996, was less than the regional average (28.7 persons) or the national average (51.6 persons);

- The population of Donegal is overwhelmingly rural in its habitation; there has been a continuous rural-urban population shift in recent years, and towns like Letterkenny, Buncrana, Ballybofey and Bundoran continued to grow rapidly, while rural areas have tended to lose population (Table 11.3);

- The age-profile of Donegal shows higher shares of persons in the dependent age groups (those persons aged 0-14 and those persons aged 65+).

It is clear that Ireland's East Coast has developed in economic terms with the growth of the 'Celtic Tiger', the more peripheral areas of the Western Seaboard have been by-passed when investment was being attracted. Against such a background, the robustness of Donegal's economy and of its social structures is remarkable, but without the catalyst of increased economic activity, it is doomed to lag further and further behind the areas of greatest prosperity.

The proposal to extend the pier at Magheraroarty will enhance the tourism potential of the area and thereby encourage the development of associated enterprises through the provision of support services, catering, over-night accommodation by local firms – both existing and developing.

The pier extension will also benefit the infrastructure of the area in terms of providing a safer and more reliable ferry service between the mainland and Tory Island.

Table 11.3 Population of Towns in County Donegal 1991-1996

Town	1986	1991	1996	% change (1991-1996)
With Population >1500				
Letterkenny Urban	6,691	7,186	7,606	5.8
Buncrana Urban	3,106	3,118	3,312	6.2
Ballybofey/Stranorlar	2996	2792	3047	9.1
Ballyshannon	3015	2838	2775	-2.2
Donegal	2243	2193	2296	4.7
Carndonagh	1603	1541	1580	2.5
Killybegs	1632	1522	1408	-7.5
Bundoran	1610	1463	1707	16.7
Total	13099	12349	12813	3.8
With Population >1000 and <1500				
Bunbeg/Derrybeg	1489	1427	1400	-1.9
Moville	1281	1392	1394	0.1
Lifford	1461	1359	1275	-6.2
Raphoe	1084	1090	1065	-2.3
Dungloe	940	988	1042	5.5
Total	6255	6256	6176	-1.3
With Population <1000				
Falcarragh	996	951	961	1.1
Ramelton	989	920	978	6.3
Convoy	891	911	907	-0.4
Milford	981	864	816	-5.6
Glenties	914	802	738	-8.0
Castlefin	694	692	698	0.9
Ardara	685	653	635	-2.8
Newtowncunningham	664	610	594	-2.6
Greencastle	584	588	547	-7.0
Rathmullen	554	536	491	-8.4
Total	7952	7527	7365	-2.2
Source: Census 1996				

12.0 THE LANDSCAPE

12.1 Introduction

A Landscape and Visual Assessment of the proposed pier extension to Magheraroarty Pier on the north-west of Donegal was carried out, within the context of the site location and environs. This has formed the basis of determining the visual and landscape impact of the development proposals within the contextual landscape.

12.2 Methodology

The Landscape and Visual Assessment was carried out utilising a methodology developed by the Landscape Architects, drawing reference from the following publications:

"Guidelines for Landscape & Visual Impact Assessment 1995" prepared by The Landscape Institute and the Institute of Environmental Assessment.

"Design Manual for Roads & Bridges Vol II, Environmental Assessment 1994"

The assessment process can be segregated into clear stages.

Stage 1 Baseline studies, data collection and survey of landscape character and visual context

Stage 2 Impact Assessment

Stage 3 Mitigation

Stage 1 – Baseline Studies
Stage one involved detailed survey work to record the existing landscape character, quality enhancement potential and visual resources in the vicinity of the proposed pier extension.

The contextual landscape has been subdivided into areas of broadly homogenous units of character and value. This classification provides an appreciation of the character of the landscape. The zones are evaluated by means of attaching a (non-monetary) value, which relates to specific criteria.

The sites were studied from various viewpoints where it became visually apparent from public roads. The viewpoints have been carefully selected to ensure that key views and people (receptors) exposed to those views, are fully considered within the development process.

Stage 2 – Impact Assessment
The Impact Assessment has been separated into two parts. These outline the changes in the character, quality and visual resources that are expected to result from the development.

(i) **Landscape Character Impacts:** i.e. changes in the fabric, quality and character of the landscape and features within it.

(ii) **Visual Impacts:** i.e. changes in available views of the landscape and the effect of these on people (receptor groups). Receptors include residents, visitors, fishermen, boat and ferry users, ramblers, tourists and other groups of viewers.

The assessment process should be impartial and embrace the landscape character impact and visual impact of the proposed pier extension and associated works.

The landscape and visual context illustrations outline both the objective baseline and field survey information with analysis of the potential impacts on both the landscape character and visual receptors.

Stage 3 – Mitigation
Mitigation is generally a crucial part in the overall landscape character and visual assessment process. Development proposals can have a negative impact on the contextual landscape and may require amelioration. In some instances the proposed development may provide a positive contribution to the landscape and visual context and require little, if any, form of mitigation, particularly when

the development is in keeping with its landscape context, as in this case e.g. extending an existing pier further into the sea.

12.3 Landscape Context

The proposed pier extension to Magheraroarty Pier is situated on the north-west coast of Donegal on the southern shores of Tory Sound. Bloody Foreland (Cnoc Fola) lies to the west of the pier almost 6 kilometres away, to its highest point at 314 metres above sea level.

Inishbofin (Inis Bó Finne), and its associated islands are directly off shore from Magheraroarty Pier only some 2.5 kilometres to the north. Tory Island (Toraigh) is situated approximately 12 kilometres away from the pier to the north, passing through Tory Sound (Cainéal Thoraí).

To the east of the Pier the sands, beach and dunes of Dooey (An Dumhaigh) Peninsula sweeps around in a north-easterly direction to Inishbofin forming a natural enclosure to Inishbofin Bay to its southern boundary. This peninsula also forms a natural undulating visual buffer of the existing pier when viewed particularly from the shores of Ballyness Bay from the eastern and southern directions at Gortahork (Gort an Choirce).

The lands along the coast to the west of the pier gently drop down from the R257 to the shoreline, and this land has little or no significant vegetation due to the typical coastal climate formed by its proximity to the Atlantic Ocean and subsequent exposure. There are also isolated dwellings, and small areas of concentrated housing and holiday homes along this section of land. Ribbon development occurs along the R257 around Meenlaragh.

To the south of the Pier, the land sweeps upwards beyond the R257 past Meenlaragh (Min Lárach) to Crocknaneeve (Cnoc ná Naomh) which reaches approximately 154 metres above sea level. This high land mass contains ribbon development on the southern edge of the R257 predominantly around the 50-60m contour range, rising from there to the highest point of Crocknaneeve where the land remains of a rough pasture/bogland meadow type, with no significant vegetation apparent due to the exposure from the Atlantic.

12.4 Landscape Character Assessment

The landscape character areas have been defined based on inter-relationship of the following components; topography, vegetation, natural habitats, historical and archaeological features which combine to create homogenous character areas. Each of these areas has been evaluated and assessed based upon the impact of the proposed pier extension and associated works.

Criteria have been devised to put a scale or measure of landscape quality on each of the identified character areas. The criteria are based on a five point scale which takes account of the local landscape. This scale is as follows:

(i) **Very High Quality**: an area of landscape character which exhibits a range of important elements which makes it uniquely attractive, with strong cultural traditions, or importance of national significance such as an Area of Outstanding Natural Beauty (AONB).

(ii) **High Quality**: an area of regional or local importance with a strong sense of place and/or positive characteristics or cultural traditions. These areas need not necessarily have statutory planning designation for their landscape quality.

(iii) **Moderate Quality**: an area which has a positive quality and sense of place with some local cultural traditions. These areas are unlikely to be designated for their landscape value.

(iv) **Low Quality**: areas that possess little quality or have no distinctive character, which may have gone through changes that have altered the character.

(v) **Very Low Quality**: areas of degraded landscape in poor condition which have lost much of their distinctive character or aesthetic quality.

Character Areas

The character areas identified from the baseline studies are illustrated on Figure 12.1 and are categorised as follows:

Character Area A – Dunes/Beach (Figure 12.2)

The sandy beach and adjacent sand dunes on the Dooey Peninsula are of high environmental and scenic value and have been evaluated as high quality in terms of landscape character.

Character Area B – Ballyness Bay (Figure 12.2)

Ballyness Bay, located to the east of Dooey Peninsula is also of high environmental and scenic value for the area. This Character Area has been evaluated as high quality.

Character Area C – Coastal (Figure 12.3

This broad character area embraces the landscape between the coast and upland character areas. It has been evaluated as moderate landscape quality.

Character Area D – Settlement (Figure 12.3)

Ribbon development is present along the R257 and adjacent feeder roads and has increased in recent years. It has been evaluated as moderate quality in terms of landscape character.

Character Area E – Uplands (Figure 12.4)

The upland character area is broadly based on areas above 70m above sea level. This character area has been evaluated as moderate quality.

12.5 Landscape Character Impact Analysis

A set of criteria has been developed to measure the impact of the developments on the landscape character. This criteria takes into account the fact that the impact may be positive as well as negative.

The criteria are as follows:

(i) **Substantial Impact**: Where the proposed developments will have such an effect on the landscape character of an area with regional or national significance that areas of scenic quality may be reduced (or increased) by virtue of the developments and associated mitigation measures.

(ii) **Moderate Impact**: Where the development proposals would create a reduction (or increase) in the scenic quality, cultural heritage, or loss of some features which are of regional significance, although the overall integrity of the area would remain.

(iii) **Slight Impact**: Where the development proposals would be of such an insignificant consequence on the character of the area that there would be some loss (or gain) to the landscape character without changing the overall integrity.

(iv) **No Impact**: Where the development proposal would have no impact on the landscape character.

Character Areas affected by the Proposal

The character areas affected by the proposals are;

(i) ***Character Area A – Dune/Beach***
Impact = Slight (positive impact on coastal character)

(ii) ***Character Area B – Ballyness Bay***
Impact = Slight

(iii) ***Character Area C – Coastal***
Impact = Slight

(iv) ***Character Area D – Settlements***
Impact = Slight (positive impact on settlement character)

(v) ***Character Area E - Uplands***
Impact = Slight

Conclusions from the landscape character impact analysis

The proposed development will not have a significant impact on the landscape character areas. Any impacts which may occur, will have a positive impact on the area, reinforcing the existing character.

12.6 Visual Impact Assessment

The visual assessment of the proposed development was carried out as a baseline study to measure the level of visual prominence of the proposed pier extension. Viewpoints were selected which are representative of views within the contextual landscape. They have been taken along public roads or rights of way, where the main receptor groups i.e. vehicular traffic, tourists, visitors, farmers, boat users etc. can see the proposed development site. This visual analysis forms the basis of the Zone of Visual Influence (ZVI) map which indicates the zones of land where the site is visible. (Figure 12.5).

Visual Assessment Viewpoints (See Figure 12.5)
The following viewpoints are representative of those available within the visual envelope.

Viewpoint 1	Illanreagh Pier, (Figure 12.6)
Viewpoint 2	R257 near Meenlaragh, (Figure 12.6)
Viewpoint 3	R257 at School, (Figure 12.7)
Viewpoint 4	Dooey Peninsula, (Figure 12.7)

Conclusions of the baseline visual assessment

(i) The proposed Magheraroarty Pier extension site is generally well screened from the surrounding area, due to the topography of the adjacent and surrounding landscape.

(ii) As shown in Figure (12.7), the site can be clearly seen from a section of the R257 (to the south of the Site) and along the western side of the beach on Dooey Peninsula.

(iii) Very slight intermittent views are achievable from the east, from the N56 and R256, but these are largely obscured by Crocknaneeve and the Dooey Peninsula.

(iv) Slight intermittent views are also available from Crocknananeeve to the south of the site.

(v) A slight glimpse of the site can be seen from the coastal area to the west of the site, located north to the townlands of Lower Town and Bunaninver.

(vi) The site can be seen from the Southern side of Inishbofin Island, although the orientation of the pier extension suggests that the view will still largely be a head on view, therefore not dramatically changing from the existing view.

12.7 Visual Impact Analysis

The analysis of the impact of the views has been described with an indication of suggested development constraints and mitigation measures. Impact is measured in terms of the following scale:

(i) **Substantial Impact**: Where the view will dramatically alter the landscape character experienced by receptor (user) groups i.e. walkers, farmers, residents, road users or boat users.

(ii) **Moderate impact**: User groups may experience alteration in the overall visual effect. It may enhance or detract from the view either in a positive or negative way.

(iii) **Slight Impact**: Where user groups may experience a minor change in the view without disrupting the overall view itself.

(iv) **No Impact**: There is no alternative to the view.

The Impact Significance on each of the viewpoints of the proposed developments are outlined as follows:

Viewpoint 1 Illanreagh Pier
Visual Impact – No Impact

Viewpoint 2 R257 near Meenlaragh
Visual Impact – Slight

Viewpoint 3 R257 at School
Visual Impact – Slight

Viewpoint 4 Dooey Peninsula
Visual Impact – Slight

Conclusion of the Visual Impact Assessment

(i) The proposed development is largely well screened from the surrounding area due to the topography of the local and wider landscape. The majority of views are generally distant, with the proposed development potentially forming a slither view on the horizon. (see ZVI map). The visual impacts are generally of slight significance.

(ii) The most panoramic views of the site tend to be from the section of road along the R257 or along the western side of the Dooey Peninsula. The proposed development will not provide any negative visual impacts from these areas. The scale of the proposed extension will still be in keeping with the surrounding visual environment.

12.8 Mitigation

As stated in the introduction the development proposals can sometimes make a positive contribution to the landscape character and visual context.

This negates the need to provide additional measures which help soften the impact of the development.

Due to the topography of the surrounding area and the relatively minor nature of the pier extension in terms of scale and visual impact, mitigation measures are not deemed necessary.

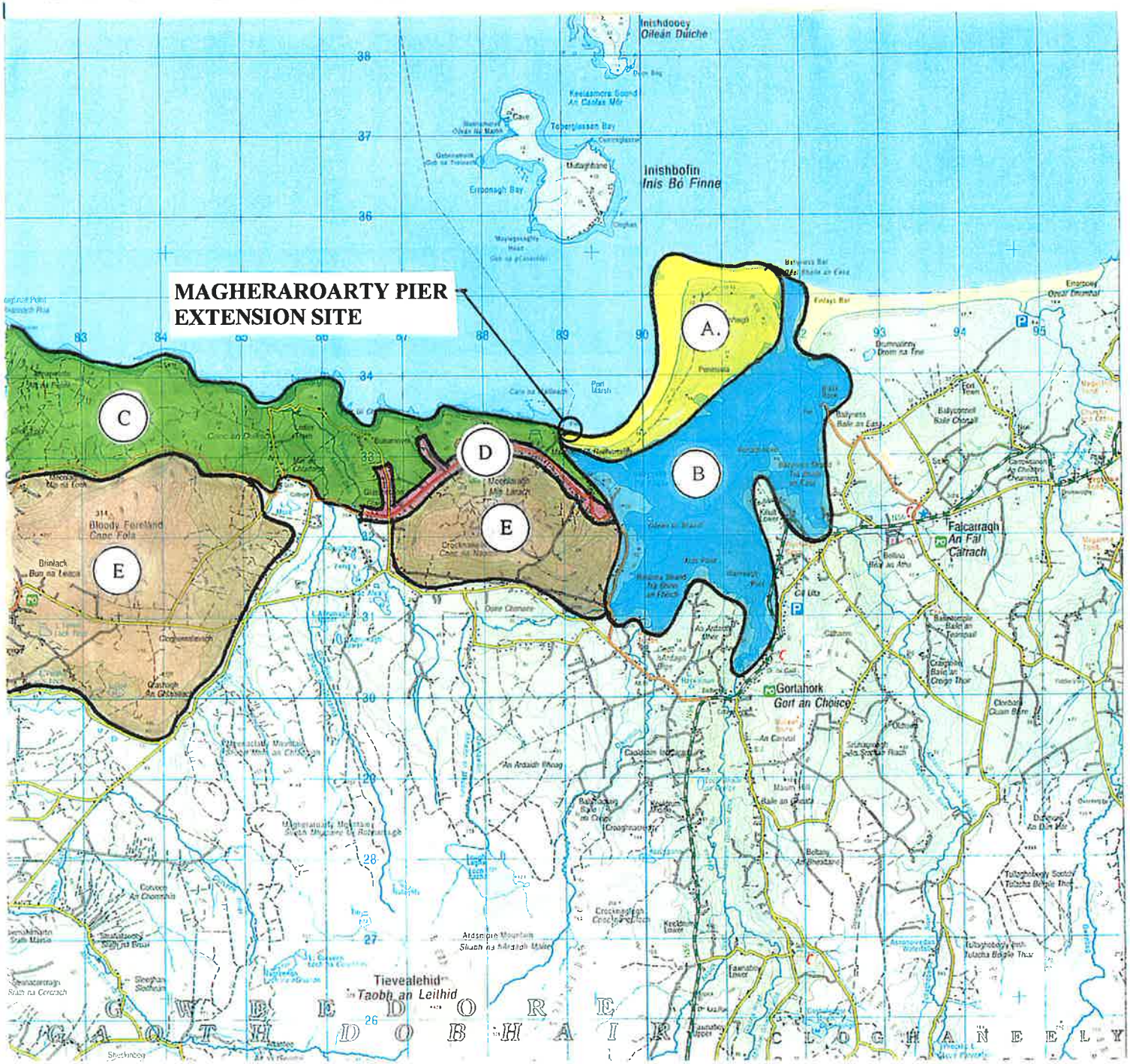
12.9 Landscape Character & Visual Assessment Conclusion

The following conclusions have been drawn from the study:

(i) The proposed development site is well screened from the surrounding landscape due to its coastal location, topography of the west and south of the site, and the sand dunes on Dooey Peninsula and Ballyness Bay area to the east and south-east.

(ii) From those areas from which the development site is visible, the existing pier is integrated visually into the landscape and has the capacity to sustain this integration, following the proposed extension to the pier and associated works.

(iii) The development site will not present any negative impacts on the designated landscape character areas. In many instances the proposed development, while not presenting any negative visual impacts, will provide positive impacts to the landscape character.



LANDSCAPE CHARACTER AREAS

- A — DUNES/ BEACH
- B — BAY
- C — COASTAL
- D — SETTLEMENT
- E — UPLAND

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Figure 12.1 Magheraroarty Pier Extension – Landscape Character Areas



Landscape Character: **CHARACTER AREA A – BEACH/ DUNES**

Description: The sandy beach and adjacent sand dunes on the Dooey Peninsula are situated to the east and north-east of the existing pier. Both are environmentally important and have substantial importance for recreation and amenity.

Evaluation: High quality

Impact Analysis: The proposed development will not have a substantial impact on the character of the beach/ dunes area. The Character area is of adequate distance from the site so as to maintain its existing character. Any impact the character area will receive, may be of a positive nature, as the development will reinforce the existing distant focal point. The proposed pier extension is typical of a sea-scape nature, and would compliment this character area.

Impact Significance: Slight: Positive impact on Coast Character



Landscape Character: **CHARACTER AREA B – BAY (BALLYNESS BAY)**

Description: Ballyness Bay is located to east and south east of the Dooey Peninsula and is also of high environmental and scenic value.

Evaluation: High quality

Impact Analysis: The proposed development will not have a significant impact on the Bay Character Area. The Dooey Peninsula and associated sand dunes visually protect the Bay from the proposed development, which is of a significant distance from the majority of the Bay. Any impact will be of a positive nature, reinforcing the pier area as a visual focal point.

Impact Significance: Slight

Figure 12.2 Magheraroarty Pier Extension – Landscape Character Impact Assessment – Area A – Dunes/Beach, Area B – Ballyness Bay



Landscape Character: **CHARACTER AREA C - COASTAL**

Description: The Coastal Character area is the remaining land adjacent to the sea, to the west of the site. It is largely of rough agricultural pasture land sloping down towards the sea.

Evaluation: Moderate.

Impact Analysis: For much of the coastal character area, the proposed development is hidden due to the topography of the area. In the coastal areas where the proposed development can be seen, the character of the area is not significantly altered. The existing character is that of the pier and associated boats and occasional parked cars. This character is going to be intensified, but this change is going to be minimal.

Impact Significance: Slight.



Landscape Character: **CHARACTER AREA D - SETTLEMENT**

Description: Ribbon development exists along the R257 and off adjacent feeder roads.

Evaluation: Moderate.

Impact Analysis: This settlement character area is linked with the existing pier area and the proposed pier extension should have a positive effect, reinforcing the small harbour feel of the area.

Impact Significance: Slight: Positive

Figure 12.3 **Magheraroarty Pier Extension – Landscape Character Impact Assessment – Area C – Coastal, Area D - Settlement**



Figure 12.4 Magherarоarty Pier Extension – Landscape Character Impact Assessment – Area E – Uplands

Landscape Character:	**CHARACTER AREA E - UPLANDS**
Description:	From the coastal areas, the landforms quickly rise to highpoints such as Bloody Foreland to the west of the site and Crocknaneeve to the south of the site
Evaluation:	Moderate.
Impact Analysis:	The proposed development does not directly impact upon this landscape character area. The limited infrastructure on these adjacent upland areas, means if there are any views available of the proposed development, the receptor groups will be minimal (occasional farmers).
Impact Significance:	Slight.

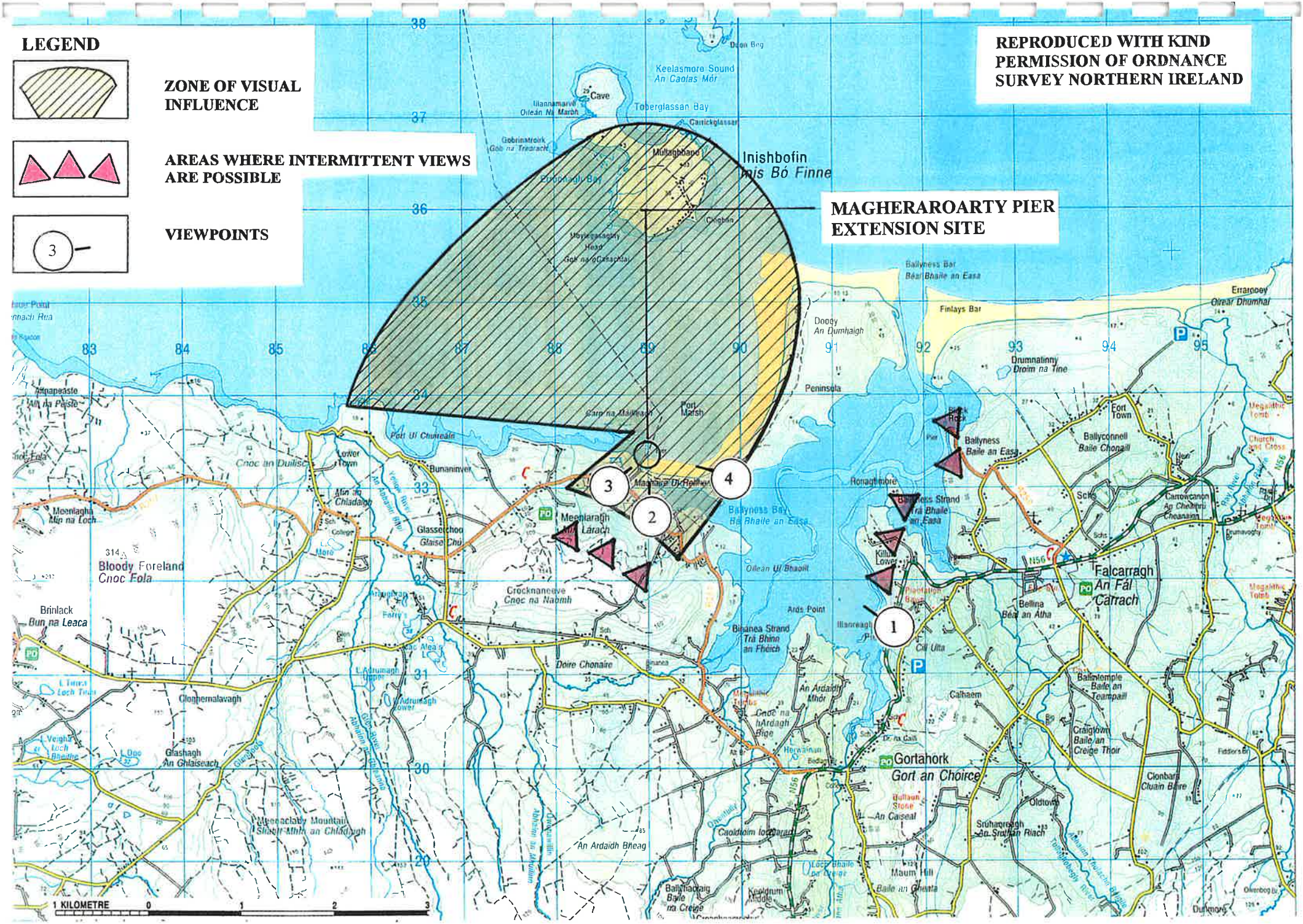


Figure 12.5 Magheraroarty Pier Extension – Zone of Visual Influence Map



Viewpoint 1 Illanreagh Pier
Distance from Developments: 3.3Km approx.
Viewers Affected: Visitors to local viewpoint.
Description: View looking north-west to the existing pier and proposed extension, beyond Ballyness Bay, shown in the foreground.
Visual Impact Analysis: The existing pier is visually hidden by the existing sand banking to the beach on Dooey Peninsula (shown on the horizon) and natural topography to the left of the photo. The proposed extension will also be hidden from view.

Visual Impact Significance: Nil



Viewpoint 2: R257 near Meenlaragh
Distance from Developments: 600m approx.
Viewers Affected: Local people and visitors to viewpoint.
Description: View looking directly north to the existing Pier and north-east to the Dooey Peninsula. The sand banking to the Dooey beach can clearly be seen to the right of the photo. Inishbofin can be seen in the distance.

Visual Impact Analysis: From this view, directly behind the existing pier the beach/land mass seems to jut out into the sea, with the existing pier reinforcing this visually. The 50m extension to the pier will therefore continue to reinforce this visual context. The extension will add to the existing 'visual framing', nature of the Doughy Peninsula and Inishbofin. The proposed marshalling area at the base of the pier is partially hidden from this view.

Visual Impact Significance: Slight.

Figure 12.6 Magheraroarty Pier Extension Visual Impact Assessment Viewpoints 1 and 2



Viewpoint 3: From the R257 adjacent to school at Meenlaragh
Distance from Developments: 500m approx.
Viewers Affected: Locals and Tourists.
Description: This is perhaps the best view of the existing pier and proposed development. This view is looking north-east towards the pier. The fields sloping down towards the site serve to partially obscure the proposed marshalling area to the right of the existing car park.

Visual Impact Analysis: The prominence of the existing shingle beach/ landmass to the left of the pier (west), assures that the 50m extension will not be out of place within the existing landscape.

Visual Impact Significance: Slight.

Viewpoint 4: From the sand dunes on Dooey Peninsula
Distance from Developments: 1 Km approx.
Viewers Affected: Beach users.
Description: The beach and sand dunes can be seen in the foreground, with the existing pier in the middle distance and the natural land formation in the distance.

Visual Impact Analysis: It can be seen that due to the coastal land formation, the existing pier is not visually prominent. An extension to the pier would be adequately integrated into the visual environment, and be in keeping with the coastal character of the area.

Visual Impact Significance: Slight



Figure 12.7 Magheraroarty Pier Extension – Visual Impact Assessment Viewpoints 3 and 4

PART IV SUMMARY OF IMPACTS AND MITIGATION MEASURES

13.0 SUMMARY OF IMPACTS AND MITIGATION MEASURES

Sections 5.0 to 12.0 of this EIS assess the likely significant impacts arising from the proposed development. This section summarises the impacts identified and the measures required to mitigate against them, where necessary.

The key impacts and mitigation measures identified in the EIS are summarised in Table 13.1 below.

Table 13.1 Summary of Impacts and Mitigation Measures

	IMPACT/COMMENT	MITIGATION
FLORA AND FAUNA		
Terrestrial Environment	▪ The hay meadows landward of the site is an Important Bird Area due to the presence of the corncrake. ▪ The site falls within the Ballyness Bay proposed Natural Heritage Area and candidate Special Area of Conservation.	▪ The construction works will not directly impact on the hay meadows. Fencing will however be used to prevent these important habitats from being trafficked or used for stockpiling of equipment or materials during the construction works. ▪ The important habitats comprising fixed dunes, machair, marram dunes and embryonic dunes listed in the site synopsis for the area will not be impacted by the proposed works.
Littoral Environment	▪ No rare or protected species were recorded. The construction of the marshalling area will however result in a small loss of littoral feeding area to wading birds.	▪ The loss of littoral area is not considered to be significant. Birds will relocate to areas in the nearby vicinity where similar feeding is available. No mitigation measures are therefore required.
Sublittoral Environment	▪ No rare or protected species were recorded. The dredging works will remove a section of littoral and sublittoral habitat.	▪ These areas will be naturally recolonised over time. No mitigation measures are therefore required.
COASTAL PROCESSES		
Wave Climate	▪ The proposed pier will significantly improve the shelter provided at Magheraroarty pier. ▪ The berth will however not be tenable during gales generated from the west to north-westerly sector. ▪ Access to the berth will be available for most of the time, however, the approach channel will not be suitable at low tide when there is a significant swell running. ▪ The proposed pier extension will not affect the surf along the western facing beach along the Dooey peninsula.	▪ No mitigation measures are required.

	IMPACT/COMMENT	MITIGATION
Sediment Transport	▪ The Magheraroarty pier is currently acting as a groyne and retaining gravels on the storm beach to the west of the pier. Model simulations have shown that 1,100m^3/year would be transported eastwards along the upper beach if the pier structure was not in place. The effect of the pier has been to cause local erosion to the east of the pier.	▪ It is recommended that shingle is mechanically bypassed and placed on the storm beach to the east of the pier so that the supply of shingle to the gravel ridge in the area is maintained.
	▪ The berth will, over time tend to silt up.	▪ The material will be fine and easily removed by excavator.
	▪ The approach channel is in the path of the main littoral currents feeding into Inishbofin Bay and is therefore liable to silt up in a relatively short space of time.	▪ Regular maintenance dredging of the approach channel will be required.
	▪ The proposed pier extension and approach channel will have no impact on the main beach and dune system of the Dooey peninsula.	▪ No mitigation measures are required.
	▪ A longer pier extension than that required would begin to impact on the coastal processes influencing the dynamic stability of the southern section of the Dooey peninsula.	▪ No additional extension, beyond that proposed, should be considered.
MATERIAL ASSETS		
Water Infrastructure	▪ The proposed pier extension will not have a significant impact on Magheraroarty's water supply.	▪ No mitigation measures required.
Sewerage Infrastructure	▪ No negative impact on water quality within the immediate receiving waters of Inishbofin Bay is expected as boats will be strictly prohibited from discharging wastewater while moored at the pier.	▪ No mitigation measures required.
Roads and Traffic	▪ The operational phase will not have a significant impact on the local road network given that the ferry service will not generate any notable additional traffic, hence existing traffic volumes are representative of the likely situation when the construction of the new pier is complete.	▪ No mitigation measures required.
	▪ The N56 and the R257 are capable of handling the volume of construction traffic generated by the pier extension.	▪ A traffic management plan will be established for the construction phase.
	▪ The road width of the R257 was	▪ No mitigation required as the road

	IMPACT/COMMENT	MITIGATION
	examine to determine if it is wide enough for the safe passage of two HGVs on the carriageway (5.5m considered appropriate). The road width falls below 5.5m at a few locations, however given that the volume of HGVs during peak periods of construction is very low, the occurrence of any conflict between construction traffic will be minimal.	width is adequate in strategic locations to allow the safe passage of goods vehicles and in some areas existing lay-bys can be used.
	▪ The increase in construction traffic will not result in a significant impact with regard to air or noise levels.	▪ No mitigation measures required.
AIR AND WAVE CLIMATE		
Climate	▪ There are no long-term gaseous emissions associated with the pier extension, therefore there will be no impact on the climate either locally or regionally.	▪ No mitigation measures required.
Dust	▪ The main possible sources of dust arise during the construction period.	▪ Mitigating measures to reduce the impact of dust will be specified in the contract documents for the works and will include the following: - wastes shall not be disposed of by open burning; - bulk material on site and internal access roads shall be sprayed with water during periods of dry weather; - vehicle wheels shall be washed prior to entering public roads.
	▪ There are no long term issues associated with dust once the pier extension has been constructed.	▪ No mitigation measures required.
Noise	▪ Noise levels from the construction works will be kept to within acceptable levels at noise sensitive locations for the duration of the contract.	▪ Mitigating measures to control noise levels during construction, as recommended in BS 5228, are as follows: - use of well maintained plant and where possible new plant manufactured under recent EC guidelines for manufacturers; - substitution of unsuitable plant; - maintenance of silencers and moving components; - uses of screening devices; - occasional monitoring of noise levels on site; - restriction of work at night time.

	IMPACT/COMMENT	MITIGATION
	▪ For all noise sensitive properties, no significant impact from existing or proposed ferry operations is expected.	▪ No mitigation measures required.
CULTURAL HERITAGE		
Marine archaeology	▪ There may be potential disruption of previously unrecorded archaeological remains.	▪ An archaeological plan will be implemented in order to deal with potential finds during the construction phase of the project. ▪ If a previously unknown site is uncovered during construction a contingency team led by a licensed archaeologist will carry out all necessary archaeological excavation to ensure that no information is lost as a result of the proposed pier extension.
GEOLOGY AND SOILS		
Solid geology	▪ There are no significant outcrops of interest at the site and is therefore considered to be of little geological interest.	▪ No mitigation measures required.
Hydrogeology	▪ The pier extension will have no impact on groundwater resources.	▪ No mitigation measures required.
Nature of the Dredged Materials	▪ Sediment samples analysed at Magheraroarty have very low levels of contaminants. The dredged spoil can safely be disposed of on land or at sea.	▪ No mitigation measures required.
HUMAN BEINGS		
Tourism and socio-economic	▪ The proposed pier extension at Magheraroarty will help to increase the tourism potential of the area in terms of increased access to Tory Island for visitors and more berthing facilities for visiting yachts. ▪ The increase in tourism in the area as a result of the pier extension will in turn benefits locals business such as pubs shops etc.	▪ No mitigation measures required.
THE LANDSCAPE		
Landscape Character	▪ The proposed development will not have a significant impact on the landscape character areas. Any impacts which may occur will have a positive impact on the area reinforcing the existing character.	▪ No mitigation measures required.
Visual Impact	▪ The proposed development is well screened from the surrounding landscape due to its coastal location, topography of the west and south of the site, and the sand	▪ No mitigation measures required.

	IMPACT/COMMENT	MITIGATION
	dunes on Dooey peninsula and Ballyness Bay area to the east and south-east. ▪ The existing pier is integrated visually into the landscape from existing viewpoints and has the capacity to sustain this integration, following the proposed extension to the pier and associated works.	

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ACKNOWLEDGEMENTS

The following organisations/individuals have made valuable contributions during the environmental impact assessment and preparation of the EIS. Their co-operation and assistance is greatly appreciated.

Donegal County Council - Roads Section
- Implementation Unit
- Planning Section
- Sanitary Services

Birdwatch Ireland
Bord Iascagh Mhára
Department of Health and Children
Dúchas – National Parks and Wildlife Division, Dublin
Environmental Protection Agency – Environmental Management and Planning
Environmental Protection Agency – Waste Management Licensing
Forest Service
Irish Landscape Institute
Irish Surfing Association
National Roads Authority
Northern Regional Fisheries Board
Údarás na Gaeltachta
Local residents of Magheraroarty, Inishbofin and Tory Island

APPENDICES

APPENDIX I
CONSULTATION PROCESS

A	**Summary of written responses from statutory and non-statutory consultees**
B	**Summary of written responses to the Project Information Leaflet and Public Meetings**
C	**Public Meeting Presentation (Gortahork, 22 June 2000)**
D	**Record of Public Meeting (Gortahork, 22 June 2000)**
E	**Record of Public Meeting (Magheraroarty 8 November 2000)**

Appendix IA Summary of Written Responses from Statutory and Non-Statutory Consultees

Letters were issued to the following Statutory and Non-Statutory Consultees

Organisation
An Taisce
Birdwatch Ireland
Bord Failte Eireann
Bord Iascaigh Mhara
Bord na Móna
Central Fisheries Board
Coillte Teoranta
Department of Agriculture and Food
Department of Health and Children
Department of Public Enterprise
Department of the Environment and Local Government
Department of the Marine and Natural Resources (Donegal)
Department of the Marine and Natural Resources (Dublin)
Department of Tourism, Sport and Recreation
Dúchas – Education and Visitor Services
Dúchas – National Inventory of Architectural Heritage
Dúchas – National Monuments & Historic Properties
Dúchas – National Parks and Wildlife Division (Dublin)
Dúchas – National Parks and Wildlife Division (Glenveagh)
Dúchas – Waterways and Engineering Division
Earthwatch (Friends of the Earth Ireland)
Eircom
Electricity Supply Board
Enterprise Ireland
Environmental Protection Agency
Forest Service
Geological Survey of Ireland
Irish Landscape Institute
Irish Surfing Association
Marine Institute
National Roads Authority
North West Regional Tourism Authority Ltd.
North Western Health Board
Northern Regional Fisheries Board
Teagasc
The Heritage Council
Údarás na Gaeltachta

Replies were received from the following

Source	Summary of Points Raised and Information Supplied
Birdwatch Ireland	• The proposed development site is located within Ballyness Bay candidate Special Area of Conservation and proposed Natural Heritage Area. • The landward side of the development site is located within a Birdlife International's Important Bird Area (IBA). The IBA was created for the Corncrake, a species listed under Annex I of the EU Birds Directive. The hay meadows in this area have supported corncrakes as recently as 1998 and Birdwatch Ireland conduct annual surveys of this area for corncrakes. • The main issues in the project area would be the stability of the Dooey strand and dune system and the loss of intertidal area for the proposed marshalling area. Alternative sites should be considered for the marshalling area and any impact to the intertidal area must be assessed. • Mitigating measures may need to be provided.
Bord Iascaigh Mhára	• BIM have consulted with fishermen in the Magheraroarty area and they have indicated that the proposed improvements to the pier will be to their advantage. • The fishing activity there is minimal with a few boats landing crab, lobster and wild salmon (in season). • The proposed improvements are directed at providing better access for the Tory Island Ferry, which runs a service from there during the Summer. • The area is very shallow, and boats often have to wait for high tide to land catches whereas the proposed works should enable them to land at all times. • BIM's main concern is that the proposed pier extension does not interfere with the present or future development of aquaculture in the area.
Department of Health and Children	• The Department have forwarded correspondence to the North Western Health Board which is the relevant authority for this development.
Dúchas – National Parks and Wildlife Division (Dublin)	• The site of the proposed development lies within Ballyness Bay candidate Special Area of Conservation (copy of the site synopsis and site map were provided). • Dúchas are principally concerned with maintaining the dune habitat, together with the salt marsh which lies to the east of the sand dunes. • It appears that the construction of the existing pier has resulted in accelerated erosion in the area. It is recommended that the EIS should consider the conservation value of the site and address how increased erosion in the area can be best avoided. • Dúchas recommend that sediment transport and water movement are modelled in the area.
Environmental Protection Agency - Environmental Management and Planning	• It is recommended that EPA publications on EIAs mainly "Environmental Impact Statements: Advice Notes on Current Practice in the Preparation of Environmental Impact Statements" and "Draft Guidelines on the Information to be Contained in Environmental Impact Statements" are consulted.
Environmental Protection Agency – Waste Management Licensing	• Based on the information provided by Donegal County Council (i.e. dredgings arising will be used as part of the Project) the dredgings concerned do not constitute a waste for the purposes of the Waste Management Act, 1996. • The requirement for a waste license does not arise in relation to the use of the dredging as set out in the information provided by Donegal County Council.
Forest Service	• The proposed development will not have any environmental impact on any afforestation projects in this area.
Irish Landscape Institute	• Landscape is one of the key issues listed in the EIA guideline, and in an environmentally sensitive area of tourism value it would be expected to see detailed consideration of any potential changes in landscape character. • The visual impact of the proposed development during construction as well as the

Source	Summary of Points Raised and Information Supplied
	operational phase should also be demonstrated including any mitigating proposals.
Irish Surfing Association *	• The wave at Magheraroarty is of considerable significance in the life of the members and contributes significantly to our appeal internationally as a surfing destination. • Concern is expressed about the effects of a solid breakwater running 50 metres out into the bay.
National Roads Authority	• The Authority has no objection to the proposed development as outlined.
Northern Regional Fisheries Board	• The development will lead to increased traffic to and from the pier. It may be necessary to examine critically and perhaps upgrade the existing road infrastructure. • It is envisaged that restroom facilities are to be incorporated at the new Údarás na Gaeltachta which will argument/support the new pier extension. It would be advisable in the EIS to indicate how the domestic wastewaters from any proposed toilet facilities are to be catered for. • It would be advantageous that the dredged material is examined for any toxicity. • All machinery used in the project (especially the dredger) must be in good working order and free from oil/hydraulic fluid leakages. • Machinery maintenance should not take place within 100m of waters. • Fuel must be stored in a secure and bunded area. • During the dredging operation it would be advisable to regularly sample the site to determine the extent of silt/dredge movement. • Concrete/cement are highly polluting materials and they must not be allowed to enter any waters. Their use must be carefully supervised. • The provision of an adequate number of strategically located rubbish bins would be advisable. • An adequate monitoring regime before and after construction of the extension must be in place in order to determine any adverse sediment supply of Dooey Strand. A plan of action must be established should an adverse supply materialise.

* A meeting was held with The Irish Surfing Association on the 8 December 2000 to discuss their concerns about the proposed development. Their main concern was the impact of the proposed pier extension on the surf at Magheraroarty. At the meeting a representative from Kirk McClure Morton provided information on the extensive computer modelling which has been carried out on the wave climate in the vicinity of Magheraroarty. The results of the computer modelling show that the pier extension will not impact on the quality of the surf at Magheraroarty. Subsequent to this meeting correspondence was received from the Irish Surfing Association in which they stated "*We do not believe that the proposals for Magheraroarty will have a major impact on the waves and when taken in to consideration the benefits this development will bring to the people of Tory Island it is difficult to object*".

Appendix IB Summary of Written Responses to the Project Information Leaflet and Public Meetings

Source	Summary of Points Raised
Resident A, Magheraroarty	• Congratulate the Council on their proposal to extend the existing pier at Magheraroarty. • It should be noted that a large rock lies approximately 200m to the north-west of the existing pier and it is recommended that this is incorporated in the approach to the proposed extension. • The road down to the pier should be widened where it joins the Bothar Cois Farraige (R257).
Resident B, Magheraroarty	• Any work that is undertaken in this area in a professional manner is a bonus. • The present beach retaining work and ongoing road work is a disgrace. This improvement work would appear to be undertaken in a very haphazard way and is taken years to complete. • It is recommended that the rocks lying on the beach side of the present pier shoud/could be used for back-fill for the proposed marshalling area. This would create a pleasing view at low tide and encourage pleasure boating with the obvious local financial spin offs. • An area of real concern is the mounting seaweed that is being trapped. Would this problem be resolved by the new extension.
Resident C, Magheraroarty	• From the start of the last century and before this, the beach was one vast sandy crescent stretching east and north-east from the site of the original slip-way, a short low, open-structured pier. This was built adjacent to the extensive natural causeway of boulders, accumulated on reef-like outcrops of bed-rock and acted as a massive groyne assuring the deposition of sand along the beach which itself was unchanged until the first extension took place at the pier. • The influence of the location of Inishbofin on tidal drift together with progressive silting over the centuries of Ballyness Bay Estuary contributed to the classic development of what became a massive sand-dune spit, still expanding northwards but under severe erosion threat from unlimited access. • A far more evident and invidious threat is the extensive and progressing gravelling of the beach which has undoubtably resulted from extending and improving the pier without its designers understanding the consequent effect of a more massive structure on the local pattern of littoral drift which helps maintain such an attractive scenic and ecological balance of a really clean sandy beach and stable dune system. • There is little doubt that the growing length and bulk of the pier has been the only variable as far as beach deposition is involved. • It would be an engineering folly to proceed with the present proposals for the pier without a specialist in-depth study of local hydrology under the direction of a world-class expert who would probably need to construct a model for detailed study. • It is envisaged that apart from possible adverse environmental effect of over-development of tourism there are risks of widespread damage/gravelling of the beach and a possible adverse change in storm-wave pattern with risk to narrow dune-neck. • There will also be the possibility of frequent and expensive re-dredging of the proposed navigation channel.

Appendix IC Public Meeting Presentation (Gortahork, 22 June 2000)

MAGHERAROARTY PIER EXTENSION

PUBLIC MEETING



KIRK McCLURE MORTON

DONEGAL COUNTY COUNCIL INITIATIVE

Demand for improvements to the Pier

- Access to the ferry at all stages of the tide
- Shelter from swell waves to ensure safe berthing

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MAGHERAROARTY PIER EXTENSION



Coastal Study Report

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MAGHERAROARTY PIER EXTENSION



Aerial Photograph 1977

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION

Coastal Study on the impact of the Pier Extension

Conclusions

- Major extension will impact on the beach
- Extension of about 50m likely to be tolerable

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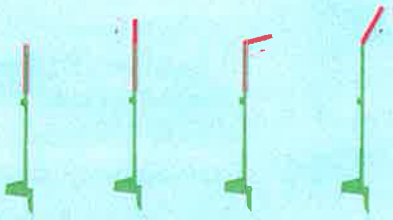
MAGHERAROARTY PIER EXTENSION

Extension Options

- Deepen the berth at existing Pier
- Straight extension
- Angled extension
- Extension with a return
- Costs between £750,000 to £1,100,000

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MAGHERAROARTY PIER EXTENSION



Extension Options

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MAGHERAROARTY PIER EXTENSION

Difficulties with Options 1 - 4

- Dredging likely to require underpinning of the existing Pier
- Straight extension provides little shelter
- Greater dredged volume for disposal

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MAGHERAROARTY PIER EXTENSION



Stability of the Existing Pier

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MAGHERAROARTY PIER EXTENSION

Preferred Option 5

- 50 metre extension
- 30 metre return
- Dredged channel and basin to -1.5m CD

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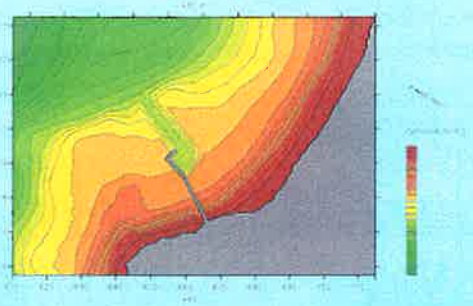
MAGHERAROARTY PIER EXTENSION



Preferred Option

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MAGHERAROARTY PIER EXTENSION



Pier Extension & Dredging

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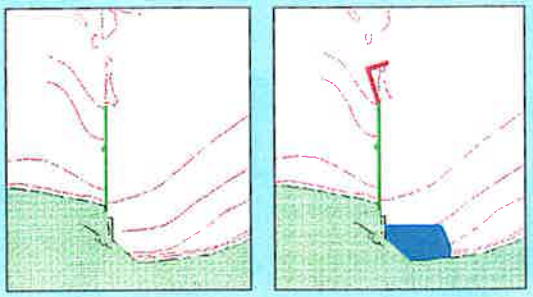
MAGHERAROARTY PIER EXTENSION

Service Area for Pier

- Car Parking
- Ticket and information office
- 5,000 cubic metres of suitable dredged material
- Area to the east of slipway suitable for reclamation

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MAGHERAROARTY PIER EXTENSION



Proposed Land Reclamation

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MAGHERAROARTY PIER EXTENSION

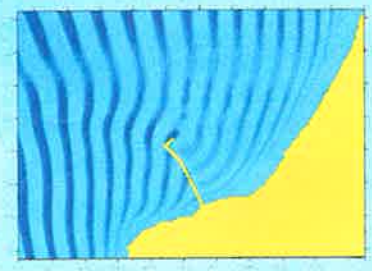
Performance of proposed scheme

- Shelter and access
- Stability of dredged channel
- Siltation of berth

Investigation using computational models

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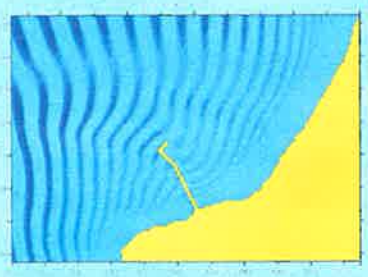
MAGHERAROARTY PIER EXTENSION



Wave Pattern at High Tide

KIRK McCLURE MORTON

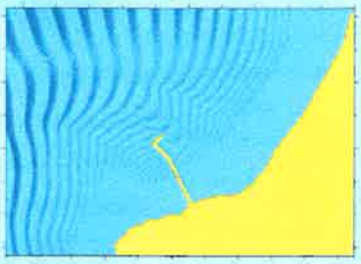
MAGHERAROARTY PIER EXTENSION



Wave Pattern at Mid Tide

KIRK McCLURE MORTON

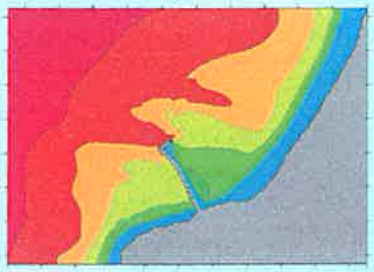
MAGHERAROARTY PIER EXTENSION



Wave Pattern at Low Tide

KIRK McCLURE MORTON

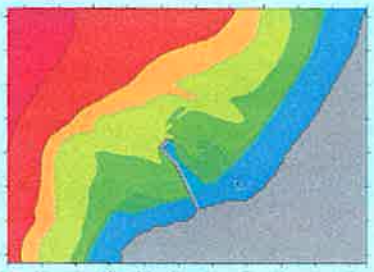
MAGHERAROARTY PIER EXTENSION



Wave Heights at High Tide

KIRK McCLURE MORTON

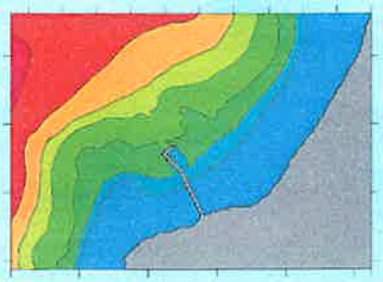
MAGHERAROARTY PIER EXTENSION



Wave Heights at Mid Tide

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION



Wave Heights at Low Tide

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION

Shelter and Access - Conclusions

- Pier extension will provide a degree of shelter
- Berth not tenable during westerly gales
- Access to the berth available for most of the time
- Channel not suitable at low tide with significant swell

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MAGHERAROARTY PIER EXTENSION



Stability of the Dredged Channel

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MAGHERAROARTY PIER EXTENSION

Stability of Dredged Channel

- Bed material sands and gravel
- Finer material easily moved by waves
- Larger stones tend to armour slopes

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MAGHERAROARTY PIER EXTENSION



Stability of the Channel

KIRK McCLURE MORTON

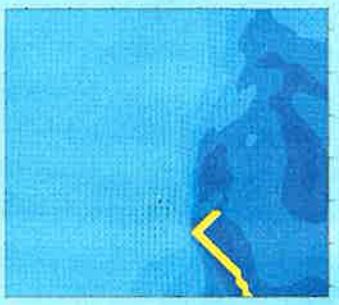
MAGHERAROARTY PIER EXTENSION

Siltation of Berth and Channel

- Complex littoral currents
- Sediment transport influenced by Stoney Point
- Wave currents significant during gales
- Back eddy tends to silt berth

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION



Littoral Current at High Tide

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION



Littoral Current at Mid Tide

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION



Littoral Current at Low Tide

KIRK McCLURE MORTON

MAGHERAROARTY PIER EXTENSION

Siltation of Berth and Channel - Conclusions

- Channel is likely to be reasonably stable however, major storms will alter the profile
- Siltation of the berth is likely
- Material will be fine and easily removed by excavator

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MAGHERAROARTY PIER EXTENSION



ENVIRONMENTAL IMPACT ASSESSMENT

KIRK McCLURE MORTON

ENVIRONMENTAL IMPACT ASSESSMENT

An Environmental Statement is being prepared to ensure that:

- the new pier extension is fully integrated with the overall development of Magheraroarty
- safe-guards are put in place to protect the environment

KIRK McCLURE MORTON

ENVIRONMENTAL IMPACT ASSESSMENT

The following key issues are being addressed

- Impact on Marine Ecology
  - natural habitats
  - flora and fauna
- Impact on Beach and Dunes

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ENVIRONMENTAL IMPACT ASSESSMENT

- Impact on Local Residents/Visitors
  - Noise
  - Traffic
  - Landscape and Visual
  - Cultural Heritage

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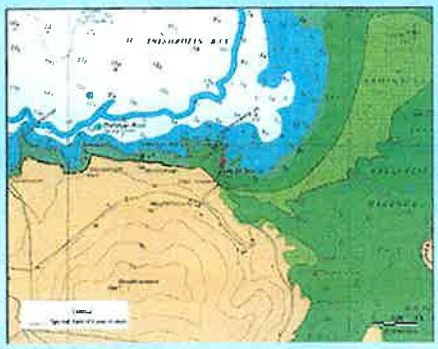
NATURE CONSERVATION STATUS - pNHA



BALLYNESS BAY pNHA

KIRK McCLURE MORTON

NATURE CONSERVATION STATUS - SAC



BALLYNESS BAY SAC

KIRK McCLURE MORTON

FLORA AND FAUNA ASSESSMENT

- Habitats were assessed in terms of conservation status and their likely use by birds for feeding and/or breeding
- Marine ecology was assessed by analysing sediment samples

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FLORA AND FAUNA ASSESSMENT

- The terrestrial habitat is characterised by by poor pasture land
- The intertidal area to the east of the pier is characterised by shingle and rocks
- The sub-tidal area is composed of cobbles
- There are no rare or protected invertebrate species present

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FLORA AND FAUNA ASSESSMENT

- Birds present included Dunlin, Ringed Plover and Oystercatcher
- The development site is not an important breeding location for birds
- The proposed development will have little significant negative impact on the conservation status of the area





KIRK McCLURE MORTON

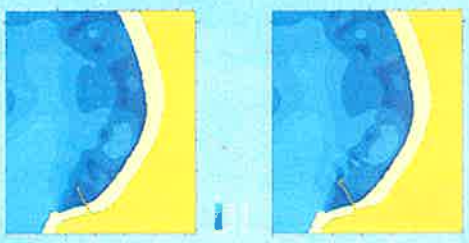
IMPACT ON BEACH AND DUNES



Littoral Currents at High Tide

KIRK McCLURE MORTON

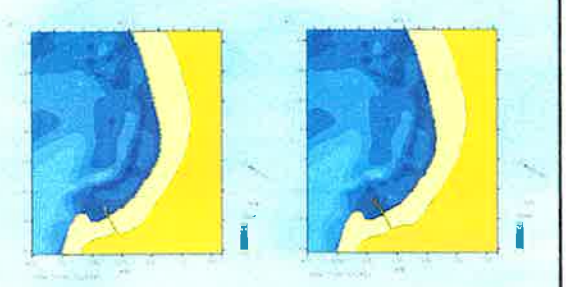
IMPACT ON BEACH AND DUNES



Littoral Currents at Mid Tide

KIRK McCLURE MORTON

IMPACT ON BEACH AND DUNES



Littoral Currents at Low Tide

KIRK McCLURE MORTON

IMAPCT ON BEACH AND DUNES

Impact on Beach and Dunes - Conclusions

- Pier and channel has no impact on coastal processes except at high tide.
- Impact at high tide is limited and restricted to area to east of pier.
- Proposed pier extension and dredging will have no impact on the main beach and dune system.

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NOISE

Noise surveys at neighbouring dwellings have been undertaken

- Typical evening level: 49 -51 dBA

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NOISE

- Expected noise levels during construction
  - Typical 55 dBA
  - Occasional Maxims 60 dBA
- Night-time working will be restricted to maintain sleep environment at neighbouring dwellings
- Use of well maintained plant, silencers will be specified (compliance with BS 5228)

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TRAFFIC

- Traffic surveys are being undertaken to assess existing traffic flows
- Traffic Management Plan will be developed prior to construction specifying HGV routes to and from the site
- Public roads will be kept clean at all times

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LANDSCAPE AND VISUAL

- The Planning Section of Donegal County Council is being fully consulted to ensure the development is in keeping with their Planning Regulations
- The development will enhance the first impression of visitors wishing to travel to Tory Island

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CULTURAL HERITAGE

- A marine archaeology survey will be undertaken this summer
- An archaeological strategy will be agreed with Dúchas and the National Museum to accommodate any potential finds uncovered during construction

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PUBLIC CONSULTATION



KIRK McCLURE MORTON

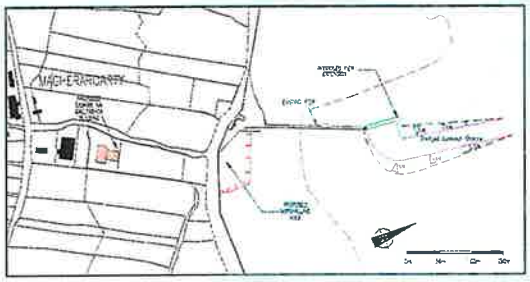
PROGRAMME

- The Environmental Statement and Planning Application will be submitted to Donegal County Council in the Autumn 2000
- A Foreshore License will be sought from the Department of the Marine and Natural Resources
- A Waste License is not required from the EPA
- It is hoped that construction will commence Spring 2001 depending on the granting of approvals

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KIRK McCLURE MORTON



KIRK McCLURE MORTON

Appendix ID Record of Public Meeting, Gortahork, 22 June 2000

MINUTES OF MEETING HELD ON 22 JUNE 2000 AT 7.30 P.M. IN THE LOCH ALTAN HOTEL, GORTAHORK, CO. DONEGAL.

OFFICIALS IN ATTENDANCE:

Dr. Alan Barr – Kirk McClure Morton, Consulting Engineers
Ruth Sugrue – Kirk McClure Morton, Consulting Engineers
Frank McDonnell – Maritime Engineer, Donegal County Council
Michael Rowsome – Assistant Staff Officer, Donegal County Council

APOLOGIES:

Pat the Cope Gallagher MEP
Councillor David Alcorn
Eunan Quinn, Planner, Donegal County Council
Minister Jim McDaid T.D.
Paddy Mathews, Planning Officer – The Heritage Council

INTRODUCTION:

Councillor Paddy Kelly introduced the officials in attendance to the members of the public present and explained the background to the project.

PRESENTATION:

Dr. Alan Barr of Kirk McClure Morton gave a presentation on the different options considered for developing Magheraroarty Pier. It was stressed that the new pier extension will not endanger the integrity of environmentally important areas adjacent to the Pier at Ballyness Bay and the Dooey Peninsula. The new pier extension will be 50 metres long with a return at the end of 30 metres to provide protection from storm waves.

Two factors influencing the design of the new pier are as follows:
(1) Safe berthing to be provided at all tidal states
(2) Stability of the adjoining beach and dune system at Dooey Strand.

Dr. Barr informed the meeting that on commencement of construction works that there shall be a slight increase in noise levels from 50 to 55 decibels during daytime operations and that this would be an acceptable increase for a rural community. A restriction would be placed on night - time construction activity. Silencers would be utilised on machinery and plant. A traffic management plan will also be developed prior to the commencement of construction, and public roads will be cleaned regularly. A summary of the pre construction stages of the project were outlined with a likely start date of Spring 2001.

QUESTIONS AND COMMENTS:

At the end of a detailed and informative 50-slide presentation lasting over 45 minutes Councillor Kelly invited questions from the public.

Q. Have the Council located large rocks in the navigation area near the pier?
A. This particular rock will not be a hazard to navigation as it is not in the navigation channel. However, the observation was noted.

Q. What do the Council intend doing with existing Pier?
A. Undermining has occurred at the Pier. A new top will be placed on the old Pier, and underpinning will also take place. However, the old pier will not be widened.

Q. Would rock armor limit the effects of the waves?
A. No. Waves will still refract around the corner of the pier as the wave pattern is of a long swell type.

Q. What will happen to the arches under the old Pier?
A. The arches will be closed.

Q. Have you considered a breakwater?
A. A breakwater wouldn't prove beneficial as the environmental importance of the dunes is limiting development.

Q. Why is it necessary to go outwards if you can dredge inwards?
A. By dredging inwards you would undermine the existing pier.

Q. How do you propose to build the Pier?
A. The price involved is in excess of 1 million pounds and this should attract a reasonable sized contractor. A site supervisor will be employed.

Q. Have you considered using bearing piles as opposed to sheet piles given the 50-year life span of the sheet pile?
A. The suggestion was welcomed and noted.

Q. Can large rock in the Bay be removed?
A. It will prove difficult and heavy specialised machinery will have to be employed.

Q. What will the Pier look like on completion?
A. Sheet piles at low water and concrete face at high water.

Q. Will the Car Park be sheet piled?
A. The wave climate won't be as high at the shore line. A revetment with rock armor will be developed.

Q. When is the likely start date of construction?
A. As a waste licence is not needed April 2001 is the expected start date. However, once planning is applied for in the autumn of this year objections could delay progress.

Q. Have you considered knocking down the old Pier?
A. Costs will be reduced by utilising the old pier as a starting point.

Q. Will locals be employed on the project?
A. The contractor has responsibility for this issue. However, given the remoteness of Magheraroarty it would make commercial sense to hire locals.

Q. Will a harbour manager be employed to look after the Pier?
A. This point was noted for referral to Council Administration.

Q. Why was the meeting not held in Magheraroarty Hall?
A. There was a difficulty in obtaining permission from Gael Linn but every effort would be made to hold any future meetings in Magheraroarty.

CONCLUSION:

Seamus Coyle of the Department of Arts, Heritage, Gaeltacht and the Islands thanked Dr. Alan Barr for making the presentation and Donegal County Council for arranging a meeting with the locals. He also informed the meeting the importance of obtaining value for money from the project.

Brian Ó Domhaill of Udarás na Gaeltachta also thanked Dr. Alan Barr and Ruth Sugrue of Kirk McClure Morton and the Council for communicating with the locals so that they could have a real input to this project.

This concluded the business of the meeting

Appendix IE Record of Public Meeting, Magheraroarty, 8 November 2000

MINUTES OF MEETING HELD ON 8 NOVEMBER 2000 AT 7.30 P.M. IN THE COMMUNITY HALL, MAGHERAROARTY CO. DONEGAL.

OFFICIALS IN ATTENDANCE:

Diarmuid O'Loan – Kirk McClure Morton, Consulting Engineers
Frank McDonnell – Maritime Engineer, Donegal County Council
Michael Rowsome – Assistant Staff Officer, Donegal County Council
Councillor Padraig Doherty

APOLOGIES:

Councillor David Alcorn
Mary Coughlan, TD
Senator Enda Bonner

INTRODUCTION:

Councillor Padraig Doherty introduced the officials in attendance to the members of the public present and invited them to participate in deciding upon the proposed pier design.

PRESENTATION:

Diarmuid O'Loan of Kirk McClure Morton explained the background to the project. The proposed pier at Magheraroarty will be designed to provide safe berthage at the Pier and to ensure the stability of the adjoining beach and dune system at Dooey Strand. At present Kirk McClure Morton have developed a design which will be 50 metres long with a 30 metres return at the end to provide storm wave protection. He stated that the pier deck will be 6 metres wide and that the approach channel and turning basin will be dredged to a depth of 1.5 metres.

At this stage of the meeting Mr. O'Loan invited those present as users of the pier to put forward any suggestions that they have in relation to the pier design.

QUESTIONS AND COMMENTS:

A number of people suggested that the following recommendations be taken on board by Kirk McClure Morton in their design of the pier:

- Pier to be widened for its entire length to a width of 6 metres;
- Sheet piles to be extended from the end of the closed structure outwards;
- Dredging to be carried out all the way to head of the existing closed structure;
- Wave wall for entire length of new structure.

A suggestion in relation to the construction of an offshore breakwater was also raised. Diarmuid O'Loan informed the meeting that an Environmental Impact Assessment would be required and it was eventually decided not to incorporate this construction into the design.

CONCLUSION:

Mr. O'Loan thanked those present for their participation and informed them that their ideas would be examined and incorporated into the design of the pier.

Councillor O'Doherty thanked those in attendance and also Mr. O'Loan for his presentation.

This concluded the business of the meeting

APPENDIX II
FLORA AND FAUNA

A **Ballyness Bay Site Synopsis**

B **Magheraroarty, Intertidal and Subtidal Species**

Appendix IIA: **Ballyness Bay Site Synopsis**

SITE NAME: BALLYNESS BAY

SITE CODE: 001090

Ballyness Bay is situated in north-west Donegal adjacent to the towns of Gortahork and Falcarragh. The underlying geology is mostly pelites with some smaller areas of limestone and quartzite. This is mostly covered by windblown sand and peat.

Ballyness Bay is a large and very shallow estuarine complex, with extensive areas of sand flats which are exposed at low tide. The bay is almost completely cut off from the open sea by two large sand-dune covered spits. The Dooey sand dunes are highly dynamic and have grown to a considerable height near the tip of the spit – they contain what is probably the largest unvegetated sand dune in the country. The succession of vegetation types across the spit and the topographical features make this are of special interest.

Of particular importance are the fixed dunes, a priority habitat on Annex I of the EU Habitats Directive, which occur along the length of the Dooey sand spit. They are found east of a large band of mobile Marram dunes. There are some good species-rich areas, which include common Dog-Violet (*Viola riviniana*), Wild Pansy (*Viola tricolor* subsp. *Curtisii*), Thyem-leaved Sandwort (*Arenaria serphlliformis*), Harebell (*Campanula rotundifolia*), Daisy (*Bellis perennis*), Wild Thyme (*Thymus praecox*), Common Bird's foot-trefoil (*Lotus corniculatus*), Red Fescue (*Festuca rubra*) and Land's Bedstraw (*Galium verum*). There is also a good variety of moss and lichen species, including *Tortula ruraliformis*, *Brachythecium albicans*, *Rhytidiadelphus squarrosus*, *Homalothecium lutescens* and *Peltigera canina*. Dunes dominated by Marram (*Ammophila arenaria*) are well developed. Also occurring are embroynic dunes, with species such as Lyme Grass (*Leymus arenarius*), Sea Couch (*Elymus farctus*) and Sea Rocket (*Cakile maritima*).

The dunes at Drumatinny by contrast are quite low but also have areas of fixed dune as well as sandy machair-type grassland. Areas of saltmarsh, dry and wet grassland and heath add further diversity to the site.

This site is of importance for waterfowl. Species counts (all average peaks over 4 seasons, 1994/95 to 1996/97) include Ringed Plover (110), Brent Goose (85), Red-breasted Merganser (12), Wigeon (47), Oystercatcher (87), Curlew (55), Sanderling (47), and Greenshank (7). The populations of Ringed Plover and Sanderling are of national importance. Also occurring is Golden Plover (165, same count period), a species listed on Annex I of the EU Birds Directive. Large numbers of Lapwing have been noted sheltering during stormy weather in dune slacks near Drumatinny. Chough, another species listed on Annex I of the EU Birds Directive, have been noted feeding near Binavea Strand.

Landuse within the Bay comprises fishing and sailing on a small scale; the surrounding dunes and grassland are grazed by sheep and cattle.

Ballyness Bay contains several important coastal habitats listed on Annex I of the EU Habitats Directive, including the priority habitat fixed dunes. The site is also an important wildfowl site.

Appendix IIB Intertidal and Subtidal Species collected from Samples

Table 5.1 Macrofaunal species recovered in replicate intertidal cores from three stations in the vicinity of Magheraroarty Pier on 23 February 2000

	1		2		3	
	A	B	A	B	A	B
OLIGOCHAETA	2	-	-	-	<10	<10
POLYCHAETA	-	-	-	-	-	-
Microphthalmus sczelkowii	-	-	-	-	-	5
Anaitides mucosa	-	-	-	-	-	3
Protodorvillea kefersteinii	-	-	-	-	1	-
Malacoceros fuligenosus	-	1	2	-	576	15
Capitella capitat	-	2	-	-	4	-
MOLLUSCA	-	-	-	-	-	-
Mytilacea sp.	-	1	-	-	-	-
Goodalia triangularis	-	-	-	-	-	1
CRUSTACEA	-	-	-	-	-	-
Amphipoda sp.	-	-	-	-	1	-
Eurydice pulchra	-	-	-	-	-	3
Carcinus maenas	-	-	-	1	-	-

Table 5.2 Macrofaunal species recovered in the replicate subtidal cores in the vicinity of Magheraroarty Pier on 23 February 2000.

	A	B	C
POLYCHAETA	-	-	-
Pisione remota	1	-	-
Glycera lapidum	-	2	-
Goniada maculata	-	-	1
CRUSTACEA	-	-	
Urothoe marina	-	-	1

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The following sub-consultants carried out specialist studies:

Aqua-Fact International Services Ltd.: Flora and Fauna
Aquatic Services Unit: Chemical Sediment Analysis
Archaeological Development Services Ltd.: Archaeology
FR Mark and Associates: Noise Impact
MWA Partnership: Landscape and Visual Impact