Appendix 8 - Attachment I

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Bantry Inner Harbour Development

Environmental Impact Statement

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BANTRY HARBOUR DEVELOPMENT
ENVIRONMENTAL IMPACT STATEMENT

DOCUMENT CONTROL REPORT

Client	**Bantry Bay Harbour Commissioners**					
Project Title	Bantry Harbour Development					
Document Title	Environmental Impact Statement					
Document No.	IBE0 558					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	1	-	-	7

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TABLE OF CONTENTS

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Appendix 7 Consultations

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1.0 INTRODUCTION

This Environmental Impact Statement (EIS), as required by the Planning and Development Regulations, 2001, has been prepared in support of the Planning Application for the proposed development. This EIS was prepared by RPS with a number of specialist sub-consultants.

1.1 Project Summary

Bantry Town located about 90 km west of Cork City is a bustling county town in the tourism hotspot of West Cork. Bantry Town is located at the head of Bantry Bay which is one of the deepest harbours in Europe and the longest Bay in Ireland. It is a major tourist attraction in Ireland in its own right and attracts large numbers of Irish and overseas visitors on an annual basis. The town itself has a large harbour which makes up a substantial portion of the town and is a significant backdrop and focal point for the town. The Harbour is currently constrained by the available water depths. At low water parts of the harbour dry out leaving exposed areas of mudflats. Therefore at present, it is not suitable for use by vessels at all states of the tide.

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RPS were commissioned by Bantry Bay Harbour Commissioners in 2008 to examine options for developing the Inner Harbour. Various design criteria were given to RPS which steered the design process. There were also constraints such as contamination issues with sediment in the Inner Harbour. RPS in partnership with Bantry Bay Harbour Commissioners and other stakeholders devised a scheme which will provide a sheltered harbour environment and marina with increased water depth and improved pier facilities to promote fishing and tourism activities in the Bantry area. The scheme will also provide additional and improved recreational and amenity areas. The scheme includes proposals for the beneficial re-use of clean dredged material at adjacent, and connected, locations for beach re-nourishment and land reclamation. The proposed scheme is described in detail in Chapter 4 of this EIS, but the following are the main components of the project:

- Dredging of the Inner Harbour to depths of up to - 3m CD thereby providing a harbour with water at all states of the tide;
- Dredging of the Outer Harbour approaches to depths of up to – 6m CD;
- Provision of pontoon berths for 200 vessels;
- Provision of reclamation area to the north of the pier which can be used for amenity purposes;
- Use of clean dredged spoil for beach renourishment at Cove Beach to the north of Bantry Harbour
- Use of dredge spoil for land reclamation at Abbey to the South of Bantry Harbour.

It is envisaged that the project will proceed in phases subject to the availability of funding. The funding for this project will be provided by a combination of local and central government and the overall capital cost is in the region of 21 millions. The timescale for commencing this project provided all statutory permissions are in place is Autumn 2013.

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1.2 Project Justification

It has long been recognised that the failure to dredge the Inner Harbour at Bantry has affected the economic and tourism growth of Bantry in particular and West Cork in general. It is for this reason that an alliance of Bantry Bay Harbour Commissioners, Cork County Council and Bantry Town Council came together to look at options for developing the resource of Bantry harbour for the overall benefit of the town and environs.

Bantry Bay is an area of immense beauty and unfulfilled tourism potential. The Bay itself is one of the deepest in Europe and popular for sailors for its wide expanses of water and favourable sailing conditions. The Inner Harbour at Bantry however due to its limited depths does not offer the same attractiveness to Sailors and parts of it are deemed off limits due to the fact it dries out at low water. In fact, it can appear visually unattractive at low water due to the sight of exposed mudflats. There are significant constraints also in terms of the berthing facilities at the two piers in the town with frequent congestion on the piers giving rise to health and safety issues.

What is clearly lacking also in the Bantry Bay area from a tourism viewpoint is a high quality amenity beach. The Bay does not contain any sandy beach and long distances need to be travelled from Bantry to reach beaches in Allihies and Barley Cove. A good quality recreational beach within walking distance of Bantry Town would benefit the local community in terms of amenity asset but also in terms of bringing additional tourists and in turn revenue to the town.

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In the past, the constraints on depth have meant that Bantry has missed out on some prestigious events e.g. the Bantry Rowing Club were denied holding the All Ireland Championship in 2007 because the Rowing Federation felt that facilities were too inadequate in Bantry. Equally Rivercruise Ireland would be interested in basing one of their pleasure cruise boats in Bantry during the tourist season because of the demand for sail trips from the area but they could not do so because they cannot dock safely at the port. They have mentioned that the pier is so unsightly and unsafe that even in high water it really is not a suitable pick-up and drop-off point for their customers.

Aquaculture and fishing are very important local industries. The availability of the full pier at all time would enhance their socio-economic value. Bantry Bay Sea Foods Ltd is a major local employer that processes all local mussel catch and is in a position to process further local catch if it were available. At €800 a tonne, this would have a major impact on that sector of local industry.

It is envisaged that the prospects for both general and marine leisure tourism arising from the proposed works are immense: the proposed 200 berth marina and other opportunities including sea angling, sea adventure activities and boat and yacht chartering will become major attractions both for the people of Bantry and tourists, and will encourage then to stay, enjoy and make use of the facilities offered. Research carried out by the Irish Marine Federation has found that visiting boats remain on average three nights at each location with an average daily spend of €150 excluding berthing charges of between €20 and €30 per day.

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This may well be a conservative spend as the British Marine Federation estimates that visiting boats to UK marinas contribute on average £150 (€227) each per night to the local economy.

It is estimated that for every Euro spent by an out of state tourist, 52 cent eventually ends up with the government through VAT, excise duty, PAYE etc. Also, every one million Euro of tourism revenue supports some 17.4 full-time equivalent (FTE) jobs. The construction sector is also a major contributor to the Exchequer returning 30 per cent of the capital cost through taxes.

The potential broad direct and indirect economic benefit to Bantry consequent to the proposed works over five years is some €40 million with a return to the Exchequer of a minimum of €13 million. Additional employment is estimated at 264 Full-time equivalent (person-year) positions.

It complies with the principles enunciated in the County Council's North and West Cork Strategic Plan 2002 to 2020 that underlies the importance of integrated and synergistic development. The Department of the Environment, Community and Local Government has already made a serious contribution to the environment and infrastructure of Bantry by recently investing €21 million in the Bantry Sewerage Scheme and Bantry Water Supply Scheme. A failure to develop the Harbour would mean that the full benefits of the proposed schemes would not be achieved.

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The key findings of the report investigating the reasons why this development is entirely justifiable are outlined below:

1. The failure to address Bantry harbour in terms of its unappealing appearance, lack of water depth, contaminated spoil problem and unavailability of the full pier is a constraint on local development.
2. The Pier plays an important safety and commercial role in the area: the local fishing vessels tie up there; the ferries to and from Whiddy Island operate from there, and visiting yachts often moor there.
3. Because only a small proportion of the Pier is usable, there are conflicting demands on its single access point at times.
4. The Inner Harbour works are seen as a catalyst for the development of the town both in terms of enhancing its profile as a tourist resort as well as becoming a marine leisure centre which will offer a range of opportunities for marine tourism.
5. Bantry Rowing Club is at a severe disadvantage due to the lack of slipping, launching and shore facilities.
6. Rivercruise Ireland have indicated that they would be interested in basing one of their pleasure cruise boats in Bantry during the tourist season. They would also like to be able to dock the *Jeanie Johnston* as they have had a lot of demand for sail trips from the area but which cannot be fulfilled as they cannot safely dock at the port. They have mentioned that the pier is so unsightly and unsafe that even in high water it really is not a suitable pick-up and drop-off point for their customers.

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7. There is a general consensus that the dredging, as a first stage of the infrastructure development will have a significant impact on the economic and tourism potential of the town and region.
8. The overall costs of the proposed works are in the region of 21 millions. When indirect and induced effects are taken into account, the overall economic impact of that spend is of the order of €13.5 million with an overall labour content of approximately 112 man-years. At an average wage of €39,000 and a tax-take of 30 per cent, the return to the state from income tax alone is some €1.3 million.
9. The commencement and success of developments that are presently being drawn up for sites adjacent to the Harbour and the town in general depend very much on the clean-up of the Inner Harbour. The town's people have huge confidence in the potential of the area and therefore very supportive of the proposals.
10. The recent construction of the new hotel and apartments in the harbour area is a reflection of the confidence that local developers have in the area.
11. The proposed scheme will provide other opportunities in the marine leisure industry e.g. sea angling, sea adventure activities and boat/yacht chartering. There will also be a need for support services such as boat repairs and chandlery.
12. According to Failte Ireland statistics, the average stay of visitors to the South West in 2005 was some 6.2 days and the average daily spend was some €80 or €114 when the multiplier effect is taken into account.
13. The attraction of cruise ships to Bantry would have a significant local and regional economic impact as the average daily spend of such visitors is €315, or €450 when the indirect and induced effects are included.
14. The average daily spend of a visiting yacht comprising two people varies between €150 and €227. Yachts stay on average two days at a location before moving on.
15. An increase in tourists to Bantry could support a growth in tourism on Whiddy Island where there has been no tourism facilities for some time. The island has some unique battlements which would have an appeal for those with an interest in historical settlements and buildings.
16. Aquaculture and fishing are important local industries. The availability of the full pier at all times would enhance their socio-economic value through facilitating the landing of additional catch.
17. There are many non-monetary benefits arising from the proposed works including health and safety, the elimination of offensive smells at the harbour, environmental effects as well as the "feel-good" factor that will arise from the expected improvements.
18. The marina itself will become a tourist attraction in its own right whereby people come to Bantry to view the boats and walk on the newly created walkways and amenity areas. This in turn could provide opportunities for local businesses to capitalise on the increase in visitors into the area and thereby increase their revenues.

In summary, the case for development is clear as there are significant economic, socio-economic, environmental and community benefits to be achieved. The partnership of Bantry Bay Harbour Commissioners, Cork County Council and Bantry Town Council is committed to the development of the Bay and is anxious to proceed without delay. It is a project which has

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been discussed and longed for over more years that the local population can remember and now with the current momentum to develop the harbour at this level, it is now time to write the next chapter of the development of Bantry by proceeding without delay in starting this ambitious but great development for the town.

1.3 Consideration of Alternatives

The consideration of alternatives is an important requirement of the Environmental Impact Assessment (EIA) process. For the purposes of the EIA Regulations, alternatives may be described at three levels:

- Alternative Locations;
- Alternative Designs;
- Alternative Processes

The consideration of location, design and processes were given careful consideration during the EIA process.

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1.3.1 Alternative Locations

With regards to location, it was decided that as the current location of Bantry harbour is the optimum location in Bantry for the new harbour development, there was no need to seek an alternative location. The Harbour is ideally located close to the town, main businesses etc. To move it to an alternative location would be un-realistic and not beneficial.

1.3.2 Alternative Designs

The design of the harbour and the other components of the proposed development were given careful consideration. The following design criteria emerged for the development of a sheltered harbour:

(a) Treatment and/or removal of contaminated material from the harbour seabed.
(b) Provision of adequate berthing for the local fishing industry.
(c) Pier widening and extension to improve berthing facilities for the fishermen and permit the turning of an articulated lorry on the pier head.
(d) Provision of public and amenity areas on reclaimed lands.
(e) Provision of sufficient water depths at low tides for the anticipated range of vessels.
(f) Provision of a sheltered berthing facility for a range of uses including commercial use, fishing industry and tourism.
(g) Consideration of maintenance requirements, particularly with respect to sedimentation at berths and within the dredged harbour basin.
(h) Advice on costs associated with reinstating fishing docks by either piling or underpinning.

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(i) Assess feasibility of providing a quay at the breakwater head.
(j) Provide pontoons adjacent to the proposed hotel apartment complex.

All of the above design criteria were considered when arriving at the proposed scheme that is now going forward for planning and described in detail in Chapter 4 of this EIS.

1.3.3 Alternative Processes

The consideration of alternative processes and options was considered in terms of how to deal with the dredged spoil arising from the dredging of the Inner and Outer Harbour.

There has been a problem with contaminated sediment in the upper layers of Bantry Harbour for a long time and this is one of the main reasons why development has never taken place as the issue of how to remove and dispose of the contaminated spoil was always a major obstacle and stumbling block. The material underneath the contaminated spoil is deemed to be uncontaminated and will be used for beach re-nourishment at Cove Strand. As part of this project, RPS have assessed the various options for dealing with the contaminated portion of the material to be dredged and have arrived at a solution to the problem which has held up development in Bantry for too many years.

The options for disposal/treatment of the contaminated spoil were as follows:

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1. Disposal of the Contaminated Dredged Spoil at Sea

Disposal of dredged spoil at sea is a traditional method of disposal of material if no alternative uses can be found for it as part of the proposed development. In order to be allowed dispose of material at sea under a Dumping at Sea Permit, the material must be within specified guidelines for chemical quality.

Extensive testing of the material to be dredged was carried out (refer also to Chapter 8 of this EIS) and the results were discussed with the Marine Institute. Based on the level of contamination in the upper layers of the harbour, the Marine Institute responded as follows: "*Based on the Guidelines for Suitability of Dredged Material for Dumping at Sea, the uppermost material would not be considered suitable for dumping at sea".* Dumping at sea was then ruled out as an option for disposal of the contaminated sediments from Bantry Harbour.

2. Treatment on Site Prior to Disposal/Re-use

Technology is available which would provide for treatment of the contaminated material on the site prior to disposal. One possible treatment technique suitable for the contaminated material within Bantry inner harbour is stabilisation/solidification. This would be achieved by mixing the contaminated material with a treatment additive such as modified clay, which would have the capability to deal with inorganic heavy metals and organic tins.

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Such technology has been successfully employed in a number of sites throughout the UK, specifically for dealing with harbour sediments. One such example is Falmouth Harbour in Cornwall.

A suitable area would be set aside for the treatment facility. The mixing strategy would be based on using a tractor mounted spade which can mix the sediments and the treatment additives at a rate of around round 300m3 per day (this can be increased to 600m3 per day if a second treatment operation is established).

Two options were then considered for the disposal of treated contaminated material;

Reuse as Construction Fill on site

There is a need for construction fill for the proposed reclamation areas in the harbour development and it has been calculated that the anticipated volume of contaminated material could be incorporated within the planned amenity area and pier reclamation area.

Consultations with the Marine Institute, has indicated it is their opinion that the contaminated material within the inner harbour at Bantry is suitable for treatment and reuse as fill within the reclaimed areas of the proposed development.

Disposal to non-hazardous/inert landfill site

The second option for the disposal of material which has been treated on site is to transport to a suitably licensed non-hazardous landfill site. Due to the lack of space available for storage of material, the treated material would be transported directly to the landfill site(s) where it would self compact whilst curing. The rate of transportation of material to the landfill site(s) would be determined by the rate of treatment, i.e. 300m3 per day if one treatment operation used, 600m3 per day if a second operation was used.

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Suitable landfill availability to receive the nature and quantity of material proposed is extremely limited. Suitable sites are not available in close proximity to Bantry. The closest potential receptor sites are located in the greater Dublin area, those being Kilmurry South (Co. Wicklow), Ballymore Eustace (Co. Kildare), Drehid Waste Management Facility (Co. Kildare) and at Naul (Co. Dublin).

If the treated soil is transported in a reasonably saturated state there may be a requirement for particular measures to be implemented to minimise the risk of spillage before soil is in transit. This may involve part loading which could increase transportation costs.

3. Transport Contaminated Sediment Off-site for treatment and disposal

Offsite treatment of the dredged material can be carried out wherever facilities are available at the most cost effective rates. Options considered for off-site treatment were as follows:

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Remove contaminated material to treatment facility in Ireland and then dispose to landfill

There are several waste management companies within Ireland who specialise in the treatment of contaminated soil in dedicated facilities, such as Enva (Portlaoise, Co. Laois), Indaver (Dublin, Co. Dublin) and Rilta (Rathcoole, Co. Dublin). Contaminated soil is transported to such facilities where it is then suitably treated, repackaged and made available for disposal. The closest suitable treatment centre to Bantry is the Enva facility at Portlaoise, approximately 240km away.

Remove contaminated material to hazardous landfill in mainland Europe

A further option is the direct export of spoil off site to a hazardous landfill site in mainland Europe provided that the volumes of soil are significant enough to warrant the use of barges. Transfer of spoil outside of Ireland is classed as a Trans-Frontier Shipment (TFS). All TFS licenses in Ireland are granted subject to the discretion of the National TFS Office of Dublin City Council.

1.3.3.1 Preferred Option for Resolving Contaminated Spoil Problem

After careful consideration of all the above options involving many different alternative processes, it was decided that the most effective method of dealing with the contaminated material will be to treat the material on site and to incorporate the remediated material as fill in the proposed reclamation area. This option can also be considered as having an advantage in terms of sustainability as transport is negated and there is no usage of what is generally very limited existing landfill capacity.

It also negates the need to import vast quantities of fill material into the site as the dredged material itself will be used as fill material.

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Further details on the dredging processes and treatment facilities are provided in Chapter 4.0 – Project Description.

1.4 Planning Process

1.4.1 Introduction

This section of the Environmental Impact Statement (EIS) provides an assessment of the proposal against prevailing National, Regional and Local Planning Legislation and Policy in the Republic of Ireland (RoI). This EIS is an all encompassing document prepared cognisant of the planning and marine licensing processes. It is submitted in association with appropriate applications presented to the relevant authorities for consideration.

1.4.2 Description of Proposal

A summary of the scheme is provided below. Described collectively as “Bantry Inner Harbour Development,” the main components of the proposal comprise:

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- A breakwater Construction – This will incorporate a quay structure with a berthing facility on both sides;
- Dredging of the Harbour Basin – Required to provide adequate water depths for all tide access and berthing;
- Refurbishment of the Fishing Pier – This includes widening the existing pier by 4 metres along its entire length as well as extending and widening the head of the pier to accommodate access to a floating pontoon and to allow the turning of Heavy Goods Vehicles;
- Land Reclamation at the inner harbour will facilitate the creation of an amenity area, play area and fun park;
- A sufficient number of car parking spaces are to be provided to serve the proposal;
- A suitable package of hard and soft landscaping proposals will be augmented across the site; Installation of pontoons and marine services – Other works as described including breakwater, shore protection and land reclamation will allow a basin capable of providing up to 200 marina berths;
- Land Reclamation at Abbey Site and Beach Re-nourishment at Cove and Beicin Sites – It is proposed that uncontaminated materials accumulated through the dredging process will be utilised at the Abbey, Cove and Beicin sites. At the Abbey site, dredged material will be transported by barge to the existing slipway facility for treatment. Afterwards it will be placed behind armoured bunds. At the Cove and Beicin sites, material will be transported from the inner harbour by barge, beached at low tide and profiled to form the beach;
- Marine Security – A suitable locking gate is proposed at the top of the access gangway whilst pontoons are adequately separated from adjacent structures to prevent unauthorised access;
- Safety Measures – Pontoons will be restrained by vertical steel piles driven into the bedrock. Life buoys will be placed strategically around the marina;
- Services – A metered supply of electricity will be available on-site. Water taps will be provided. No sewerage pump out facilities for vessels will be provided; and
- A fuel supply will be available on site.

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The above information comprises only a short summary of the complete project description which is contained within Chapter 4.0 of this EIS.

1.4.3 Methodology

Consideration of why the proposal constitutes EIA development is provided in a brief summary of relevant European and jurisdictional EIA legislation. Further to EIA considerations, to establish the Plans and Policy Context for the area it was necessary to undertake:

- Analysis of key planning legislation as applied to the project;
- An analysis of relevant planning policy to be applied during the assessment of this proposal; and
- A review of further material considerations which fairly and reasonably relate to the application concerned.

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Consideration of the following documents has taken place:

- Planning & Development Act 2000;
- National Spatial Strategy (NSS);
- Regional Planning Guideline for the South West Region– 2010 – 2022;
- Cork County Development Plan 2009;
- Bantry Electoral Area Local Area Plan; and
- Further Material Considerations.

Conclusions were informed by a critique of the above documents as well as the information contained within other tailored EIS Chapters regarding specific issues.

1.4.4 EIA Consideration

Environmental Impact Assessment (EIA) is a key instrument of European Union (EU) environmental policy. EIA is a procedure required under the terms of European Union Directives 85/337/EEC on assessment of the effects of certain public and private projects on the environment

Article 2 of the Directive requires that "Member States shall adopt all measures necessary to ensure that, before consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects." Article 8 then requires that "The results of consultations and information gathered pursuant to [the EIA process] must be taken into consideration in the development consent procedure".

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The EIA Directive has been amended three times, in 1997, in 2003 and in 2009:

- Directive 97/11/EC brought the Directive in line with the UN ECE Espoo Convention on EIA in a Transboundary Context. The Espoo (EIA) Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries
- Directive 2003/35/EC - seeking to align the provisions on public participation with the Aarhus Convention. This grants the public rights regarding access to information, public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment. It focuses on interactions between the public and public authorities.
- Directive 2009/31/EC amended the Annexes I and II of the EIA Directive, by adding projects related to the transport, capture and storage of carbon dioxide (CO_2).

In Ireland, EIA requirements under domestic planning legislation have been consolidated into Part X of the Planning and Development Act 2000 (as amended) and Part 10 of the Planning and Development Regulations 2001 (as amended).

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1.4.4.1 EIA Screening

Whilst an official EIA Screening Exercise has not taken place, the decision to proceed with the preparation of an Environmental Impact Statement was taken, advised through consultation with Cork County Council. It is further informed by RPS' experience and in consideration of all project elements against the relative legislative context.

Schedule 5 (Development for the purposes of Part 10 - EIA) of the Development Regulations (2001) sets out the classes of development for which an EIA is compulsory. Schedule 5 is divided into Parts 1 and 2 which reflect Annexes 1 and 2 of the EIA Directive respectively. The approach adopted in the Directive is that EIA is mandatory for all Annex I projects on the basis that these project classes will always have significant environmental effects. In most cases, mandatory thresholds are specified in respect of the project classes in Annex I.

In the case of Annex II projects, the Directive gives Member States considerable discretion in determining the need for EIA. The overriding consideration (as set out in article 2 of the Directive) is that *projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location* should be subject to EIA. In transposing the Annex II requirements of the Directive into Schedule 5 Part 2, Ireland chose to set mandatory thresholds for each of the project classes in Annex II.

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Irish implementing legislation addresses the possible need for EIA below the Annex II national thresholds where the competent/consent authority considers that a development would be likely to have significant effects on the environment. Such developments are described as "sub-threshold." Article 102 of the Regulations states: "Where a planning application for sub-threshold development is accompanied by an EIS, the application shall be dealt with as if the EIS had been submitted in accordance with section 172(1) of the Act." Article 103 states: "Where a planning application for sub-threshold development is not accompanied by an EIS, and the planning authority considers that the development would be likely to have significant effects on the environment, it shall, by notice in writing, require the applicant to submit an EIS."

Relevant thresholds which upon initial inspection, could relate to the project are as follows:

- Part 2.1 (g) - Reclamation of land from the sea, where the area of reclaimed land would be greater than 10 hectares.
- Part 2.2 (d) - Extraction of stone, gravel, sand or clay by marine dredging (other than maintenance dredging), where the area involved would be greater than 5 hectares or, in the case of fluvial dredging (other than maintenance dredging), where the length of river involved would be greater than 500 metres.
- Part 2.10 (e) - New or extended harbours and port installations, including fishing harbours, not included in Part 1 of this 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 metres in length.
- Part 2.10 (k) - 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

EPA Export 08-04-2016:00:59:05

defence works, where the length of coastline on which works would take place would exceed 1 kilometre, but excluding the maintenance and reconstruction of such works or works required for emergency purposes.

- Part 2.12 (b) - Sea water marinas where the number of berths would exceed 300 and fresh water marinas where the number of berths would exceed 100.

Schedule 5 Part 13 also includes a requirement for EIA in developments incorporating any change or extension of development which would result in the development being of a class listed in Part 1 or paragraphs 1 to 12 (Part 2) of Schedule 5, and result in an increase in size greater than:

- 25%; or
- An amount equal to 50% of the appropriate threshold – whichever is the greater

At Bantry Inner Harbour, the total footprint area of the proposed new reclaimed amenity area and breakwater is approximately 15,960m² (1.596h) which is 41% of the current area of the harbour basin (which currently stands at approximately 38,500m² - 3.85h). The proposals do not however, lead to listing as per Part 1 – or paragraphs 1-12 of Part 2.

Accordingly detailed consideration revealed that none of the above thresholds have been exceeded by the proposals and as such they can be described as "sub-threshold." Nevertheless the holistic consideration of the following issues has led to the production of this voluntary EIS – including the:

- Range and scale of activities to occur;
- Receiving waters are subject to an EU Shellfish designation; and
- Contamination of some of the material to be dredged.

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When combined the proposals could have the potential to have significant impacts on the environment.

1.4.4.2 EIA Scoping

A targeted EIA Scoping exercise was undertaken by RPS. The scoping exercise is described in Section 1.5 of this Chapter of the EIS and also in Chapter 2 of this EIS which deals with the Consultation process. All relevant responses have been considered during the preparation of this Environmental Impact Statement.

1.4.5 Planning Legislation

The starting point for the modern planning code is the Planning and Development Act 2000. This Act consolidated all planning (and relevant associated environmental) legislation from 1963 to 1999 and codified much of what had grown up in custom and practice during that time, clarifying and simplifying the overall process into one self-contained piece of legislation. The 2000 Act remains the basis for the Irish planning system however there have been a number of amendments to the legislation the most significant of which include the Planning and Development (Amendment) Act 2002, the Planning and Development (Strategic

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Infrastructure) Act 2006, as well as the recently commenced Planning and Development (Amendment) Act 2010.

The principal regulations underpinning the Planning and Development Acts 2000 (as amended) are the Planning and Development Regulations 2001. They also consolidate all previous Regulations made under the 2000 Act and replace the Local Government (Planning and Development) Regulations 1994 - 2000. They prescribe the detail of the various planning processes and procedures in the RoI. Some significant amendments have been made to these regulations, notably the Planning and Development Regulations 2006 which *inter alia* underpinned the new strategic consent procedure established under the Planning and Development (Strategic Infrastructure) Act 2006.

A key provision of the Planning and Development (Amendment) Act 2010 is to ensure a closer alignment between the National Spatial Strategy, Regional Planning Guidelines, Development Plans and Local Area plans. The 2010 act also transposes the provisions of the Habitats Directive directly into planning legislation and clearly outlines the obligations for Planning Authorities and An Bord Pleanála in respect of same.

All development, unless specifically exempted, needs planning permission. This proposal does not constitute exempted development. In general all decisions to grant or to refuse planning permission are firstly for the relevant planning authority. Anyone applying for planning permission in Ireland and anyone who made valid, written submissions/observations to the planning authority on a planning application can appeal a subsequent planning decision to An Bord Pleanála, within the appropriate period. An Bord Pleanála ('the Board') is the Irish national planning appeals board. In this regard, Ireland is one of the few European countries to have an independent third party planning appeals system.

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The primary legislation governing planning and development in Ireland is the Planning & Development Act 2000 (PDA), as amended by various subsequent acts. However as noted above, the Planning and Development (Strategic Infrastructure) Act 2006 introduced a new planning regime to streamline the planning process for major infrastructure projects. Certain developments of strategic importance to the state or regions can apply for permission / consent directly to the Board rather than submitting a planning application to the local authority in the first instance in a process designed to reduce the delays involved in planning for such projects.

Section 37A(2) of the Planning and Development (Strategic Infrastructure) Act 2006, describes Strategic Infrastructure Development (SID) as that which:

- Is considered to be of national strategic economic or social importance;
- Would contribute significantly to the fulfilment of any of the objectives of the National Spatial Strategy or any regional planning Guidelines for an area; and
- Would have significant effects on the area of more than one planning authority.

Accordingly, Bantry Harbour development does not constitute SID.

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1.4.6 Marine Legislation

Given the nature of the proposal, some project elements are proposed to occur on the foreshore. This is defined as the seabed and shore below the line of high water of ordinary or medium tides and extends outwards to the limit of twelve nautical miles (approximately 22.24 kilometres).

Following on from the enactment of the Foreshore and Dumping at Sea (Amendment) Act 2009 responsibility for certain foreshore functions has transferred to the Minister for the Environment, Heritage and Local Government with effect from 15 January 2010. This includes:

- All foreshore energy-related developments (including oil, gas, wind, wave and tidal energy);
- Aggregate and mineral extraction developments on the foreshore; and
- Foreshore projects in respect of port companies and harbour authorities governed by the Harbours Acts, 1946, 1996, and 2000, and foreshore projects in respect of any other harbour and harbour-related developments intended for commercial trade. All other foreshore projects, other than those relating to aquaculture and sea fisheries.

The Foreshore Acts 1933-2005 entitles the Minister to grant leases/licences and permissions to individuals or bodies to occupy or use the foreshore. Leases are granted under the Acts for the erection of long-term structures (e.g. piers, marinas, bridges, roads, carparks). Licences are granted for other works (e.g. laying of submarine pipelines and cables) and purposes (e.g. aquaculture).

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The Minister has absolute discretion to accept or reject a proposal to use state-owned foreshore. Collectively, the Foreshore Acts can be cited as the Foreshore Acts 1933 to 2005 and comprise of the following:

- Foreshore Act 1933;
- Foreshore (Amendment) Act, 1992;
- Section 5 of the Fisheries and Foreshore (Amendment) Act 1998;
- Fisheries (Amendment) Act, 2003 (Part 5);
- Maritime Safety Act 2005 No. 11 (Part 6);
- Foreshore and Dumping at Sea (Amendment) Act 2009; and
- Consolidated Foreshore Acts (Unofficial).

As a point of note, the entire foreshore in Ireland is presumed to be state owed unless alternative valid deed of title is provided. Given the variety and scope of the Bantry Bay works, it is anticipated that this project will necessitate a requirement for both marine license and lease.

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1.4.7 Planning Policy

In RoI the development plan serves as the primary statement on land use planning at city, town and county levels in and provides a reasonable level of guidance for developers, the public and those involved in or responsible for making planning decisions within planning authorities and An Bord Pleanála.

The development plan is part of a systematic hierarchy of land use and spatial plans, including the National Spatial Strategy and Regional Planning Guidelines. It is also informed by the plans and strategies of the Government and other public agencies in general. An overview of the hierarchy of plans and their inter-relationships with other documents is provided in Figure 1.1.

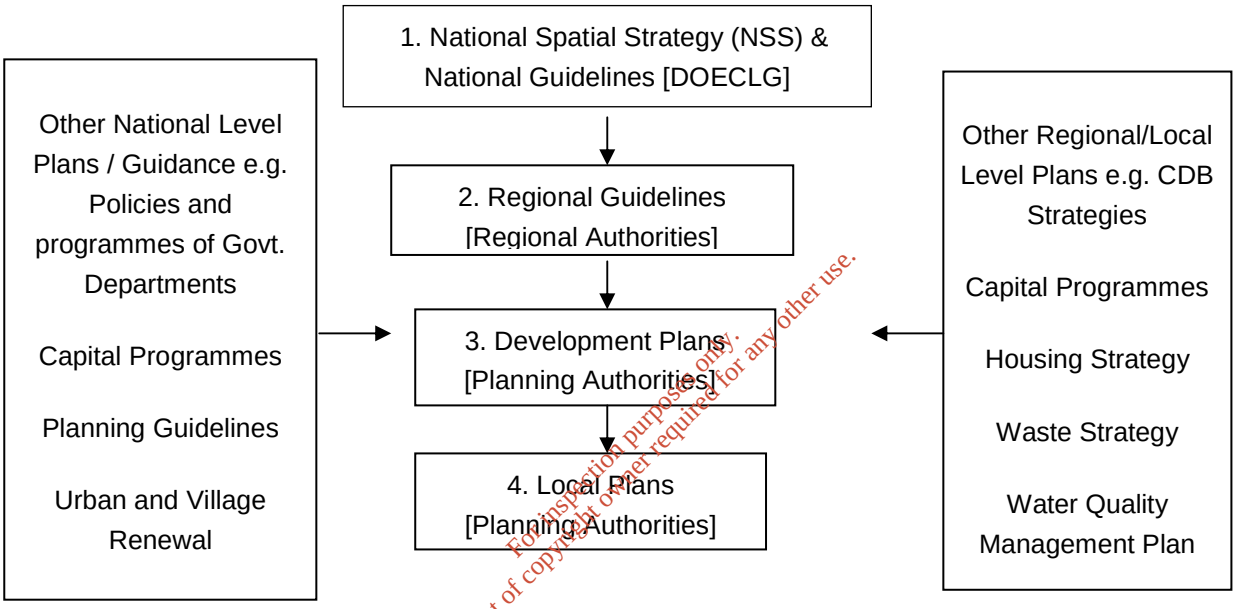

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Figure 1.1 – Planning Hierarchy and Links – Republic of Ireland

National, regional and local planning policy documents perform an important function in the physical implementation of development. It is critical that plans are prepared to take account of further government policy documents so that they can be translated locally via the plan led system.

1.4.7.1 National Development Plan 2006 – 2013 (Currently under Review)

NDP - Transforming Ireland – A Better Quality of Life for All - sets out the Government's roadmap to Ireland's future within the context of funding streams and investment targets. The "better quality of life" espoused will be characterised by:

- A strong, competitive economy, delivering quality, sustainable employment in a more regionally balanced manner;
- Affordable, quality housing, complemented by efficient access to facilities and services for work, education, healthcare, childcare, sports, recreation and culture;
- A sustainable, high quality environment; and
- A greater level of participation in society by all.

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Among the high level objectives of the Plan are:

- Balanced Regional Development;
- Environmental Sustainability; and
- Supporting Enterprise Innovation and Productivity.

Chapter 4 of the NDP focuses on development of the rural economy and supporting inter alia:

- Enhancement of villages and small towns;
- Conservation of areas of high natural and cultural value; and
- Enhancement of cultural and leisure facilities for rural communities.

Funding commitments are given to ensure improved harbours and landing facilities to assist the sustainability of rural communities and it is recognised that diversification away from the traditional fishing industry towards marine tourism and leisure will be required to provide alternative forms of employment. Tourism is noted as a strong contributor to the vitality and sustainability of a wide variety of local enterprises particularly in rural areas.

1.4.7.2 National Spatial Strategy (NSS)

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The NSS is a twenty-year spatial strategy designed to achieve a better balance of social, economic, physical development and population growth between regions. It is the overall framework for planning in Ireland and other plans at regional and local level.

To achieve its goals, the Strategy identifies a network of gateways and hubs which are the focus for and driving influences of development in each region. The strategy sets out a framework for the development of Ireland in a way that is internationally competitive, socially cohesive and environmentally sustainable. The hope is that through closer matching of where people live with where they work, different parts of Ireland will for the future be able to sustain:

- A better quality of life for people;
- A strong, competitive economic position; and
- An environment of the highest quality.

In addition to providing a framework for the actions of government, its agencies and the private sector, the key to the implementation of the NSS lies in the actions of regional and local authorities. Regional guidelines, integrated planning frameworks, county and city development plans and strategies and local strategies all support the NSS, reflecting its policies and influencing appropriately at regional and local levels.

Sustainable development underpins the strategy. This is described as development that meets the needs of this generation without compromising the ability of future generations to meet their needs. The need for the NSS was formally recognised by the Government with the publication of the 2000-2006 National Development Plan (NDP), under which the NSS is mandated to:

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- Identify broad spatial development patterns for areas, and
- Set down indicative policies in relation to the location of industrial development, residential development, services, rural development, tourism and heritage.

The NSS contains four main messages in its regional approach to spatial planning:

- *Frameworks for spatial planning of cities around the country and their catchments must be developed and implemented*. This involves addressing the planning issues for metropolitan and hinterland areas of cities in an integrated way. Cities and surrounding counties must put in place sustainable and public transport-centred settlement and development strategies within the planning system to support continued progress and competitiveness into the future.
- *The county town and large town structure must be strengthened.* This will be achieved through regional and county level settlement and planning policies. These should support the towns, as both generators of business activity and delivery points for the key services that people need if they are to continue living in or be drawn to a particular area.
- *A renewed emphasis is needed on the potential role of the small town and village structure.* This can be achieved through public and private investment in essential services such as water services and the use of local authority powers to tackle blockages in the supply of development land. It will also be important to improve the attractiveness of towns and villages through community and other activities such as urban and village renewal schemes and urban design initiatives by local authorities.
- *Key rural assets must be protected and the local potential of rural areas developed.* This will be achieved through identifying, conserving and developing on a sustainable basis the various types and combinations of economic strengths of rural areas, with the support of appropriate levels of infrastructure provision. Their potential for economic activity, such as natural resource, local enterprise and tourism related development, and qualities that underpin such activity such as a clean and attractive environment will be central to this process.

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Although described later in the NSS as a medium sized town, Bantry fits most comfortably within the definition of a small town – a described by the structure above.

Bantry is located within the South-West Region as defined by the NSS, comprised of Counties Cork and Kerry. Cork City is recognised as a regional city and designated as a gateway with considerable potential for further development and expansion. Of the regional cities, Cork is thought to have the most immediate potential to be developed to the national level scale required to complement Dublin. The Cork Area Strategic Plan (CASP) sets a positive agenda for proceeding in this direction, given the emphasis in it on enhancing Cork's capabilities as a metropolitan, business friendly, public transport based and physically attractive city.

Section 4 of the NSS describes Bantry as a medium sized town with important economic and service functions along remoter parts of the coastline within the southwest region. The Strategy notes that: "Accessibility and effective local planning frameworks and initiatives to

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release capacity in terms of land and services for sustainable growth are critical factors in activating the potential of such centres in their important county roles."

Section 5.2.2 of the Strategy recognises tourism as a significant economic driver that can be further developed however notes that the resource and the potential differs greatly throughout the country. Cork is described as an established tourism area. Developments in marine and natural resource sectors offer significant advantages for stable, long-term economic activity in rural areas. Furthermore it is noted that, "Coastal infrastructure, commensurate with the needs of the seafood and marine leisure sectors, at strategic ports and other key locations of particular importance for local economies must be developed."

1.4.7.3 Regional Planning Guidelines (RPSs) (for the South West Region) 2010 - 2022

The South West Regional Authority is the statutory authority for the South West Region of Ireland, covering Cork City and County and County Kerry (Figure 1.2). The Planning and Development Act, 2000 requires Regional Authorities to make Regional Planning Guidelines in respect of their region and to review the Guidelines at intervals not exceeding six years.

This is a strategic policy document designed to steer the future growth of the region over the medium to long term and implement the strategic planning frameworks contained within the NSS as well as the National Development Plan 2007 – 2013. RV01 – Regional Vision Statement declares that, "The broad vision for the south west region is to maintain and develop a sustainable and competitive economy, optimise the quality of life of its residents and visitors, protect and enhance its unique environment, culture and heritage." The RPG policies inform local authorities in the review and preparation of development plans and provide a link between local and national policies. They are underpinned by the promotion of sustainability and growth. The RPG's for the South West Region were adopted in 2004 and are due for review again in 2016. Within the document the South West Region is divided into 4 main planning areas comprising:

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- Greater Cork Area (including Cork Gateway and Mallow hub);
- Tralee/Killarney linked hub;
- Northern Area; and
- Western Area.

Bantry is located within the Western Area, comprising a combination of the peninsulas of County's Kerry and Cork (Figure 1.3). This is described as a predominantly rural area of high amenity and cultural value with a strong tourist base. The peninsular topography of the area means it is relatively peripheral to the hubs of Cork/Mallow and Killarney/Tralee as well as being separated from the Atlantic Corridor. This, when combined with the decline on traditional employment areas of fishing and agriculture means employment opportunities are fewer than in the other defined areas.

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Figure 1.2 – The South West Region in an all island context (Source RPGs for South West)

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Bantry is one of 6 ports and harbours in the region - in addition to the Port of Cork – which are identified for particular attention by the Department of Transport. The improvement and maintenance of smaller ports, harbours and slips is recognized as important to the local economies of these coastal areas. Bantry Bay is noted for the development of potential liner based employment.

Guidelines and objectives contained within the RPG's which are of relevance to the proposal include:

RES - 03 – Tourism: It is an objective to protect existing tourism assets in the region and develop additional sustainable facilities for activity holidays, urban and rural tourism. Bantry is recognised as having a very strong tourist role within the western area;
RTS – 06 - It is an objective generally to support the sustainable development of ports and harbours as potential economic generators for the region and support the maintenance of other facilities such as slipways and to protect them from inappropriate uses;
RSS – 07 – Settlements in the Western Area - It is an objective to strengthen the economic and tourism roles of the towns and villages and forge greater links to their surrounding hinterlands and to peripheral areas and improve accessibility to peripheral areas in a sustainable manner;
REAS – 02 – Environment and Amenities Strategy – It's an objective to promote integrated coastal management strategies to involve key stakeholders and aimed at inter-alia recognizing the environmental sensitivity of the coastal areas and identifying potential social and economic development;

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REAS -03 – Management of Natural Heritage – Local authorities are required to screen projects and draft land use plan or variation for potential impacts on areas designated for inclusion as Natura 2000/Eurpoean sites and shall make a determination whether a Habitats Directive Assessment is necessary of the potential impact on any Natura 2000/European site;
REAS – 05 – Flood Risk Management – Consideration must be given to the implications of development and land use policies on flood risk. Where required strategic and local flood risk assessment should be prepared;

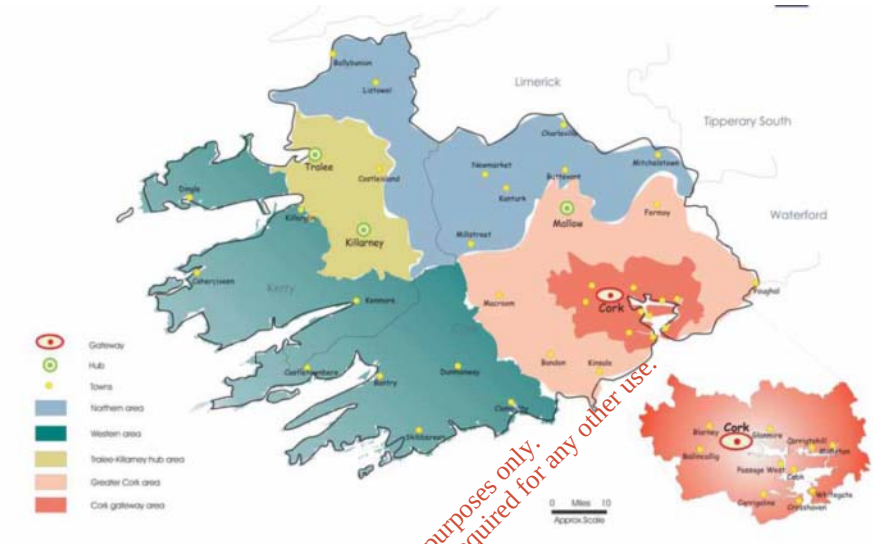

Figure 1.3 – Planning Areas within the South West Region (Source RPGs for South West)

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1.4.7.4 Cork County Development Plan 2009

The main instrument for regulation and control of development is the Development Plan. Each planning authority is required to publish notice of its intention to review its plan, not later than four years after the making of a development plan. A new plan must be made every six years (i.e. two years after the notice of the intention to review the plan has been published). The plan states the authority's policies for land use and for development control and promotion in its area. The authority, in exercising control, must consider the provisions of the Plan, and try to secure its objectives.

Cork Development Plan describes itself as the, “Core Strategy for County Cork looking forward to the year 2020. It sets out the County strategy for the local implementation of the National Spatial Strategy, the Atlantic Gateways Initiative and the Regional Planning Guidelines for the South-West Region. It also draws on the recommendations of the Cork Area Strategic Plan Update (2001- 2020) and the North and West Cork Strategic Plan (2002-2020).” It is the first County Development Plan to be written without any reference to land “zoning” and as such is described as an entirely “strategic document”, focusing on the major issues and allowing zoning to be addressed via Local Area Plans.

Sustainability is entrenched in the four key aims of the Strategy – as follows:

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- Enhanced quality of life for all, based on high quality residential, working and recreational environments and sustainable transportation patterns;
- Sustainable patterns of growth in urban and rural areas, reflecting the need to reduce energy consumption and emissions and taking account of the need to plan for the effects of climate change, that are well balanced throughout the County, together with efficient provision of social and physical infrastructure;
- Sustainable and balanced economic investment, in jobs and services, to sustain the future population of the County together with wise management of the County's environmental, heritage and cultural assets; and
- Responsible guardianship of the County so that it can be handed on to future generations in a healthy state.

Cork County Development Plan sets out the County strategy in relation to four 'Strategic Sub-Areas' that best reflect the differing mix of socio-economic, cultural and environmental issues that define the main areas within the County. Bantry is located within the "West Strategic Planning Area" and is designated as a Principle Tourist Attraction. The Plan contains 9 No. targeted planning and sustainable development goals for the West Planning Area. Among these are:

- Promote tourism and leisure through protection of the natural and built heritage and by encouraging new forms of employment development; and
- Protect the natural and built heritage of Bantry.

Development Plan Objective STA 1-1 – National and Regional Planning Policies – states that:
(b) It is an objective of this plan to ensure the protection of the environment of the County including the natural and built heritage, landscape and biodiversity. And
(c) It is an objective of this plan to ensure that growth and development of the county is managed in a manner that does not expose the population to increased risk from natural hazards such as flooding.

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Development Plan Objective SET 1-1 –Role of the Main Towns - states that, "Local Area Plans will give guidance on the scale, character, layout and design appropriate to each town and on the timely delivery of both physical and social infrastructure required for the town to achieve its target population and develop in a sustainable manner."

Development plan objective SET 3-15 refers specifically to Bantry, and its future role as a provider of employment to support population growth within the town and extended hinterland. This states:

"It is an objective of this plan to develop Bantry as a significant District Employment Centre, an important centre of population with potential for enhanced employment and transport links for future tourism, marine and port related activity and protect its natural and built heritage so as to protect and improve quality of life. It is important that the objectives contained in the Marine Leisure Infrastructure Strategy for West Cork are implemented."

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Chapter 4 of the Plan contains a series of objectives relating to the coastal area or "zone" Including the following:

RCI 16-4 - Development in Coastal Areas

a) It is an objective, for coastal areas, to encourage development generally to be located in accordance with the settlement policies of this plan and in particular to recognise the limited capacity of many coastal areas for accommodating development on a large scale.
b) It is a particular objective to reserve sufficient land in the various settlements to accommodate the particular requirements of coastal industry, ports and harbour development and other coastal infrastructure.

RCI 16-5 - Marine leisure

It is an objective to support the development of rural Cork's inland and coastal marine leisure facilities, where this is compatible with the long-term well-being of the environment and local livelihood.

RCI 16-6 - Coastal Amenities

It is an objective of the Council to maintain and improve its beaches to a high standard and develop their recreational potential as publicly accessible seaside amenity facilities, in accordance with the principles of proper planning and sustainable development.

Objective ECON 2 – 6 promotes the development of Bantry – alongside other towns - as a District Employment Centre for their local labour markets so that they meet the employment needs of an urban area and its wider rural hinterland.

Objective LAP 4-1 – Architectural Conservation Areas in Local Area Plans – states; "It is an objective to examine the potential for designating Architectural Conservation Areas within local areas." Much of Bantry Town Centre is designated as an ACA.

Further development plan objectives relating to issues of built heritage are contained within ENV 4-1 to ENV 4-4, Section 7.4 of the Development Plan. Map 13 – Heritage and Conservation – contained within Volume 3 of the development plan contains a list of protected structures located within Bantry.

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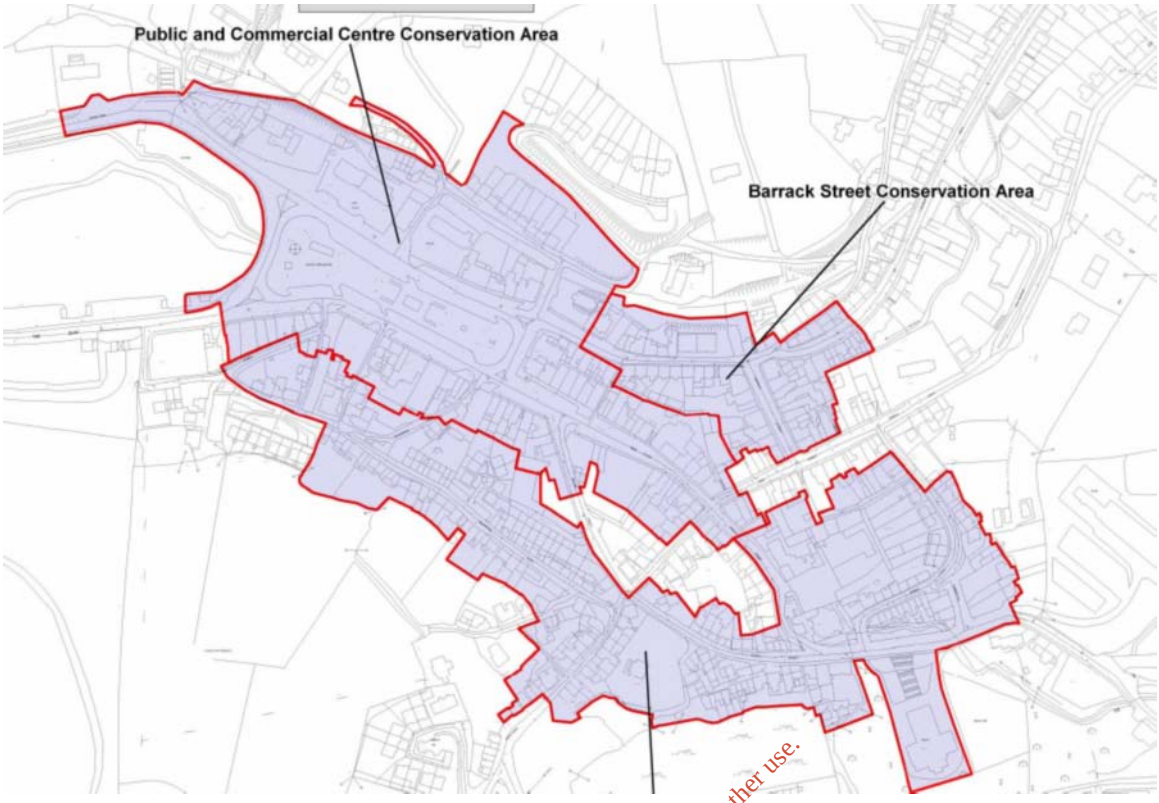

Figure 1.4 – Bantry Architectural Conservation Area (Source Cork County Development Plan – Volume 3)

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Objective LAP 4-2 – Landscape Character Assessment in Local Area Plans – states; "It is an objective to complete, at local level, the procedure for Landscape Character Assessment in line with the recommendations of the Draft Guidelines issued by the Department of the Environment and Local Government." Much of the landscape surrounding Bantry is designated as "Scenic", whilst part of "Scenic Route" S108 is located immediately south of the harbour proposal (Figure 1.5).

Scenic routes described in this plan are largely based on designations established by previous development plans. They are based on traveller experience along the routes of some of the highest quality and most important areas of natural heritage in the county. The main intention is to ensure that the character of the views and prospects that can be obtained from these routes are preserved.

As above, scenic landscapes are based largely on the content of previous plans and include those areas of natural beauty valued most highly by locals and visitors alike. The intention is to preserve the visual and scenic amenities of these areas.

A suite of Development Plan Objectives relating to issues of landscape are contained within ENV 2-2 to ENV 2-15 of the Development Plan –Section 7.2.

Map 13 – Heritage and Conservation contained within Volume 3 of the development plan illustrates those areas designated because of their nature conservation importance. A proposed Nature Conservation Area (pNCA) is located at the southern tip of Whiddy Island.

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Development plan objectives relating to issues of natural heritage are contained within ENV 1-1 to ENV 1-13, Section 7.1 of the Cork Development Plan.

1.4.7.5 Bantry Electoral Area Local Area Plan (BEALAP) - 2011

Prepared in accordance with the Planning and Development Acts, BEALAP focuses on the local level implementation of the overall strategy for County Cork established in the County Development Plan. All Local Area Plans must be consistent with the relevant Development Plan whilst adhering to the core strategies of higher level plans including the NSS and Regional Planning Guidelines.

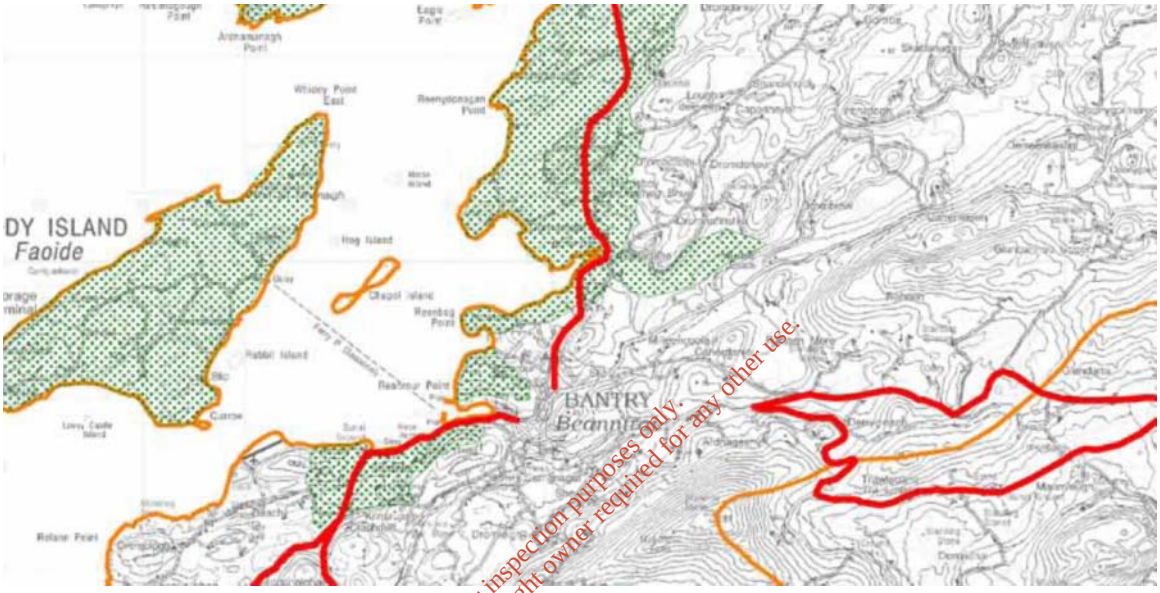

Figure 1.5 – Scenic Landscape Designations surrounding Bantry (Source – County Development Plan – Volume 3)

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As suggested in the title of the document, the LAP covers the entire Bantry Electoral Area including the main settlements of Bantry, Castletownbere and Schull, a number of villages and island communities, and their corresponding rural hinterlands (Figure 1.6). The main towns mentioned, are described as the most significant material asset in the electoral area.

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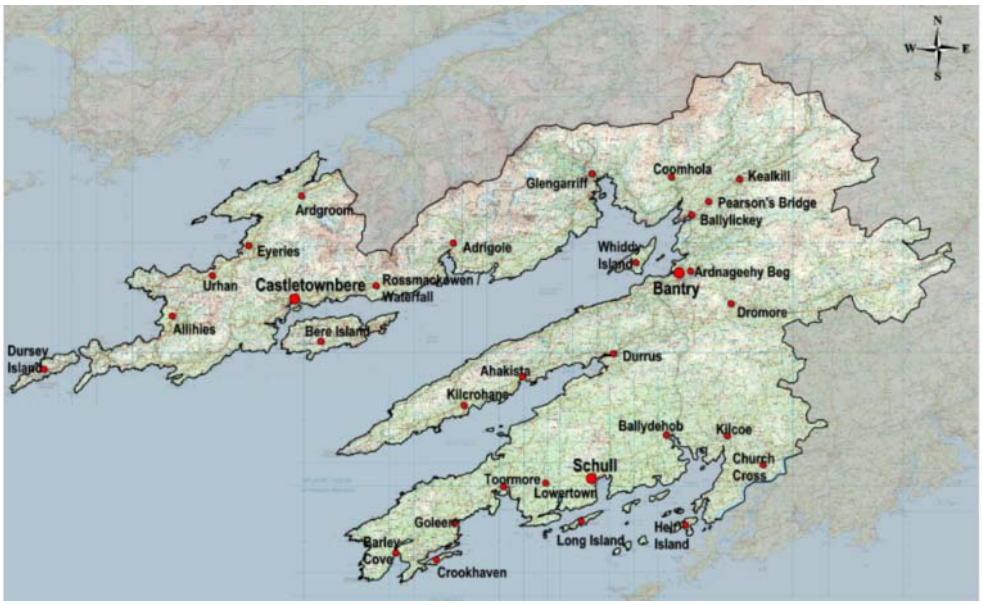

Figure 1.6 – Bantry Electoral Area Local Area Plan Boundary – Source BEALAP

To best achieve consistency with the Regional Planning Guidelines for the South West Region 2010 and the County Development Plan - the LAP has been prepared taking 2020 as its horizon year. The Plan provides a detailed planning framework for sustainable development which responds to the needs of the community within the host area, setting out proposals for the delivery of physical, social and environmental infrastructure. As with the County Development Plan the objectives set out in the LAP are aimed at:

- Making best use of previous investments in built fabric or infrastructure in the main towns;
- Establish the main towns as the principal location for future investment in housing, jobs, infrastructure and social and community facilities;
- Identify land for future development that will meet the planned requirements for each main town and offer a reasonable choice of location to those intending to carry out development;
- Prioritise future investment in infrastructure to support the sequential or phased development of the land identified for the future needs of the town;
- Confirm the role of the town centre as the preferred location for future retail development; and
- Protect the setting of the town from sprawling or sporadic development by maintaining the existing 'green belt' where only limited forms of development are normally considered.

Bantry is the principal town in the Electoral Area and is the largest population, services and employment centre where the majority of future growth is targeted. The stated vision for the town over the lifetime of the Plan is:

"To develop Bantry significantly as the primary urban centre and gateway for this western part of Cork. The plan will promote a significant expansion of the population based on an important marine related role, including aquaculture, and key employment functions in the service and tourism industries. It will promote good access to modern shops and services

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without destroying the unique setting of the town on which its attractiveness to tourist depends."

Bantry zoning map, contained within the LAP illustrates that the harbour is designated as a Special Policy Area (Plan Objective X-02) which is bordered by the designated town centre, most significantly to the east (Plan Objective T01) and north (Plan Objective TO2). A narrow town centre area is also located to the south beyond which there is a significant area of open space (Plan Objective O -06). A narrow portion of lands to the north and south of the harbour, however most significantly towards the southeast, are located within an "Area Susceptible to Flooding: Zone A" (Plan Objective FD 1-4). Wolf Tone Square – an Architectural Conservation Area is located immediately east of the proposed development (Plan Objective DB-12). An itinerary of all the Plan Objectives noted previously in brackets has been provided below.

BEALAP considers the matters below as follows:

Employment and Economic Activity

Under the 'Marine Leisure Infrastructure Strategy for the Western Division of Cork County 2007' Bantry is designated as a Primary Hub - requiring the provision of facilities to cater for all year round marine leisure operations. Adequate and appropriate infrastructure, complementary ancillary services and Harbour Management Plans are required for Bantry Town.

Marina development and future use of the railway pier site is important role in the provision of marine and mixed use developments around the harbour to improve the tourism and employment potential of the town.

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Natural Heritage

According to the LAP there are no nature conservation sites either within or directly adjoining the current development boundary of Bantry. However, much of the town, particularly lands toward the coast are included within designated Scenic Landscape in the County Development Plan 2009, are the subject of existing Green Belt designations and are within more visually sensitive coastal areas. A Landscape and Visual Impact Assessment has been undertaken in Chapter 14.

Built Heritage

As alluded to above, much of the town centre, including Wolfe Tone Square is designated as an Architectural Conservation Area (ACA). A full assessment of the impact of the proposal on considerations of built heritage is included in Chapter 9.

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Flooding

It is recognised that parts of Bantry are prone to flooding. The strategic flood risk assessment undertaken for Bantry and contained within Volume 2 of the Local Area Plan states that, "All development proposals within the Indicative Flood Risk Areas must satisfy the 'Development Plan' justification test for projects in Flood Zone A/B either as part of the preparation of this LAP or at the planning application stage. Where the 'Development Plan' justification test is satisfied, site specific Flood Risk Assessment is necessary."

A site specific Flood Risk Assessment was carried out for the proposed development at Bantry and this is reported on in Chapter 16 of this EIS and also in Appendix 5.

Objectives

A series of objectives apply to all development proposals within the development boundary of Bantry. Those which are of most relevance to the proposal are as follows:
DB-08 - It is an objective, in a sustainable manner, to support the preparation and implementation of a Harbour Management Plan for the harbour area and support the development of the marina for the town. In addition it is an objective to support the development of marine leisure proposals generally in Bantry which are in line with securing the objectives of the Marine Leisure Strategy which designates Bantry as a primary hub.
DB-12 - It is an objective to prepare further guidance in relation to the Bantry Architectural Conservation Area during the lifetime of the plan.
FD 1-4 - It is an objective of this plan to ensure that all proposals for development falling within flood zones 'A' or 'B' are consistent with the Ministerial Guidelines – 'The Planning System and Flood Risk Management'. In order to achieve this, proposals for development identified as being at risk from flooding will need to be supported by a site-specific flood risk assessment.
T-02 – To facilitate mixed use development including marine and marine related activities, leisure tourism uses, offices, residential, specialist and small to medium sized retail development. Any development should avoid prejudicing existing marine related activities. Parts of this site are at risk of flooding. Any development proposals on this site will normally be accompanied by a flood risk assessment that complies with Chapter 5 of the Ministerial Guidelines 'The Planning System and Flood Risk Management."
X-02 – Support the redevelopment of the Inner Harbour for recreational, amenity, residential, retail, office, tourist and marina related uses. In general a gateway development consisting of residential, retail and office uses should be located on the southern quay opposite the existing hotel. A very high standard of design is required, both in terms of appearance and relationship to adjoining activities. The visual and heritage sensitivities of the area will need careful consideration having regard to the setting of the town and the sites location overlooking Bantry Bay. Any development should avoid prejudicing existing marine related activities. Parts of this site are at risk of flooding. Any development proposals on this site will normally be accompanied by a flood risk assessment that complies with Chapter 5 of the Ministerial Guidelines 'The Planning System and Flood Risk Management' as described in objectives FD 1-4, 1-5 and 1-6 in Section 1 of this plan.

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1.4.7.6 Further Considerations

Atlantic Gateways Initiative

The NSS notes that the rapid growth of the "Gateway" cities and hinterlands of Cork, Galway, Limerick and Waterford as well as the hub towns of Ennis and Mallow, points to their possible role in driving development to provide a strong counterbalance to the critical mass of investment and population of Dublin, and complementing the dynamic east coast Dublin to Belfast economic corridor.

Atlantic Gateways initiative is a feasibility study which explores how the NSS can be implemented in this regard. Although Bantry is beyond this corridor, the Atlantic Gateways concept needs to be viewed as a dynamic and moving concept. Having started with the gateways themselves and intervening areas, the initiative has the potential to grow outwards to areas such as the west, northwest, and further southwest towards Bantry and beyond. These areas too, can become active in the development of the metropolitan corridors of the Atlantic Gateways.

Cork Area Strategic Plan (CASP) 2001 – 2020 – As Updated

The strategies in CASP 2001 – 2020, were formally adopted by Cork County Council and Cork City Council on 22nd October 2001. CASP was updated in 2008 and has informed the production of Cork City Development Plan 2009 and Cork County Development Plan 2009.

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CASP is a pioneering initiative jointly sponsored by Cork City Council and Cork County Council which provides a vision and strategy for the development of the Cork City-Region up to 2020. This sets out the broad strategy which aims to provide guidance as to the general direction and scale of growth to enable the Cork City-Region to provide a high quality of life and opportunity for all of its citizens over a 20-year period. The strategy appropriately seeks to move towards a more sustainable form of development for the Cork City Region. The study area extends to an area determined by a journey time of about 45 minutes from Cork City. Bantry is taken to be outside this area.

North and West Cork Strategic Plan (NWSP) 2002 - 2020

This strategic plan aims to address a syndrome of decline which it asserts has become endemic in areas of North and West Cork. This is to be addressed by making this a more popular place in which to live thus retaining a portion of the populous which may otherwise have moved out and by attracting inward migration.
To reflect communities' values future strategy should contain an increased appreciation of the unique qualities – environmental, heritage and cultural – of each part of North and West Cork.

The NWSP aims to address the core development issue of falling population and decline in rural living as well as to realise fundamental objectives, as expressed by communities, by:

- Raising the productive potential of the economy;

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- Optimising spatial development patterns as an essential requirement for infrastructure development;
- Improving access and communications and increases infrastructure provision and resources;
- Incorporating environmental sustainability;
- Promoting access to social, recreational and cultural facilities; and
- Containing effective implementation procedures.

Among the recommendations regarding the coastal zone is that:

- The needs and environmental obligations of different users, i.e. the off shore fishermen, the on shore fishermen, the fish farmers and shellfish producers and the recreational user of the coastal zone, should be acknowledged and these should be co-ordinated if the response is to be coherent;
- A monitoring programme for all uses of the coastal zone should be initiated to establish baseline data on environmental changes.

Chapter 4 of the Plan presents an environmental profile of the area and environmental sustainability emerges as an integral requirement for future development proposals in the area. The strategy further promotes a major programme of town and village renewal. Bantry emerges as one of a group of towns located in South West Cork which are described as being suitable for complimentary development.

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Bantry Bay Coastal Zone Charter

This Project was initiated by Cork County Council to address the challenge of successful coastal zone management around Bantry Bay. It represents a consensus agreement between all those with a stake in the coastal zone area (including the regulatory agencies) about how they wish to see the area managed and developed into the future. The area includes Bantry, Beara and Sheep's Head and is a recognised model of integrated coastal zone management, which involves consulting as widely and fully as possible with local interests.

This Charter is based on the understanding that the regulatory agencies need to work in partnership with the local community for the successful management and development of this area. It explores the use of consensus, where all those who are stakeholders (those who have a 'stake' in the area) work together, to develop a single agreed approach to its development.

Bantry Bay Coastal Zone Charter contains a range of specific proposals for the management and development of the Bantry Bay coastal zone. Each of these is based on a common set of agreed principles that support the overall aim of the Charter. The individuals, companies, and agencies that sign up in support of the Charter agree to apply these principles to their activities. Among the agreed principles are: consensus, partnerships, transparency, sharing of information, social inclusion, improvement of the environment, polluter pays; and use of best information and expertise.

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South-Western River Basin Management Plan (SWRBMP)

Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the Water Framework Directive - WFD), and transposing regulations, European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003), as amended by the European Communities (Water Policy) (Amendment) Regulations, 2005, establish a legal framework for the protection, improvement and sustainable management of rivers, lakes, transitional waters (estuaries), coastal waters and groundwater. The aim of the WFD is to prevent deterioration of the existing status of waters and to ensure that all waters are classified as at least 'good' status (by 2015 in most cases, with all waters achieving good status by 2027 at the latest). Under this directive River Basin Management Plans (RBMPs) have been produced for all River Basin Districts in Ireland. The South Western RBMP came into effect on 15th July 2010 and outlines the status and programme of measures required to meet the regulations. It is important to ensure that the proposals do not have any implications on the status of water bodies assigned under the WFD.

The Shellfish Directive (2006/113/EC), transposed in Ireland by the Quality of Shellfish Waters Regulations (S.I. No. 268 of 2006), as amended, aims to support shellfish life and growth and to contribute to the high quality of directly edible shellfish products within designated shellfish areas. Under these Regulations the Minister for Environment, Heritage and Local Government is required to have Pollution Reduction Programmes (PRP) prepared for designated shellfish waters. Bantry Inner and Bantry Bay South, fall within protected zones. Please refer to Figure 1.7 – below – for delineation of the applicable areas. It is the purpose of each PRP is to take reasonably practicable steps to protect and, where necessary, improve water quality in the designated shellfish growing areas with the aim of achieving the environmental water quality standards established for them.

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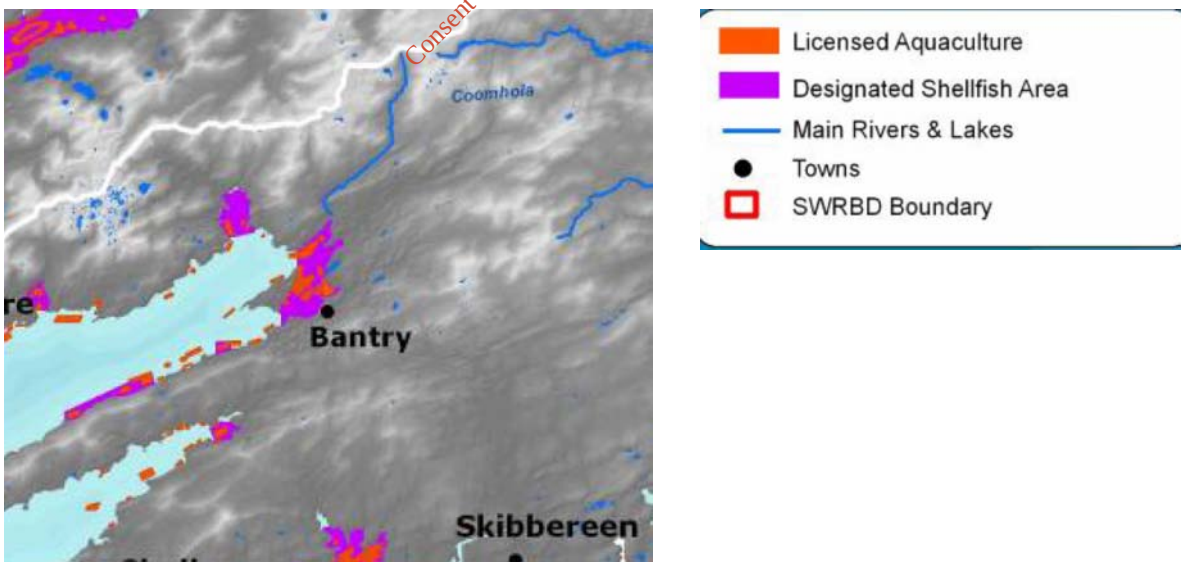

Figure 1.7 – Designated Shellfish Areas – Source SW RBMP

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1.4.8 Marine Planning

The policy setting pertaining to offshore development in Ireland is at developmental stage. Currently the policy setting is spread across several ministries and state bodies and there are no statutory requirements to prepare marine plans. However, the need for plan-led framework for the marine area has been long acknowledged.

"Sea Change – A Marine Knowledge, Research and Innovation Strategy for Ireland 2007-2013" presents a national agenda, comprising science, research, innovation and management, aimed at a complete transformation of the Irish maritime economy. The need to research the law and policy underpinning the following is identified:

- Marine spatial planning;
- Integrated coastal zone and ocean management;
- Foreshore use; and
- Research, enterprise, and the commercial development of the marine sector.

In 2010, on the transfer of the foreshore functions to the Department of Environment, Community and Local Government, the Minister stated that the key objective for the new modernised model will be that the foreshore functions will operate within a "*plan-led"* policy framework. Such an approach, together with the modernised legislation, could:

- Provide greater certainty to developers concerning potentially acceptable locations for different types of development;
- Allow a more strategic approach to management in that it would improve understanding and consideration of the cumulative and combined effects between different activities and the marine environment itself; and
- Allow for planning proactively, rather than just reacting to applications, changes and situations.

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1.4.9 Assessment and Conclusions

A brief assessment of the proposal is provided below within the context of each relevant piece of legislation and policy. On occasion conclusions may appear to be repetitive although this is due to the consistency in the hierarchy of Planning Documents, throughout which given themes tend to reverberate.

1.4.9.1 EIA and Planning Legislation

This development proposal requires planning consent however is not considered to constitute Strategic Infrastructure Development – whereby it is assessed differently procedurally. Upon detailed consideration this proposal has been assessed as sub-threshold development. However, given the range of project elements, the legislative context as described in Section 5.4, and based on previous experience, the Client/Consultant team took the pre-emptive measure of preparing this Environmental Impact Statement (EIS) to accompany the planning and licensing applications. This EIS has been prepared in accordance with all legislative requirements and robustly assesses all on-shore and off-shore elements of the development process. This EIS will support the planning application by

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Bantry Bay Harbour Commissioners for the redevelopment of the Inner Harbour, which will be submitted to Cork County Council for consideration and determination.

1.4.9.2 Marine Legislation

This proposal requires both foreshore lease and license applications to be made to the Foreshore Unit of the Department of Environment. All environmental impacts associated with development of the off-shore environment have been appropriately assessed in this Environmental Impact Statement.

1.4.9.3 National Development Plan

This proposal contributes to the ethos (create a better quality of life for all) and objectives of the NDP as it represents a significant investment in a rural peripheral area thus contributing to balanced regional development. The new harbour will create jobs during the construction and operational phases of the project as well as an additional tourist "pull" to Bantry by contributing to the existing resource of leisure facilities, thus contributing to the local economy. The environmental consequences of the project are rigorously assessed in appropriate detailed chapters within this EIS testifying to the overall environmental sustainability of the project. Please refer to Chapter 12 – Human Beings – for further information.

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1.4.9.4 National Spatial Strategy

Sustainability is an integral facet of this proposal in terms of its design, build and operation. The proposal contributes to the aim of the NSS to develop coastal infrastructure in accordance with the marine leisure sector. Furthermore, it contributes to the recognised economic role of Bantry within its wider area.

1.4.9.5 Regional Planning Guidelines

The proposal supports the objectives of the RPG by contributing to the economy of the South West Region and the recognised tourist baseline within the "Western Area" in which Bantry is situated. The improvement of Bantry Port is noted as being important for the local economy. It is estimated that circa 20-30 jobs will be created during the 2 year construction phase and a further 5 jobs during the operation phase of the project. The total capital investment represents €21 million and the overall economic impact is estimated at €13.5 million. Additionally, further benefits in terms of increased visitor footfall and exponential spend will result from the proposal. Please refer to Chapter 12 – Human Beings.

The proposal is sensitive to the existing natural and built heritage resource of the area. Appropriate consideration of this is provided elsewhere in Chapters 10 & 11 and Chapters 9 respectively.

1.4.9.6 Cork Development Plan

Bantry Harbour development has been designed responsibly and within the context of the natural, built and human environment of the area. Via the Environmental Impact Assessment

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(EIA) process the design and continued to evolve. The proposal represents significant inward investment for the town, creating jobs directly and indirectly during construction and operational lifetime phases, and adding to the critical mass of tourist attractions in the area. Accordingly the proposal is consistent with the aims and goals of the Development Plan.

Consideration of the built environment and Architectural Conservation Area (ACA) has been provided in Chapter 9 of the EIS.

Consideration of the natural heritage is provided in Chapters 10 and 11 of the EIS.

Impacts of the proposal on flooding is provided in Chapter 16 and Appendix 5 of the EIS.

A full Landscape and Visual Impact Assessment is provided in Chapter 14.

1.4.9.7 Bantry Electoral Area Local Area Plan

Proposals are consistent with Plan Objectives relating to the harbour. Individual assessments regarding specific issues of inter-alia: flooding; landscape and visual impact; built heritage; and natural heritage; are provided elsewhere in this EIS. For a summary of conclusions, please refer to section 1.4.9 – directly above. A summary of the economic impact of the proposal is provided above in Section 1.4.9.5. For further details please refer to Chapter 12 – Human Beings.

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1.4.9.8 Further Considerations

Atlantic Gateways Initiative: Bantry is located beyond the delineated Gateway however it is recognised that this area needs to be dynamic and moving. The proposal is in accordance with the principles of the initiative, representing a significant investment in a peripheral but proximate area.

North and West Cork Strategic Plan: This proposal is in accordance with the fundamental objectives of the plan. It represents a significant environmentally sustainable investment which will contribute to a higher quality of life and opportunity in the West Cork Region.

South West River Basin Management Plan: The proposal has been developed cognisant of the requirements under the Water Framework Directive as well as other important commitments under the Shellfish Directive, as there are designated shellfish waters in Bantry Bay. This designation contributed to the decision to undertake a pre-emptive EIA. Further information on appropriate measures aimed at contributing to the European Shellfish designation is contained within Chapter 16.

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1.5 Scope and Format of EIS

1.5.1 Scope of the EIS

Prior to work commencing on the EIS, it is important that the scope of works is effectively defined. The scoping exercise will confirm the nature of the development, the extent of the environmental assessment, the key issues and the level to which these issues need to be addressed.

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

- Preliminary consultation with the principal statutory consultees and key interested parties;
- 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.

A summary of the potential impacts identified during the scoping study are presented in Table 1.1.

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, nature and magnitude.

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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 the main consultation phase of the study, as outlined in Chapter 2 of the EIS.

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Table 1.1 Scoping Matrix

Environmental Topic (Ref: EIA regulations)	Potential Impacts			
	Construction Phase		Operational Phase	
	Degree of Potential Impact	Description	Degree of Potential Impact	Description
FLORA AND FAUNA				
Flora and Fauna	-	• Loss and disturbance during construction activities • Potential knock-on effects from water quality impacts	- to 0	• Potential knock-on effects from potential changes to the benthic ecology • Potential knock-on effects from water quality impacts
FISHERIES				
Finfish and shellfish	-	• Loss and disturbance during construction activities • Potential knock-on effects from water quality impacts	- to +	• Use of reclaimed area for fishery-related activity • Potential knock-on effects from potential changes to the benthic ecology • Potential knock-on effects from water quality impacts
MARINE MAMMALS				

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Environmental Topic (Ref: EIA regulations)	Potential Impacts			
	Construction Phase		Operational Phase	
	Degree of Potential Impact	Description	Degree of Potential Impact	Description
Marine mammals	-	• Loss and disturbance during construction activities • Potential knock-on effects from water quality impacts • Potential collisions • Potential interference with the ability of the animals to communicate, orientate and catch	- to 0	• Potential knock-on effects from potential changes to the benthic ecology • Potential knock-on effects from water quality impacts
MATERIAL ASSETS				
Material assets	0	• No likely impacts during construction	- to +	• Either development likely to add to the material assets of the area. • Increased usage of the sites could lead to increased traffic congestion.
CULTURAL HERITAGE (INCLUDING ARCHAEOLOGY)				
Cultural heritage	- to +	• If material of archaeological interest is present, it could be damaged, destroyed or buried during the works phase. • Potential to discover previously unknown archaeological artefacts.	0	• Once present, there will be no additional impacts.

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Environmental Topic (Ref: EIA regulations)	Potential Impacts			
	Construction Phase		Operational Phase	
	Degree of Potential Impact	Description	Degree of Potential Impact	Description
HUMAN BEINGS				
Human beings	- to +	• Potential disturbance from noise and dust during construction phase. • Potential increase in revenue in local businesses from spends during construction phase.	+	• Direct benefit through mooring charges and indirect benefit through increase tourism to the area.
SEASCAPES AND VISUAL IMPACTS				
Visual Impact	-	• The machinery present during the works phase will have a negative visual impact.	- to +	• The re-nourished beach is likely to have a positive effect on visual amenity. • The reclaimed area could negatively affect visual amenity if not sensitively designed.
NOISE AND VIBRATION				
Noise and vibration	-	• Most of the noise will be associated with the works phase.	- to 0	• Potential for increase noise due to increased usage of the Cove and Abbey sites.

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Environmental Topic (Ref: EIA regulations)	Potential Impacts			
	Construction Phase		Operational Phase	
	Degree of Potential Impact	Description	Degree of Potential Impact	Description
GEOLOGY				
Geology	- to 0	• Potential impact due to burial of marine sediments.	- to 0	• Potential impact due to burial of marine sediments.
WATER QUALITY				
Water quality	-	• Increased turbidity levels	- to 0	• Potential longer term water quality changes due to changes in flow and sediment regimes.
COASTAL PROCESSES				
Coastal processes	- to 0	• Changes to hydrodynamics, sediment regime and hydromorphology	+	• Changes in coastal processes will results in the provision of a sheltered beach and connecting strand

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1.5.2 Format of the EIS

The EPA has produced guidelines on the production of a statutory Environmental Impact Statement (EIS) in line with the Environmental Impact Assessment Regulations and these guidelines have been followed in the production of this EIS. The report 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 development proposals and puts forward mitigation measures to lessen the degree of the impact

Part IV provides a summary of impacts and mitigation measures

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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 of the project heard during the initial design stages of the project. This can allow changes to be made during the design stage taking on-board comments and ideas from the consultation process. A comprehensive consultation phase was conducted as part of the EIA for the proposed harbour development at Bantry. This chapter of the Environmental Impact Statement (EIS) reports on the various stages and findings of the consultation process.

2.2 Statutory and Relevant Bodies Consultation

The consultation with statutory bodies and other relevant bodies commenced at the outset of the project and extended during the impact assessment phase. A letter and information (presented in Appendix 7a) about the proposed development was sent to the consultees listed on Table 2.1. A summary of the issues raised by the consultees is presented in Table 2.2. All replies received were fully considered and issues raised were followed up where relevant and taken on board during the design phase of the EIA.

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Table 2.1 Statutory and Non Statutory Bodies consulted during EIA Process

Department of Environment, Community and Local Government (Development Applications Unit)	Department of Communications, Marine and Natural Resources (Dublin)	Marine Institute
Environmental Protection Agency	Inland Fisheries Ireland (Dublin)	Inland Fisheries Ireland (Cork)
Bord Iascaigh Mhara	Department of Environment, Community and Local Government	Bantry Town Council
Department of Agriculture, Fisheries and Food	Underwater Archaeology Unit	Department of Communications, Marine and Natural Resources (Cork)
Office of Public Works	Irish Naval Service	South Western Regional Authority
An Taisce	Arts Council	Geological Survey of Ireland
Comhar – Sustainable Development Council	Irish Federation of Sea Anglers	Irish Fisherman's Organisation
Irish Fish Producers Association	IFA Aquaculture and Irish Shellfish Association	Birdwatch Ireland
Irish Whale and Dolphin Group	Irish Wildlife Trust	County Nature Trust (Cork)
Heritage Council	Cork Environmental Forum	VOICE
Bord Gais Eireann	Eircom	Electric Ireland
Cork/Kerry Tourism	Failte Ireland	Royal Cork Yacht Club
Baltimore Sailing Club	Monkstown Bay Sailing Club	Coastwatch Europe Network
RNLI Ireland	Enterprise Ireland	Commissioners of Irish Lights
Department of Arts, Heritage and	Department of Transport, Tourism	Department of Finance

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the Gaeltacht	and Sport	
Department of Jobs, Enterprise and Innovation	National Roads Authority	Health Service Executive
IDA Ireland	South Western River Basin District	Sustainable Water Network
National Monuments Service	Chambers Ireland	Landscape Alliance Ireland
IBEC	ISME	National Anglers Representative Association
Federation of Irish Salmon and Sea Trout Anglers	Sea Fisheries Protection Authority	

Table 2.2 Summary of Issues Raised by Consultees during Consultation Process

Topic	Organisation	Issue
Marine mammals	IWDG	A review of cetacean records in the area and adjacent waters could be carried out to reveal species likely to be present. The IWDG have a database of over 15,000 cetacean sighting records from which this information could be drawn.
	IWDG	Generally the NPWS and other agencies usually require the use of a Marine Mammal Observer (MMO) to ensure no cetaceans are present during dredging. A buffer zone might need to be created to ensure there is no effect on cetaceans in the area.
	IWDG	The waters adjacent to Bantry Harbour and especially Bantry Bay is important for a variety of cetacean species including harbour porpoise which is entitled to strict protection as it is under Annex II of the EU Habitats Directive. In addition bottlenose and common dolphin and minke whale have also been regularly reported in the area. The presence of some of these species is seasonal (e.g. minke whale) while others are resident (e.g. harbour porpoise)
	Marine Institute	An assessment of the impact on flora and fauna in the bay area, including mammals, fish and fisheries, birds, aquatic mammals and invertebrates during both the construction and operational phases of the development
Fisheries	Inland Fisheries Ireland	Impact of dredging both in terms of habitat loss and the quantification and offsetting of this loss
	Inland Fisheries Ireland	Control and monitoring of suspended solids associated with dredging
	Inland Fisheries Ireland	Quantification of the loss of habitat from reclamation and offsetting of this loss.
	Inland Fisheries Ireland	Treatment and disposal of sewage effluent from proposed marina
	Inland Fisheries Ireland	Safe disposal of dredged materials and potential impact on fisheries
	Inland Fisheries	Overall impact of the proposal in general on fisheries in the wider

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Topic	Organisation	Issue
	Ireland	Bantry Bay area.
	Marine Institute	DAFM licensed shellfish areas is a key dataset to take into consideration
	Marine Institute	MI are responsible for the monitoring programme under the Shellfish Waters Directive and also for marine biotoxins under the Hygiene Directives and have some relevant data from inner Bantry Bay. Make a formal request for these data via the MI web site http://www.marine.ie/home/publicationsdata/RequestForData.htm
	Marine Institute	An assessment of the impact on human activities, including aquaculture, fishing and marine leisure activities during the construction and operational phases of the development
	Marine Institute	An assessment of the impact on flora and fauna in the bay area, including mammals, fish and fisheries, birds, aquatic mammals and invertebrates during both the construction and operational phases of the development
	Marine Institute	An assessment of the impact of the works on the Bantry Bay designated Shellfish Water area (see SI 200 of 1994)
	DAFM	Licensing of the aquaculture industry in Inner Bantry Bay is currently in progress, but this should not significantly alter the information relating to the aquaculture industry from an EIA perspective.
	DAFM	In the short term, the capital works will have a number of impacts that the EIA should consider from an aquaculture and fishery harbour perspective. These include water quality, sedimentation, hydrodynamics, navigation and access during construction phase, dredging and treatment of contaminated and uncontaminated materials, dumping at sea, reclamation, and the undermining of existing structures.
	DAFM	In the long-term the EIA should consider impacts on navigation, marine traffic, usage of the pier, development of storage and maintenance facilities, other harbour facilities and maintenance dredging.
	DAFM	The proposal will require statutory licences and permissions for various aspects of the development from a number of authorities. This Department is of the view that removal of the TBT would certainly require a "*Dumping at Sea*" consent from the EPA and possibly a foreshore licence from the Department of the Environment, Community and Local Government (in view of the apparent 'capital dredging' aspect).
	DAFM	The concern for wild fisheries in the area is the potential mobilisation of TBTs from the sediment during its removal.
	DAFM	There is limited data available on inshore fisheries traditionally operating in the area concerned, however, there is likely to be a shrimp fishery in the area and possibly some scallop and lobster

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Topic	Organisation	Issue
		crab potting on reefs close to the shore. Molluscs are very sensitive to TBT, especially larval stages and juveniles. Any impact on stocks could give rise to claims for loss of income.
	DAFM	The EIA should set out how the required statutory licences and permissions will be handled in a co-ordinated manner.
Tourism	Failte Ireland	Fáilte Ireland Guidelines for the treatment of tourism in an EIS
Human beings	Marine Institute	An assessment of the likely effects of the proposed development on the health and safety of human beings during the construction and operational phases of the development
	Marine Institute	An assessment of the impact on human activities, including aquaculture, fishing and marine leisure activities during the construction and operational phases of the development
	HSE	Response from Environmental Health Department. Environmental Health Department made the following HSE departments aware of the consultation: Emergency Planning (Mr Peter Daly); Asst National Director for Health Protection (Kevin Kelleher and Marie Woods); RDO (Pat Healy); Estates (Helen Maher). No comments were received from these departments for inclusion in the report from Environmental Health Department.
	HSE	The development would potentially have a positive effect on the local town and surrounding area however its construction and operation must be managed to ensure that it does not have a negative effect on the health of the area
	HSE	The EIA should clarify whether additional on-site development is proposed and the cumulative impacts of any such proposal.
	HSE	The EIA should indicate and identify the presence and location of any water supply sources within the proposed site curtilage and clarify whether such sources are currently serving as drinking water supplies to households and business premises in the general locality.
	HSE	The EIA should consider alternatives not only for location but also for other items such as services, in the report and outline the reasons in full as to the final decision.
	HSE	Alternatives should also be addressed for residents and workers on Whiddy Island if the pier in Bantry is not available for use at any time during construction.
	HSE	The EIA should include details of how information regarding the development was provided to the public including the making of submissions. The EIA should include meaningful public participation identifying what issues or concerns are raised by the public and how they are addressed.
	HSE	The following departments should be contacted to ensure that their respective areas of responsibility are protected:
	HSE	Cork Co Co to establish the storm drainage and sewerage networks in the harbour area and possible impacts on the town's

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Topic	Organisation	Issue
		drainage system, given the history of flooding in the lower area of the town;
	HSE	Cork Co Co to establish the capacity of the water supply in the town and whether it can sustain the activities proposed in the development. This is an area where alternatives may need to be considered;
	HSE	Cork Co Co and other relevant organisations regarding the possible impact on vulnerable groups in the area e.g. the travelling community living in close proximity to the proposed development;
	HSE	Sea Fisheries Protection Agency to establish the possible effects on the fishing industry in the area including the mussel lines in the bay. The effects much be looked at during construction and operation phase of the development;
	HSE	The potential impacts on structures on the shoreline should be assessed that may result from changed sediment transport patterns;
	HSE	Suitable modelling should be carried out to estimate the rate of suspended sediment in the area during dredging and its possible effect on nearby marine life;
	HSE	Baseline studies should be carried out over at least a twelve month period;
	HSE	There should be an integrated approach to the EIA to ensure that areas are not looked at independently but as a whole to ensure that one area does not adversely affect another.
	HSE	Assessments should be carried out on the following impacts during the construction phase:
	HSE	Construction Phase Impacts. Potential impacts of construction/development phase on groundwater including a geological assessment of the site landscape;
	HSE	Construction Phase Impacts. Potential impacts on the surface water arising from on-site run-off during the construction phase;
	HSE	Construction Phase Impacts. An assessment of whether proposed on-site construction/development works could exacerbate the flooding problems in the area;
	HSE	Construction Phase Impacts. An assessment of whether proposed on-site construction/development works could affect beaches used by the public in the area;
	HSE	Construction Phase Impacts. Mitigation measures are recommended to be outlined to ensure that during construction polluting substances are prevented from entering water courses;
	HSE	Construction Phase Impacts. Mitigation measures are recommended to be outlined to ensure that during construction, materials containing toxic substances such as the TBTs, heavy metals and hydrocarbons are treated and disposed of in the

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Topic	Organisation	Issue
		correct manner so as not to cause harm;
	HSE	Construction Phase Impacts. The impact of dust generation from excavation, construction machinery, stockpiling and general construction traffic should be assessment and dust minimisation plan or similar mitigation measure that meets current national or international standards for construction sites put in place;
	HSE	Construction Phase Impacts. Potential impacts of noise pollution (including vibration) arising from the construction phase should be clearly detailed;
	HSE	Construction Phase Impacts. Pest control on the site should be considered. The disturbance of land and accumulation of waste on the site may lead to increased rodent activity in the local area. This may impact on the local residents;
	HSE	Construction Phase Impacts. The health and safety of the public should be considered and access to the site should be controlled;
	HSE	Construction Phase Impacts. The report should comment on the provision of facilities for workers on the project. There are a number of factors such as wastewater treatment, sanitation facilities, canteen facilities etc which should be described;
	HSE	Construction Phase Impacts. The Bathing Water Directive must be complied with for the area to be used for recreational purposes. All reasonable practicable steps should be made to ensure that construction does not affect this.
	HSE	Operational Phase Impacts. The potential impact of noise should be evaluated in the context of any noise sensitive locations (domestic properties). Baseline noise data at the nearest dwellings should be established.
	HSE	Operational Phase Impacts. The EIA should identify any potential impacts which the development may have on site soils or water post completion.
	HSE	Operational Phase Impacts. Increased traffic should be considered on both land and sea and the potential impacts on the area.
	HSE	Decommissioning. The proposed plan for decommissioning of the project should be outlined.
Flora and Fauna	Marine Institute	An assessment of the impact on flora and fauna in the bay area, including mammals, fish and fisheries, birds, aquatic mammals and invertebrates during both the construction and operational phases of the development
	Department of Arts, Heritage and the Gaeltacht	The inner harbour mudflats support very small numbers of waders (e.g. redshank in winter and oystercatcher all year), a flock of mute swan and large numbers of gulls, especially in winter. The gulls are mainly black-headed and herring, but perhaps of most interest is the regular sightings of rare gulls in

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Topic	Organisation	Issue
		amongst them e.g. Mediterranean Gull, Iceland gull, little gull and ring-billed gull. Nearby to Cove is the important arctic/common tern colony of Horse Island which had 143 AONs in 2009 (counted by NPWS).
	Department of Arts, Heritage and the Gaeltacht	The nearest SAC is Glengarriff Harbour & Woodlands (Site code: 90). The only qualifying interest in relation to the marine part of the site is the Annex II species common seal. These mostly haul out in Glengarriff Harbour, around Cooliereagh Harbour and west of Whiddy Island but would use the area towards the inner Harbour for feeding. The impact of acoustic disturbance from the works and the impact of any toxins that might be released during dredging and through use of the sediment for breakwaters etc. should be assessed.
Material assets	Department of Transport, Tourism and Sport	Guidelines for Accessible Maritime Transport
	ESB	'sub-aqua' electricity cable runs from the Airstrip at Bantry across the Harbour to Whiddy Island.
	ESB	Contact 'Central Site' to locate possible cables in the vicinity of the excavation area. Send pdf map to dig@esb.ie
	NRA	Circular 6/2006 Policy Statement on Development Management and Access to National Roads
	NRA	DEHLG - Spatial Planning and National Roads (Consultation Draft) Guidelines for Planning Authorities
	NRA	The Authority would be specifically concerned as to potential significant impacts the development would have on the N71 in the proximity of the proposed development, especially with regard to reference to proposed land reclamation element along the frontage at Abbey. The Authority advises that this location is outside the 50-60 km/h applicable speed limit and should, inter alia, be subject to the requirement that no additional traffic would be generated by the development concerned or increased road safety hazard created.
	NRA	The developer should have regard to any Environmental Impact Statement and all conditions and/or modifications imposed by An Bord Pleanala regarding road schemes in the area. The developer should in particular have regard to any potential cumulative impacts.
	NRA	It would be important that a Traffic and Transport Assessment be carried out in accordance with relevant guidelines and best practice, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. The authority's Traffic and Transport Assessment

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Topic	Organisation	Issue
		Guidelines (2007) should be referred to in this regard.
	NRA	The developer, in conducting EIA, should have regard to the NRA's Environmental Assessment and Construction Guidelines, including the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (National Roads Authority, 2006).
	NRA	The EIS should consider the Environmental Noise Regulations 2006 (SI 140 of 2006) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Guidelines for the Treatment of Noise and Vibration in National Road Schemes, National Roads Authority, 2004, as amended)
	NRA	The designers are asked to consult the NRA's Road Safety Audit Guidelines (NRA HD 19/09) to determine whether a Road Safety Audit is required.
	NRA	The developer should assess visual impacts from the existing national roads.
	NRA	Notwithstanding any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.
Cultural heritage	Marine Institute	An assessment of the potential impacts on archaeological heritage in inner Bantry Bay including intertidal and sub tidal areas.
	DAHG	Bantry Harbour is of high underwater, coastal and maritime archaeological potential.
	DAHG	Bantry Harbour has a long and extensive history of maritime activity, particularly during the post-medieval periods when the harbour was the focus of coastal fortification, foreshore utilisation and maritime usage, including seeing several key historical events, not least sea battles and associated ship loss, within the harbour itself. Such maritime activity was associated with the ruling maritime Gaelic O'Sullivan Beara lordship, or was part of illicit piratical plunderings; similarly it was also associated with the extensive commercial merchant trade that was part and parcel of Bantry's development over time or indeed was naval and/or military in context, particularly in regard to the French Armada that used Bantry Bay as its entry point during the late-18th-century. Bantry Harbour has therefore seen all aspects of maritime movements over time. There is therefore the high potential that cultural material associated with the development of Bantry town and its quays (structures, features, artefactual material) and with the maritime activity within the confines of its harbour waters (structures, features, wreck, artefactual material)

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Topic	Organisation	Issue
		may be impacted by the proposed development works.
	DAHG	It is recommended by the Underwater Archaeology Unit that an Underwater Archaeological Impact Assessment, as detailed below, forms an integral part of the EIA for this proposed development.
	DAHG	Previously, in 2008 and again in 2009, this Department recommended that the results from proposed investigation works in the Inner Harbour area (core samples, bore samples, grab samples, etc.) being undertaken to inform the current proposed works, be provided to a suitably qualified archaeologist to assess for possible cultural material content. A copy of the requisite requirement letters from that time are attached with this current letter.
	DAHG	Underwater Archaeological Impact Assessment (Reason: To ensure the continued preservation (either in situ or by record) of places, caves, sites, features or other objects of archaeological interest)
	DAHG	The applicant(s) shall engage the services of a suitably qualified underwater archaeologist to carry out an underwater archaeological assessment of all areas to be impacted by the proposed works. This shall look at all areas to be impacted, including the proposed areas for reclamation and dredge spoil usage, including Beicin Strand and the Cove and at the Abbey Strand.
	DAHG	The underwater archaeologist shall carry out relevant documentary research including consulting with the following: the Shipwreck Inventory of Ireland data for Cork, to include available mapping data for the Bantry Bay area and the Archive of Ports and Harbours, both held in the Department of Arts, Heritage & the Gaeltacht; relevant Annalistic, journalistic, historical and local sources and results from previous relevant archaeological assessment/investigations in the area; the Topographical Files held in the National Museum of Ireland and all available cartographic material that will inform on how the Inner Harbour has developed over time.
	DAHG	The underwater archaeologist shall undertake diver/intertidal survey of areas to be impacted by the proposed works. These surveys to be accompanied by a metal detection survey.
	DAHG	The results of all investigation works data, including the previously applied for core, bore and grab samples, be provided to the archaeologist to assess for cultural material content potential. The results of this should also be included in the Impact Assessment Report.
	DAHG	Both the underwater and metal detection surveys shall be licensed under the National Monuments Acts 1930-2004 and it is

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Topic	Organisation	Issue
		advised that all diving, if required, be undertaken to the Health and Safety Authority's Safety in Industry (Diving Operations) Regulations 1981, SI422.
	DAHG	Having completed the work, the archaeologist shall submit a written report to the Underwater Archaeology Unit for consideration. The report shall include a detailed Impact Statement, including addressing the proposed dredging activity in the Inner Harbour area, and shall put forward further archaeological mitigation requirements if thought necessary.
	DAHG	Where archaeological material/features are shown to be present, this Department may make further archaeological recommendations. This may include preservation in situ (avoidance) or preservation by record (archaeological excavation) or proposed redesign of work to mitigate the cultural material. Archaeological monitoring of future dredging works may also be a requirement.
	DAHG	The completed EIA, with the UAA Report included, shall be forwarded to the UAU and the applicant shall await a considered response from this Department.
Noise and vibration	Marine Institute	An assessment of noise arising from both construction and operational phases of the development.
	Marine Institute	An assessment of underwater noise and vibration and an assessment of its impact on birds, fish and fisheries and marine mammals.
Water Quality	Marine Institute	An assessment of the impact of the works on water quality, hydrodynamics, tidal/wave patterns and sediment transport in the receiving environment.
Coastal Processes	Marine Institute	An assessment of the impact of the works on water quality, hydrodynamics, tidal/wave patterns and sediment transport in the receiving environment.
General	Marine Institute	A full and detailed description of the scale, nature and extent of all aspects of the development, a schedule of works including timescales and phasing arrangements.
	Marine Institute	The purpose of and need for the proposed development described in the context of any relevant national, regional or local policies and/or objectives.
	Marine Institute	An outline of the main alternative forms of development design, scale and construction methodologies considered prior to the selection of the preferred development option.
	Marine Institute	Justification for choosing the preferred design and construction methodologies
	Marine Institute	Details of the construction methods and materials that would be used to construct the proposed development.
	Marine Institute	Details of all dredging proposed
	Marine Institute	Information on the chemical composition of the material to be

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Topic	Organisation	Issue
		dredged and proposals for disposal / reuse of this material.
	Marine Institute	Calculations of the amount of and a description of the nature of material which would be disturbed or excavated on the site during dredging, including details of contaminant mobilisation from the seabed as a result of dredging
	Marine Institute	Outline of the alternative methodologies considered for the proposed on-site treatment of TBT contaminated sediments prior to the selection of the preferred treatment option and justification for choosing the preferred treatment option.
	Marine Institute	Outline of the main alternatives considered for the beneficial reuse of dredged material prior to the selection of the preferred option and justification for choosing the preferred option.
	Marine Institute	Information on the flora and fauna (including fisheries and aquatic mammals) in the receiving environment and surrounding area and details on their conservation status and ecological importance.
	Marine Institute	Information on the bathymetry, oceanography, hydrodynamics, tidal and wave patterns in the receiving environment
	Marine Institute	Proposals for the storage and disposal of material dredged or otherwise generated during construction of the proposed development and for the prevention or minimisation of emissions from it to marine waters.
	Marine Institute	Information on the type and quantity of the materials to be used in the construction of the development and on their storage and handling.
	Marine Institute	An assessment of the proposal in the context of the provisions of the Development Plan(s) relevant to the area.
	Marine Institute	A clear description of the measures envisaged in order to avoid, reduce and, if possible, remedy any significant adverse effects identified.

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2.3 Public Consultation

Two days of public consultations were held in Bantry on 17th and 18th July 2012. The events were advertised in the local newspaper (Southern Star) on the week before. A copy of the advert is included in Appendix 7B of this EIS. The public consultations were also advertised by means of posters displayed around Bantry town and Harbour, and it was announced at church services on the weekend before.

The consultations consisted of open sessions from 6-9pm on 17th July and 9am to 12 noon on 18th July at the offices of Bantry Bay Harbour Commissioners. Any member of the public could come along to the open sessions where drawings and all information pertaining to the EIA were on display. Engineers and scientists from RPS were on-hand to talk people through the proposals and also to answer any questions that people might have had. The two sessions were well attended with people representing a cross section of community in terms

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of age profile and background/interests. Overall, the proposed plans for Bantry Inner Harbour were very well supported by all attending and there was a general air or anticipation that it was finally going to proceed in Bantry after many years of longing for the harbour to be developed.

The questionnaire used at the public consultations sessions to gauge views from the general public on the development is presented in Appendix 7C. A number of photographs taken at the sessions are presented below.

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Plate 2.1 **Photograph taken on 17th July 2012 at public consultation session, Bantry**

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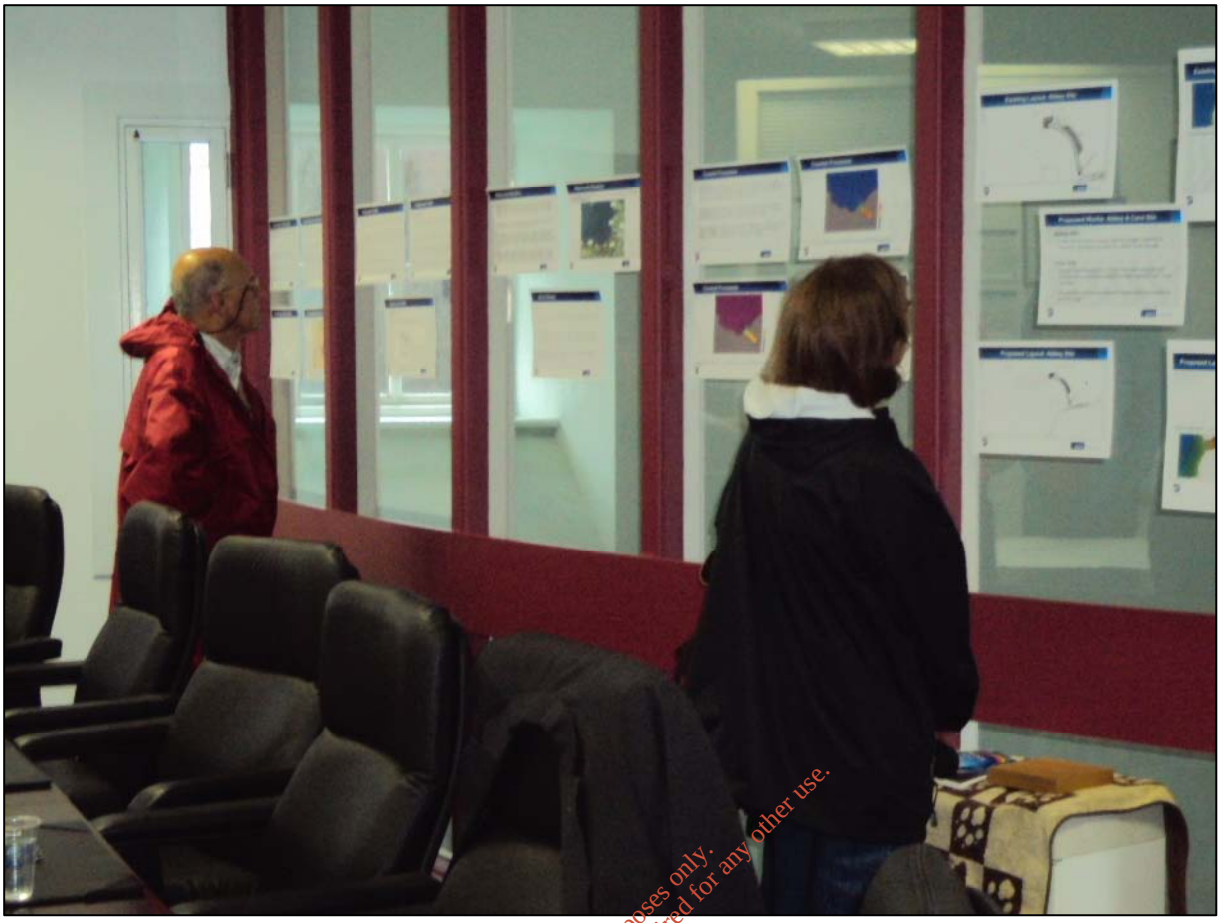

Plate 2.2 Photograph taken on 17th July 2012 at public consultation session, Bantry

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2.4 Conclusions

The various submissions and comments made in relation to the proposed new development at Inner Harbour, Bantry have been fully considered by the consultants in the preparation of the Environmental Impact Statement. 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 development.

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3.0 SITE DESCRIPTION

3.1 Site Location and Site Context

Bantry Bay (Figure 3.1) located on the south west corner of Ireland on the edge of the Atlantic Ocean is one of the deepest harbours in Europe and is the longest bay in Ireland. It is orientated in a south-westerly direction and is approximately 34km in length whilst its width varies from 8km at the mouth to 5km at the head of the bay. Bantry Bay is open to the south west and is vulnerable to waves from the south to west directions including swell from the north Atlantic. However, the area around Bantry to the east of the Bay is sheltered from significant wave attack in any direction by the presence of Whiddy Island, meaning that the wave climate there is dominated by locally wind generated waves. As the fetch is small, even the local wind waves do not have a particularly large wave height. The Mean Spring tidal range and Mean Neap tidal range are 2.9metres and 1.5metres respectively.

Bantry Harbour is a narrow inlet on the eastern shore of Bantry Bay (Figure 3.2). Bantry Harbour is approximately 100 metres wide and 500 metres from its mouth to its head. Mean high water levels are approximately 3.4 metres above Chart Datum while the seabed is often exposed at low tide. Bantry town is situated at the head of the harbour (Figure 3.2). Bantry Harbour is enclosed by steep slopes that provide natural shelter and a dramatic and attractive landscape setting for both the harbour and town.

Bantry is a bustling country town located approximately 90 km west of Cork City. It is located along the N71 National Secondary Route from Cork to Killarney. Figure 3.3 shows the location of Bantry in a regional context. It is a large market town providing commercial, retail and tourism/leisure facilities for an extensive coastal and inland catchment area. It is an important holiday and tourist centre, conveniently situated for easy access to Bantry Bay and the Beara and Sheep's Head Peninsulas. The proposed location of the new harbour development which this EIS is concerned with is within the Inner Harbour at Bantry.

Cove and Beicin Strand which are the proposed location of the beach renourishment projects as part of this overall development are located to the North of Bantry Harbour as shown in Figure 3.4. Abbey which is the proposed location of land reclamation is located to the south west of Bantry Harbour as shown in Figure 3.4.

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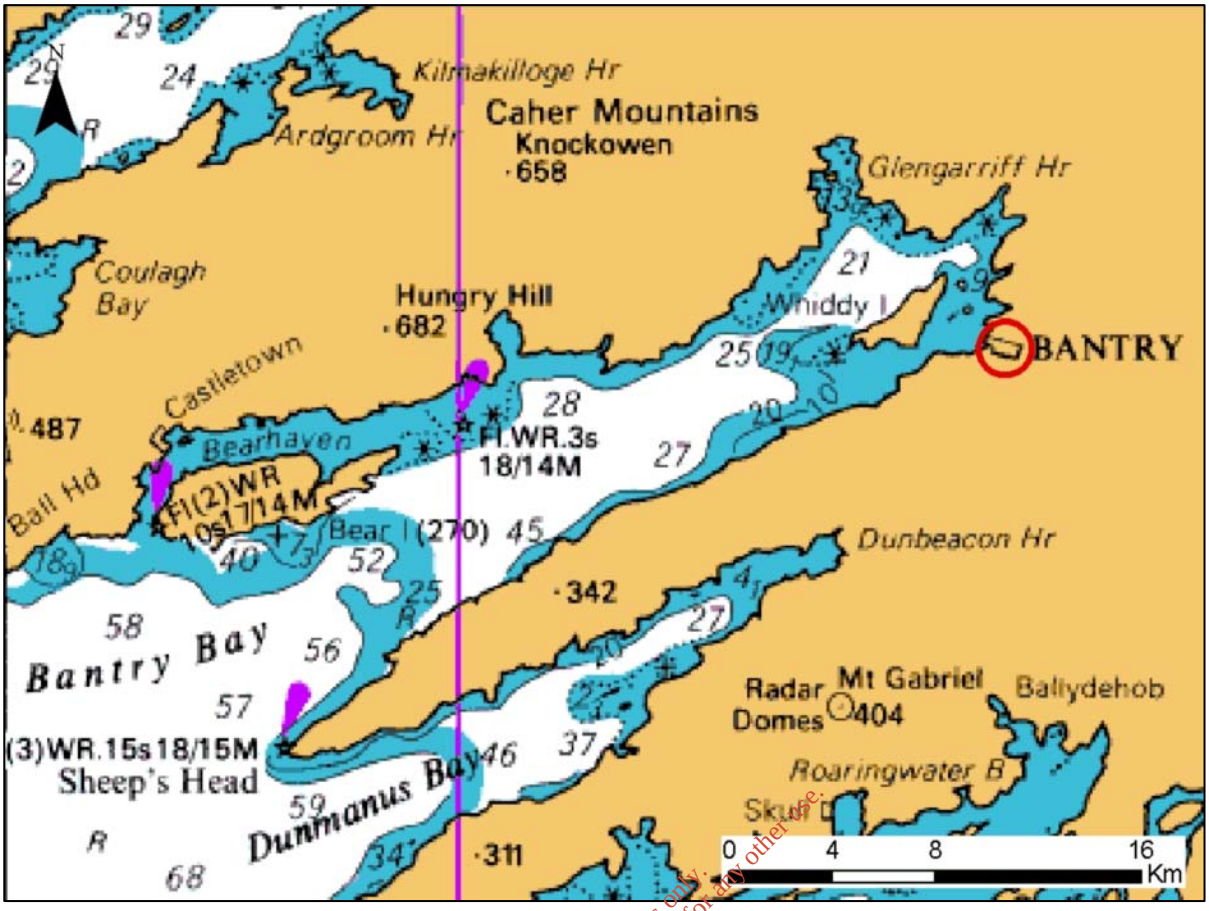

Figure 3.1 Bantry Bay – Regional Context

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Figure 3.2 Bantry Harbour

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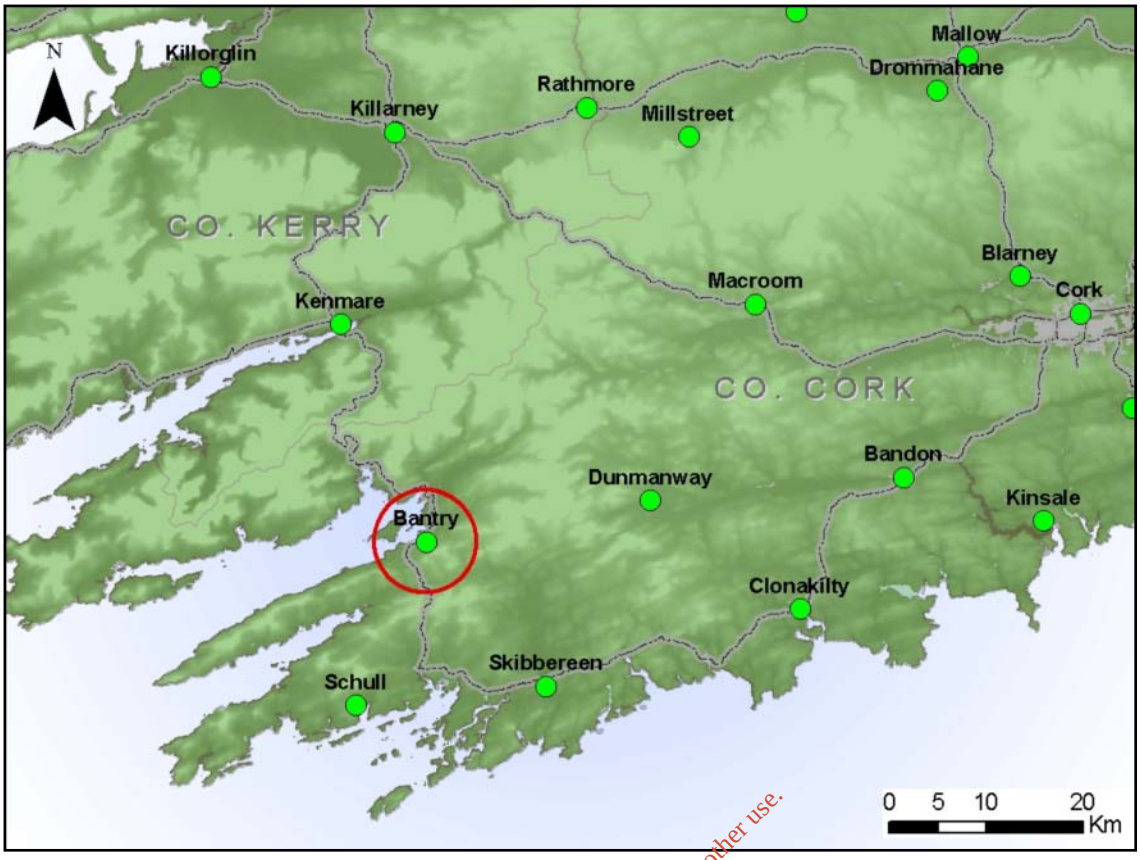

Figure 3.3 Bantry Town – Regional Context

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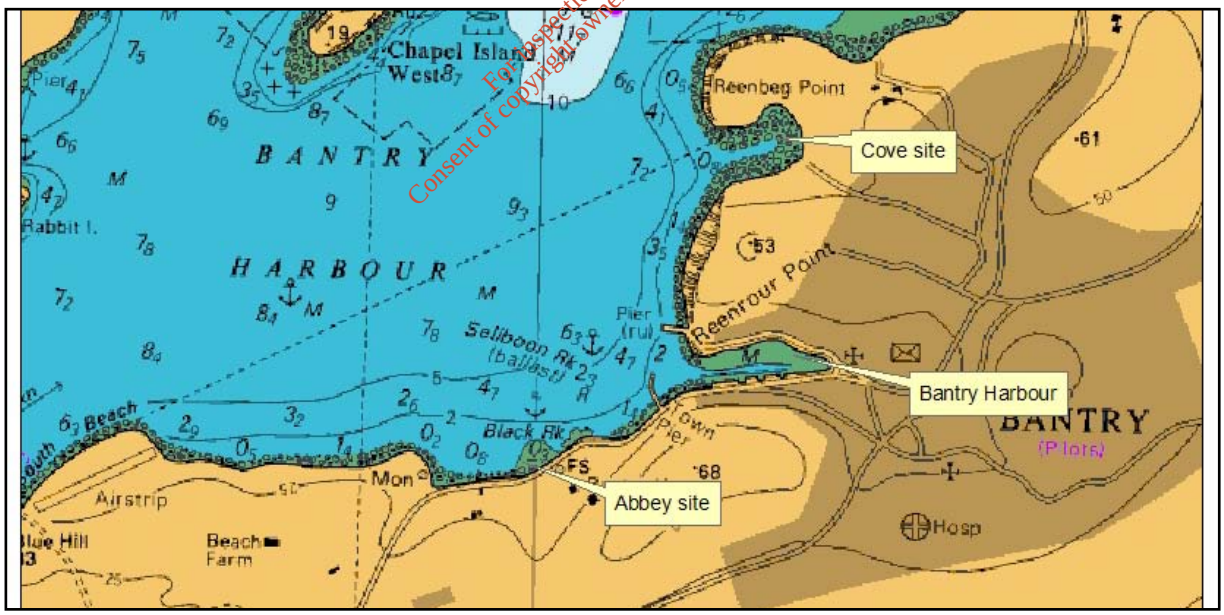

Figure 3.4 Locations of Cove and Abbey Sites

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3.2 Existing Land Use

3.2.1 Bantry Harbour

The photograph of Bantry Harbour presented in Plate 3.1 demonstrates that the harbour is a significant backdrop and makes up a large portion of Bantry Town. This photograph was taken at high tide but at low water, a large portion of the harbour dries out leaving areas of exposed mudflats as shown in plate 3.2.


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Plate 3.1 Bantry Harbour

Plate 3.2 Bantry Harbour at Low Tide showing exposed mud-flats

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The existing infrastructure within the Harbour is shown in Figure 3.5 and comprises primarily:

- Fishing pier
- Railway Pier
- Fishing Pier Quay Wall
- Northern Embankment Quay
- Wolfe Tone Square Reclamation Area
- Dry Dock
- Mooring for Vessels in Harbour

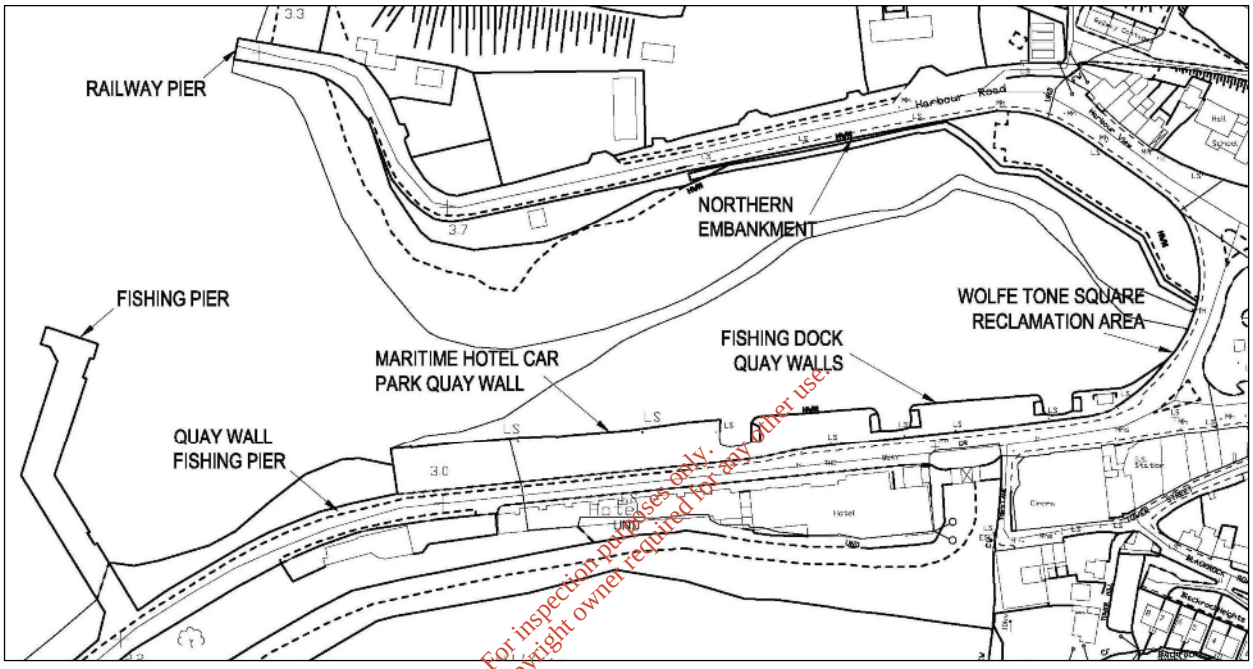

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Figure 3.5 Existing Infrastructure in Bantry Harbour

3.2.2 Cove

The focus of the proposed beach renourishment will be at the Cove Site. Plates 3.3 and 3.4 show some photographs of the Cove site in its existing state. It currently contains very little sand, as there does not seem to be a supply in the nearby area and it is also particularly subject to wave exposure, hence is composed of mostly gravel and cobbles. It is surrounded all around on landward side by agricultural land which is mostly used for grazing of lifestock. A number of private residential properties overlook the Cove site. There is access to Cove from a public road which extends from the N71 down to the beach itself. Access can also be gained along the shore at low tide from Bantry Harbour via Beicin Strand.

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Plate 3.3 Cove Strand (Coast of Ireland Oblique Imagery Survey)

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Plate 3.4 Cove Strand Images

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3.2.3 Abbey Site

The Abbey Site is the proposed location for land reclamation using material dredged from the Outer Harbour. The Abbey site is currently used as slipway for leisure craft. A hardstanding area is provided for slipway users and is used as a car park and for short term boat trailer storage as shown in Plate 3.5.

Plate 3.5 Slipway and boat storage facilities at Abbey Site

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It is accessed by a local access road from the N71, the main road into Bantry. The name Abbey relates to the name of the cemetery which is located on a raised area which adjoins the site on the southern side. The cemetery can be clearly seen in the background in Plate 3.5.

Plate 3.6 Existing Layout at Abbey Site

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Plate 3.7 Existing Layout at Abbey Site

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4.0 PROJECT DESCRIPTION

4.1 Introduction

This chapter of the Environmental Impact Statement describes the main components of the proposed harbour development at Bantry, Co. Cork and also the beach renourishment works at Cove and land reclamation works at Abbey. Consideration is also given to construction activities associated with the works and operation and maintenance of the completed facilities.

4.2 Proposed Development Works – Site Layout and Infrastructure

This section of the report describes the proposed harbour layout, beach renourishment schemes and land reclamation and the infrastructure required to achieve the project objectives. The proposed works do not include for the construction of any buildings or other structures on the proposed reclamation areas. Should any such infrastructure be considered in the future, then these will be the subject of a separate planning application. The existing arrangement in Bantry Harbour is shown in Figure 4.1.

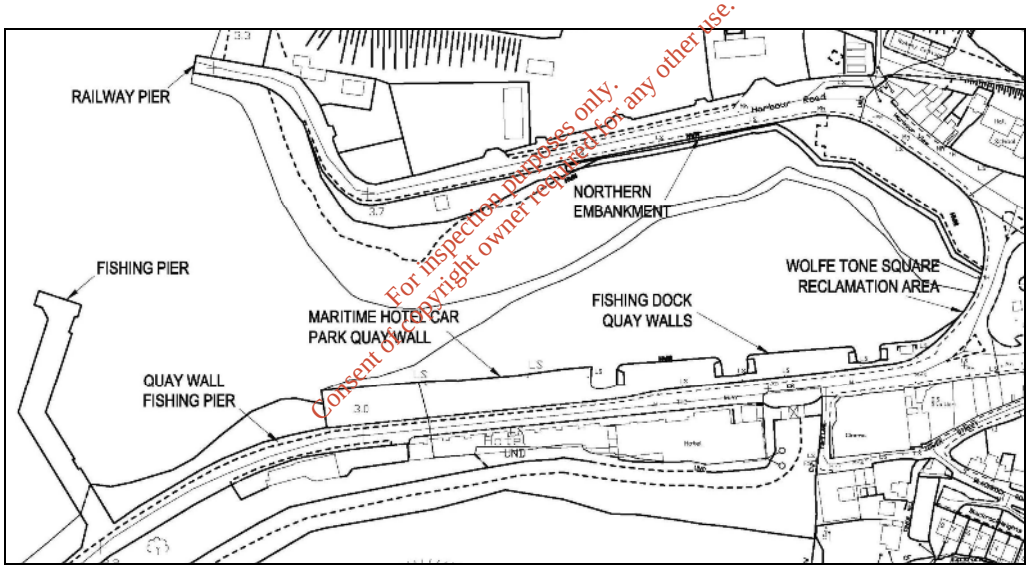

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Figure 4.1 Existing Layout of Bantry Harbour

The main components of the proposed development at Bantry are as follows:

1. Dredging of Harbour Basin
2. Fishing Docks and Quay Wall Improvements
3. Revetment construction
4. Fishing Pier Refurbishment
5. Land Reclamation within Bantry Harbour
6. Breakwater and Open Pile Quay Construction
7. Installation of Pontoons and Marina Services
8. Land Reclamation at Abbey Site to develop boat storage site
9. Beach Renourishment at Cove Site and Beicin Strand

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Figure 4.2 shows items 1 to 7 above and Figure 4.3a and 4.3b show the locations of items 8 and 9 on the list above.

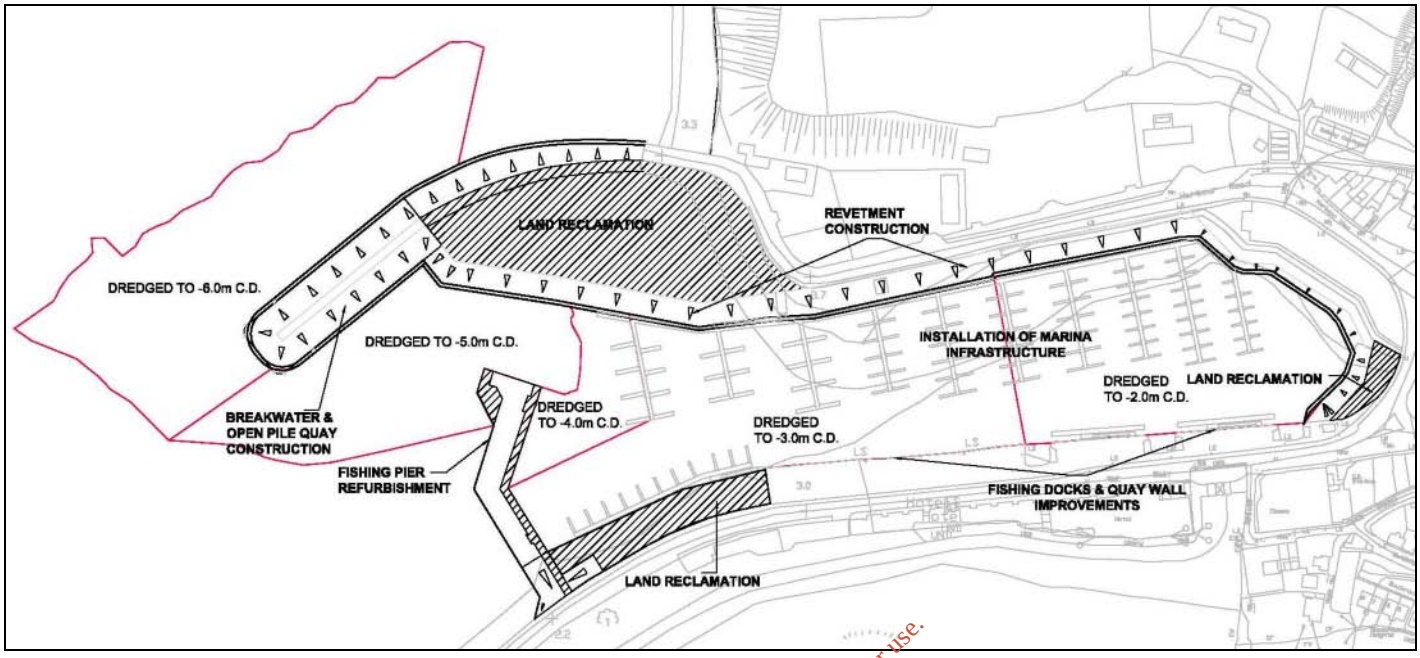

Figure 4.2 Proposed Arrangement of Harbour Development Works

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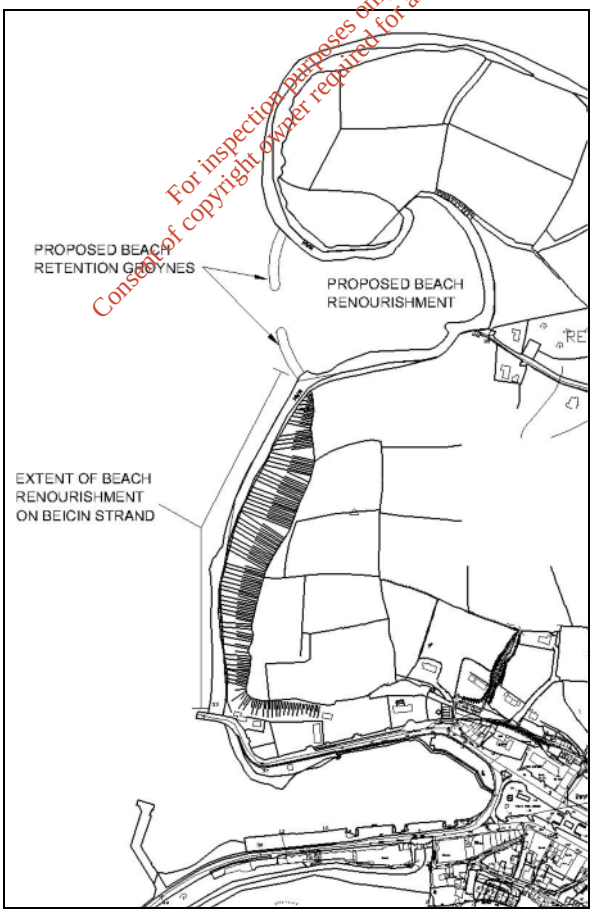

Figure 4.3a Beach Renourishment Sites at Cove and Beicin Strand

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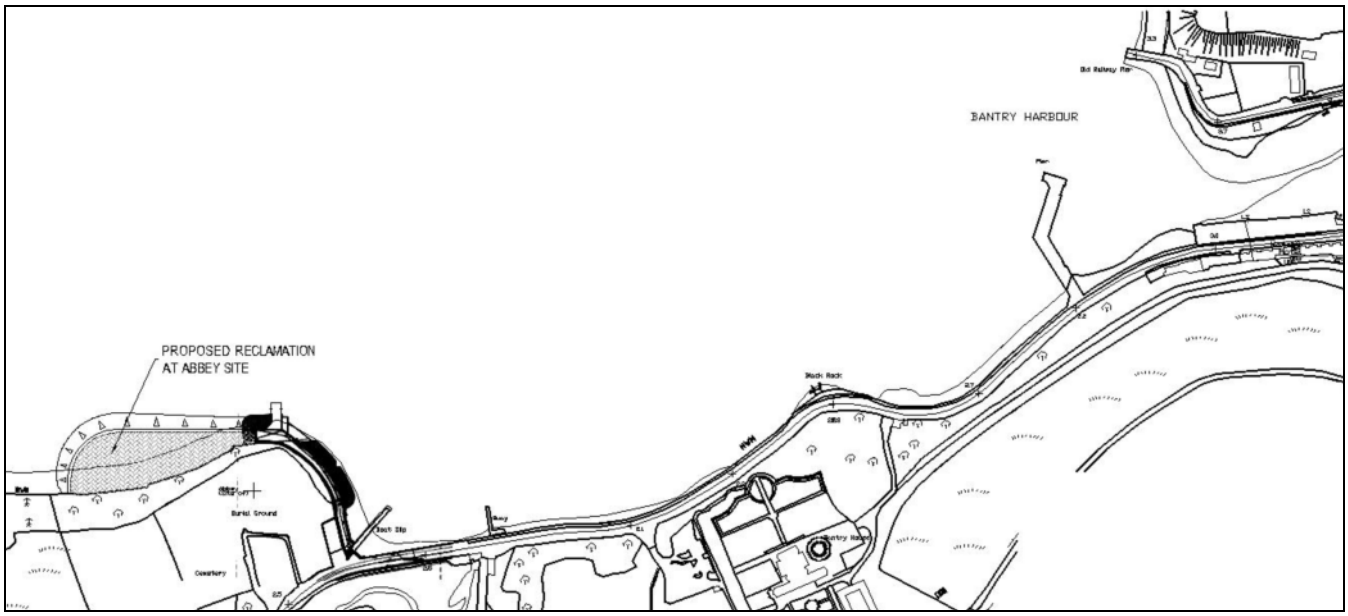

Figure 4.3b Proposed Land Reclamation site at Abbey

4.2.1 Breakwater Construction

A breakwater is required in order to ensure adequate protection to the Inner Harbour basin. The outer breakwater will incorporate an open pile quay structure with the facility for berthing on both the inner and outer faces. The layout of the proposed breakwater is shown in Figure 4.4.

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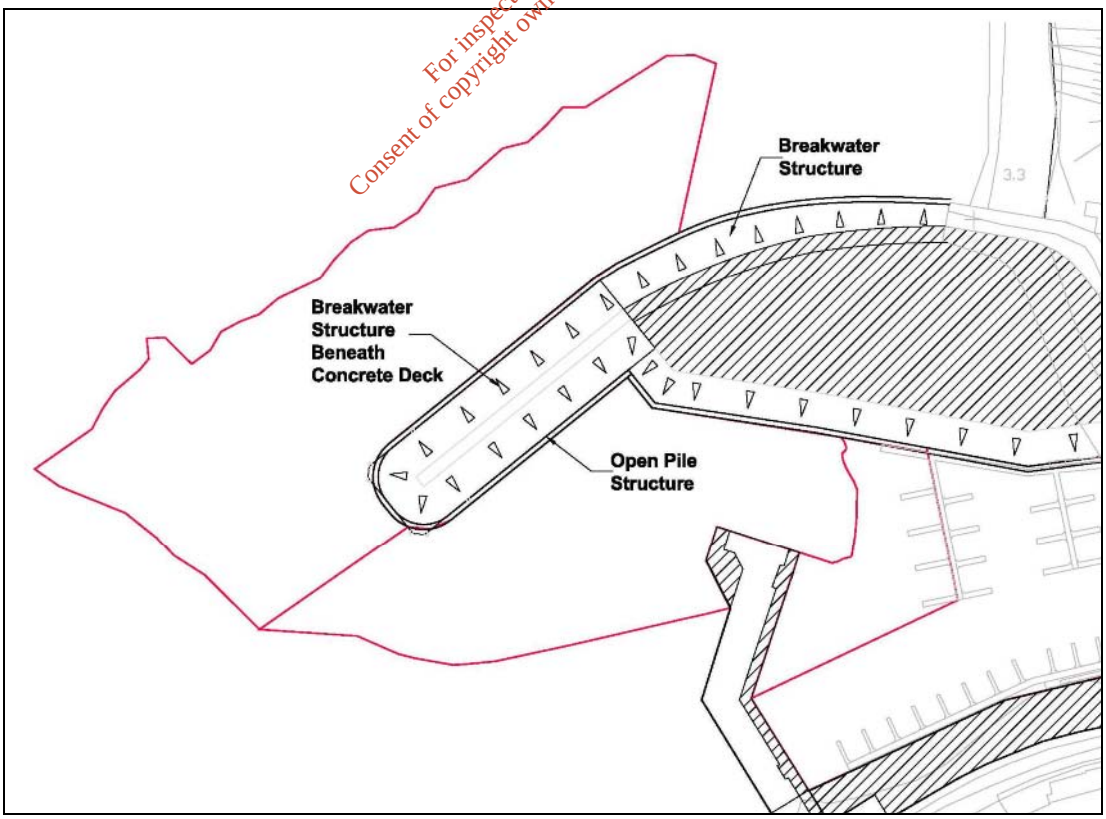

Figure 4.4 Proposed Breakwater Layout

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The breakwater will comprise a rockfill core with outer armour stones in the order of 0.5t weight. Dredged material will not be suitable for use in the breakwater construction and as such all materials will be imported. The top level of the breakwater and quay will be +5.75m CD to accommodate future sea level rise and extreme water levels.

4.2.2 Dredging of Harbour Basin

Dredging within the basin is required to provide adequate water depths for all tide access and berthing. At present there is significant silting up along the east face of the Fishing Pier, preventing usage as a berthing face. Therefore, dredging along this side of the pier will create two additional berths for larger vessels to tie up and float at all tides.

The material to be dredged largely comprises sandy silty gravels, along with some clay and rock. Environmental testing has indicated that there are high levels of mercury, TBT and copper within the upper 1m of the harbour sediments.

Dredging is proposed to -3m CD in the outer sections of the harbour basin with the depth in the inner sections being -2 m CD. Dredging will also be carried out in the areas outside the Harbour to -4m CD, -5m CD and -6m CD, as shown on Figure 4.5. The fate of dredged material from this dredging campaign is discussed further in Section 4.3 of this chapter.

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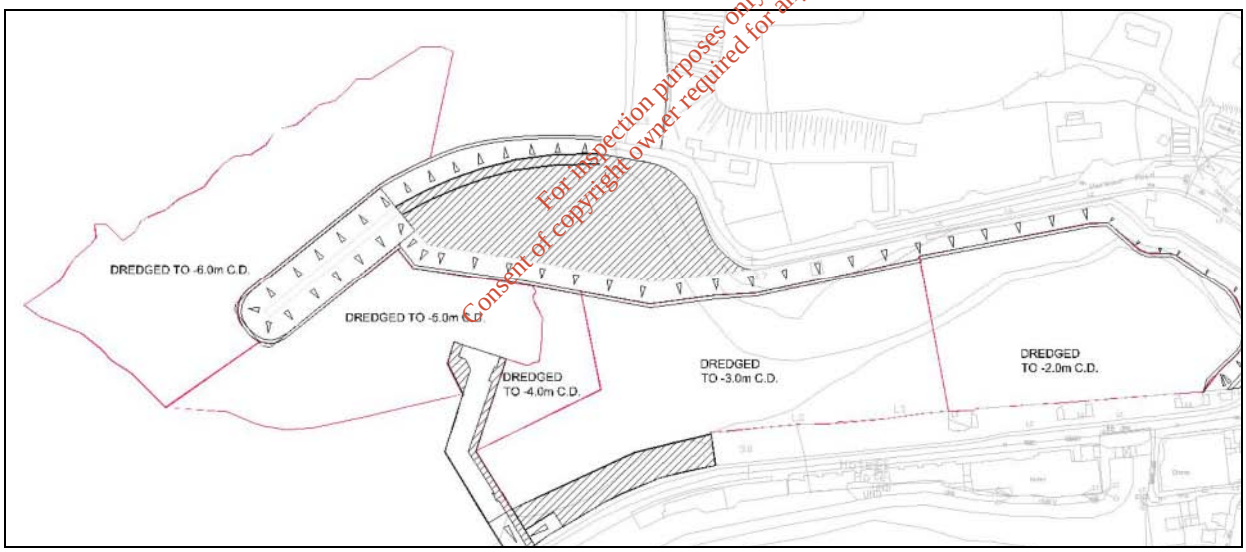

Figure 4.5 Extent of Dredging

4.2.3 Fishing Pier Refurbishment

The refurbishment works proposed for the fishing pier involve widening the existing pier by 4m along its entire length, and extending and widening the head of the pier to accommodate access to a floating pontoon and to allow the turning of HGVs. Sections of the pier will be closed off to facilitate the works and where possible the pier will remain operational. Should this not be feasible, there are various alternative piers in the Bantry area which can be used whilst the pier improvement works are ongoing. The proposed layout of the fishing pier works is shown in Figure 4.6.

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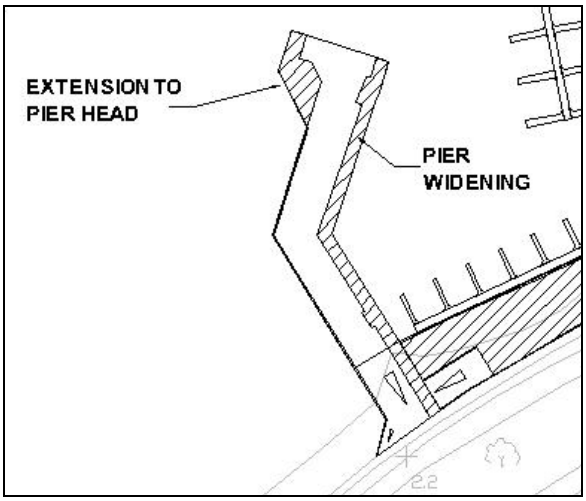

Figure 4.6 Proposed Fishing Pier Improvements

4.2.4 Fishing Docks & Hotel Car Park Quay Wall Improvements

Strengthening and deepening works are proposed for the foundations of the quay wall along the fishing docks and hotel car park. Deepening the foundations will allow the dredging of the inner harbour to extend to the line of the quay wall, without undermining the foundations of the quay wall thus maximising the water area of the dredge basin and the number of berths which can be provided. Pontoons will be installed along the face of the quay wall, providing berths for fishing vessels or leisure craft. The deck level along this length of quay will not be raised; the existing levels will be retained.

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4.2.5 Northern Embankment

A 7m wide tree-lined promenade overlooking the pontoons is proposed for the inner harbour. It is envisaged that this promenade will be provided on existing lands (currently comprising the footpath and roadway), in accordance with the overall master plan for the harbour area which includes the pedetrianisation of this area of Bantry. The existing stone pitched revetment will be extended to the new proposed dredge depth, minimizing the impact on existing features. This revetment will assist in the reduction of wave reflection within the basin.

The existing masonry wall at the top of the revetment will be replaced by a handrail to maximize the view over the pontoons. The existing surface levels will be raised by approximately 500mm to ensure the promenade ties in with the proposed level of +5.75m CD along the Northern Embankment and the Amenity Area.

4.2.6 Land Reclamation at the Inner Harbour

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4.2.6.1 Amenity Area Reclamation

The proposed amenity area reclamation adjacent to the existing Railway Pier will serve as the projects most extensive receptor for the accommodation of treated contaminated spoil arising from the dredging of the Inner Harbour.
This receptor can accept approximately 38,000m^3 of treated dredge material. The edges of the amenity area will be formed using rock armoured revetments, except where abutting existing structures. The treated material will be capped and a landscaped finish provided to the surface. A finish level of +5.75m CD is proposed for the Amenity Area, this will accommodate predicted sea level rise and will tie in with existing levels adjacent to the reclaimed area. The proposed layout of the Amenity Area is shown in Figure 4.7.

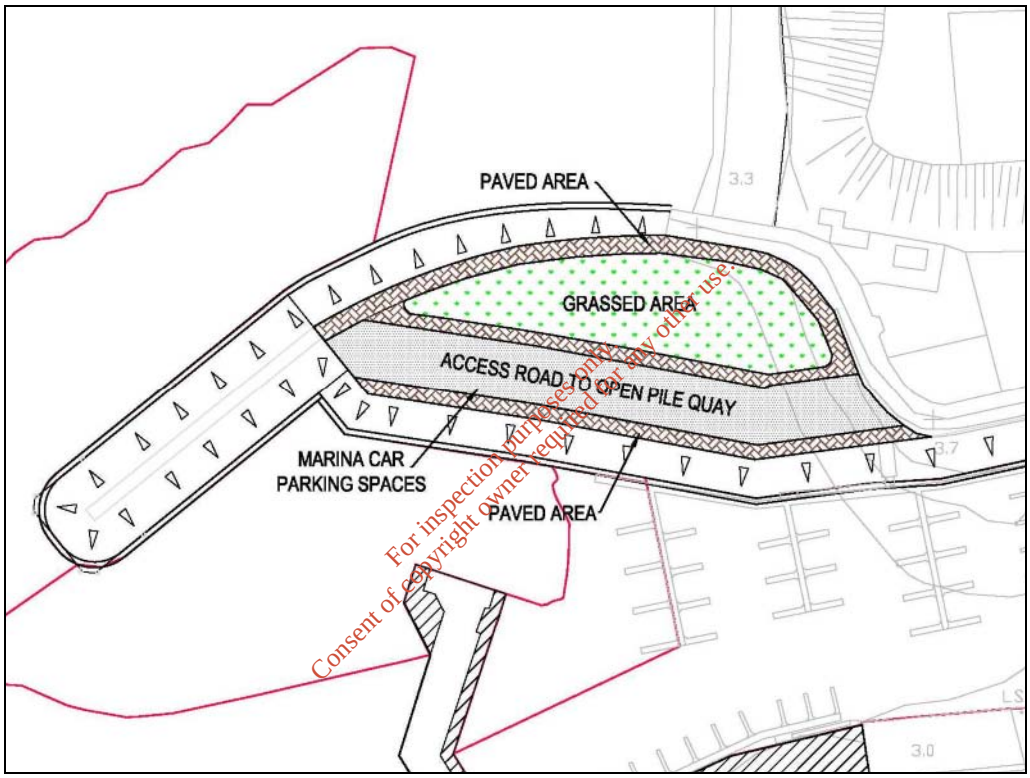

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Figure 4.7 Proposed Layout of Amenity Area Reclamation

4.2.6.2 Pierside Reclamation

It is proposed to reclaim an area between the root of the Fishing Pier and the Hotel Car Park. This will serve as an extension to the Fishing Pier and will provide additional car parking which will serve to alleviate congestion on the pier. This area will also provide a receptor for approximately 5,000m^3 of treated dredge material.

The finish level of the reclamation will be +4.75m CD, higher than the adjacent public road and levels, therefore a ramped access will be provided from the road level to the reclaimed area. Protective guard rails will be provided around the perimeter of the area also.

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Pontoons will be installed along the face of the reclaimed area, providing berths for smaller visiting leisure craft. A bridge structure providing access to the pontoons will be installed adjacent to the proposed hotel apartment complex.

4.2.6.3 Wolfetone Square Reclamation

A reclaimed area for pedestrians is proposed for this location, which will serve as an extension to Wolfetone Square. The reclamation levels will tie in with existing levels adjacent to the site. A protective guard rail will be provided along the edge of the reclaimed area; this will maintain the view from Wolfetone Square over the proposed marina and out to Bantry Bay.

4.2.7 Installation of Pontoons and Marine Services

Based on the extent of the basin possible after consideration of the provision of a suitable breakwater, wave propagation into the basin and proposed reclamation and shore protection it is considered that approx 230 marina berths could be provided as per the breakdown below. A proposed layout of the marina is presented in Figure 4.8. The breakdown of berths per vessel size is as follows:

- 7m – 20 nr
- 9m – 55 nr
- 11m – 103 nr
- 13m – 30 nr
- 15m – 8 nr

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Longer vessels or additional shorter vessels can be accommodated along the ends of the rows of berths. Two 50m long pontoons will also be provided for berthing along the fishing docks within the inner harbour. A localised structure with vertical walls will be provided at the access bridge location along the Northern Embankment to accommodate the landing of a bridge on the pontoons.

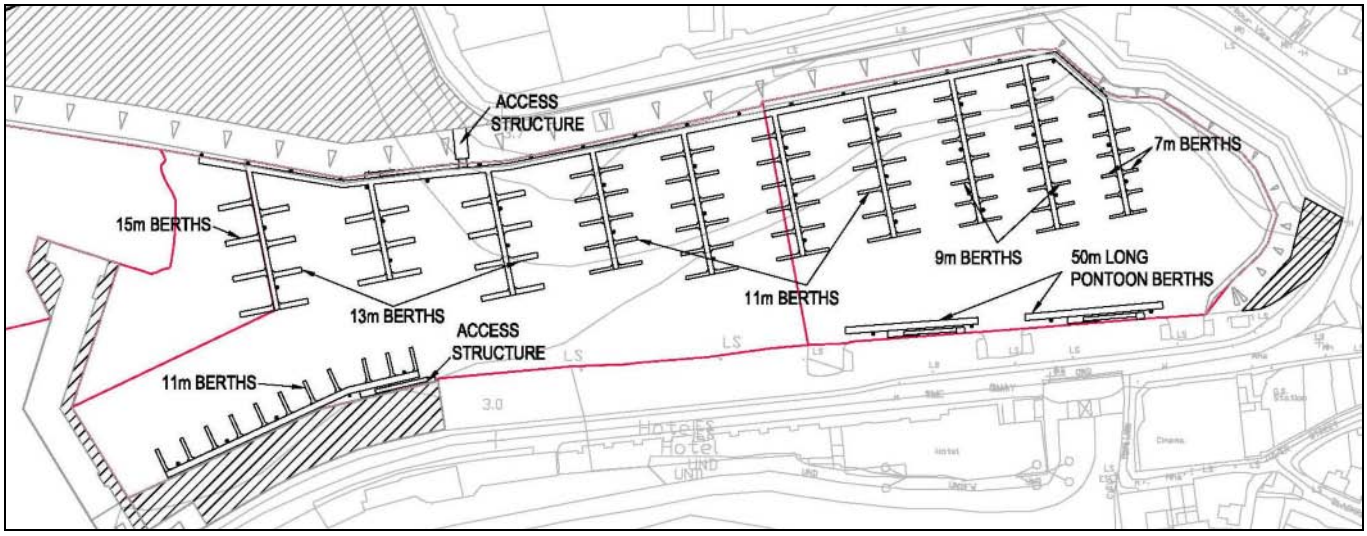

Figure 4.8 Proposed Marina Layout

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Following the installation of the marina, it is envisaged that there will be an increase in the number of leisure vessels using the harbour. Bantry Bay Harbour Commissioners estimate that approximately 100 additional vessels will use the harbour, half of which will be vessels which are currently moored elsewhere in Bantry bay and half of which will be new vessels. Of the additional vessels, it is envisaged that 25% of these will be short stay vessels, with 75% being long term moorings.

4.2.7.1 Marine Security

Security will be provided by a suitable locking gate and fencing at the top of the access gangways and by ensuring that pontoons are located far enough from adjacent structures to prevent unauthorised access.

4.2.7.2 Safety at the Marina

The pontoons will be restrained by the provision of vertical steel piles which will be drilled and grouted into the bedrock after completion of dredging. Handrails and safety rails will be fitted along gangplanks accessing the pontoons. Life buoys will be placed in strategic places around the marina in the event of a person falling into the harbour and requiring assistance.

4.2.7.3 Electrical, Water and Sewerage Services

The vessels moored at the pontoons will be provided with access to electrical services by means of a metered supply. Water taps will also be provided. There is sufficient capacity in Bantry Low Level Water scheme to supply the proposed marina.

It is not envisaged at this stage that pump-out facilities for vessels will be supplied. The pump-out of sewage from waste tanks on board vessels will be strictly prohibited.

4.2.7.4 Fuel Supply at Harbour

A dedicated fuel berth pontoon will be provided within the inner harbour.

4.2.8 Land Reclamation at Abbey Site

The material to be removed from the dredging of the Outer Harbour will comprise approximately 25,000 m^3. This material is all deemed to be contaminated and cannot be disposed off at sea or used for beach renourishment purposes. After appropriate treatment, this material will be suitable for land reclamation purposes due to its granulometry and physical characteristics. The Abbey Site is located south west of Bantry Harbour. It is proposed to construct a boat storage facility at Abbey. This facility will allow for the storage of vessels during the winter months and also facilitate repairs. Figure 4.9 shows the proposed layout of the reclamation at Abbey.

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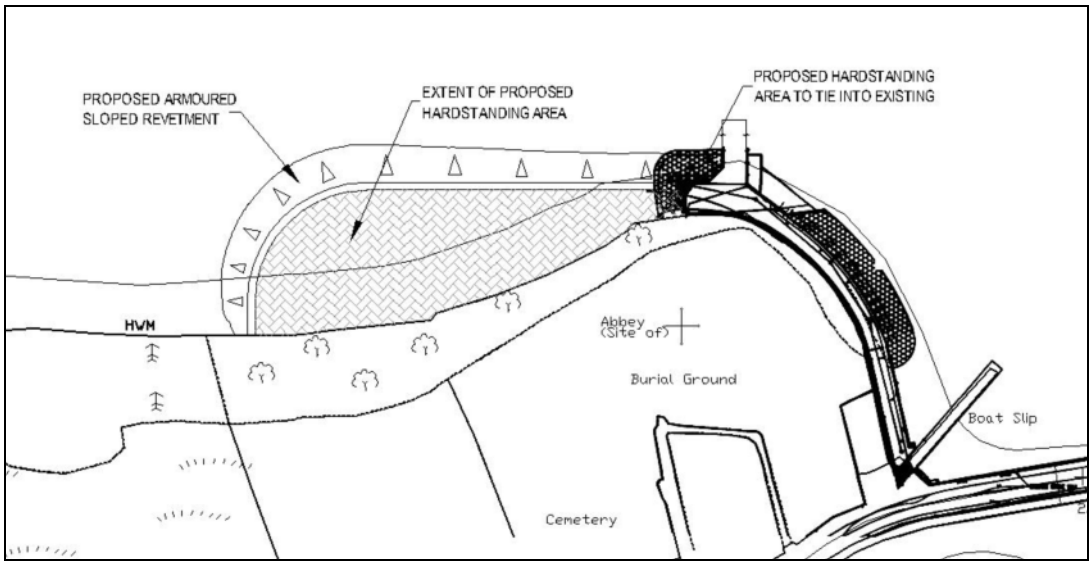

Figure 4.9 Abbey Layout

4.2.9 Beach Renourishment at Cove Site and Beicin Strand

It is envisaged that approximately 81,500m^3 of uncontaminated "clean" material will be yielded by the dredging of the inner harbour to the design dredge depths. This material will be transported to the Cove site and Beicin Strand for use in beach renourishment. It is anticipated that circ 79,500m^3 of material will be required to produce a beach with a gradient of between 1 in 10 or 1 in 15 slope, levelling out towards the water line. The remaining 2,000m^3 of material will be placed along the Beicin Strand.

In order to facilitate sediment retention at Cove, two protective beach retention breakwaters will be constructed at the entrance to Cove. This will minimise the mass movement of the finer particles and retain the beach at Cove. It is expected that Beicin Strand will retain the coarser sediment without hard defences, and effectively provide a passageway along the beach between Bantry Harbour and Cove.

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4.3 Construction Methods

The construction methods to be employed in each element of the works are described in the following section.

It is envisaged that the works will be implemented in a single phase. However, should the necessary funding not be available for the entire project, a phased approach has also been identified for the scheme (as discussed in Section 4.4).

Should the works proceed as a single phase, it is envisaged that the construction period will be over approx a 30 month period.

4.3.1 Site Access

During the dredging operations it is envisaged that the inner harbour will be inaccessible to vessels. However, in its current state, access to the inner harbour is already tidally dependent.

Access to the fishing pier will be dependent upon the construction methods employed during the construction stage. However, there are alternative piers available for use in the vicinity of Bantry.

Access to the site will be via the N71. In general, all construction related traffic will use the N71 where possible to avoid the narrow roads to the east of Bantry town. However, the one way system in operation around Wolfetone Square necessitates that construction traffic will utilise this route.

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Suitable traffic management and other systems will be put in place as required to minimise disruption to existing activities during the construction period. These will include:

- Suitable restrictions on timing of deliveries to avoid peak traffic periods
- Preparation of a detailed traffic management plan for the construction phase

4.3.2 Dredging Operations

A semi-wet dredging operation is considered to be the most appropriate for the dredging of the inner harbour at Bantry. The Eastern end of the harbour dries out at low tide; therefore it will be possible at this location to effectively dredge in the dry by carrying out operations tidally. Bunds would be used in the deeper sections of the main harbour to allow land based excavation equipment to dredge without major tidal restrictions. In the vicinity of the fishing pier, harbour entrance and outer harbour, where the water depths are greatest, it may be necessary to use an excavator mounted on a floating pontoon.

Environmental testing has been undertaken on the sediments of Bantry harbour. The results of these tests showed that the top 1m of bed material in the inner and outer harbour dredge footprint is contaminated with heavy metals and TBTs. Therefore, this material must be dredged and treated prior to re-use in the project.

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4.3.2.1 Dredging of Contaminated Material

Dredging of contaminated material will be to sufficient depths to ensure the removal of all of the contaminated sediment. The dredging will be undertaken using an excavator mounted Clamshell bucket adapted for environmental dredging. This will minimise the disturbance and escape of material at the seabed and during removal through the water column.

Silt curtains will be utilised whilst the dredging of contaminated material is ongoing. These will serve to reduce the spread of suspended contaminated sediments beyond the dredge foot print.

The dredged material will be loaded onto vehicles/barges to be transported to the appropriate treatment facility. The area surrounding the inner harbour is highly developed and there is a lack of storage space available for any dredged material. Therefore, in order to minimise the stockpiling of dredged material, the rate of dredging will be determined by the rate of treatment of the dredged material.

It is envisaged that the dredging of the most contaminated sediments at the inner and outer harbour will be carried out between November and March inclusive. This will negate any potential impact on the aquaculture identified in the area adjacent to the proposed scheme, as it will be outside the mussel spawning and shrimp settlement seasons.

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Upon completion of the removal of contaminated material from the dredge area, a suite of environmental testing will be carried out on the bed level to confirm that all contamination has been removed. Subsequent to this confirmation, the environmental dredging equipment can be demobilised.

4.3.2.2 Dredging of Uncontaminated Material

The uncontaminated material within the inner harbour will be dredged to the required design dredge depths by an excavator, which will operate from a bund where water depths permit and from a barge where water depths are greater.

The dredged material from the inner harbour will be transported by barge for use in beach renourishment at the Cove site and along Beicin Strand.

Dredging of uncontaminated material from the inner harbour will be carried between August and March inclusive. This will negate any potential impact on the aquaculture in the vicinity of the dredging operations.

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4.3.3 Treatment of Contaminated Dredged Material

Best practice industry techniques will be used to treat the contaminated material yielded from the dredging of the inner and outer harbour at Bantry. Stabilisation is proposed for the treatment of the contaminated material. The dredged material will be screened and crushed (if required) prior to treatment. A selected additive/combination of additives will be used to reduce the mobility and leachability of contaminants. Treatment reagents specifically designed to address the target contaminants will be mixed with the contaminated material using spaders and screening/mixing buckets. Cementitious materials will also be used to improve the physical engineering properties of the treated material and allow the treated material to be used as a substitute for imported fill material. Treated material will be re-emplaced in layers to allow for adequate compaction and curing.

The contaminated material yielded from the inner harbour will be transported to a treatment facility located in the existing car park on the north side of the inner harbour, location shown in Figure 4.10. This location has been chosen due to its close proximity to the source of the dredged material, therefore minimising the distance that the contaminated material must be transported. The area around the harbour is built-up and a one way traffic system is in place through the town centre. The material can be taken from source and across a local access road to the treatment facility, negating the requirement to transport contaminated material through the town centre to a facility located elsewhere. A traffic management system will be put in place to maintain local access for the boat house and ESB station located near the Railway Pier.

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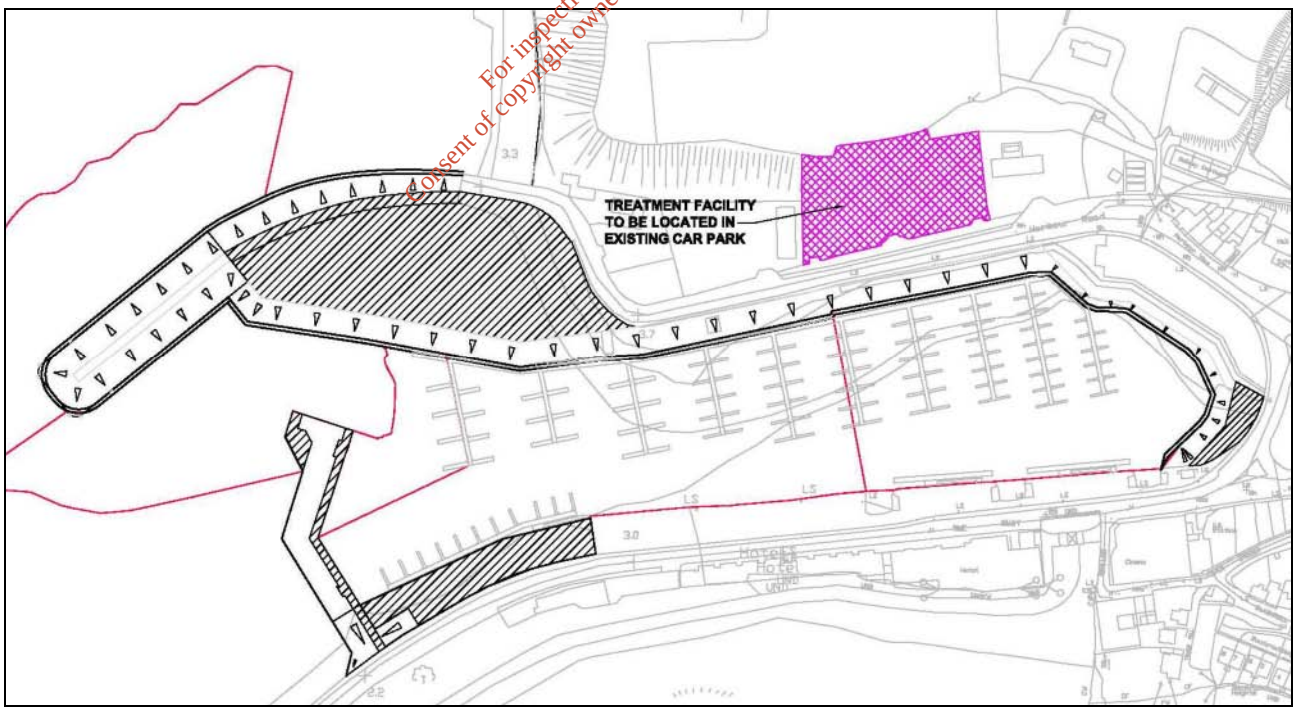

Figure 4.10 Location of Inner Harbour Treatment Facility

Once this material has been treated it will be transported along the local access road to the bunded receptor at the Amenity area.

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It will also be transported to the pierside reclamation area, using the temporary bund constructed for the dredging operation as access across the harbour, and negating the requirement to travel through the town centre.

The contaminated material yielded from the outer harbour dredging will be transported by barge to a treatment facility established at the Abbey Site.

Once the material has been treated, it will be transported to the bunded area constructed for the Abbey hardstanding area and allowed to cure.

At both treatment facilities, an interceptor tank and appropriate drainage scheme will be provided to negate the potential risk of highly alkaline discharges and minimise the discharge of suspended solids back into Bantry Harbour and Bantry Bay. The stockpiling of materials will be kept to a minimum and any stockpiles will be bunded with a spill contingency plan in place.

Prior to the demobilisation of the dredging plant and treatment facility, a suite of environmental testing will be carried out on the surface level of the bed (and possibly at 0.5m depth) to confirm that all contaminated material has been removed.

4.3.4 Fishing Pier Refurbishment

A sheet pile combi-wall will be constructed in front of the existing pier quay face to widen the pier by 4m along its length and to extend and widen the pier head. Tie rods will be installed to tie the combi-wall back into the existing masonry wall on the seaward side of the existing pier. Imported rockfill will be placed between the existing quay and the combi-wall, and a new deck slab will be cast along the widened and extended section of the pier. Figure 4.11 shows the proposed form of construction. The level of the new concrete deck will tie in with the existing levels of the recently raised pier deck slab. Corrosion protection will also be provided to the combi-wall by the installation of sacrificial anodes.

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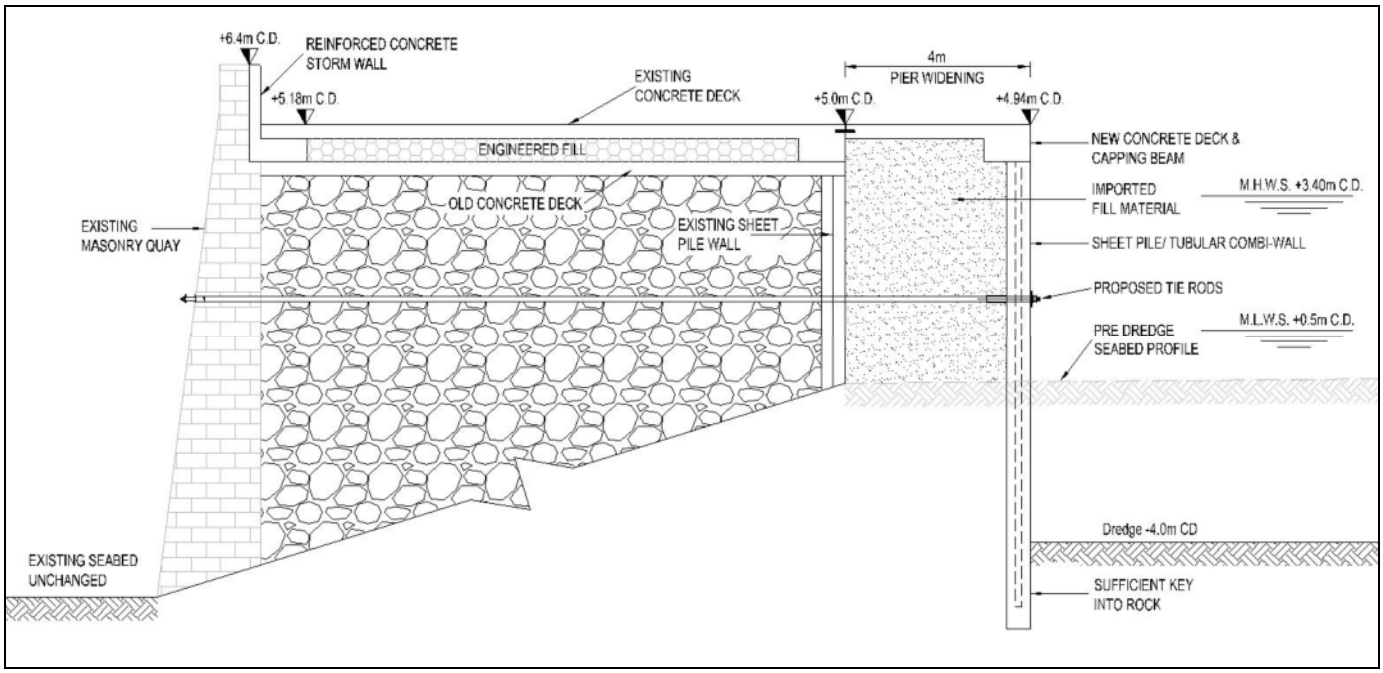

Figure 4.11 Proposed Pier Improvements

4.3.5 Fishing Docks & Hotel Car Park Quay Wall Improvements

The depth of the existing quay wall foundations will not facilitate the dredging of the inner harbour. Therefore, a sheet pile wall with ground anchors will be installed in front of the existing masonry walls. The sheet piles will be cut off at MLWS and a reinforced concrete capping beam will be cast along the top of the sheet piles. This will be below the level of the entrance to the existing fishing docks and slipways. The existing masonry will be removed prior to the installation of the sheet piles, and will be re-used to build face a concrete retaining wall on top of the capping beam. Therefore, at MLWS the sheet piles will not be visible, and the masonry wall will appear as it was prior to the deepening works. Imported rockfill will be used to fill between the piles and the existing quay face, and the cobbled deck will be extended to the new quay line. Figure 4.12 shows the proposed construction detail. No works are proposed to the slipways or dry docks along this length of quay.

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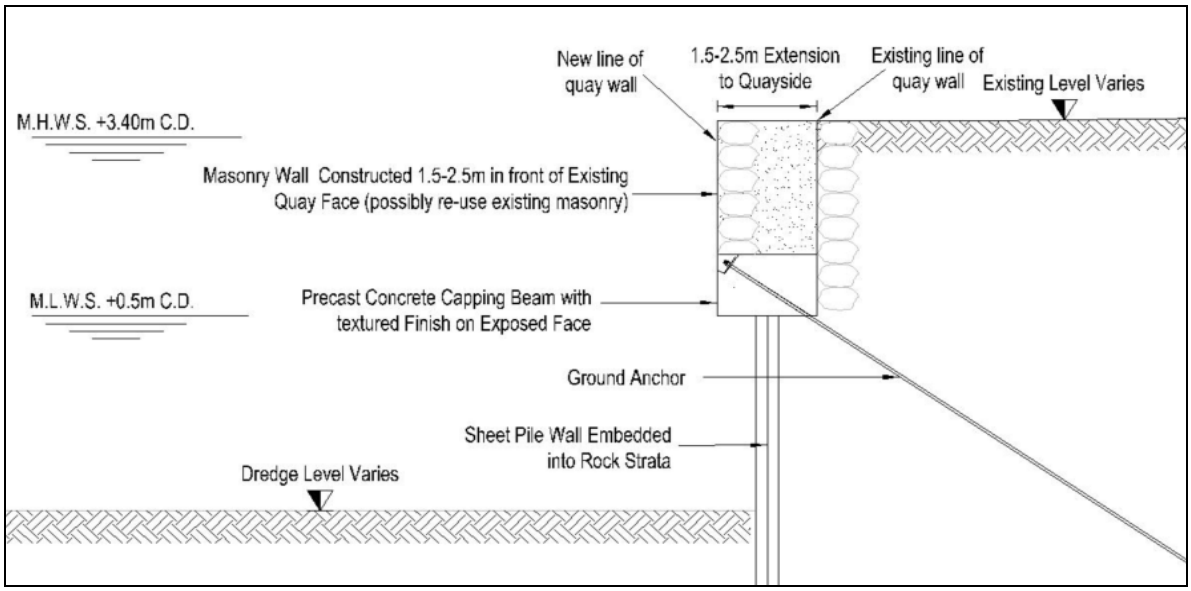

Figure 4.12 Proposed Quay Wall Improvements

4.3.6 Northern Embankment

As discussed in Section 4.2.5, the existing revetment will be extended to the proposed dredge depth and the levels at the top of the revetment will be raised by 500mm to tie in with the proposed amenity area level. Figure 4.13 shows the proposed arrangement for the revetment and the pontoons.

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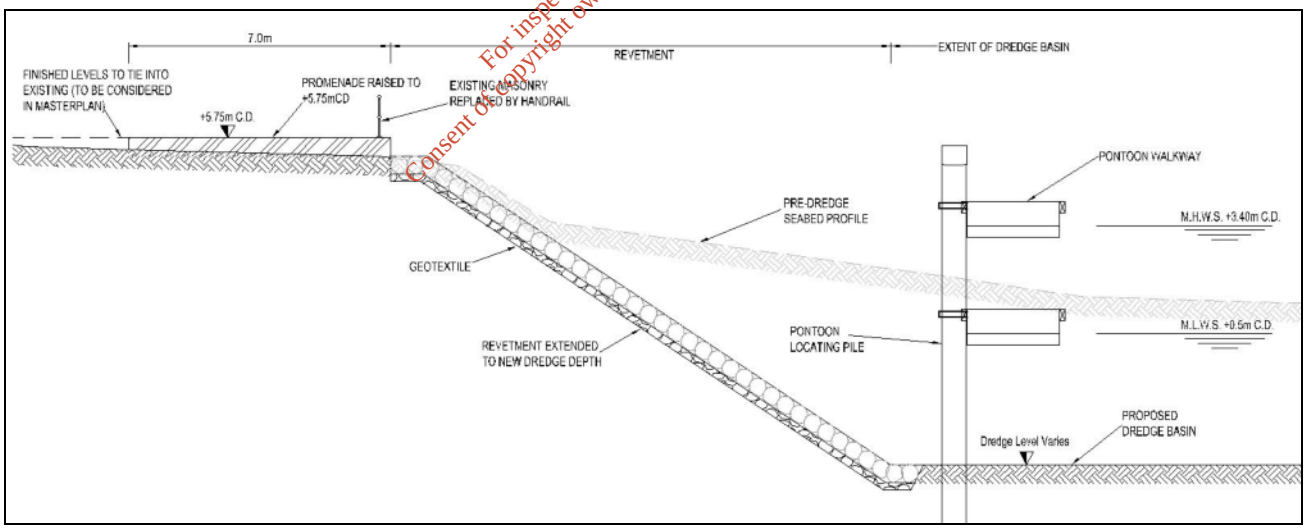

Figure 4.13 Proposed Revetment Detail at Northern Embankment

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4.3.7 Land Reclamation at the Inner Harbour

4.3.7.1 Amenity Area Reclamation

Rockfill bunds will be constructed to form a receptor for the treated contaminated dredged material from the inner harbour. The outer face of the bund will be protected by 0.5T rock armour revetments extending to the design dredge depth. The inner face of the bund will be lined with a geotextile to prevent suspended solids being dispersed from the treated material when it is placed in the receptor. Once the treated material has cured and the engineering properties have been tested and are satisfactory, a capping layer will be placed to a level of +5.75m CD.

This area will be surfaced for car parking and amenity use (layout shown in Figure 4.7).

4.3.7.2 Pierside Reclamation

Given the rising rock level at this location, a sheet pile combi-wall will be installed along the proposed quay line for the reclaimed area beside the fishing pier. In order to minimise the visual impact of the sheet piles, a patterned concrete façade will hang over the top of the piles. Treated dredged material will be placed behind the sheet piles and allowed to compact and cure. A capping layer will be placed to a level of +4.75m CD and a car park surface will be provided, along with required edge protection. The proposed construction detail is shown in Figure 4.14 below.

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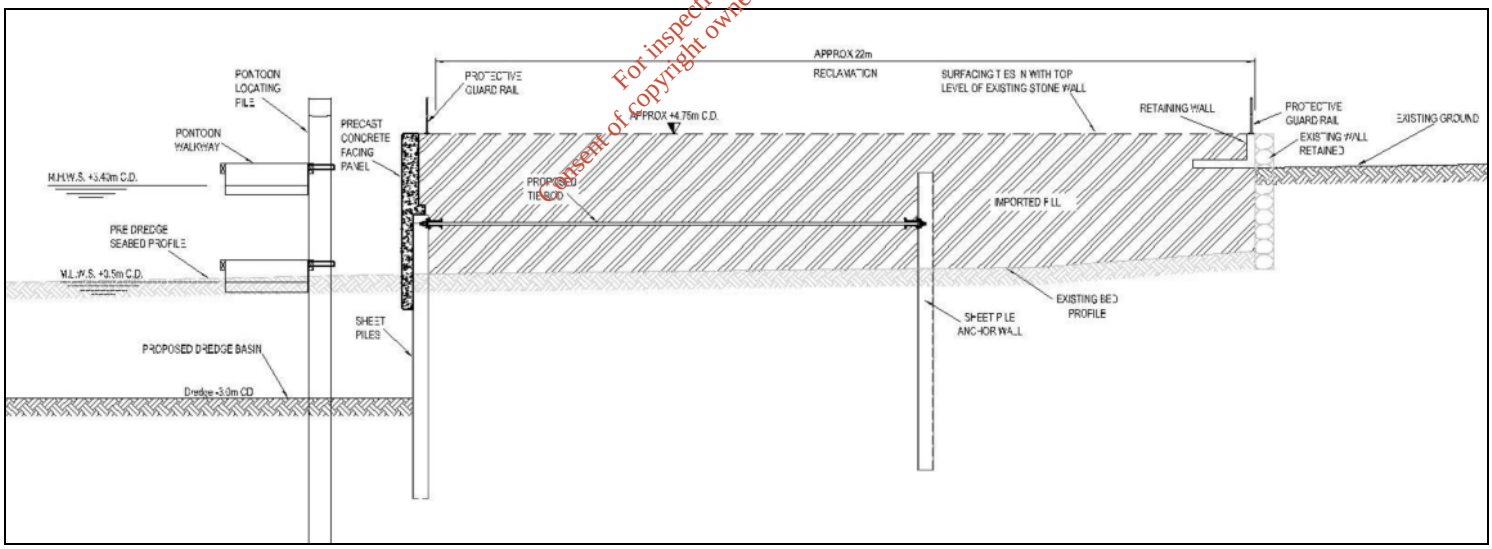

Figure 4.14 Pierside Reclamation Construction Detail

4.3.7.3 Wolfetone Square Reclamation

Imported material will be used to form a rockfill bund along the edge of the proposed reclamation area adjacent to Wolfetone Square. A precast concrete culvert will be placed to extend the existing culvert out through the reclamation area. The outer face of the bund will be protected with a rock armour revetment and will act as a spending bank within the inner harbour.

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Imported rock fill will be placed behind the bund and a paved surface will be provided. The finished level of the reclamation will tie in with the existing adjacent levels. Figure 4.15 shows the proposed construction detail.

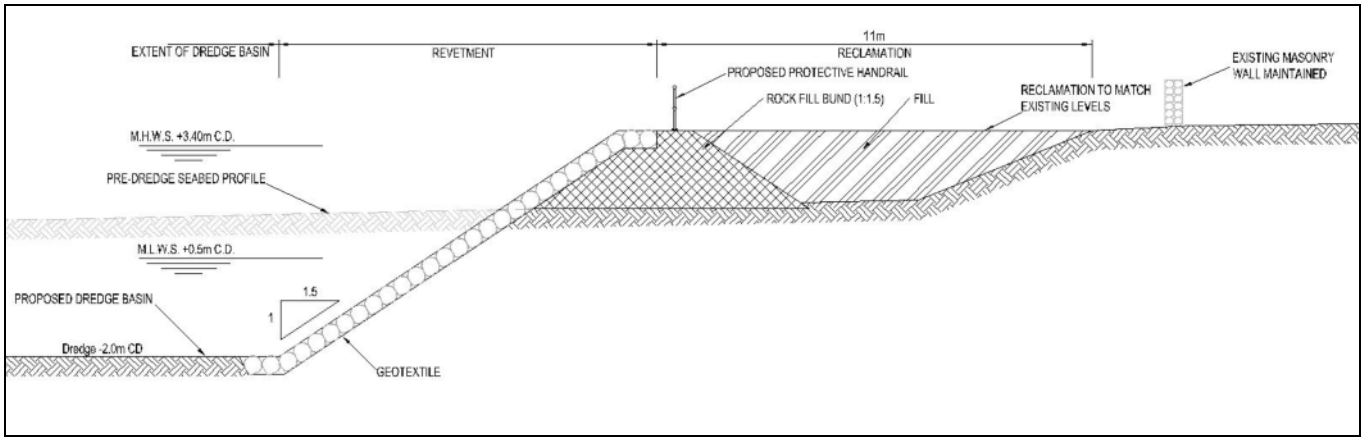

Figure 4.15 Wolfetone Square Reclamation Details

4.3.8 Breakwater and Open Pile Deck Construction

Imported rock fill will be used to construct a bund along the line of the proposed breakwater. This bund will serve as the core for the breakwater, as well as providing access for a piling rig to install the tubular piles. Installation of the steel tubular piles will commence at the outer end of the bund and progress landwards. 0.5T rock armour will be placed between the piles following their installation to complete to construction of the breakwater.

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Precast concrete beams will be placed between the pile caps and the concrete deck will be progressed outwards from the landward end of the breakwater. The finished level of the concrete deck will be +5.75m CD. Figure 4.16 shows the proposed form of construction. The necessary quay furniture and navigational aids will be provided also.

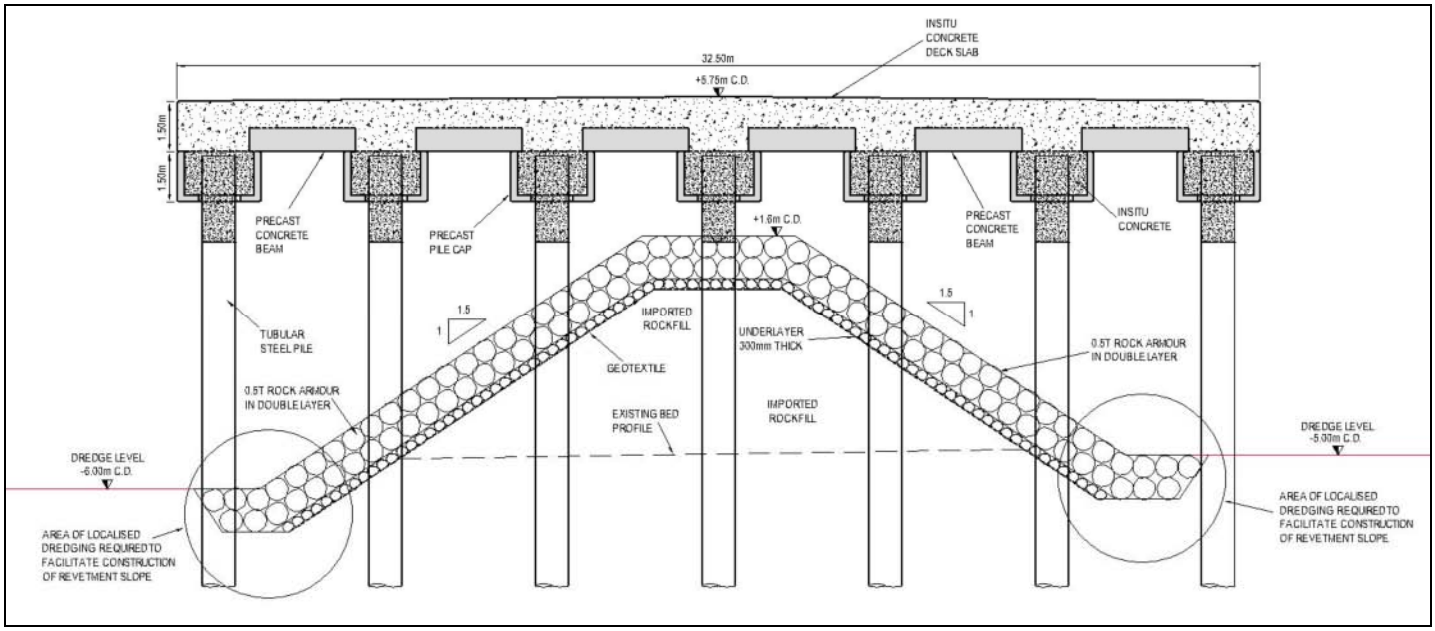

Figure 4.16 Breakwater and Deck Detail

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4.3.9 Beach Renourishment at Cove and Beicin Strand

Prior to the commencement of the dredging of uncontaminated material from the inner harbour, the beach retention breakwaters will be constructed to 2/3 their final length. This will prevent the loss of sediments by current action whilst the beach renourishment is ongoing, whilst still permitting access for the barge into the Cove Site. The breakwaters will be constructed using an imported rockfill core and protected with 0.5T rock armour.

Clean dredged material will be transported to Cove by barge. At low tide the barge will be beached at Cove and an excavator will unload the barge and profile the material to the required slopes. Upon completion of the beach renourishment the beach retention breakwaters will be completed.

Dredged material will also be placed along the Beicin Strand. However, it is envisaged that the fines will wash away over time, with the coarser material remaining in place.

4.3.10 Abbey Site

The proposed structure of the Abbey Site will consist of an imported rockfill bund which will be protected by a rock armour revetment. The dredged material will be transported by barge and treated at a treatment facility located at the Abbey Site. The treated material will be placed within the protected bund structure.
Rock size and construction details have been developed to match the storm wave climate at the site. It is estimated that a double layer of rock armour will be required in the structure, of size 0.5 tonnes and approximate nominal diameter of 0.6 – 0.7 meters. Structural levels have been designed taking into account sea level rise; therefore the design crest level will be +5.75m to Chart Datum. The slope of the structure will be 1 in 1.5.

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4.3.11 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 1989 and the Safety, Health and Welfare at Work (Construction) Regulations, 2001 and 2003. All aspects of design construction will be reviewed with regard to health and safety and a risk assessment will be carried out. A Planning 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 Planning Supervisor (Construction Stage).

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4.3.12 Waste Disposal

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

Table 4.1 Typical Wastes Generated by the Construction Works

Activity	Waste Generated	Disposal/Treatment Recommendation
General Construction Waste	Waste Oils	Collected by waste recycling contractor
	Other Waste	Collected in skips for disposal by licensed waste contractor
General Office/Messing	Paper, packaging, canteen etc	Collected in covered skips/large bins for disposal by a licensed waste contractor. Any materials which can be recycled e.g. cardboard or paper will be collected on site and arrangements made for it to be brought to a recycling centre
Temporary Site Toilets	Sewage	Emptied under contract for disposal at an appropriate facility

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4.4 Phased Approach

In the event that a phased approach is required for the scheme, it is anticipated that the phases would be broadly as outlined below. Details of each of the work items listed can be found in sections 4.2 and 4.3 of this chapter.

Phase 1

- Amenity bund construction
- Pierside Reclamation Construction
- Dredging of approx 18,000m^3 of contaminated material

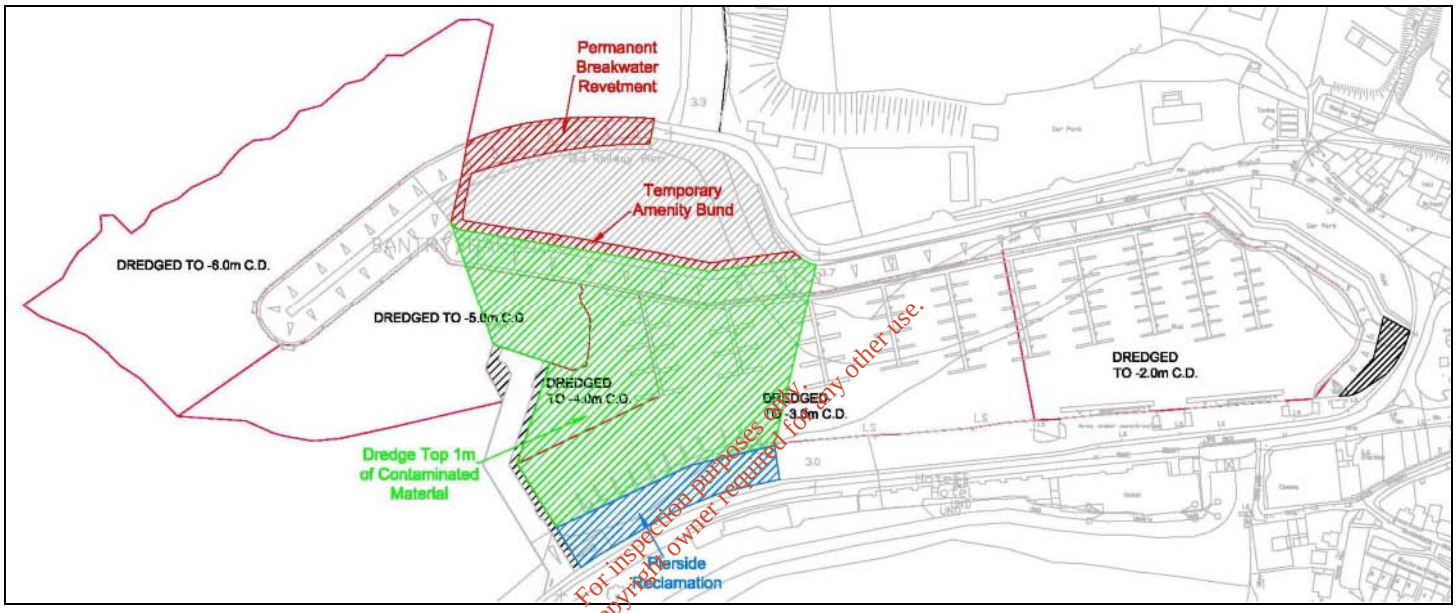

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Figure 4.17 Phase 1 Works

Prior to the commencement of the dredging of contaminated material, suitable receptors must be available. A temporary bund will be constructed at the proposed amenity area, with the permanent revetment constructed to form the north side of the bunded area.

The pierside reclamation receptor will also be constructed prior to the commencement of the dredging. This will avoid any additional material being yielded as the dredging can extend to the face of the sheet piles. The pierside receptor can facilitate approximately 5,000m^3 of treated dredged material and this area should be filled prior to the filling of the amenity bunded area.

In order to facilitate the transportation of dredged material to the treatment facility and treated material to the receptor at the pierside reclamation during Phase 1, it is proposed to construct a bund across the inner harbour which will extend from the northern embankment to the south side of the harbour. During the construction the top level of the bund will tie in with the road levels at both the northern embankment and the south side of the harbour. This will allow lorries to drive across the bund to transport treated material to the pierside reclamation and negate the requirement to have these lorries driving through the town.

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Dredging and treatment of the top 1m of material from the dredge footprint shown in Figure 4.17 can commence once the receptors and temporary access bund have been constructed.

During the time between Phase 1 and Phase 2, it is proposed to leave the bund in place but lower the top level so that the bund is approximately 1m above the existing bed level. This will serve to reduce the risk of cross contamination into the dredged area by reducing the transportation of silts from the un-dredged area into the dredged area.

This lower level of the bund will still permit access to the inner harbour at a high tide, however, the location and height of the bund will need to be marked with buoys and water depth indicators to make harbour users aware of its presence.

Phase 2

- Piling to Fishing Docks and Hotel Carpark Quay Wall
- Dredging of remaining contaminated material within inner harbour

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Figure 4.18 Phase 2 Works

The footings of the fishing docks and hotel car park quay wall have been proven to be approximately 800mm below the existing bed level. Therefore the piling works to this length of quay must be undertaken prior to the dredging of the 1m of contaminated material to avoid undermining the existing structures.

Upon completion of the sheet piling works, the remaining contaminated material in the inner harbour will be dredged, treated and placed within the amenity bund receptor.

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Phase 3

- Construction of revetments along Northern Embankment, Amenity area & Wolfetone Square
- Construction of groynes at Cove site (2/3 of total length)
- Dredging of inner harbour to design dredge depths
- Transportation of material to Cove and Beicin Strand for beach profiling
- Completion of groyne construction

Figure 4.19 Phase 3 Works

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Prior to the dredging to design depths within the inner harbour, the construction of revetments along the amenity area, northern embankment and Wolfetone Square must be undertaken. Local excavation will be required at the base of the existing revetments to facilitate construction of the revetment toe at the proposed dredge level, with the material displaced locally into harbour.

Before the dredged material can be transported to the Cove site, the beach retention breakwaters at the entrance to Cove must be constructed to 2/3 of their final length in order to retain any placed material. Dredged material from the inner harbour will be transported to Cove and Beicin Strand for beach renourishment, and the construction of the retention breakwaters completed upon completion of the dredging operation.

Phase 4

- Breakwater construction
- Open pile quay structure construction

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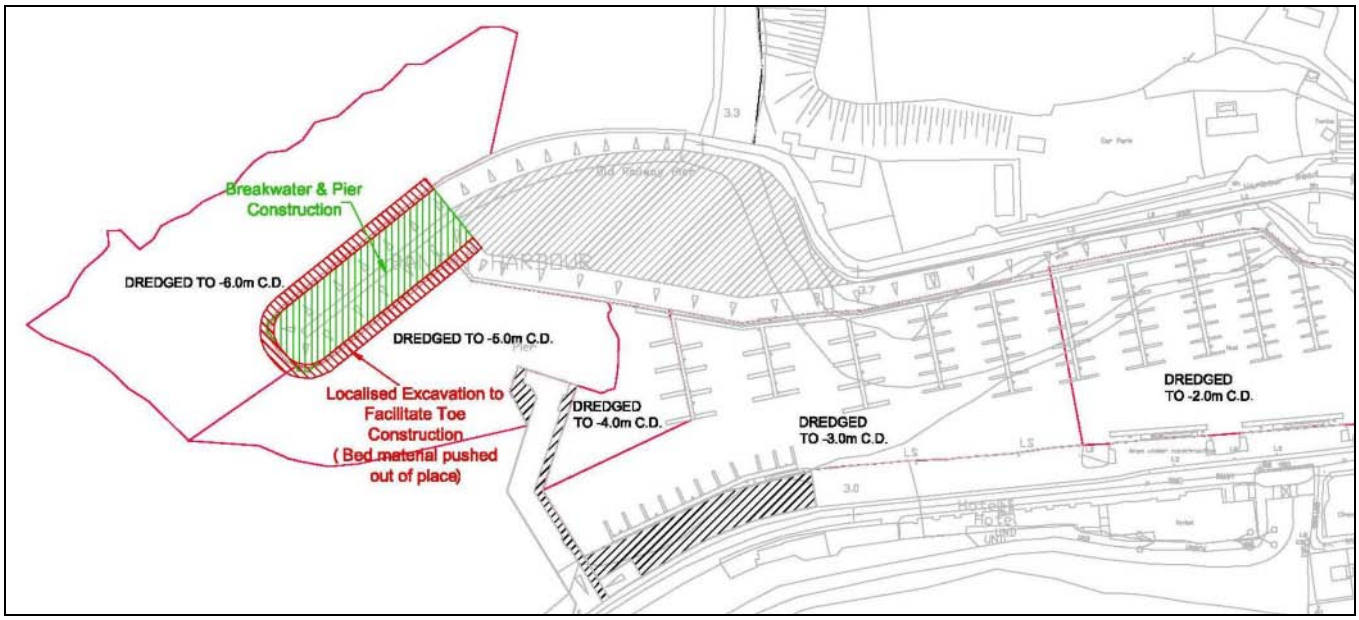

Figure 4.20 Phase 4 Works

Construction of the breakwater and open pile quay structure will progress simultaneously. Localised excavation will be required to facilitate the breakwater toe construction, with bed material locally pushed outwards into the area earmarked for future dredging and treatment at Abbey site during the later stages of the project.

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Phase 5

- Construction of receptor at Abbey
- Dredging, treatment and placement of material from outer harbour

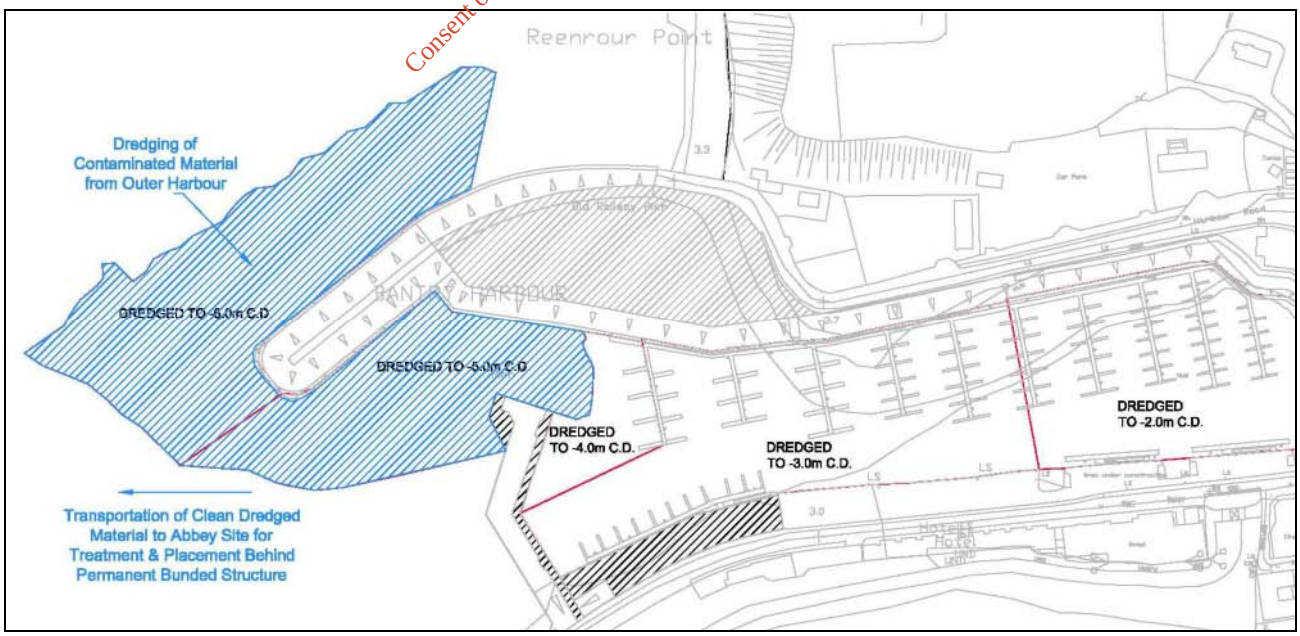

Figure 4.21 Phase 5 Works at Harbour

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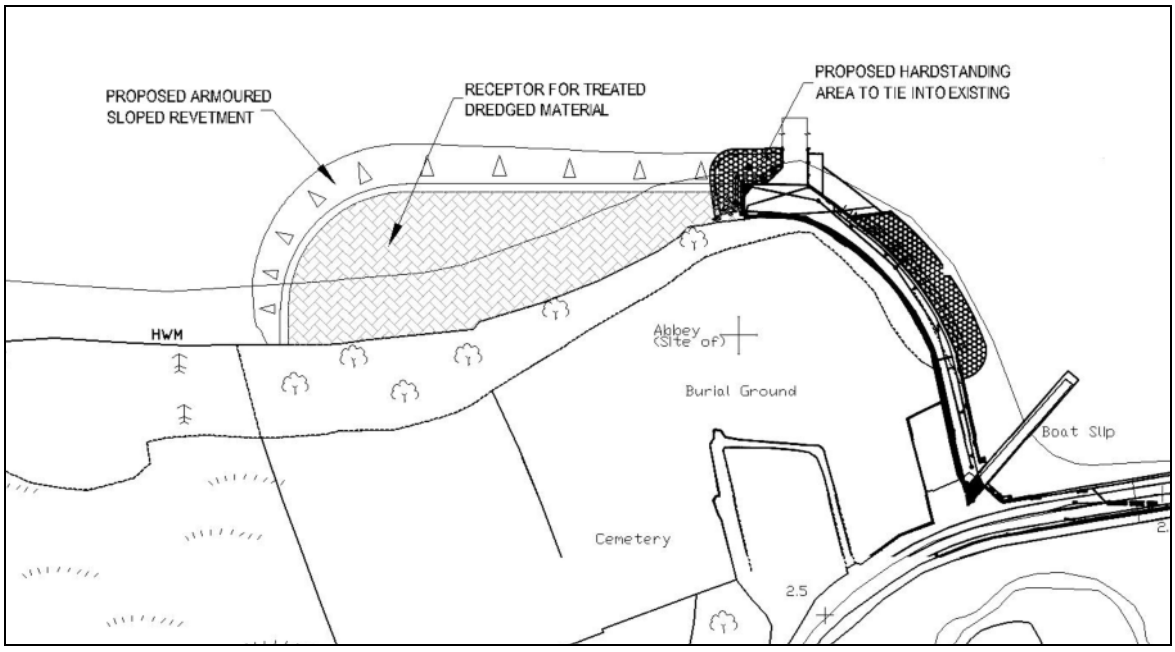

Figure 4.22 Layout of Receptor at Abbey Site

Prior to the commencement of the outer harbour dredging, the receptor at the Abbey site must be constructed. The armoured revetments around the proposed hardstanding area will serve as the bunded area for the placement of the treated material. The dredged material from the outer harbour will be transported to Abbey by barge for treatment and placement in the receptor.

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Phase 6

- Fishing Pier Improvements

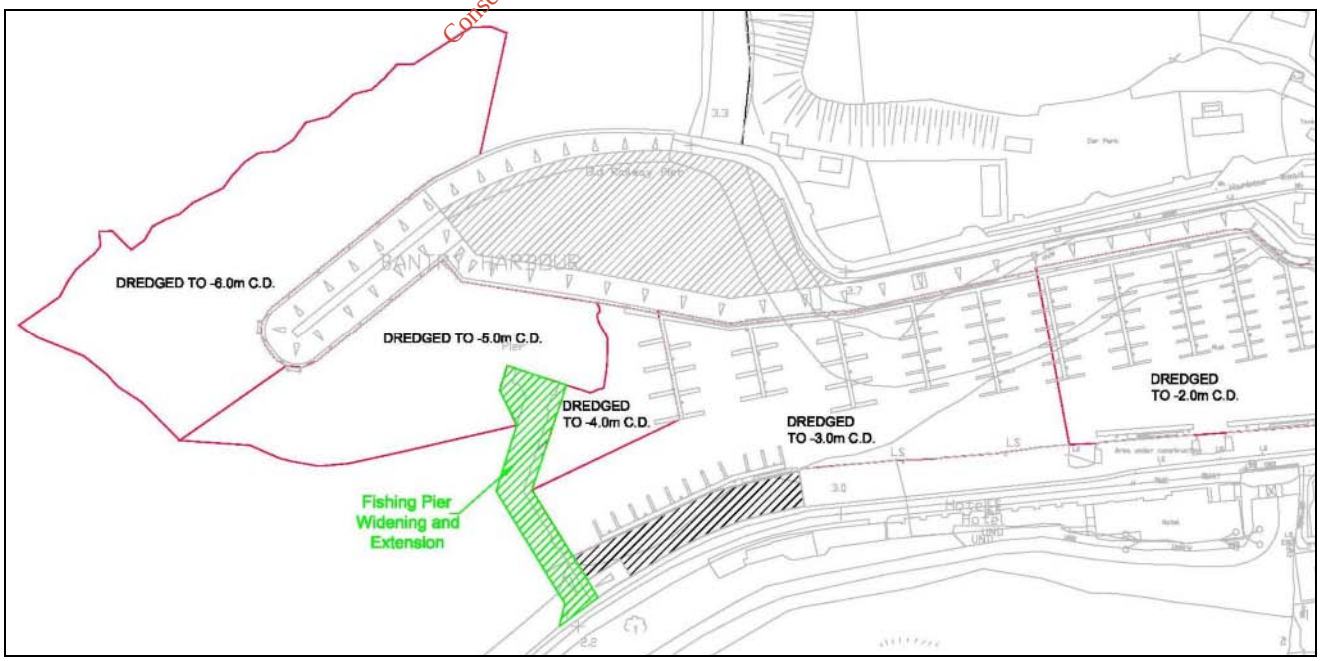

Figure 4.23 Phase 6 Works

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The improvements to the Fishing Pier involve the widening of the pier and extension to the pier head using a sheet pile combi-wall construction.
These works are a stand alone phase with no linkages to other phases. Therefore, they could be carried out at any stage of the project.

Phase 7

- Provision and installation of Marina Infrastructure

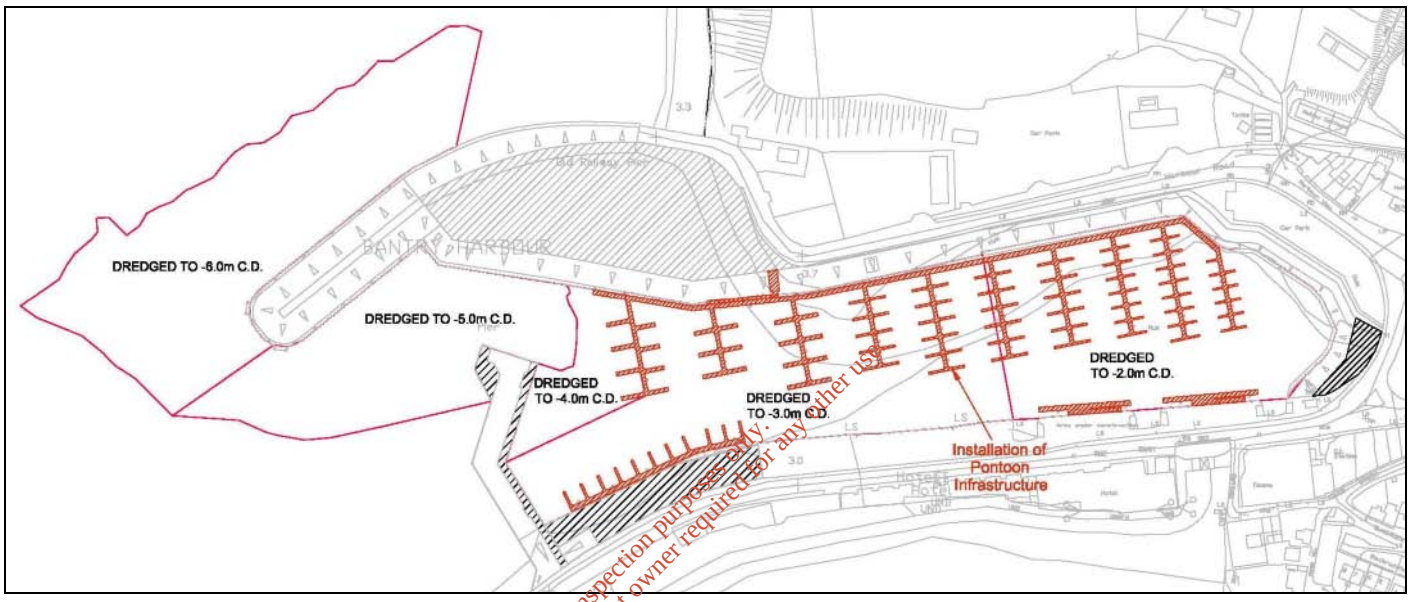

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Figure 4.24 Phase 7 Works

The installation of pontoon infrastructure is dependent upon the completion of a number of work elements. These are the inner harbour dredging, revetment construction, fishing docks works and pierside reclamation. Therefore, the pontoon infrastructure can be installed any time after the completion of Phase 3.

Phased Project Timeframe

At this stage it is not possible to identify an overall timeframe for a phased approach, as this is dependent upon a number of external factors.

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5.0 AIR AND CLIMATE

5.1 Introduction

This Chapter of the EIS has been prepared to identify and assess the potential air quality impacts that the proposed Bantry Harbour development at Bantry, Co. Cork may have on the receiving environment during the construction and operational phases of the development. This section includes a description of the existing air quality in the vicinity of the proposed Bantry Harbour development site, a description and assessment of how construction activities and the operation of the development may impact existing air quality, the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and finally to demonstrate how the development shall be constructed and operated in an environmentally sustainable manner.

This air quality impact assessment has focused on the potential impact on nearby residents and the environment in the vicinity of the proposed development site. The main predicted impact on existing air quality in the vicinity of the proposed development site is due to traffic arising from the operation of the proposed development. Temporary impacts on air quality may also occur during the construction phase. This air quality assessment has been prepared on the basis that the project will be constructed in one phase which is the worse case scenario. If it is built over a number of phases which will take a longer period, then the same impact assessments will apply.

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The pollutants that have therefore been considered in this assessment are Nitrogen Dioxide (NO_2), Particulates (PM_{10}) (particulate matter which passes through a size-selective inlet with a 50% efficiency cut-off at 10 µm aerodynamic diameter)), Sulphur Dioxide (SO_2), Benzene (C_6H_6), and Carbon Monoxide (CO).

5.2 Methodology

To characterise the existing air quality in the vicinity of the proposed Bantry Harbour development, and assess the impacts of both the construction and operational phases of the development, the following approach has been adopted:

- Identification of potential pollutants.
- Assess the current air quality using data collected from the Environmental Protection Agency's (EPA) monitoring stations.
- Predict the construction and operational impacts of the proposed development on the surrounding environment.
- Discuss the impacts of the proposed development during both the construction and operational phases.

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- Propose mitigation measures to minimise or ameliorate any identified impacts.

5.2.1 Ambient Air Quality Standards

In order to protect our health, vegetation and ecosystems, EU directives set down air quality standards in Ireland and the other member states for a wide variety of pollutants. These rules include how we should monitor, assess and manage ambient air quality.

The European Commission set down the principles to this approach in 1996 with its Air Quality Framework Directive. Four "daughter" directives lay down limits for specific pollutants:

- 1st Daughter Directive: Sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead
- 2nd Daughter Directive: Carbon monoxide and benzene
- 3rd Daughter Directive: Ozone
- 4th Daughter Directive: Polyaromatic hydrocarbons, arsenic, nickel, cadmium and mercury in ambient air

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The Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive (2008/50/EC) was published in May 2008. It replaced the Framework Directive and the first, second and third Daughter Directives. The fourth Daughter Directive (2004/107/EC) will be included in CAFE at a later stage. The limit and target values for both Directives are outlined below.

The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). It replaces the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

The fourth Daughter Directive was transposed into Irish legislation by the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I. No. 58 of 2009). Tables 5.1 – 5.6 set out the limit values or target values specified by the three published daughter directives.

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Table 5.1 Limit Values of Directive 1999/30/EC

Pollutant	Limit Value Objective	Averaging Period	Limit Value ug/m3	Basis of Application of the Limit Value	Limit Value Attainment Date
SO_2	Protection of human health	1 hour	350	Not to be exceeded >24 times in a year	1 Jan 2005
	Protection of human health	24 hours	125	Not to be exceeded >3 times in a year	1 Jan 2005
	Protection of vegetation	calendar year	20	Annual mean	19 July 2001
	Protection of vegetation	1 Oct to 31 Mar	20	Winter mean	19 July 2001
NO_2	Protection of human health	1 hour	200	Not to be exceeded >18 times in a year	1 Jan 2010
	Protection of human health	calendar year	40	Annual mean	1 Jan 2010
NOx	Protection of ecosystems	calendar year	30	Annual mean	19 July 2001
PM_{10} - Stage 1	Protection of human health	24 hours	50	Not to be exceeded >35 times in a year	1 Jan 2005
	Protection of human health	calendar year	40	Annual mean	1 Jan 2005
PM_{10} - Stage 2	Protection of human health	24 hours	50	Not to be exceeded >7 times in a year	1 Jan 2010
	Protection of human health	calendar year	20	Annual mean	1 Jan 2010
Lead	Protection of human health	calendar year	0.5	Annual mean	1 Jan 2005

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Table 5.2 Alert Thresholds for Sulphur Dioxide and Nitrogen Dioxide

The public must be informed if the following thresholds are exceeded for three consecutive hours.

Pollutant	Averaging Period	Limit Value
Sulphur Dioxide	1 hour	500 ug/m3
Nitrogen Dioxide	1 hour	400 ug/m3

Table 5.3 Limit Values of Directives 2000/69/EEC

Pollutant	Limit Value Objective	Averaging Period	Limit Value	Limit Value Attainment Date
Carbon Monoxide	Protection of human health	8 hours	10 mg/m3	1 Jan 2005
Benzene	Protection of human health	Calendar year	5 ug/m3	1 Jan 2010

The ozone daughter directive is different from the previous two in that it sets target values and long term objectives for ozone levels rather than limit values. They are as follows:

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Table 5.4 Target Values for Ozone from 2010

Objective	Parameter	Value
Protection of human health	Maximum daily 8 hour mean	120 ug/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years
Protection of vegetation	AOT, 40 calculated from 1 hour values from May to July	18000 ug/m3-h averaged over 5 years

Table 5.5 Long Term Objectives for Ozone from 2020

Objective	Parameter	Value
Protection of human health	Maximum daily 8 hour mean	120 ug/m^3
Protection of vegetation	AOT, 40 calculated from 1 hour values from May to July	6000 ug/m^3-h

Table 5.6 Information and Alert Thresholds for Ozone

The public must be informed if ozone levels exceed the following thresholds

Objective	Parameter	Threshold
Information Threshold	1 hour average	180 ug/m3

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5.2.2 DMRB Traffic Emissions Assessment Methodology

The prediction of traffic derived pollutants was carried out using the Design Manual for Roads and Bridges (DMRB) (May 2007), Volume 11, Section 3, Part 1, Air Quality. The DMRB Screening Model (v1.03c) which has been prepared for the Design Manual for Roads and Bridges (DMRB) and has been published by the Highways Agency provides a screening method for the prediction of ground level concentrations of various pollutants at sensitive receptors close to roads. The DMRB has been used to determine the impact of the increased traffic on air quality due to the proposed Bantry Harbour development.

The DMRB screening model uses a worst-case screening scenario and thus deliberately overestimates predicted pollutant emission concentrations. Firstly, the emission factors employed in the model for each pollutant are biased to deliberately overestimate the actual emission rate (but without generating unrealistically high results). This ensures a margin of error in the assessment to ensure that if the model predicts no breaches of the statutory air quality limits, there is a large degree of confidence that no breaches will occur. Additionally, the DMRB model assumes that wind speeds will be 2 m/s all of the time which would give rise to poor air dispersion and elevated levels of pollutants. In reality, wind speeds in Ireland are measured at less than 2 m/s for only approximately 10% of the time. Again, this ensures the model is underestimating pollutant dispersion and significantly overestimating the pollutant concentrations at the roadside.

The results of the air quality impact assessment using the predicted traffic flows have been compared with the relevant objectives of the Air Quality Standard Regulations. If the predicted pollutant concentrations are found to be in excess of 90% of the Air Quality Standard Regulations using the DMRB screening model as outlined above, then a detailed

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dispersion modelling assessment will be carried out using the CALINE and CAL3QHCR air dispersion modelling software.

5.3 Description of the Existing Environment

5.3.1 Baseline Air Quality

The Air Framework Directive deals with each EU member state in terms of "Zones" and "Agglomerations". For Ireland, four zones are defined in the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). As part of the EU Framework Directive on Air Quality (1996/62/EC), 4 air quality zones have been defined for Ireland, as follows;

- **Zone A:** Dublin Conurbation
- **Zone B:** Cork Conurbation
- **Zone C:** Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, Letterkenny, Celbridge, Newbridge, Mullingar and Balbriggan.
- **Zone D:** Rural Ireland, i.e. the remainder of the State excluding Zones A, B and C.

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These air quality zones have been declared for air quality management and assessment purposes. The proposed development is located in a rural setting and the surrounding area is classified as “Zone D”. EPA mobile monitoring units monitor air quality at locations within Zone D. The typical baseline air quality data outlined below in Table 5.7 is based on a review of the EPA – Air Quality Monitoring Report 2010. This is the most up to date available EPA monitoring data.

5.3.2 Baseline Air Quality Concentrations used in Impact Assessments

The background air quality data used in the DMRB assessment for the area near to the proposed Bantry Harbour development has been based on the baseline air quality data outlined in the EPA – Air Quality Monitoring Reports 2010 from Zone D monitoring stations. The background air pollutant concentrations used in the DMRB assessment of the potential impact of traffic on air quality are outlined in Table 5.8. These are a worst – case estimate of background concentrations near to the proposed development along the rural south-west coast of Ireland.

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Table 5.7 Air Quality Monitoring Data Representative of EPA Zone D Monitoring Sites (2010)

Pollutant	Zone D Monitoring Stations	EPA Baseline Monitoring Data Annual Mean (µg/m^3)	Relevant Limit Value
PM_{10}	Castlebar, Co. Mayo	15	PM_{10} annual mean limit for the protection of human health = 40 µg/m^3
$PM_{2.5}$	Castlebar, Co. Mayo	16	$PM_{2.5}$ annual mean limit for the protection of human health = 25 µg/m^3
SO_2	Kilkitt, Co. Monaghan	2	SO_2 annual mean limit for the protection of vegetation= 20 µg/m^3
NO_2	Castlebar, Co. Mayo	10	NO_2 annual mean limit for the protection of human health = 40 µg/m^3
NO_x	Castlebar, Co. Mayo	17	NO_x annual mean limit for the protection of vegetation = 30 µg/m^3
Lead	Kilkitt, Co. Monaghan	7.8	Pb annual mean limit for the protection of human health = 0.5 µg/m^3
Ozone	Castlebar, Co. Mayo	49	Maximum Ozone daily 8 – hour mean limit = No more than 25 days > 125 µg/m^3
Carbon Monoxide	Zone C Note 1	0.4	CO maximum daily 8 – hour mean value = 10,000 µg/m^3
Benzene	Emo Court, Co. Laois	0.4	Benzene annual mean limit for the protection of human health = 5 µg/m^3

Note 1 – Average CO concentration from Zone C monitoring stations Celbridge & Newbridge, Co. Kildare.

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Table 5.8 Worst-case background air pollutant concentrations (µg/m^3) used in the DMRB Air Quality Impact Assessment

Year	Background air pollutant concentrations – Annual Average (µg/m^3)					
	NO_2	NOx	PM_{10}	CO Note 2	Benzene Note 2	$PM_{2.5}$
2010	10	17	15	0.4	0.4	16
2012	9.6	16.4	14.9	0.4	0.4	15.8
2014	8.0	13.5	14.4	0.4	0.4	15.1
2029 Note 1	6.4	10.8	14.0	0.4	0.4	14.5
Limit Value	40	30	40	10,000	5	25

Note 1 – Year 2020 used as according to NRA guidelines.

Note 2 – Current worst case background concentrations were used for CO & Benzene.

5.4 Predicted Impacts of the Proposed Development

There are two phases of the proposed development that may impact on the existing air quality and climate environment. These are:

- **Construction phase**
- **Operational phase**

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5.4.1 Construction Phase

The construction phase of the proposed development has the potential to give rise to:

- The emission of dust from excavation and construction works and the storage and movement of materials,

- Exhaust gases from construction vehicles and plant. There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to carbon dioxide and nitrous oxide emissions. However the level of emissions will be insignificant compared to national greenhouse gas emissions.

5.4.1.1 Dust Emissions from Construction Operations

Dust emissions have the potential to cause nuisance at nearby existing residential properties during the construction phase of the development.

The quantity of dust released during construction depends on a number of factors. These include the type of construction activities occurring, the volumes of material transported and the moisture and silt content of the materials, the distance travelled on unpaved roads, the mitigation measures employed and the area of exposed materials. Methodologies for predicting dust impacts are not straightforward. As a result, a qualitative approach to the assessment has been used, as described below.

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The construction of the scheme will involve a number of key activities, which have the potential to generate dust. These may include;

- Earthworks associated with the excavations to create the space for the proposed development.

- Concrete operations.

- Demolitions, if required.

Dust becomes airborne due to the action of wind on material stockpiles and other dusty surfaces, or when thrown up by mechanical action, for example the movement of tyres on a dusty road or activities such as digging, cutting, drilling, etc. There are many types of particulate matter that are included in the definition of dust, including variations in terms of size and chemical composition. The size of dust particles affects their distribution. Large particles (100 µm diameter) are likely to settle within 6-10 m of their source under a typical mean wind speed of 4 m/s, and particles between 30-100 µm diameter are likely to settle within 100 m of the source. Smaller particles, particularly those <10 µm in diameter, are

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more likely to have their settling rate impeded by atmospheric turbulence and to be transported further from their source. Dust emissions are exacerbated by dry weather and high wind speeds. The impact of dust therefore, also depends on the wind direction and the relative location of the dust source and receptor.

Dust deposition impacts may be experienced at the existing residential properties in closest proximity to the proposed Bantry Harbour development. However, due to the fact that much of the construction operations will involve dredging of underwater materials and construction activities in the waters of the existing harbour, the dust potential of the construction works will be relatively low. It has been stated that the material to be dredged as part of the Bantry Harbour Development Scheme includes some contaminated material at shallow depths (top 1 metre), but the remainder of the material is sandy sediment which is suitable for re-use. It is proposed that this material will be used for beach nourishment or land reclamation at sites adjacent to, and connected to, Bantry Harbour i.e. the Cove and Abbey sites. This material is most likely to be transported via barge type vessels. A dust nuisance from this type of material is most unlikely in the vicinity of the Bantry Harbour itself or at properties near to the Cove and Abbey sites. The maximum predicted construction vehicles numbers on the narrow roads with bad bends that leads to the Cove site will total a maximum of 1 vehicle per hour. This will not result in a significant impact on local air quality.

Appropriate mitigation measures, as outlined in Avoidance, Remedial or Reductive Measures, have been recommended in order to ensure that no significant construction dust impacts will occur at nearby properties.

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5.4.1.2 Emissions from Construction related Traffic

The proposed development will require quantities of imported building materials such asphalt, bitumen, concrete, etc. Assuming intermittent and varying levels of access of haulage and concrete trucks, throughout the proposed construction phase of approximately 30 months, the worst-case construction traffic noise impact is most likely to occur in Months 5 and 6 of the construction period. During this period construction traffic levels in the harbour area will total approximately 2,000 HGVs per month, which equates to an average of approximately 100 HGVs per working day. This is likely to equate to a worst case of 10 2-way HGVs during the peak hour. In relation to emissions from construction vehicles, due to the size, nature and the duration of the proposed construction activities, CO2 and pollutant emissions during construction will have a negligible impact on local air quality.

5.4.1.3 Odour Impact from Dredging and Sediment Disposal

Capital dredging refers to the deepening of an area such as a channel, harbour or berthing facility. Maintenance or navigational dredging is the periodic removal of material, typically sand, silt and gravel deposited by nature through river flow, tidal currents or wave action in areas that have been previously dredged. Both of these are typical processes at all harbours and ports and are necessary for typical day to day operations. Dredging is an inherently infrequent and short – term activity.

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There may be an odour associated with the proposed dredging of the Bantry Harbour sediments due to the disturbance of sulphide in the harbour sediments. However, the oxidation rate for these potentially high sulphide laden sediments is less than one hour. Therefore, any odours created would be short lived. The location of the harbour is in close proximity to sensitive receptors which means that there is the potential for the dredging to give rise to an odour nuisance. The dredged sediments will be moved via barge to the Cove site which also has sensitive receptors in close proximity. Thereafter, the dredged material will be allowed to settle and dry out at the Cove site.

Due to the regular strong sea breezes in such coastal areas of Ireland, there is the likelihood that any odours will disperse rapidly from both the harbour area and the settlement and drying out site at the Cove site. In fact, it is likely that the odour nuisance potential of such practices will be greatly reduced by such strong sea breezes as odours will be rapidly dispersed. The impact of this dredging excavation together with the placement of the dredged material at the Cove site will be temporary and is anticipated to have slight short-term negative odour impact.

5.4.1.4 Climate Impact

The climate in the Bantry area on the south – west coast of Ireland is very mild with moist Atlantic sea breezes giving medium to heavy rainfall year round as shown in Figures 5.1 and 5.2.

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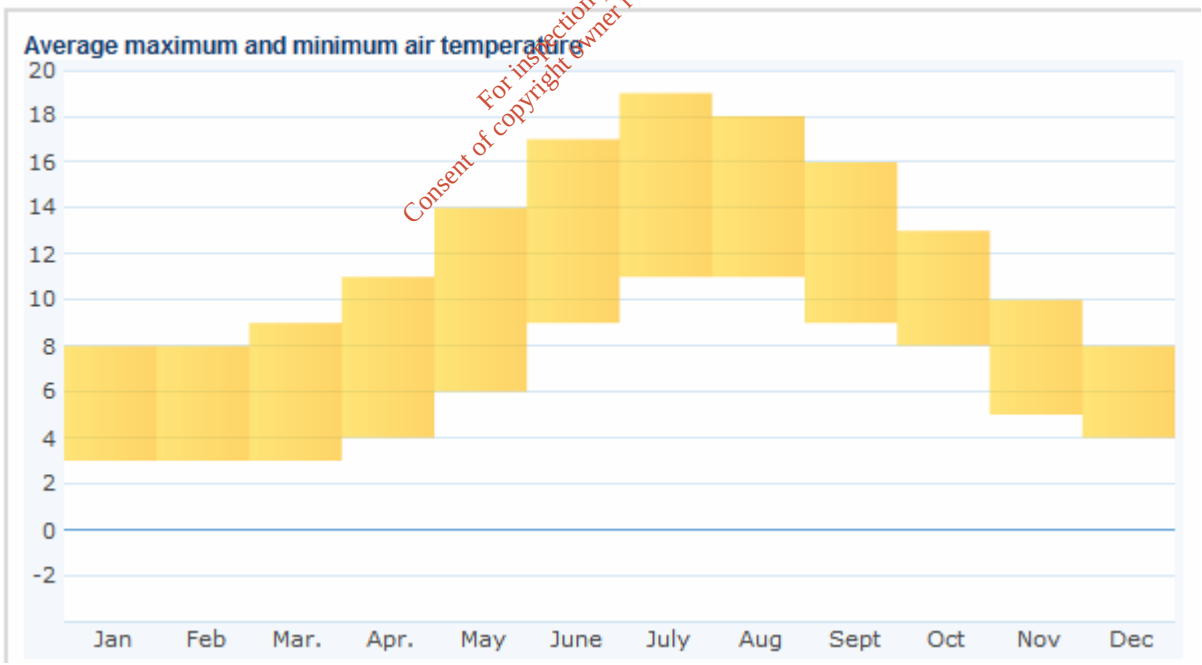

Figure 5.1 Average Maximum and Minimum Air Temperatures

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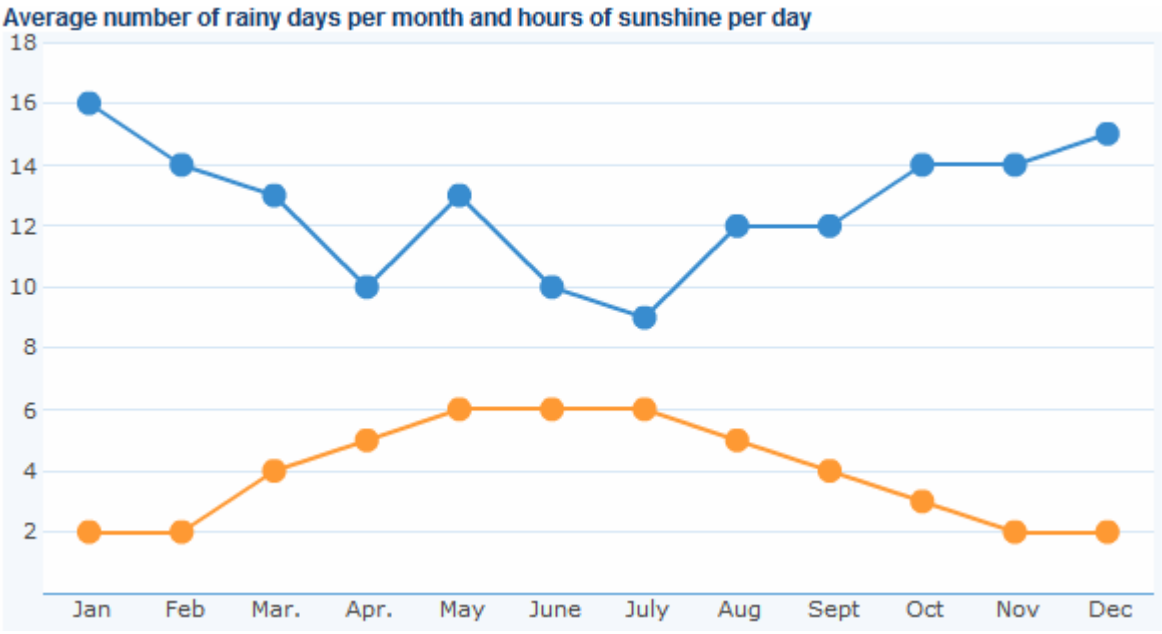

Figure 5.2 Average Number of Rainy Days per month and Hours of sunshine per day

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There is the potential for increased CO_2 emissions during the construction of the proposed Bantry Harbour development, from the operation of vehicles, plant and equipment on site. However, these impacts will be short-term and temporary and will not significantly impact climate.

5.4.2 Operational Phase

5.4.2.1 DMRB Road Traffic Impact Screening Model Predictions

The predicted traffic flows in the vicinity of the proposed development site have been directly input into the DMRB Screening Model to allow for a prediction of worst-case concentrations of carbon monoxide, benzene, nitrogen dioxide and PM_{10} at the nearest residential locations to the proposed development site. The proposed development is to include for 100 car parking spaces.

Traffic data for the proposed development has been provided by ILTP Consulting who are responsible for the Traffic Impact Assessment for the proposed development. ILTP Consulting has presented predicted Peak Hour traffic flows on the surrounding road network for the proposed Year of Opening (2014) and the Design Year (2029), with the proposed development in operation. WYG has multiplied the worst-case peak hour flows by 10, to generate realistic predicted AADT traffic volumes.

The air consultants have taken the traffic volumes and the existing background air pollutant concentrations and using the DMRB Screening Tool (July 2007) the predicted worst – case pollutant concentrations at the nearest residential receptor properties has been predicted. WYG has assumed a 5% HGV value on the surrounding road network. On the roads in the

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vicinity of the proposed development site, traffic speeds of 50 kph have been input into the DMRB model.

Background air quality data for the area in the vicinity of the proposed development site has been estimated from the baseline air quality data outlined in the EPA – Air Quality Monitoring Report 2010. The background air pollutant concentrations which have been used in the Design Manual for Roads and Bridges assessment of the potential impact of traffic on air quality are outlined in Table 5.8. These have been assumed as a worst – case estimate of background concentrations in the vicinity of the proposed development site.

The nearest sensitive residential properties are those located in the vicinity of the junction of the N71 to Cork with Wolfe Tone Square along the quay near to the proposed development. The pollutant concentrations referenced in Table 5.9 are those likely to occur at the residential properties in close proximity to the proposed development due to the existing and proposed traffic flows. The predicted results have been compared with the relevant ambient air quality standards. The residential properties assessed in order to present the worst case potential impact of the proposed increase in traffic volumes are as follows;

Table 5.9 Predicted Air quality at the Residential Apartments adjacent to the Garda Station along the quays overlooking the harbour

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Scenario	CO	Benzene	NO_2	PM_{10}	
	Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50 $\mu g/m^3$
Existing Flows	0.45	0.45	12.55	15.87	0
Opening Year 2014 – With Development	0.45	0.45	10.69	15.24	0
Design Year 2029 – With Development	0.46	0.46	9.22	14.91	0
Design Year 2029 – With Development + 50%	0.48	0.49	10.44	15.36	0
Limit Value	10 *	5	40	40	35

* Limit Value = 8 Hour mean

As shown in Table 5.9, there is no predicted exceedance of the relevant pollutant concentration limit values at the residential apartments adjacent to the Garda Station along the quays overlooking the harbour with the proposed development in operation. Pollutant concentrations in the vicinity of the proposed development are actually predicted to decrease in future years due to ongoing improvements in engine and fuel technology.

Therefore, the additional traffic flows due to the proposed development will not increase pollutant concentrations significantly in terms of local air quality and the relevant Ambient Air Quality Standards.

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5.4.2.2 Air Quality Impacts from Boats

Tailpipe emission factors for boating sources are not as readily available as those for road transport. Also, the type of boating traffic through a marina is not as uniform as may be expected on a typical regional road, national road or motorway in Ireland. Therefore, the relative impact on local air quality from the operation of the marina is not readily quantifiable. However, it can be stated that the air quality impact from the boating movements in a marina such as that proposed in Bantry harbour will be insignificant.

5.5 Mitigation Measures

5.5.1 Construction Phase Mitigation Measures

All roads in the vicinity of the proposed development shall be regularly cleaned and maintained as it is recommended that a dust minimisation plan be formulated for the construction phase of the project, as construction activities have the potential to generate dust emissions. The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust also depends on the distance to potentially sensitive locations and whether the wind can carry the dust to these locations. The majority of any dust produced will be deposited close to the source and any impacts from dust deposition will typically be within several hundred metres of the construction area.

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The implementation of a dust minimisation plan during the construction phase of the project should include measures such as:

- Appropriate hard surface roads should be swept to remove mud and aggregate materials from their surface while any unsurfaced roads should be restricted to essential site traffic only.
- Any site roads with the potential to give rise to dust should be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles removing or delivering material with dust potential to and from the site).
- All vehicles exiting the site should make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads.
- Public roads outside the site should be regularly inspected for cleanliness, and cleaned as necessary.
- Material handling systems and site stockpiling of materials should be designed and laid out to minimise exposure to wind.
- Water misting or sprays should be used as required if particularly dusty activities are being carried out or are necessary during dry or windy periods.

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- All vehicles which present a risk of spillage of materials, while either delivering or removing materials, should be loaded in such a way as to prevent spillage on to the public roads.

- The transport of dredged material via barges to the deposition locations are most unlikely to present a dust impact risk due to the wet nature of the dredged materials.

5.5.2 Operation Phase Mitigation Measures

The Operational Phase of the developed site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

Mitigation measures in relation to traffic-derived pollutants have generally focused on improvements in both engine and fuel technologies. EU legislation has imposed stringent emission standards for key pollutants for vehicle manufacturers to comply with. These improvements are ongoing and updated regularly and thereby have led to significant reduction in pollutant emissions over recent years. Also, EU Fuel Directive (98/70/EC) has introduced significant reductions in both sulphur and benzene content of fuels. Ongoing comprehensive vehicle inspection requirements in the form of the National Car Test (NCT) also ensure lower emissions from vehicles.

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5.6 Likely Effects of the Proposal

Based on the addition of the likely specific direct and indirect effects of the proposal, arrived at by adding to the receiving environment, the impact of the proposal and the proposed mitigation measures outlined above, it is predicted that the proposed development will not result in a significant air quality impact at the existing residential receptor locations in the surrounding area.

During the construction phase of the proposed development, there is the potential for intermittent short – term dust impacts due to demolitions, excavation, construction and traffic sources at existing properties in the area. These construction impacts will not be significant due to the implementation of the proposed mitigation measures. Therefore, the construction of the proposed development should not result in a significant increase in dust levels at any of the noise sensitive locations.

Traffic volumes generated by the development will be relatively insignificant in relation to existing traffic flows in the area. Using the Design Manual for Roads and Bridges (DMRB) (May, 2007), Volume 11, Section 3, Part 1, Air Quality screening method methodology, appropriate and relevant Zone D background air quality data and predicted traffic flows in the area, it has been found that the air quality impact predictions due to the proposed development will not exceed the relevant limit values outlined in the Air Quality Standards. Therefore, it is deemed that the proposed development will not result in a significant impact on local Air Quality.

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6.0 NOISE AND VIBRATION

6.1 Introduction

This Chapter of the EIS has been prepared to identify and assess the potential noise and vibration impacts that the proposed Bantry Harbour development may have on the receiving environment during the construction and operational phases of the development. This section includes a description of the existing noise environment in the vicinity of the proposed Bantry Harbour development site, a description and assessment of the potential noise and vibration impacts during construction activities and the operation of the development, the mitigation measures that will be implemented to control and minimise the noise and vibration impact that the development may have and finally to demonstrate how the development shall be constructed and operated in an environmentally sustainable manner.

This noise and vibration impact assessment has focused on the potential impact on nearby residents and the environment in the vicinity of the proposed development site. The main predicted noise and vibration impacts on existing receivers in the vicinity of the proposed development site is due to short-term temporary construction activities and traffic arising from the operation of the proposed development. The noise and vibration assessment has been based on the development being built as one phase. However, if it is built over a number of phases over a longer timescale, the same assessment and subsequent impacts will apply.

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6.2 Study Methodology

6.2.1 Standards & Guidelines

The assessment and evaluation of the noise impact arising from the proposed development involved the following methodology:

- Baseline Noise Survey – daytime and night-time noise monitoring at noise sensitive receiver locations in the vicinity of the proposed development. Noise monitoring locations used for the purposes of this assessment are presented in Figure 6.1. The purpose of the noise monitoring survey is to evaluate the existing noise environment in the area of the proposed development. Current noise sources and the background noise level have been evaluated during the noise survey. Cognisance was given to the EPA Environmental Noise Survey Guidance Document, 2003.

- A prediction of the noise levels from the proposed on site construction activities to assess the impact of the proposed development using standard noise emission values, in accordance with the calculation method in BS5228 '*Noise and vibration control on construction and open sites'*.

- A prediction of the likely traffic noise levels on completion of the proposed development in accordance with the calculation method CRTN Department of Road Transport, 1988 *'calculation of Road Traffic Noise'.*

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- Comparison of the predicted noise impact on residential receptors with the existing scenario and World Health Organisation (WHO) limits for noise and vibration.

6.2.2 Noise Monitoring Methodology

In order to characterise the existing noise environment, daytime and night-time baseline noise surveys were undertaken in the vicinity of the proposed development site. A noise sensitive receptor is defined as *"any dwelling, house, hotel or hostel, health building, educational establishment, or any other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels".*

Noise monitoring locations were chosen according to the guidelines in ISO 1996: Acoustics – Description and Measurement of Environmental Noise. All noise measurements were conducted according to the ISO 1996: *Acoustics – Description and Measurement of Environmental Noise.* The measurements were made using a Norsonic 140 Sound Level Meter which is a Type 1 meter according to IEC 651. The sound level meter was orientated towards the dominant noise source during all measurements at a height of 1.5m above ground level. A wind shield was used on the microphone throughout the survey and the sound level meter was calibrated before and after the noise survey.

The primary measurement parameters recorded were the equivalent continuous A-Weighted sound pressure level, $L_{Aeq,\ T}$, during the daytime and night-time monitoring periods and a statistical analysis of the measurement results was also completed to represent the noise level exceeded for 10% and 90% of the measurement time, i.e. the background noise level is represented by the L_{A90} parameter.

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6.2.3 Noise Prediction Methodology

A prediction of construction and operational phase noise levels at the nearest noise sensitive receptors has been completed to determine the potential impacts on the receiving noise environment over the shorter term construction period and throughout the operational phase of the proposed development.

Noise Sources (Sound Power Levels - SWL)

Noise prediction requires the combination of noise from each item of plant/activity to arrive at the equivalent continuous sound level ($L_{Aeq\ T}$) after taking account of the noise generated, the amount of time in use, the distance of the reception point from the noise-generator and whether there will be any screening. The level of sound generated by each source can be defined as its Sound Power Level (SWL). This can be provided by the manufacturer of the equipment or by referencing BS 5228: Part 1 (1997), which provides generalised data on noise emissions from various construction plant and typical site activities. For the purposes of this noise impact assessment, the SWL has been determined by either using a specific sound pressure level for a source or measuring the Sound Pressure Level (SPL) at a specific distance (e.g. 10m) from a source and using the following equation.

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$$SWL = SPL + (20*Log_{10}(Distance)) + 8$$
$$= SPL + (20*Log_{10}(10)) + 8$$
$$= SPL + 20 + 8$$

Noise Level Prediction

The predicted noise level can be calculated at a specific location if the SWL of the source, and the distance between source and receptor are both known.

$$SPL = SWL - (20*Log_{10}(Distance)) - 8$$

Adjustments can be made for the presence of any barriers and the nature of the ground the noise has to travel over. Corrections for barriers require knowledge of sound pressure levels at different frequencies and of the precise geometry of the receptor in relations to the source and barrier. These adjustments are quite complex, and are outlined in detail in Annex D of BS 5228: Part 1: 1997. However, the Standard suggests that as a working approximation, an attenuation of 10dB can be made if a screen completely hides the source from the receiver. If the top of the plant is just visible to the receiver, then an attenuation of 5dB can be assumed. In many instances, a receptor will be subject to noise from a number of different sources. If this is the case, then the total SPL at that location can be obtained from the SPLs of each source by the following equation:

$$SPL = 10*\log_{10}[10^{SPL1/10} + 10^{SPL2/10} ... + 10^{SPLn/10}]$$

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6.2.4 Noise Impact Assessment Criteria

World Health Organisation (WHO) Guidelines for Community Noise

The World Health Organisation (WHO) has published Guidelines for Community Noise, the outcome of a WHO expert task force meeting in April 1999 [World Health Organisation; Geneva 1999]. The WHO guidelines recommend a daytime limit of 50 – 55 dB(A) for outdoor living areas:

"To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development."

The World Health Organisation (WHO) recommends guideline values for noise levels in specific environments. Regarding the proposed development, the most applicable levels are presented in Table 6.1.

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Table 6.1: WHO Recommended Guideline Noise Levels

Specific Environment	Critical health effect(s)	L_{Aeq} dB(A)
Outdoor living area	Serious annoyance, daytime and evening	55
	Moderate annoyance, daytime and evening	50
Outside bedrooms	Sleep disturbance, window open (Outdoor values), Night-time	45

6.2.4.1 Perceived Impact of Change in Noise Level

The likely future perceived impact of change in noise level at the noise sensitive properties adjacent to the proposed development has also been determined. In addition to the assessment of noise impact in accordance with the methodologies outlined above, the perceived impact of change in noise level has also been reported for the noise sensitive properties. The perceived impact rating and the subjective response to changes in noise levels have been determined based on the subjective assessment of changes in noise levels, in terms of perceived change and loudness outlined in Table 6.2. The prediction of the perceived impact of change in traffic noise level may result in a noise sensitive property being classified as potentially suffering from a "no change", "negligible", "noticeable", "clearly noticeable", "substantial" or "very substantial" subjective change in noise level.

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Table 6.2: Subjective assessment of changes in noise levels, in terms of perceived change and loudness

Change in Noise Level	Impact Rating	EPA Glossary of Impacts	Subjective Reaction	Subjective Change
0	No change	n/a	n/a	No change
<3 dB(A)	Not Significant	Neutral, Imperceptible or Slight Impact	Barely perceptible	Negligible
3 – 5 dB(A)	Minor	Significant Impact: Positive or Negative	Perceptible	Noticeable
6 – 10 dB(A)	Moderate		Up to a doubling of loudness	Clearly Noticeable
11 – 15 dB(A)	Major		Over a doubling of loudness	Substantial
>15 dB(A)	Severe	Profound Significant Impact: Negative only	---	Very Substantial

Note: Based on an extract from Morris, Peter and Therivel, Riki. Methods of Environmental Impact Assessment 2nd Edition, 2001.

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6.3 Existing Environment

6.3.1 Context & Character

The proposed development is located in an urban setting in Bantry town. Therefore, there is extensive, residential, retail, commercial development as well as through traffic on the Cork – Killarney N71 resulting in typical urban noise sources and background noise levels.

This noise impact assessment has focused on the potential impact on nearby residents and the environment in close proximity to the proposed development site. The main sensitive receivers in proximity to the development site are residential properties as illustrated in Figure 6.1.

The main predicted impact on existing noise climate in the vicinity of the proposed development site will be due to additional traffic arising from the operation of the proposed development.

The existing environment with regard to noise is typical of an urban environment with traffic volumes in the area being the dominant noise source and common occasional noise sources such as children playing, dogs barking, commercial activities and harbour activities. Noise measurements and noise impact prediction has been completed in order to quantify the existing noise environment and predict future noise levels according to current applicable standards.

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In order to characterise the existing noise environment in the vicinity of the proposed development site, a baseline daytime and night-time noise survey was undertaken. The noise survey was undertaken during the daytime and night-time hours of the 31st January 2012 – 1st February 2012. Weather conditions during the daytime and night-time surveys were dry, calm, and sunny with a temperature range of approximately 4 - 5°C. The wind speed during the noise monitoring survey was approximately 2 - 5 meters per second (m/s). The noise survey was undertaken at the measurement locations outlined in Table 6.3 and shown in Figure 6.1.

Table 6.3: Description of Noise Monitoring Locations

Noise Measurement Location	Description of Location	Justification for Location Selection
NML 1	In front of apartments facing onto harbour	General passing traffic dominant noise source along the N71 / Wolfe Tone Square area.
NML 2	In front of 3-storey houses facing onto harbour	General passing traffic dominant noise source along the N71 / Wolfe Tone Square area.
NML 3	In front of houses near to harbour	Quietest corner of the harbour area
NML 4	Near to the Cove site	At houses near to the proposed area of beach reclamation with dredged materials
NML 5	Near to the Abbey site	At house near to the potential area of beach reclamation with dredged materials

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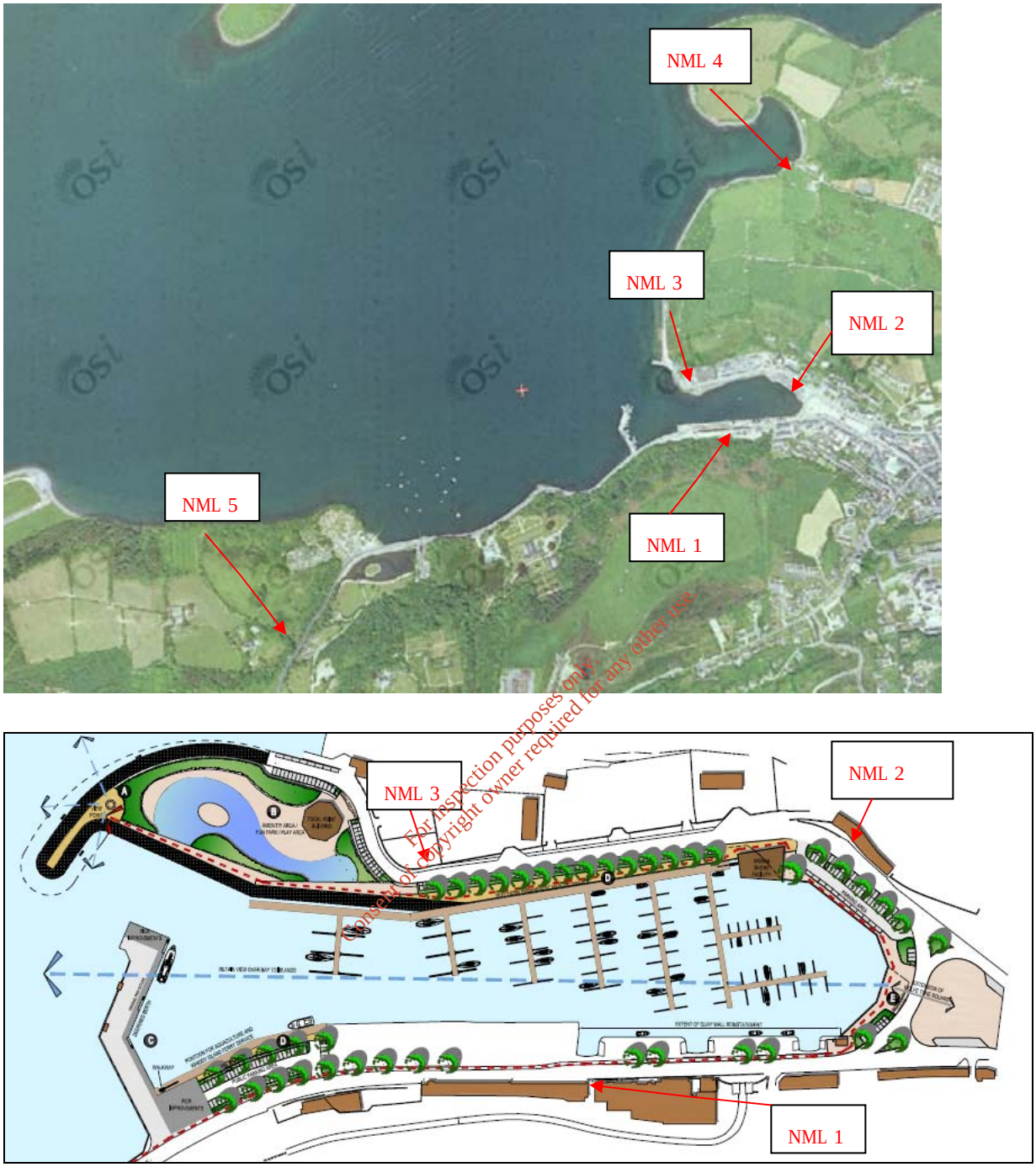

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Figure 6.1 Noise Monitoring Locations

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6.3.2 Noise Survey Results

The results for the baseline daytime and night-time monitoring survey are reported in Tables 6.4 and 6.5.

Table 6.4: Daytime Noise Monitoring Survey Results (15 minute survey periods)

Noise Sensitive Receiver	Start Time	Measured Noise Level			Description of Noise Environment
		L_{Aeq} dB	L_{A10} dB	L_{A90} dB	
NML 1	14:42:59	70.8	74.6	50.5	Traffic in harbour area dominant
NML 2	15:09:07	55.9	56.5	47.6	Traffic in harbour area dominant
NML 3	15:29:40	59.6	62.6	51.7	Traffic in harbour area dominant
NML 4	15:54:26	47.3	45.1	42.5	Very quiet rural area
NML 5	16:32:52	61.3	65.8	46.9	Traffic on N71 dominant

Table 6.5: Night-time Noise Monitoring Survey Results (15 minute survey periods)

Noise Sensitive Receiver	Start Time	Measured Noise Level			Description of Noise Environment
		L_{Aeq} dB	L_{A10} dB	L_{A90} dB	
NML 1	23:00:20	65	65.9	38	Traffic in harbour area dominant
NML 2	23:21:08	44.8	48.3	36.9	Traffic in harbour area dominant
NML 3	23:39:31	41.1	44.1	36.8	Traffic in harbour area dominant
NML 4	00:05:54	40.7	41.3	40.1	Very quiet rural area
NML 5	00:31:54	56.4	47.2	44.7	Traffic on N71 dominant

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The predominant noise source noted at the monitoring locations and noise sensitive locations was passing traffic on the surrounding road network. Other minor noise sources included general activities, birdsong and dogs barking.

The measured L_{Aeq} was above the WHO daytime recommended guidance level of 50 - 55 dB(A) at the monitoring locations located at NML 1, NML 2 and NML 3 in the harbour area. The WHO daytime recommended guidance level of 50 – 55 dB(A) was exceeded at the monitoring location NML 5 due to traffic volumes on the N71. The measured L_{Aeq} was below the WHO daytime recommended guidance level of 50 - 55dB(A) at the properties near to the Cove site. The measured background noise level (L_{A90}) was well below the WHO daytime recommended guidance level of 50 – 55 dB(A) at each monitoring location.

The measured L_{Aeq} was above the WHO night-time recommended guidance level of 45dB at the monitoring locations located at NML 1 and NML 5. This was primarily due to the traffic on the surrounding roads during the survey period. The measured background noise level (L_{A90}) was well below the WHO night-time recommended guidance level of 45dB(A) at each monitoring location.

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6.3.3 Significance & Sensitivity

At present there are no areas in proximity to the proposed development site which are exposed to particularly low or high levels of noise pollution. The noise levels in the vicinity oft the Cove site are typically of rural area noise levels. Traffic noise levels dominate the background noise levels in the harbour area. Local housing is the main sensitive receiver to which future noise levels may be significant in terms of the impact upon the development itself.

The identified noise sensitive locations in proximity to the proposed development may experience a slight increase in noise levels in the area mainly due to increased traffic volumes. This potential noise level increase has been assessed through noise prediction calculations and the relative changes in the noise environment have been quantified in accordance with Table 6.2, subjective assessment of changes in noise levels, in terms of perceived change and loudness.

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6.4 Impact of the proposed development

6.4.1 Do Nothing Impact

Naturally, the existing environment including background noise levels and significant noise sources change over time. In terms of the local noise environment it is expected that small changes for example in road traffic, commercial, industrial and domestic activities in the area will not significantly change background noise levels in such a location.

6.4.2 Predicted Impact

The primary effects relating to noise as a result of this proposed development include the following:

Construction Noise – short-term and temporary in duration
Operational Noise – mainly expected to be additional traffic in the area as a result of the development.

The above factors have been evaluated in this report to determine the resulting noise level at existing nearby residential receptors. In order to determine the potential noise impact of the proposed development on the existing residential dwellings, noise from various activities and sources have been predicted and considered. This includes both the construction and operational phases for the development.

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6.4.2.1 Construction Phase Predicted Impact

Construction noise, inherently noisy and disruptive, is temporary in duration. The works involving “heavy machinery” for the purposes of excavation, the preparation of foundations and piling usually cause the most disturbances to nearby residents. It is not envisaged that blasting will be required, just a small element of rock breaking (approx 200m3) at the inner most end of the harbour. With regard to piling, sheet piling will most likely be used for the extension works to the fishing pier and along the fishing dock walls to allow for their redevelopment. Tubular piles will most likely be used for the open pile quay structure proposed for the end of the breakwater. Heavy Goods Vehicles movements to and from the site may also be a source of potential noise disturbance to the existing occupants living in close proximity to this proposed development.

Generally, the type of works expected to be involved in the harbour development will include the following and typical noise levels are shown in Table 6.6;

1. Demolition
2. Excavation / Levelling: Excavator, dump truck & dozer
3. Rock breaking
4. Dredging
5. Foundations: Excavations, cement mixers & concrete vibrators
6. General Construction: Steel & Masonry construction, services, drainage and surfacing, etc.
7. Piling.

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Table 6.6: Typical Noise Levels from Construction Works likely to take place at various stages during the construction phase of the proposed development (Ref: BS 5228)

Activity	Plant	Noise Level (dB L_{Aeq}) at 10m
Demolition / Site clearance / Excavation / Removal of waste/rubble	Bulldozer	80
	Excavator	82
	Lorries (drive by)	70
	HGV and tippers	84
Rock Breaking	The Noise level generated during rock breaking, possibly using explosives, will depend on the type and amount of explosive and / or the machinery used. The resultant noise would also be modified by water depth although to what degree is unknown.	
Piling	Hydraulic Piling	89
	Vibratory Piling	88
	Large Rotary Bored Piling	83
	Continuous Flight Auger Piling	79
Dredging	Ship chain bucket	96
	Digging out river bed: Tracked Excavator Water Pump	85
	Loading dredged aggregates: Wheeled Loader	84
Foundations	Compressor	81
	Water Pump	80
	Concrete Pour	86
	Place and vibrate concrete cycle	80
	Cement Mixers	74
Steel Erection	Large crane operations	86
	Articulated lorry	70
Concrete Frame	Large crane operations	86
	Place and vibrate	80
General Construction Works	Surfacing	85
	Internal fit/ bricklaying	70
Road works/landscaping	Surfacing/rolling	76 - 86
Infilling/ Levelling	Dump truck	82
	Wheeled excavator/ Loader	76
	Dozer	80

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For construction noise impact prediction purposes, it can be assumed that at any one stage in the construction of the proposed development all of the above activities will not occur together. Therefore, the construction phase noise levels have been predicted assuming that there will be intermittent noise levels of approximately 80 - 85 dB L_{Aeq} at 10m from the source. Worst- case noise levels over a 1 hour period assuming continuous activity on the proposed development site have been predicted at distances of 50m, 100m, 150m and 200m from the harbour development area are shown in Table 6.7.

Table 6.7: Predicted "worst-case" construction noise levels at the nearest noise sensitive receiver locations.

Activity	Predicted "Worst – Case" Construction Noise Level dB $L_{Aeq, 1\ hour}$ at noise sensitive receivers			
	@ 50m	@ 100m	@ 150m	@ 200m
Demolition / Site clearance / Excavation / Removal of waste/rubble	72	64	60	57
Dredging	73	65	61	57
Hydraulic Piling or	74	66	62	58
Vibratory Piling or	73	65	61	57
Large Rotary Bored Piling or	68	60	56	52
Continuous Flight Auger Piling	64	56	52	48
Foundations	73	66	61	58
Steel Erection	71	63	59	56
Concrete Frame	71	64	60	56
General Construction Works	70	62	58	55
Road works/landscaping	64	56	52	48
Infilling/ Levelling	69	62	57	54

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Construction activities will be short term and temporary. The noise and vibration impact at this stage of the project development will not be significant on the nearest residential properties.

6.4.2.2 Construction Noise Impact at the Cove and Abbey Sites

Potentially noisy activities at the Cove and Abbey sites will include barge movements, unloading of the dredged sediments and spreading of these sediments in the proposed beach areas. This will be a short-term construction noise impact. The nearest residential properties to the most likely deposit site, i.e. the Cove site, are located approximately 40m from the likely nearest area of deposition. Assuming that the works include the use of a bulldozer, this will result in a short – term intermittent noise level of approximately 68 dB(A) at

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these properties. This noise level is in compliance with typical construction site noise level conditions. The nearest residential properties to the proposed Abbey deposition site are considerably more remote form the proposed area of works. Future activities at the Cove and Abbey sites will result in similar noise levels to those presently experienced.

6.4.2.3 Construction Phase Vibration

The relevant vibration standards come in two varieties, those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In the case of continuous sources of vibration, such as traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, blasting (an instantaneous activity) and piling (a repetitive/continuous activity), two potential sources of vibration during construction projects, are typically tolerated at vibration levels up to 12 mm/s and 2.5 mm/s respectively.

The National Roads Authority (NRA) guidelines on vibration during construction identify 2.5mm/s as the vibration level that may be considered tolerable during piling works. This limit provides for protection against the vibration nuisance, and is comfortably within the limit for potential cosmetic damage. The potential vibration levels that could be generated by rock breaking works, as required, would be expected to be comparable to the level of vibration that may be generated by piling works. The NRA limits for protection against cosmetic damage are given as a function of vibration frequency, and are:

- 8 mm/s (vibration frequency <10Hz)
- 12.5 mm/s (vibration frequency 10 to 50Hz)
- 20 mm/s (vibration frequency >50 Hz).

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The majority of dwellings in the vicinity of the proposed development will comply with modern building regulation standards and in this regard the vibration limit levels outlined above would be representative of levels that would be expected to be tolerable by these dwellings, without undue concern. In addition, it should be noted that there is a significant safety margin accounted for within the NRA limits, and buildings with slight deviations from modern building regulation standards should not be at significantly increased risk of cosmetic damage.

Guidance relevant to acceptable vibration at the foundation of buildings is contained within BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration. This guidance states that there should typically be no cosmetic damage to buildings if transient vibration does not exceed 15mm/s at low frequencies rising to 20mm/s at 15Hz and 50mm/s at 40Hz and above. These guidelines relate to relatively modern buildings. Therefore, the guideline values should be reduced to 50% or less for more critical buildings. Critical buildings would include premises with machinery that is highly sensitive to vibration or historic buildings that may be in poor repair, including residential properties.

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In some instances it has been shown that a Public Communication Strategy helps reduce or minimise public complaints. BS 5228: Part 1: 1997 Noise and vibration control on construction and open sites points to the benefits of establishing such a strategy in the excerpted paragraph below:

It is well established that people's attitudes to noise can be influenced by their attitudes to the source itself. Noise from a site will tend to be accepted more readily by local residents if they consider that the site operator is doing all that he or she can to avoid unnecessary noise… People's attitudes to vibration may be similarly influenced.

Due to the distance from sensitive properties construction vibration impacts will not be significant and if any, will be short – term and temporary.

6.4.2.4 Construction Phase Traffic Impact

Based on the projected Construction Traffic volumes for the proposed development, the worst-case construction traffic noise impact is most likely to occur in months 5 and 6 of the construction period. During this period construction traffic levels in the harbour area will total approximately 2,000 HGVs per month, which equates to an average of approximately 100 HGVs per working day. This is likely to equate to worst case of 10 2-way HGVs during the peak hour.

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The projected changes in traffic flows in the vicinity of the proposed development have been considered against the existing winter flows in the area of the harbour to determine if there will be significant noise impact due to the projected worst case construction traffic volumes. Based on this projected construction traffic volume data the relative increase in traffic noise at the nearest noise sensitive properties in the immediate vicinity of the proposed development have been outlined in Table 6.8 below.

Table 6.8 Predicted increase in noise levels at the nearest noise sensitive receiver locations along the quays overlooking the harbour due to Construction Traffic

Year and Scenario	Projected Daily Traffic Volume (PM Peak traffic Volume x 10)	Relative Increase in Noise Level due to Construction Traffic – 100 veh/day	Comment
Existing Year (Winter flows)	N71 to Cork = 6,450	+0.3dB(A)	Relatively small increase in traffic volume predicted due to construction traffic vehicles

As a rule of thumb, an increase in noise level by 3 dB(A) requires a doubling of traffic volume. This level of increase of traffic volume will not occur on the surrounding road

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network due to the proposed development so there will be a less than 3dB increase in noise levels.

The maximum predicted construction vehicle numbers on the narrow road with bad bends that leads to the Cove site will total a maximum of 1 vehicle per hour. This will not result in a significant noise impact at noise sensitive properties.

6.4.2.5 Operation Phase Predicted Impact

Additional Road Traffic Noise Impact

The projected changes in traffic flows in the vicinity of the proposed development have been considered to determine if there will be a significant noise impact. Estimates of changes in peak hour flows have been supplied by ILTP Consultants (Traffic Consultants for the project). The projected increase in traffic volumes with the development in operation in 2014 and 2029 have been provided. Based on this projected traffic volume data the relative increase in traffic noise at the nearest noise sensitive properties in the immediate vicinity of the proposed development, i.e. the Residential Apartments adjacent to the Garda Station along the quays overlooking the harbour, have been outlined in Table 6.9 below.

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Table 6.9: Predicted increase in traffic noise levels at the nearest noise sensitive receiver locations, i.e. the Residential Apartments adjacent to the Garda Station along the quays overlooking the harbour.

Year & Scenario	Projected Daily Traffic Volume (PM Peak traffic Volume x 10)	Relative Increase in Traffic Peak Hour Noise Level	Comment
Existing Year (Winter flows)	N71 to Cork = 6,450	-	-
2014 (Winter flows)	N71 to Cork = 6,660	+0.2 dB(A)	Relatively small increase in traffic volume predicted.
2029 (Winter flows)	N71 to Cork = 7,330	+0.8 dB(A)	Relatively small increase in traffic volume predicted.
2029 +50% (Summer flows)	N71 to Cork = 12,000	+2.6 dB(A)	Summer traffic flows higher due to tourist trade.

As a rule of thumb, an increase in noise level by 3 dB(A) requires a doubling of traffic volume. This level of increase of traffic volume will not occur on the surrounding road network due to the proposed development and so there will be a less than 3dB increase in noise levels.

The increase in noise level at any of the nearest residential properties due to additional traffic on surrounding roads in the vicinity of the proposed development will be relatively insignificant. Using the likely future perceived impact of change in noise level at the noise sensitive properties adjacent to the proposed development as outlined in Table 6.2, this is

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regarded as a Not Significant and Barely Perceptible change in noise level and the subjective change is regarded as Negligible.

Mechanical and Electrical Plant Equipment Noise

At this stage it is uncertain of the type, number, location and exact specification of plant and equipment to be installed at the proposed harbour development. The exact specification of all plant will be carefully considered to prevent and minimise any disturbances to existing residents.

General Marina Activity Noise

Marinas by their nature are relatively quiet and marinas are primarily used during daytime and in the summer months. Background noise sources such as local traffic in the Bantry harbour area are likely to mask the limited impact from the various seacraft when moving through the marina. This can be expected due to low speeds of the boats as they negotiate their way through the marina itself as well as speed limits which apply in such areas. Halyard noise, due to the sail ropes hitting the aluminium masts may be the most audible noise source on windy days. Therefore, assuming a likely summer-time daytime marina activity noise level of circa 60 dB L_{Aeq} at10m from the various noise sources, such as boat movements, halyard noise and people activities the following noise level can be expected at the nearest noise sensitive receiver locations:

Potential noise level at receivers = Marina noise level - Attenuation by distance (i.e. ~50m)
= 60 dB(A) - 20 log 50/10
= ~46 dB L_{Aeq}

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6.5 Mitigation Measures

This section provides detail on the noise mitigation and control measures that will be implemented at the site during the construction phase of the development to ensure that noise and vibration impacts are minimised to acceptable levels and that site activities do not cause unacceptable nuisance or disturbance to existing residential dwellings in the vicinity of the site.

6.5.1 Construction Phase Noise Control Methods

General guidelines for limiting the potential noise impact during the construction phase of the proposed development are outlined below:

1. Limit noisy construction works to 8am to 6pm weekdays with Saturday working from 8am to 1pm (relatively quiet construction activities could be carried out outside these hours, subject to strict controls).
2. Use modern, silenced and well-maintained equipment conforming to EU directives.
3. Shut down equipment when not in use, where practicable.

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4. Maintain site semi-static equipment such as generators, mixers, and compressors as far away as possible from sensitive locations and ensure that the orientation is the optimum for low noise.
5. Ensure that all workers are given training with respect to minimising noise and disturbance.
6. Consider quieter working methods where possible. For example, sheet piling will most likely be used for the extension works to the fishing pier and along the fishing dock walls to allow for the development. Should this piling method cause noise and / or vibration nuisance complaints, a quieter form of piling should be investigated where appropriate.
7. Where possible, design haul routes to ensure maximum distance from noise sensitive locations.
8. The utilisation of localised acoustic screening should be provided for specific fixed location items of plant throughout the site. Items such as generators, pumps and compressors should be provided with localised screening in the form of a noise barrier or actual enclosure to reduce noise emissions.
9. Maintain ongoing contact with local residents to ensure any complaints relating to construction phase noise for the project from local residents can be addressed. Also, prior to any particularly noisy activities, local residents should be contacted in order to minimise the perceived noise impact.
10. It is recommended that the Construction Management Plan for the project is inclusive of a recommendation for a suitably qualified construction noise expert to visit the site on a regular basis and carry out an audit of site work practices in order to ensure that every effort is made to reduce noise breakout from site. This should be inclusive of noise monitoring at appropriate agreed and repeatable locations. It is recommended that the nearest residential receivers as previously identified in this report be considered as "Construction Noise Monitoring Locations".
11. In accordance with other construction sites and with common local authority guidance the following noise criteria as shown in Table 6.10 will be implemented throughout the course of construction at this site.

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Table 6.10: Noise criteria for construction sites

Day of Week / Times	Maximum L_{Aeq} at Nearest Noise Sensitive Receiver / Site Boundary
Monday to Friday	
07:00 - 19:00	75 dB $L_{Aeq, 12hr}$
19:00 - 22:00	65 dB $L_{Aeq, 1hr}$
22:00 - 07:00	No noise audible
Saturday	
08:00 - 13:00	75 dB $L_{Aeq, 5hr}$
13:00 - 22:00	65 dB $L_{Aeq, 1hr}$
22:00 - 07:00	No noise audible
Sunday	No noise audible

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6.5.2 Operation Phase Noise Control Methods

6.5.2.1 Road Traffic Noise

It has been predicted that the increase in noise level as a result of the proposed development is negligible and therefore it is considered unnecessary to recommend the attenuation of road traffic noise related to the proposed development.

6.5.2.2 Mechanical and Electrical Plant Equipment

To maintain the combined sound power level of any plant and equipment associated with the operation of the proposed development to below an acceptable level and also to minimise the resulting noise level at nearby residential properties, the following recommendations are outlined:

1. Consider the sound power levels of mechanical and electrical plant equipment during the equipment selection process. By selecting quieter equipment, the limit on sound power can be achieved with less additional attenuation measures.
2. Use enclosures or sound attenuating “jackets” where necessary to minimise noise emanating from individual pieces of equipment.
3. Mount mechanical equipment on anti vibration mounts to minimise transmission of noise and vibration through to the building structure which in turn increases sound radiation into the atmosphere.

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6.6 Likely effects of the proposal

Following review of the proposal, it is likely that the change in noise environment at nearby residential properties as a result of this proposal will be negligible.

The noise impact as a result of changes in traffic flow have been shown in this chapter to be negligible and most likely will not be perceived at nearby residential locations. Noise nuisance to nearby residents is unlikely as a result of the construction and operation of the proposed development.

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7.0 MATERIAL ASSETS

This chapter of the EIS describes the impact of the proposed harbour development on the material assets of Bantry in terms of its water supply, sewerage infrastructure, electricity supply, navigation and future development.

7.1 Water Supply

The existing water supply to Bantry has been upgraded in recent years providing a good uninterrupted supply of potable water to the town. A brief description of the recent upgrade and future plans for further work are provided below.

The Bantry Interim Water Supply Scheme Phase 1 which was the construction of a new water treatment plant at Cahernacrin, has been completed and there is a current Part 8 Application for Bantry Water Interim Scheme Part 2 which includes the construction of an underground potable water booster pump chamber and associated works at Slip, Bantry and the construction of upgrades and extensions to the potable water treatment plant at Derryginaugh, Bantry.

Based on marinas of similar sizes around Ireland, it is estimated that the potable water supply for the new marina facility at Bantry will be as follows:

- Less than 1m^3 per hour as peak demand in summer
- Peak of 6 m^3 for daily usage in summer
- Peak of 2 m^3 for daily usage in winter

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These water demands have been discussed with Cork County Council in light of the capacity of the existing and future networks to accommodate these flows and they have responded that there is adequate capacity.

The proposed new harbour development will not have an impact on water supply in Bantry.

7.2 Sewerage Infrastructure

The wastewater treatment plant which was installed in 2009 at Beech, Bantry to serve the town has a population equivalent of 6,000. Effluent is pumped from the pumping station within the town to Beech and treated effluent is then discharged by gravity, controlled by a lunar clock, to the harbour adjacent to the Airstrip.

There are no plans at present to supply pump out facilities for boats in the new marina development. However, the empting of foul tanks containing sewage will be strictly prohibited within Bantry Harbour. Boats will be required to empty tanks elsewhere.

It is envisaged that the proposed harbour development will not impact on existing sewerage infrastructure in Bantry. However, during the detail design stage, engineers will liaise closely

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with the relevant wastewater engineers in Cork County Council to ensure that this is the case.

7.3 Electricity Supply

The proposed harbour development will be supplied with electricity from the local network provider. The pontoons will have individual electricity supplies and will be fed from the local electricity supply by means of underground wires. There is provision within the Bantry electricity infrastructure to accommodate the power supply without causing disruption to other users. The power supply to the harbour will not impact on the supply of electricity to Bantry.

7.4 Navigation

Navigation aids will be positioned on the new infrastructure within the Harbour in accordance with the requirements of the Commissioners of Irish Lights. In planning the layout of the pontoons, the design engineers left sufficient space for recreational vessels to access and egress the harbour without interfering with other users e.g. commercial fishermen.

Bantry Bay Harbour Commissioners have a set of Harbour Bye-Laws in place which were adopted in 2010. The Bye Laws were introduced "*with respect to the use of and the safety of navigation within the limits of Bantry Port and generally with respect to the regulation of its harbour and property*". Part 3 of the Bye-Laws deal specifically with Navigation.

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7.5 Future Development in Bantry and Environs

It is envisaged that the Harbour Development at Bantry can only be of benefit to the town of Bantry and the wider area in terms of helping to sustain businesses already in the town and encouraging growth in the local economy.

7.6 Conclusions

The impact of the proposed inner harbour development at Bantry on water infrastructure, sewerage infrastructure, electricity supply, navigation and future developments has been assessed as part of this EIA. It is concluded that the development will not significantly impact on these material assets.

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8.0 GEOLOGY AND SOILS

This Chapter of the EIS describes the natural characteristics of the site in terms of geology, soils, and the hydrogeology of the area. It also addresses the sediment quality testing which was carried out on the sediments to be dredged within and outside Bantry Harbour. While adhering generally to the guidelines for EIS preparation published by the EPA (EPA 2002), this section also followed the guidance document "*geology in environmental impact statements*" prepared by the Institute of Geologists of Ireland (IGI 2002).

The geological regime has been established by a review of geological mapping records, supported by results of ground investigations. The potential impacts during the construction phase and during the operational phase were considered and an assessment is made of the likely impact of the proposed scheme on these natural resources and, where necessary, mitigating measures are put forward to reduce the impact of the proposed development.

8.1 GEOLOGY

The desk study has included the examination of geological maps, and information derived from a number of different sources, including:

- Published geological and soils maps obtained from the Geological Survey of Ireland (GSI);
- Project-specific site investigations carried out in 2009 by Priority Drilling, PDL, for the purpose of obtaining sufficient geotechnical information within the inner harbour.

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This information was compiled into a desk-based conceptual geological model for the site to help determine the present geological description. The desk-study considered the geology on both a regional and local scale as the geological processes that created the geological characteristics of the area operated at a large scale, well beyond that of the actual site at Bantry Co. Cork. For the purpose of the EIS, the geology assessment has been divided into 'solid' (or bedrock) and 'superficial deposits' (which includes glacial and post-glacial soil materials). The information contained within this section is based, primarily, on a detailed desk study of the Bantry area.

8.1.1 Solid Geology

8.1.1.1 Regional Geology

The Geological Survey of Ireland, 1:100,000 mapping indicates the geology of the area is characterised by the Reenagough Member, which is described as sandstone, which is composed of massive and flaser-bedding. The relatively fine-grained Late Devonian to Early Carboniferous 'Cork Beds' succession of the South Munster Basin includes continuous sections of paralic facies that are over 1000 m thick and individual sandstone units over 300 m thick. However, the succession does not reflect prolonged phases when facies belts

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were stationary, but rather multiple stacking of small-scale, high-frequency sequences, each associated with pronounced migration of shorelines. What seems to have been unusual about the South Munster Basin succession was that the geographical positioning of these high-frequency sequences was fixed. This resulted from an unusual combination of tectonics, shelf hydrodynamics, sedimentation rates and the textural maturity of the sediment within the basin. This sandstone bedrock is part of the Reenagough Member was encountered during drilling as part of the site investigations. An outline of the regional geology around Bantry is illustrated in Figure 8.1.

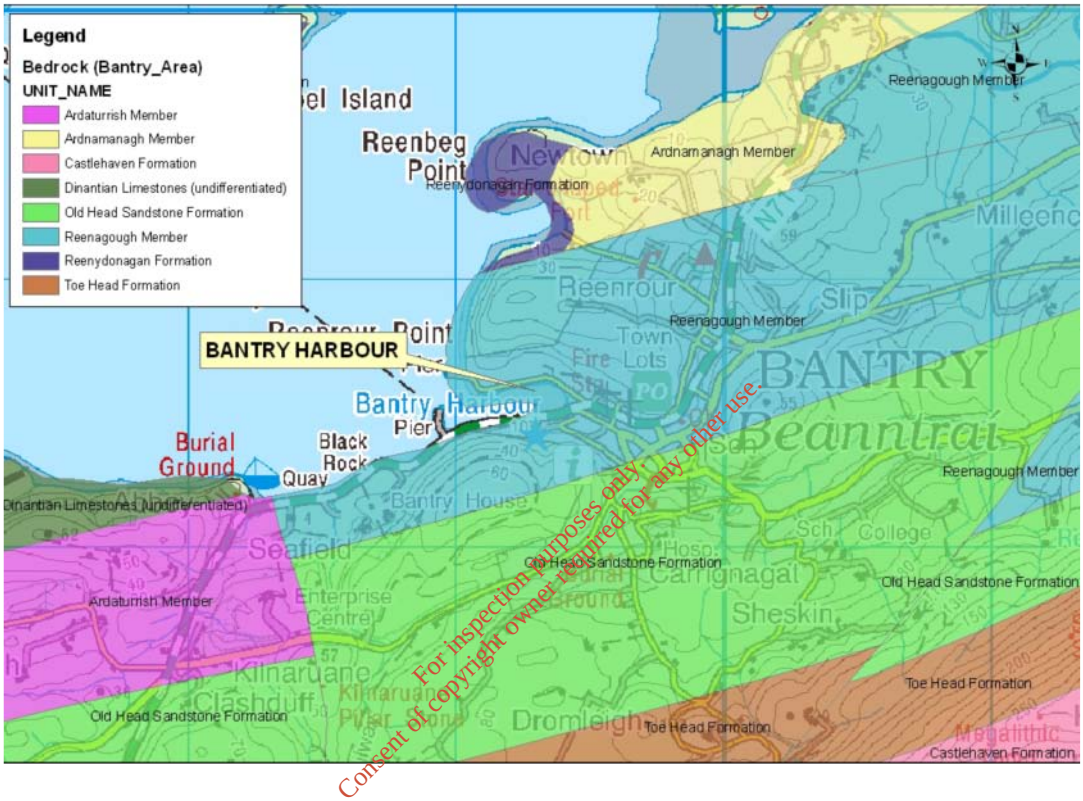

Figure 8.1 Geology in and around Bantry Harbour

8.1.2 Local Geology

The most recent published geological map identifies the bedrock occurring beneath the site as being of late Devonian sandstone. In July and August of 2009, as part of this current study, Priority Drilling Ltd. undertook a marine ground investigation within Bantry Inner Harbour. The results of the hydrogeological surveys also encountered weak to moderately strong MUDSTONE, moderately weak to strong interbedded MUDSTONE and SANDSTONE, moderately weak to very strong interbedded MUDSTONE and LIMESTONE, weak to strong SILTSTONE, moderately weak to very strong interbedded SILTSTONE and SANDSTONE and moderately strong to strong LIMESTONE were encountered from depths of 2.5m to 16.1m bsl.

The investigation comprised 17nr boreholes (both cable tool and rotary core) and sub-bottom profiling. The site was found to be characterised by very soft to very stiff, slightly sandy slightly clay/silt, very loose to dense silty very gravely sand and clayey/silty very sandy gravel

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to depths of 13.1m below existing sea bed level. The sub-bottom profiling showed that rock is closest to the surface along the eastern boundary of the harbour. In the rest of the harbour, rock generally lies at a depth of 4.1m-7.1m beneath the seabed surface. Rock levels deepen towards the mouth and outside the harbour, lying up to 11.7m below the seabed surface adjacent to the Railway Pier. It was also noted that generally a layer of silt/peat was interpreted before a rockhead layer.

Sites of geological interest are not currently comprehensively covered by existing nature conservation designations. This is currently being addressed by the Department of Environment, Community and Local Government who are drawing up a list of sites of geological interest which will be proposed as Natural Heritage Areas. In the meantime, the Cork County Development Plan, 2009, includes a list of important geological features within the county. The list was developed in consultation with the Geological Survey of Ireland and the geology department of the National University of Ireland, Cork. The objective for these sites is to maintain their possible conservation value. The list includes the Bantry drumlins which were formed during the Quaternary period.

8.1.3 Evaluation of Impacts

Geological impacts, as evaluated, can comprise either the impact of construction on the geological environment, or the impact of the geological environment on the construction.

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8.1.3.1 Ground Stability

Stratigraphically, the rocks occurring in Bantry Harbour belong to the Reenagough Member. There are no limestones occurring within the Devonian - Carboniferous succession at the location of the harbor or surrounding area that could provide a basis for karstification or karst-induced instability. All of the rock types occurring along the route are essentially inert. The harbour is located in an area which is seismically very stable so the risk of earthquakes causing ground instability is very low and there is no record of underground mining that could cause instability.

A series of marine boreholes exist from the Maritime hotel development on the southern side of the harbour. These generally indicated the presence of gravelly sandy clays at seabed level (gravels and cobbles can be viewed on the surface of the seabed at low tide) overlying mudstone at depth. The approximate rock level in this area is greater than 8m below ground and therefore deeper than the proposed dredge levels. Therefore, there are no impacts likely in relation to the geology. Boreholes taken around the existing Railway Pier showed sandy gravelly clays to a depth of approximately 10m.

At low tide a rock outcrop is visible at the east end of the harbour. Dynamic probes were carried out as part of a previous investigation to establish the rock head in the harbour; these showed that the rock level falls off sharply to the West, to depths greater than 8m in most places. A very small area of rock to be excavated is located in the area of the harbour which dries out during low tide. Hence, this rock excavation could be undertaken using land based rock breaking techniques, thus avoiding very intrusive rock breaking and such a small

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fraction is not likely to have any negative effects to the geology in the area. The extent of the rock dredging required is shown in Figure 8.2.

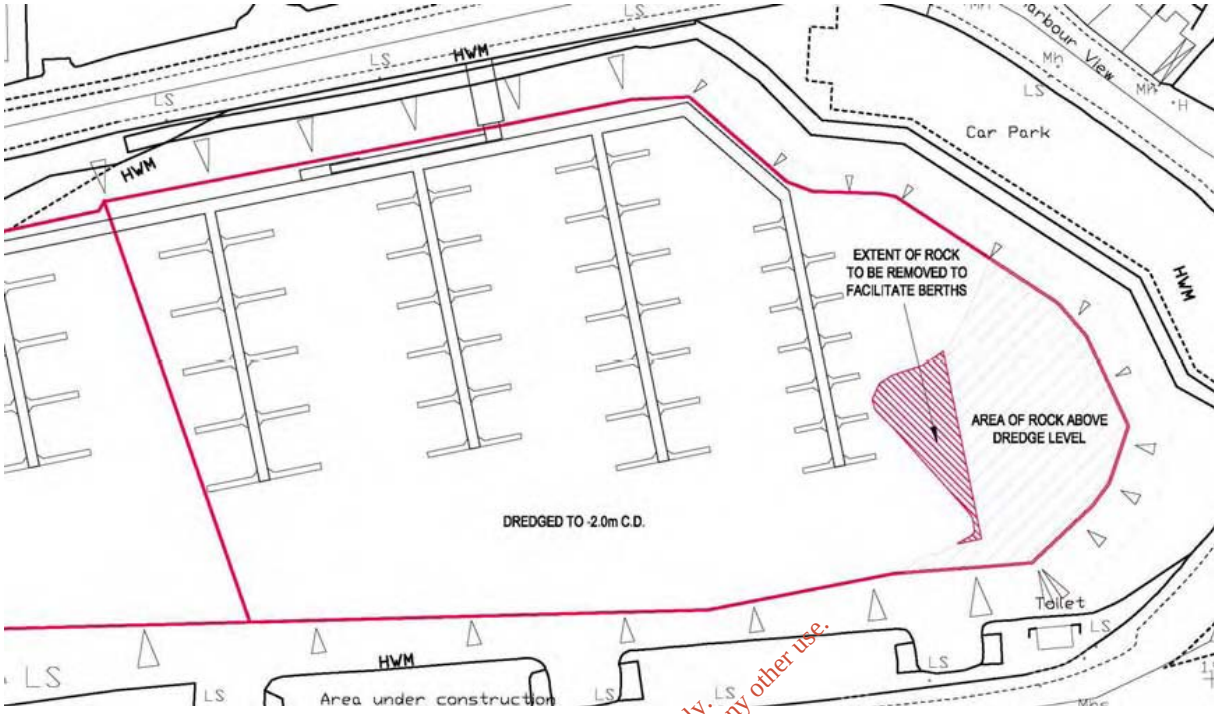

Figure 8.2 Extent of Rock Dredging Required to Facilitate Marina Development

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8.1.3.2 Topography and Landform Features

The area of the harbour selected for development is part of Bantry Bay and therefore, construction and reinstatement will be straightforward and there will be no environmental impacts to topography or landform.

- The proposed beach nourishment and land reclamation works would not affect the Bantry drumlins (a site of geological interest)
- The beach nourishment would bury the sediments currently at the site. However, this would not lead to any negative effects to geology.
- The land reclamation would bury a section of seabed. However, this would not lead to any negative effects to geology.

8.1.3.3 Superficial Deposits (Drift)

As the harbour is located within Bantry Bay, the relevant superficial deposits occurring in the area are alluvium, fine sands and silts. It is appropriate to consider environmental impacts associated with these in terms of excavatability, stability, and reinstatement. The fluvial environment also means that consideration needs to be given to the potential for downstream suspension transport of fine-grained soils exposed during excavation. Loose water-logged fine sands and silts, in particular, can develop a running condition, whereby the material flows with the water that is seeping out. So-called ‘running sands’ may require dewatering prior to construction. Since pockets and lenses of fine sand can occur in boulder

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clay as well as in sands and gravels, it is often very difficult to anticipate where running sand conditions might occur.

However, the method statement of works include:

- Breakwater and Quay Structure;
- dredging of the underlying soft sediments (approx 120,000m^3);
- approx 250m^3 of rock could be encountered above the proposed dredge levels in the inner reaches of the proposed basin, and will need to be removed.

Therefore, alluvium as a geological material, where it occurs is not anticipated to pose a significant environmental impact during construction. For the purposes of this study the design dredge depth is considered to be -3.0m CD from the existing fishing pier to the eastern edge of the hotel car park quay wall, and -2.0m CD from this point to the Wolfetone Square end of the inner harbour. Superficial deposits, where they may occur, beneath the soft sediment being dredged will be undisturbed.

8.2 SOILS

The overburden soils in the Bantry area comprise predominately "dry" soil types: typically well drained deep mineral soils (AminDW) and well drained shallow soils (AminSW), both acidic chemical derived from mainly acidic parent materials. There is also a significant area of "*made ground*" associated with Bantry village and Harbour. Overburden deposits at Bantry are illustrated soil mapping (Teagasc) in Figure 8.3.

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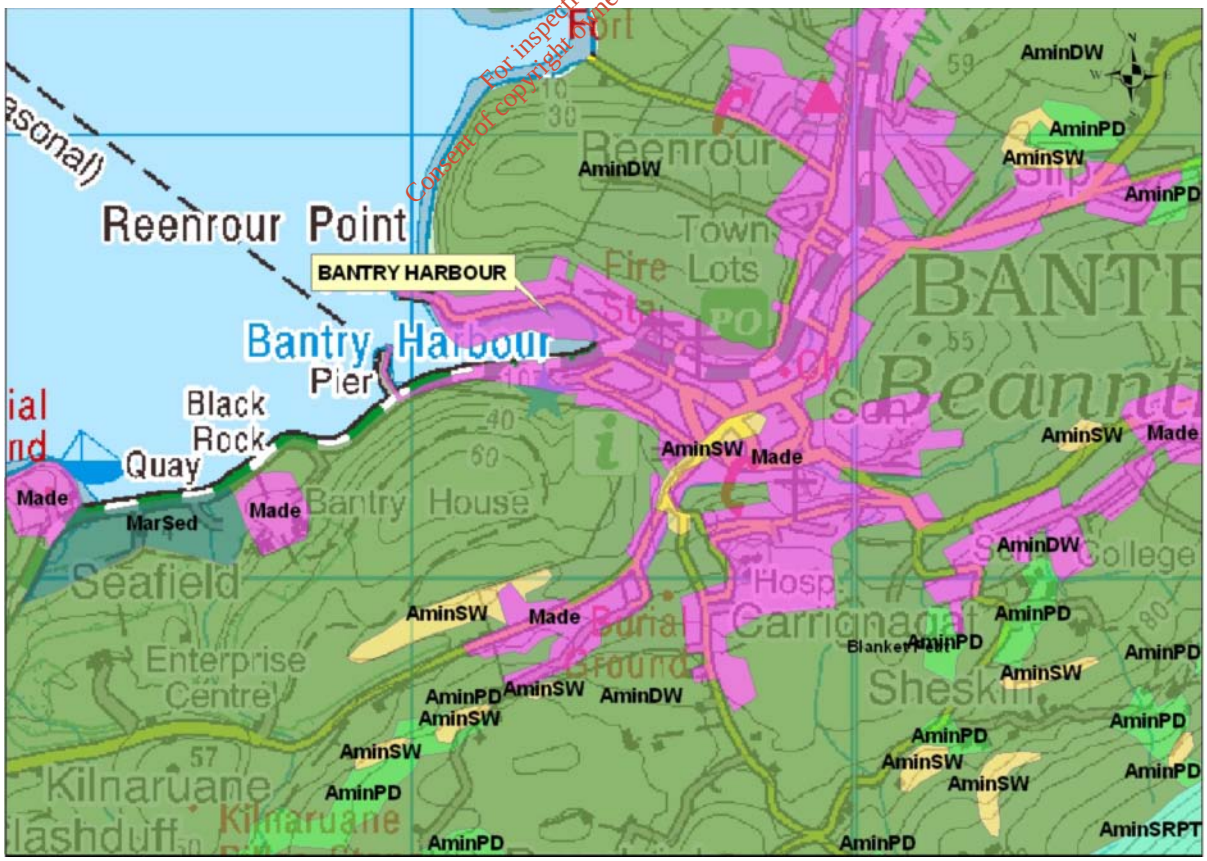

Figure 8.3 Soils Mapping (Teagasc) for the Bantry Area

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8.2.1 Evaluation of Impacts

As the current harbour is an open marine environment, the proposed works will not have a significant impact on soils in the area.

8.3 HYDROGEOLOGY

Groundwater is water found below the surface of the earth, often occurring in natural reservoirs in permeable rock layers. Bedrock formations or sand and gravel deposits which yield significant quantities of water are called aquifers. Figure 8.4 shows aquifer classification in and around Bantry.

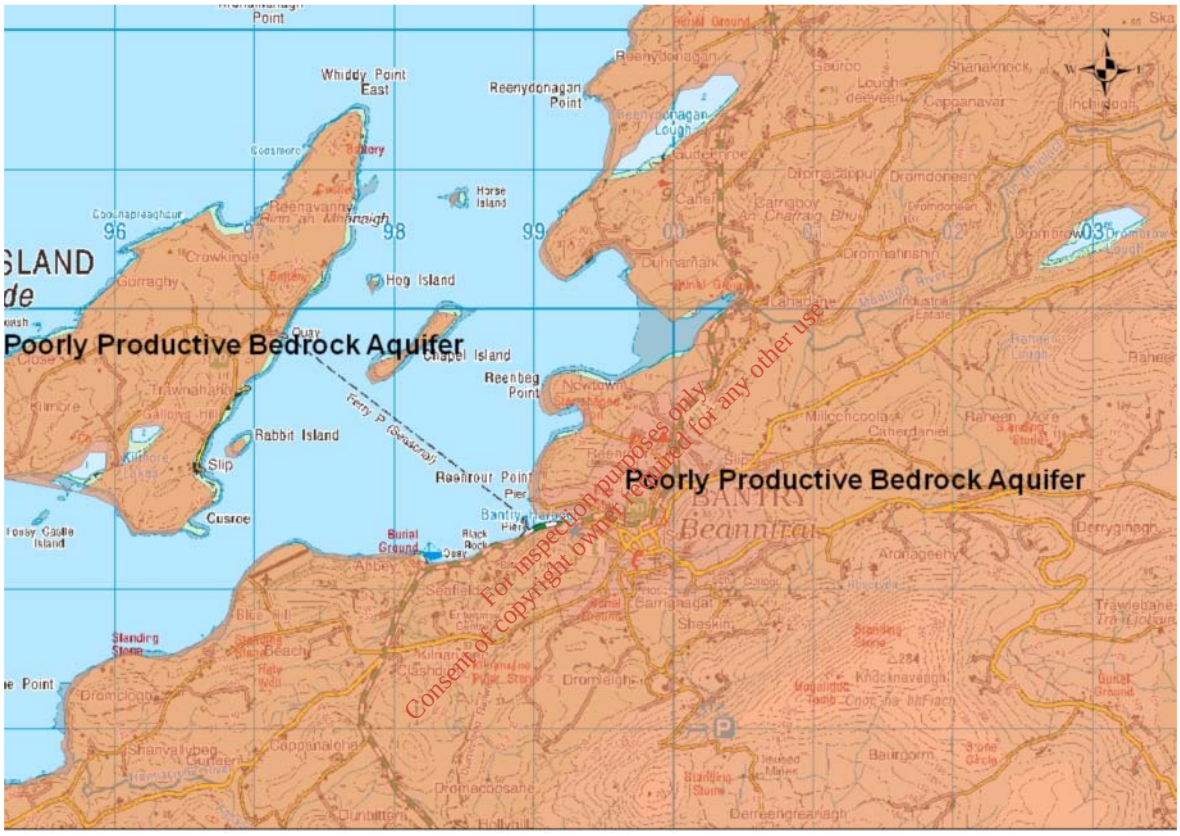

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Figure 8.4 Aquifer Classification in the Bantry Area

The type of rock affects the volume and chemistry of the water. The dominant sandstone rock types around Bantry are classified as aquifers but are have poor productivity. This means that where groundwater is present it will be present in low volumes with slow recharge if removed. Therefore it is not expected that significant quantities of groundwater will be encountered during dredging or construction works. The groundwater table was encountered during borehole drilling at the site (at BH13) during sit investigation works, at a level of 7m bgl.

8.3.1 Potential Impacts to Groundwater

A number of activities can have an impact on groundwater resources including:

- Excessive pumping e.g. from wells for water supply

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- Saline intrusion (risk of over-abstraction in coastal areas pulling sea water into the groundwater body
- Pollution from nutrients, e.g. nitrates and phosphates
- Pollution from chemicals

The proposed development is not anticipated to have an impact to the groundwater as it will not involve any abstraction of water. Day to day operation of the Harbour will not involve the use of chemicals; however contingency measures are in place in the unlikely event of any oil spills as is best practice in all harbour developments.

8.4 SEDIMENT QUALITY – MATERIAL TO BE DREDGED

8.4.1 Introduction

Sedimentation in the marine environment is a natural phenomenon, occurring by rivers eroding materials in upstream areas and settling suspended matter when the current becomes slower, runoff by lowland rivers or by currents coming from the sea transporting and settling material in protected areas such as ports and harbours.

Marine sediments are not, in themselves polluting substances. However, they can be a sink of contaminants that end up in our harbours and ports, mainly from anthropogenic sources such as sewage discharges, marine traffic, industrial wastewater and historically poor environmental management. Contaminants in sediments can act as a source of long-term environmental pollution. Certain substances can bioaccumulate in benthic organisms resulting in biomagnification at higher levels in the food chain. Some widespread pollutants such as polychlorinated biphenyls (PCBs) are no longer in use but due to their persistence they can still be detected in marine sediments (Cronin, McGovern et al, 2006). It is for this reason that sediments need to be tested prior to dredging so as to determine if any contaminants are present and if so, how they can be dealt with in the arising dredged spoil.

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8.4.2 Sediment Sampling Programme

In 2006 the Marine Institute published guidelines for the assessment of dredge material for disposal in Irish waters. The Marine Institute (MI) were consulted in regards to the requirements for a dredge spoil sampling programme in terms of sample location and parameters for analysis. MI responded by asking for the sampling programme set out in Appendix 1a to be carried out. Samples were taken and the sediments were tested by Priority Geotechnical Ltd in Co. Cork. The results of this sampling campaign are provided in Appendix 1B. The results of this initial testing were sent to Marine Institute for their views on the contamination levels in the sediments. It was found that there was elevated levels of some metals particularly mercury and TBTs. Further sampling was carried out with some samples taken at depths to determine how deep the contamination was found within the sediment. The results of this next phase of testing is provided in Appendix 1C. The Marine Institute examined all results from the testing at these 21 sites and commented as follows:

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"*the results indicate that the contamination is limited to the upper 1m, in fact most is in the upper 0.5m, apart from a marginally elevated copper concentration at sample location BH11. Based on the Guidelines for Suitability of Dredged Material for Dumping at Sea, the uppermost material would not be considered suitable for dumping at sea. …however if this upper layer can be isolated successfully, then the remainder of the material should be suitable for Dumping at Sea at an appropriate approved dumpsite*"

After this phase of sampling and analysis, it was decided to extend the area of dredging to outside the harbour and a further phase of sampling and analysis was progressed. These areas were called areas 4, 5 and 6. Again, the MI were consulted as to the sampling regime to be progressed. Their recommended sampling programmed is provided in Appendix 1D. The samples were taken and analysed and the results are presented in Appendix 1E. The Marine Institute examined the results from this phase of sampling/analysis and given that there were elevated metals again, it was decided that all material to be removed from Areas 4, 5 & 6 would be treated as contaminated and disposed off accordingly.

The proposed methods of treatment and disposal of the dredged spoil is discussed in the next section of this EIS.

8.4.3 Uses of Dredge Spoil within the Harbour Development

A description of the dredging methods to be used is provided in Chapter 4 of this EIS. As outlined in Section 8.4.2, it was found that the upper layers of sediment have contamination and will require careful treatment in order to render them safe for re-use within the harbour development.

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8.4.3.1 Contaminated Material

From the analysis of the sediment, there are elevated metal levels in the top 1m of material to be removed from the Inner Harbour. In the outer harbour (areas 4, 5 &6), all the material to be dredged is deemed contaminated. There is a requirement for fill material in the proposed development and the contaminated material from the inner harbour and outer harbour will be used for this purpose. The contaminated material from the Inner Harbour will be removed and used as fill to form a reclamation area for the Inner Harbour. The contaminated material removed from the Outer Harbour area will be removed as infill for the reclamation area at the Abbey Site. A description of how the material will be treated on-site after it is dredged is provided in Chapter 4 of this EIS.

8.4.3.2 Uncontaminated Dredged Material

The material underlying the contaminated dredged spoil will be removed and loaded into barges and used to re-nourish the beach at Cove. This material is deemed free from contamination and clean for this purpose. Further details on the beach re-nourishment process is provided in Chapter 4 of this EIS.

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8.5 SUMMARY EVALUATION OF IMPACTS

The development will not impact on the bedrock, soils or hydrogeology which occur in the Bantry area. This is because the development will not make contact with any significant area of rock outcrop, soils or groundwater. In addition, the development will not involve the removal or depletion of any bedrock resources underground. In general, the bedrock is expected to impact favorably on the development. This is because in the area of the breakwaters and quay structure, the bedrock will contribute to a competent foundation for construction of open piles which can be socketed directly into the rock.

The results of the assessment indicate that there are no requirements for mitigation measures above and beyond what is already stated in the method statement for the proposed construction works, in relation to geology and hydrogeology.

The sediment to be dredged has been extensively analysed for a wide range of metals and other parameters. Due to contamination levels found in upper layers of sediments, this material will be removed and treated and used as fill for reclamation areas in the Inner Harbour and at the Abbey Site. The uncontaminated dredged material will be used for beach renourishment at the Cove Site.

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9.0 CULTURAL HERITAGE

9.1 Introduction

This chapter of the EIS addresses the impact of the proposed development on Cultural Heritage (archaeology) and Architectural Heritage. .

This archaeological assessment present report addresses the known and potential archaeological and cultural heritage environments based on existing archival and published sources, and on marine geophysical survey and site-inspection survey commissioned specifically for this project and carried out under licence from the Department of Arts, Heritage and the Gaeltacht. The information provides a baseline of cultural heritage data that will inform the Environmental Impact Statement for the project. The report seeks to assess the actual and proposed impacts on the cultural heritage environment from the development project, and it includes a series of mitigation recommendations to resolve further cultural heritage requirements associated with the scheme.

The report is based on desk-based study and non-disturbance licensed archaeological survey.

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9.2 Proposed Development

A description of the proposed harbour development is covered comprehensively in Chapter 4 of this EIS.

9.3 Sources and Frameworks

The desktop assessment included an examination of the following sources:

1. *Cartographic sources*, including Admiralty Charts, Ordnance Survey First and Second Edition maps. Historic and current topographical maps represent very important sources that can reveal the progress of natural erosion and human development across a landscape/seascape over time. Such mapping in Ireland is metrically accurate from the mid-late nineteenth century.

2. *National Museum of Ireland Topographical Files*, which provide information on the location of individual objects and small find contexts, as reported to the Museum. The information is located with reference to the townlands of an area. For the present project, the following townlands were assessed: Abbey; Beach; Carrignagat; Castletown; Knocknamuck; Kinathfineen; Newtown; Reenrour East; Reenrour West; Seafield; Town Lots. The names Abbey Strand; Béicín Strand; Bantry and Bantry Bay were also assessed.

3. *Department of Arts, Heritage and the Gaeltacht Sites and Monuments Record files*. The information, which is also filed according to townland, provides details relating to specific monuments and sites of archaeological importance that survive or whose site area is recorded. The record generally includes only sites that pre-date c. 1750 AD.

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4. *National Inventory of Architectural Heritage* is an online register of historic buildings and features/street furniture that retain architectural interest, and is organized by place and townland. The Inventory complements the archaeological inventories by including buildings and features that date from the eighteenth century and more recently.

5. *Office of Public Works* historic port construction files. This body of mainly nineteenth-century state records refer to port improvement works and form part of the National Archives collection.

6. *Department of Arts, Heritage and the Gaeltacht Historic Shipwreck Inventory files* and *Places and Ports archive*. This information relates to the archives maintained by the Department's Underwater Archaeology Unit for shipwreck and other maritime sites of archaeological interest. The information is located with reference to the nearest topographic locator, such as a town or headland, as well as site-specific grid coordinates where known. For the present project, the following landmarks were considered to be relevant: Chapel Island; Reenbeg Point; Reenrour Point; Seliboon Rock; Black Rock; Bantry; Bantry Bay; Bantry Harbour.

7. *Excavations Bulletin* is an annual published list of licensed archaeological intervention work conducted across Ireland. It is arranged by county and then by townland, and is currently completed to 2007.

8. Relevant published sources.

9. Project specific data, including a draft report of the geotechnical site investigations.

The following legislation, standards and guidelines were considered and consulted for the purposes of this evaluation:

- National Monuments Acts, 1930-2004.
- The Planning and Development (Strategic Infrastructure) Bill, 2006.
- The Heritage Act, 1995.
- Guidelines on the information to be contained in Environmental Impact Statements, 2002, EPA.
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements), 2003, EPA.
- Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes, no date, NRA.
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, Department of Arts, Heritage, Gaeltacht and Islands (now the Department of Environment Heritage and Local Government).
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000 and the Local Government (Planning and Development) Act 2000.
- Code of Practice between Bord Gáis Éireann and the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Department of Environment Heritage and Local Government), 2002.

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Limitations

The current report is based on a desktop assessment and non-disturbance survey only. No intrusive investigations or excavations have been carried out.

Classification of Impacts

The impact categories listed below have regard to those set out in the 'Guidelines on the information to be contained in Environmental Impact Statements', 2002, Environmental Protection Agency (EPA), 'Advice notes on Current Practice (in preparation of Environmental Impact Statements', 2003, EPA, and Guidelines for the Assessment of Archaeological Heritage Impacts of National Road Schemes, National Roads Authority.

Impacts are generally categorised as either being a direct impact, an indirect impact or as having no predicted impact:

Direct impact occurs when an item of archaeological heritage is located within the investigation area and entails the removal of part, or all, of the monument.

Indirect impact may be caused where a feature or site of archaeological interest is located in close proximity of the proposed development.

No predicted impact occurs when the proposed route option does not adversely or positively affect an archaeological heritage site.

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These impact categories are further assessed in terms of their quality i.e. positive, negative, neutral (or direct and indirect).

Negative Impact: a change that will detract from or permanently remove an archaeological monument from the landscape.

Neutral Impact: a change that does not affect the archaeological heritage.

Positive Impact: a change that improves or enhances the setting of an archaeological monument.

A significance rating for these impacts is then given i.e. slight, moderate, significant or profound.

Profound: applies where mitigation would be unlikely to remove adverse effects. This is reserved for adverse, negative effects only. These effects arise where an archaeological site is completely and irreversibly destroyed by a proposed development.

Significant: an impact which, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where the part of a site would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological feature/site.

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Moderate: a moderate direct impact arises where a change to the site is proposed which though noticeable, is not such that the archaeological integrity of the site is compromised and which is reversible. This arises where an archaeological feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.

Slight: an impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological feature or monument.

Imperceptible: an impact capable of measurement but without noticeable consequences.

In addition, the Duration of Impacts is assessed and has been sub-divided into the following categories.

- **Temporary Impact:** Impact lasting for one year or less
- **Short-term Impacts:** Impact lasting one to seven years
- **Medium-term Impact:** Impact lasting seven to fifteen years
- **Long-term Impact:** Impact lasting fifteen to sixty years.
- **Permanent Impact:** Impact lasting over sixty years

In the present context, the Cultural Heritage Assessment is a pre-development statement of the archaeological and cultural heritage risk identified for the Bantry Harbour Development Project, based on desktop and non-intrusive field inspection. It can be anticipated that additional information will become available during further fieldwork, and that such additional information may alter any perceived impacts on the environment observed in the current report.

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9.4 The receiving environment

9.4.1 Overview

The modern town of Bantry provides a sheltered anchorage for shallow sea craft, with the deepest moorings lying close to Bantry House, west of the town.[1] The town has developed at the head of Bantry Bay, where the presence of Whiddy Island to the west has provided shelter from the full brunt of prevailing south-westerly airflows. The pattern of known shipwreck sites alone indicates the benefits that this protected location offers, since the four shipwrecks are located to the west of Whiddy (Figure 9.1).

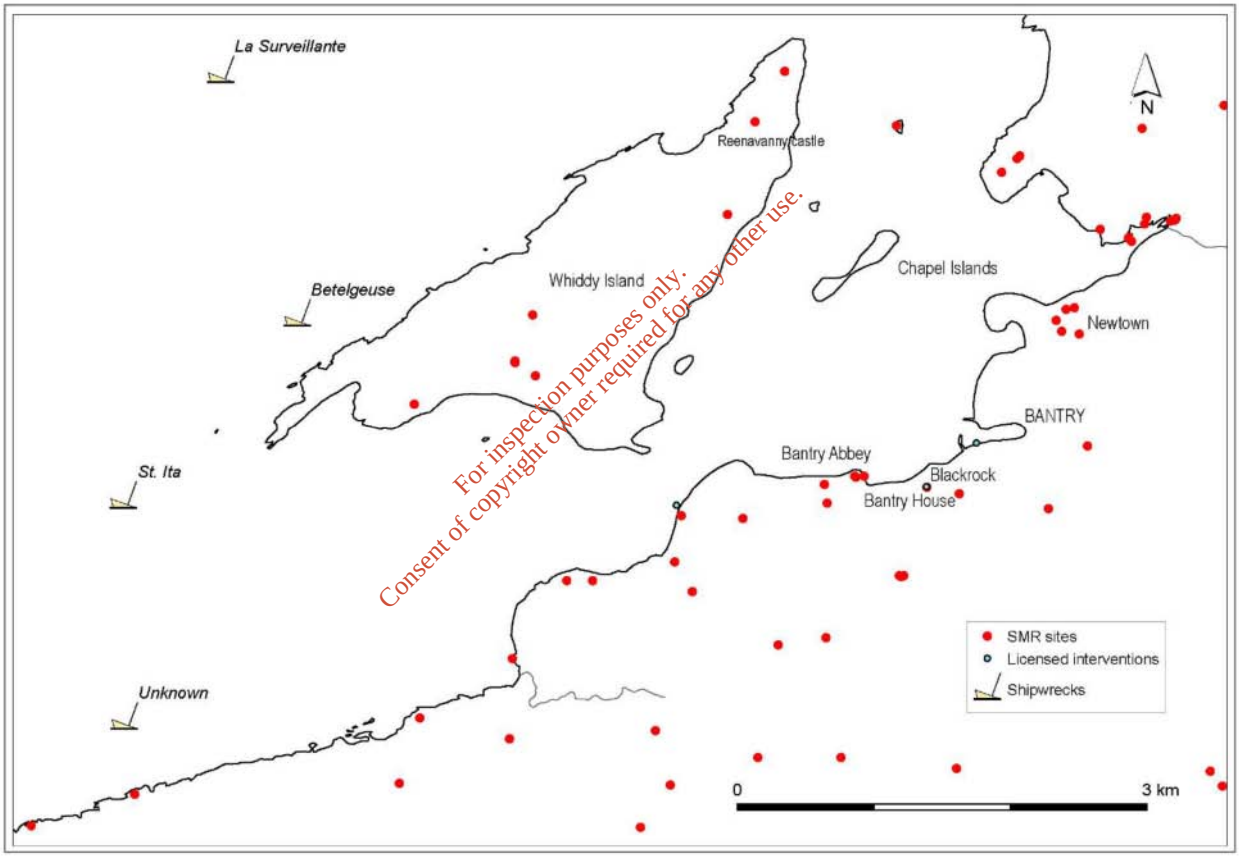

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Figure 9.1 Summary distribution of known archaeological sites in the wider Bantry area

An expansive sea area lies between the town and Whiddy Island, and this is populated by a series of lesser islands, including Horse Island to the north and the two Chapel Islands to the northwest. The archaeological

[1] *Irish Coast Pilot* Tenth edition (Hydrogrpahic Department, London 1954), pp 237-239; *Sailing directions for the south and west coasts of Ireland* (Irish Cruising Club, 2001), pp 95-99.

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potential of Bantry however is not readily apparent on first inspection.[2] Few objects or artefacts have been associated directly with the town area, and the distribution of known sites and monuments suggests there is little that is of interest in the town area. Yet this would be an incorrect conclusion to arrive at. Bantry has been the subject of an archaeological study of the wider Bay area that has focussed on the later medieval and early modern periods, from *c*. 1200-1800, and this work has begun to reveal the subtle detail that suggests a level of archaeological potential within the inner harbour area.[3]

9.4.2 Cartographic Information

Perhaps the earliest detailed map showing Bantry is a map dating to *c.* 1558, showing Cos. Cork and Kerry around Bantry Bay (Figure 9.2).

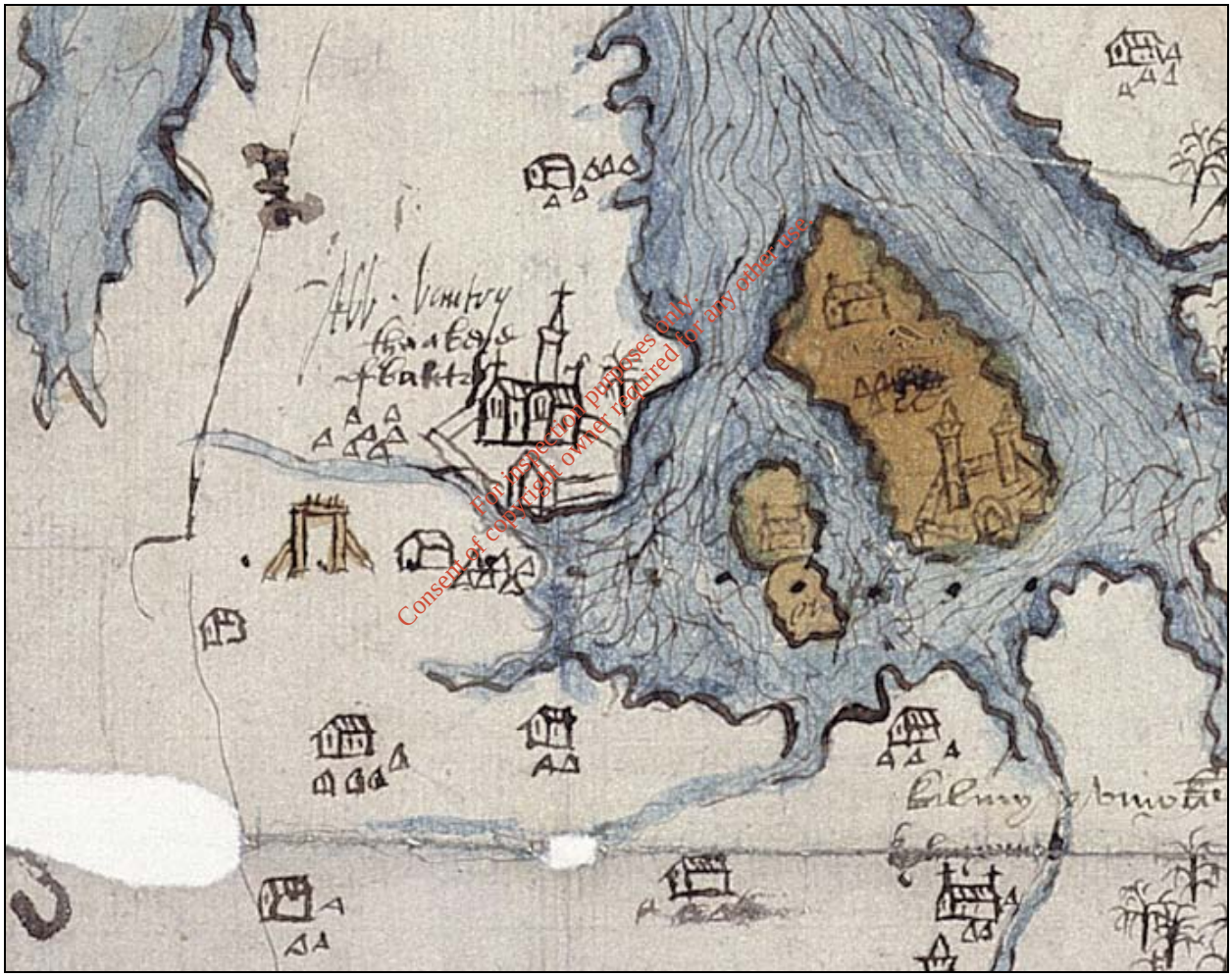

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Figure 9.2 Detail from map of Bantry and Beara c. 1558, showing Bantry Abbey and disposition of settlement around it

North is to the right side of the image. Source: NA (London) MPF/1/94.

[2] Appendix 2a of this report presents lists of the known archaeological artefacts and features associated with Bantry and its environs.

[3] Appendix 2a, CO118:075, Excavation 01E0648; Breen, *Gaelic Lordship*, pp 90-94.

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The map demonstrates the importance of maritime activities to the residents of the Beara and Bantry, and shows the Kenmare River, Dunmannus and Bantry Bays, along with forts, houses, huts, and sea craft. Bantry is indicated towards the bottom left of the map. The cartographer has recorded a series of significant settlements on Whiddy Island, as well as a building on one of the Chapel Islands. Bantry Abbey (SMR CO118:003), a Franciscan Friary founded by Dermot O'Sullivan Beare in 1460, is also indicated in some detail on the mainland, sitting within a substantial enclosure beside an inlet, and with a series of small triangular structures drawn outside the enclosure to the south, or on the left side on the map. A series of similar structures is indicated to the east, on the opposite side of the inlet. There is what appears to be a timber fortification and other buildings close by, as well as a series of buildings located at more extended distances along the coast.

It is known that a tower house castle was built on Whiddy Island at Reenavanny by the O'Sullivan Beare Gaelic lords as one of two such fortified structures to protect their demesne lands in the Bantry region.[4] The castle (CO105:033) was built so that it would be visible from many directions and it also commanded good vistas around Bantry Bay, while its position allowed the site to provide protection to the sheltered anchorage in the inner Bay area, and to monitor shipping over the fishing grounds of the larger Bay. It seems likely that this is the fortification indicated at the northern tip of the island on the map, although its actual location is a little inland. On the mainland, excavation in the grounds of Bantry House at Seafield (CO118:095, licence 01E648), uncovered the remains of small house structure, considered to be the modest remains of a Gaelic residence, and the information has been interpreted as forming part of the former settlement at Blackrock.[5]

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Further detail is indicated on a slightly later map of the early seventeenth century, which shows the inner area of Bantry Bay and provides details of the landscape at Blackrock and to the north (Figure 9.3). The map shows the abbey with a pair of tall spires clearly defined by the sharp return of the inlet on its east side. On the far (eastern) side of the inlet, Blackrock had developed into a significant settlement, with a principal building indicated as two storeys with crosses on it; the crosses are quite unlike the spires representing the abbey, and may instead represent an administration building associated with the settlement.[6] The rocky headland of Blackrock juts out into the inner bay but to its east lies another area of settlement, named Balgobben. In the *c.* 1558 map, only a handful of buildings were shown here, and it is difficult to be sure which buildings may have represented Balgobben, but now there are two lines of houses extending inland along a narrow inlet with a funnel-shaped opening into the harbour. This is the earliest representation of what became known as Bantry town, and was also known as 'Old Town'.[7]

[4] Colin Breen, *The Gaelic lordship of the O'Sullivan Beare* (Four Courts Press, Dublin 2005), p. 72.

[5] Appendix 2a, CO118:075, Excavation 01E0648; Breen, *Gaelic Lordship*, pp 90-94.

[6] Breen, *The Gaelic lordship of the O'Sullivan Beare*, p. 165.

[7] Samuel Lewis, *A topographical dictionary of Ireland* (Lon**don 1837), p. 148.**

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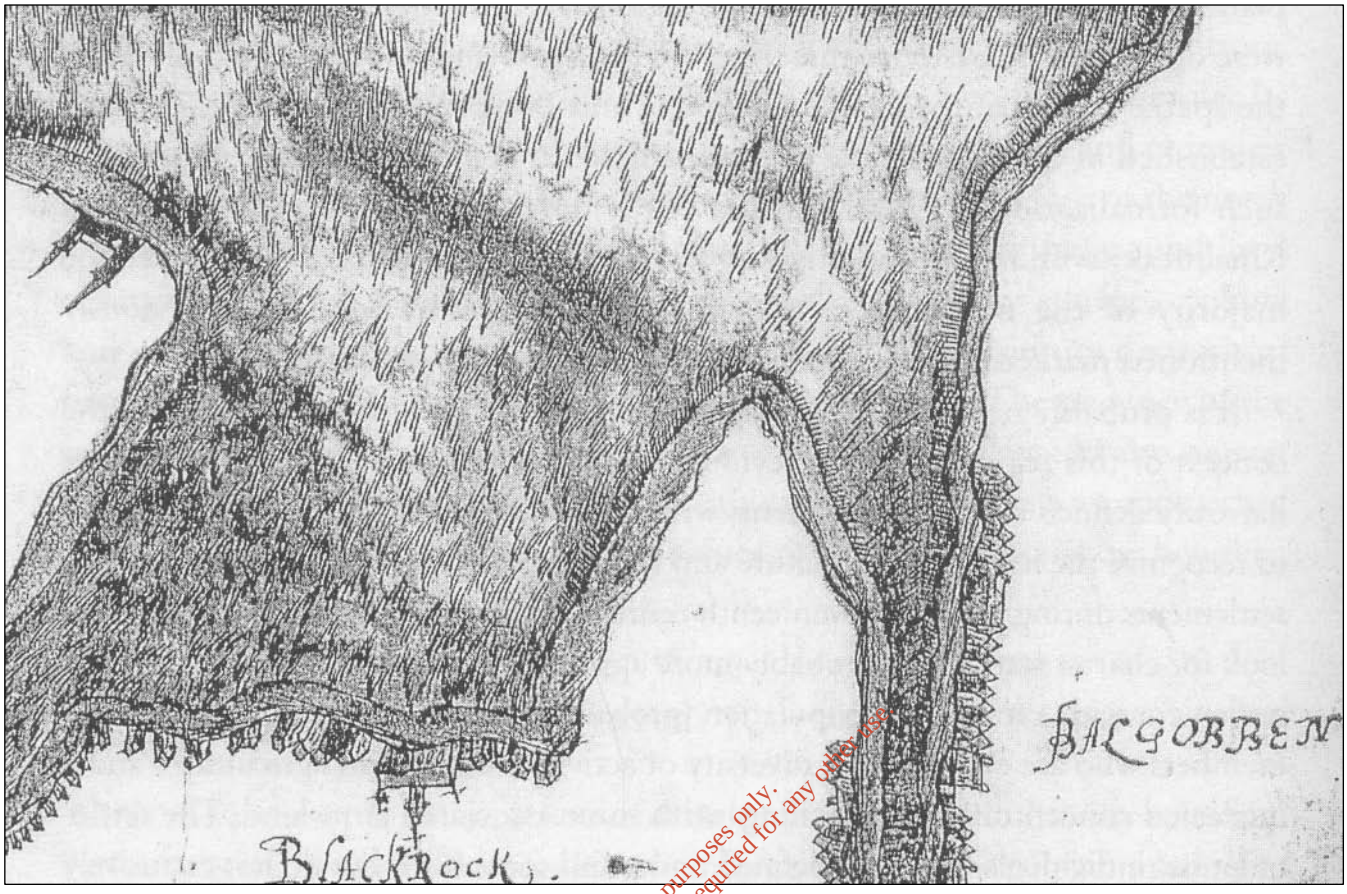

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Figure 9.3 Detail from early seventeenth century map of Bantry Bay area, showing settlement at Blackrock and Balgobben (the future Bantry town).
Source: Breen (2005) based on MS in East Yorkshire Archive, MS/DDDC (2).

More recent mapping relates to the nineteenth century, and the Ordnance Survey First Edition six-inch series, Sheet 118, reveals the first metrically accurate mapping of Bantry, in 1845 (Figure 9.4).[8] Transformations had occurred at Blackrock, and the former sixteenth/seventeenth settlement had disappeared, to be replaced with the country house and Deer Park of Bantry House (CO118:075). Bantry had become a thriving town, and the focus of settlement away from the entrance to the inlet observed in the early seventeenth-century map was continued. The inlet is given much clearer shape, where the tip of Reenrour Point extended south to narrow the entrance area, and enclosed a wide area of sand or mudflat. There was little if any development of the foreshore on the north side of the inlet's mouth. The spatial focus of the town was on the south side, reaching inland to the east. A principal wide road ran along the south shore, with houses built to the landward side, and a quay to the north punctuated with three indentations (Figure 9.5). The northern extent of the

[8] NA MPH 1/158 is a coloured map survey of Bantry harbour taken in June 1797 showing soundings, anchorages and landing places. It may provide further detail on Bantry town but it has not been examined. It is in the National Archives at Kew, London.

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town close to the sea was defined by a small strip of buildings highlighted by the Church of St. Brendan the Navigator, built in 1818. The north shore remained undeveloped.

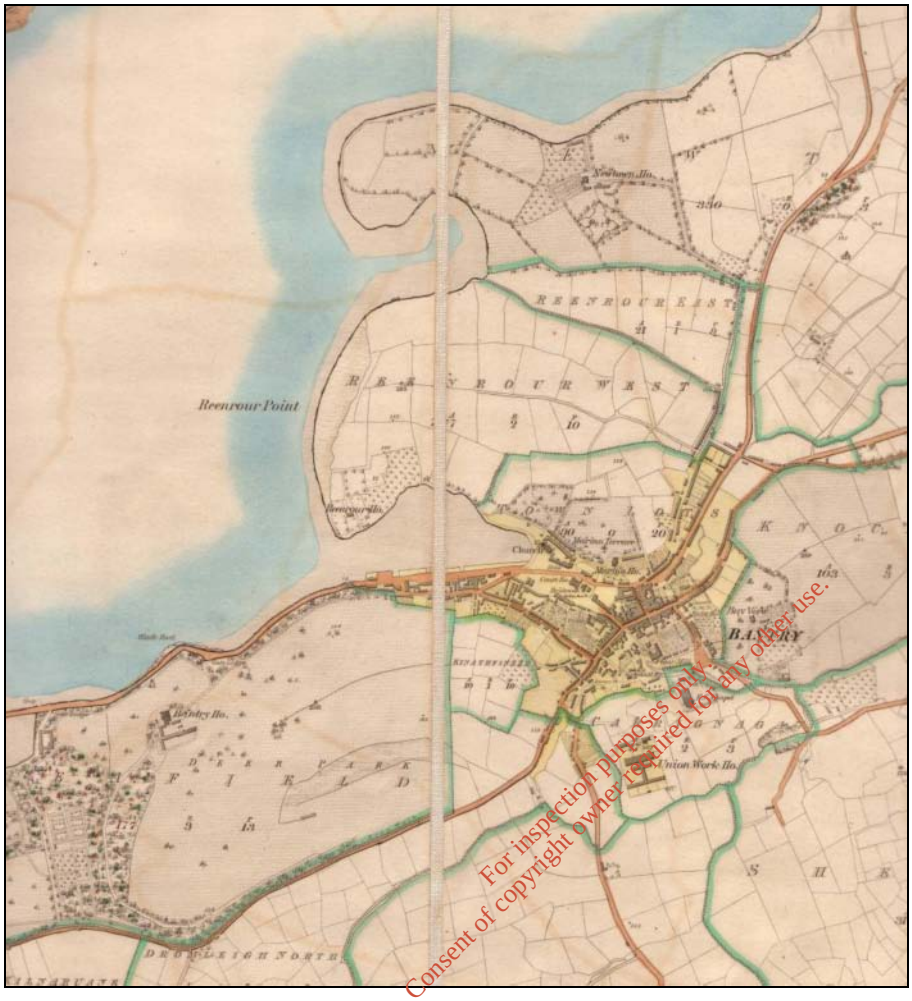

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Figure 9.4 Detail from Ordnance Survey First Edition 6-inch series, Sheet Cork 118, showing Bantry in 1845.

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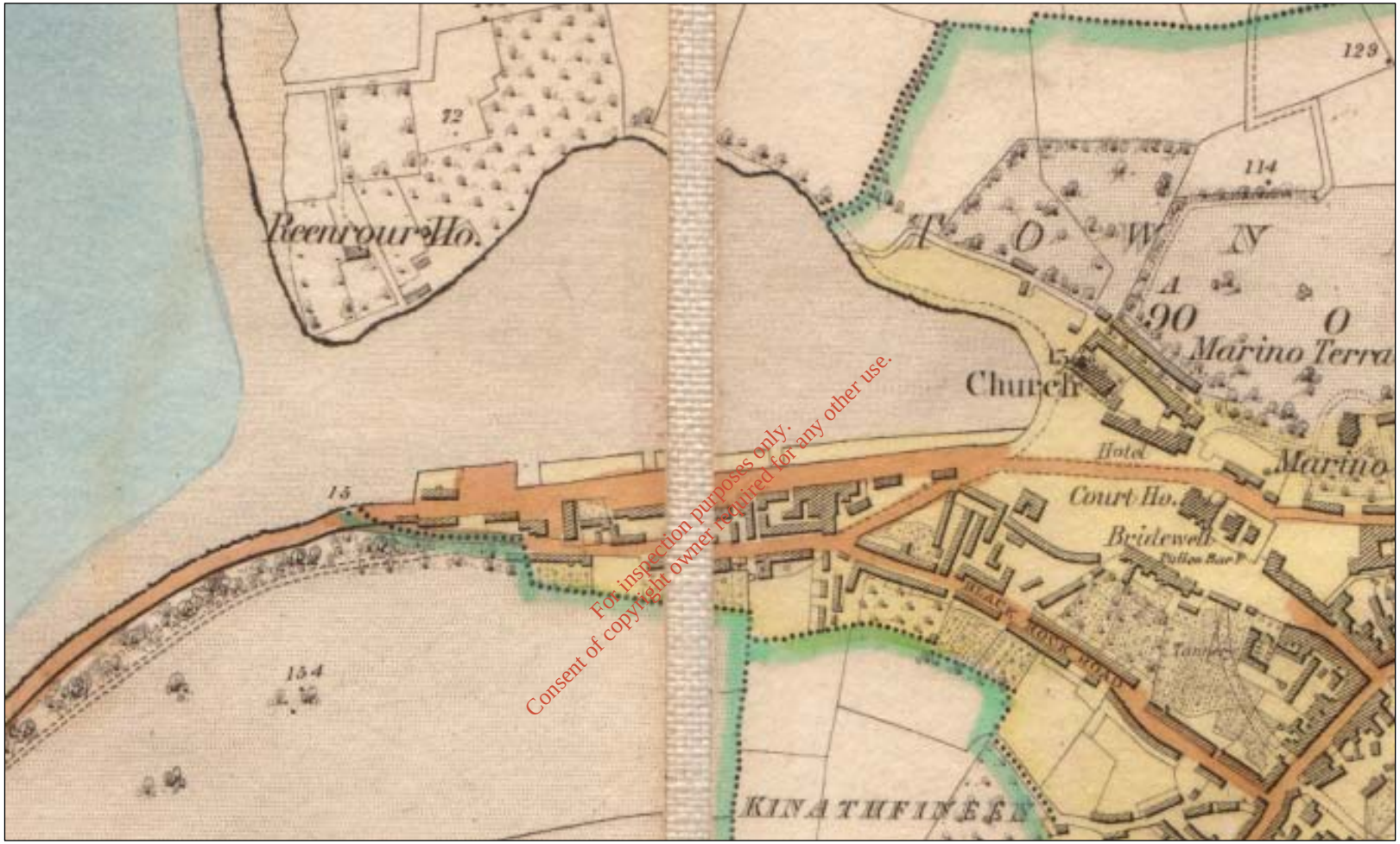

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Figure 9.5 Enlarged detail from OS 6-inch Sheet Cork 118, showing the extent of the town's development of the foreshore by 1845.
Note the focus of development on the south quay area, with the indication of the three slipways recessed behind the quay.

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Later editions of the Ordnance Survey maps reinforce these observations but also reveal the progressive enclosure of the inlet and reclamation of the mudflats. The wide street running along the south shore is formalized as The Quay, and buildings on its south side are united into a continuous arcade forming a sharp junction to the east. The principal elements of the south quay remain unchanged, with the three indentations recurring. However a pier is added to the west, formed at right angles and enclosing this part of the inner harbour. Today there is a more or less seamless run of quay wall to the south pier, but this has come about through gradual reclamation works between the west end of the old quay and the pier. A larger scale process of reclamation has taken place on the north shore. The construction of a railway line was completed in 1909 with its attendant 'Railway Pier', to provide the Cork, Bandon and South Coast Railway line with access to deep water. The train carried passengers onto steamers that would come alongside the pier as part of the 'Prince of Wales tour'. The line was closed in 1949.[9] The present pier structure is a relatively short and wide concrete construction that is referred to as the 'new pier' but it has replaced the somewhat longer Railway Pier, which was recorded as being of wooden construction in 1953, and a water depth of 18 feet (5.4m) was noted above a mud bottom (Figure 9.6). This contrasted with the much shallower water depths experienced on the south side of the harbour, where depths of only 3-7 feet (0.9-2.1m) were experienced on the inside of the stone pier.[10] The building of the railway provided a line of reclamation on the north side of the inlet, and the slob lands behind the rail line have been progressively filled in.

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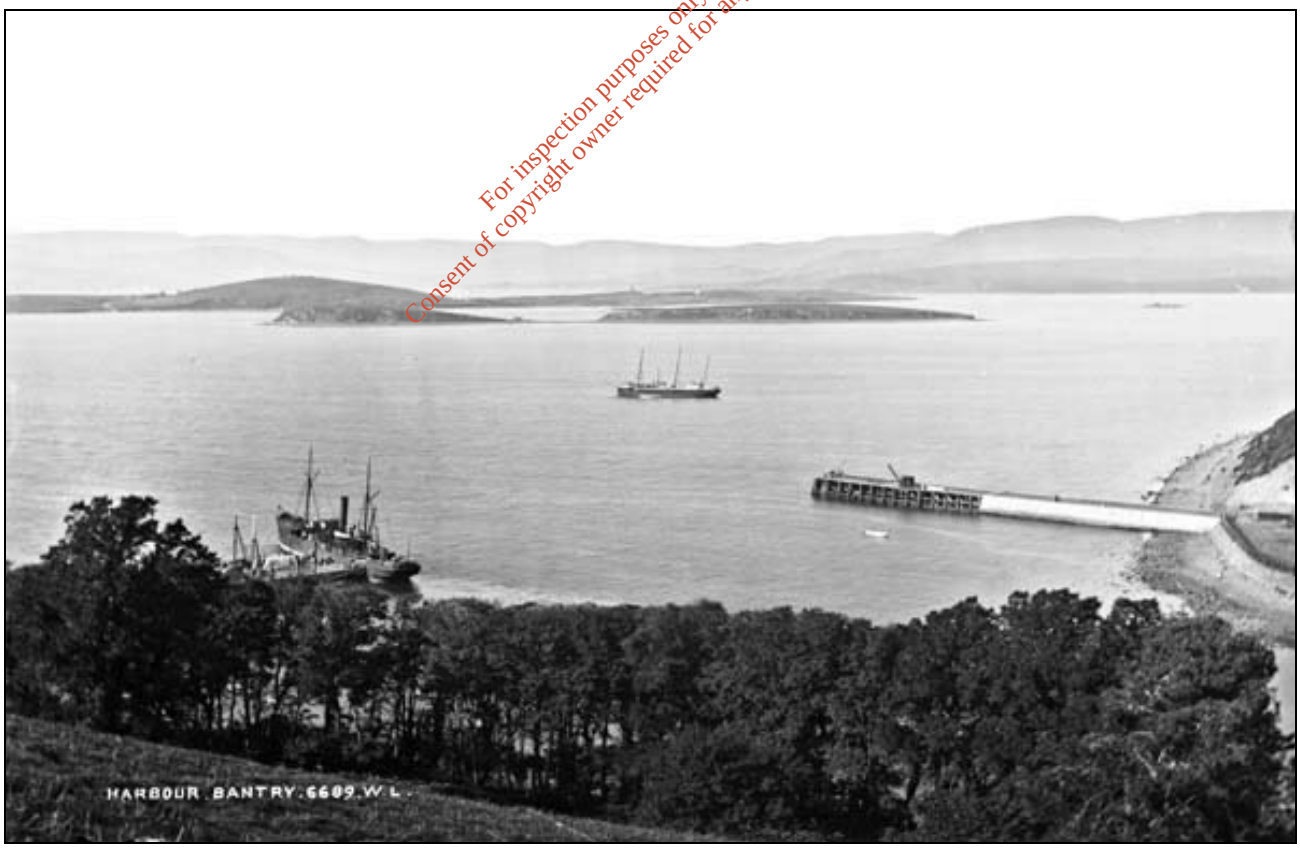

Figure 9.6 Bantry Harbour, showing the Railway Pier

[9] Information from the website, http://photosbyfred.fotopic.net

[10] *Irish Coast Pilot*, p. 238.

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The image in Figure 9.6 is thought to have been taken by Robert French, and dates broadly to the period 1841-1917. The pier head included a timber latticework of posts and beams, elements of which appear to survive in the seabed today. Source: National Library of Ireland, reference L_CAB_06689.

The areas to the north and west of the town, where beach nourishment and land reclamation measures are being proposed as part of the present project, have not witnessed any significant development previously, and the early cartographic information suggests a largely unchanged environment of natural foreshore. The one item to note is at Cove, where the First Edition map indicates the presence of a small rectangular feature on the upper foreshore of the south shore. It is likely to have been a small hut or boathouse. It is not indicated on later editions of the map (see Figure 9.7), and today a concreted pedestrian walkway has been placed across the location, making it very unlikely that remains of the feature survive.

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Figure 9.7 Enlarged detail from OS 6-inch Sheet Cork 118, showing the location and extent of Newtown Fort in 1845

The main archaeological activity relating to the fort is believed to have taken place on the shoreline to the north. There is no tradition of such activity occurring in the shallow inlet of Cove to the west. Note the small rectangular structure on the south shore of Cove; this location is now developed as a pedestrian walkway.

Admiralty Chart information does not add anything substantive to this impression of the topographic development of Bantry, where the shallow harbour is indicated at a very small scale (Figure 9.8).

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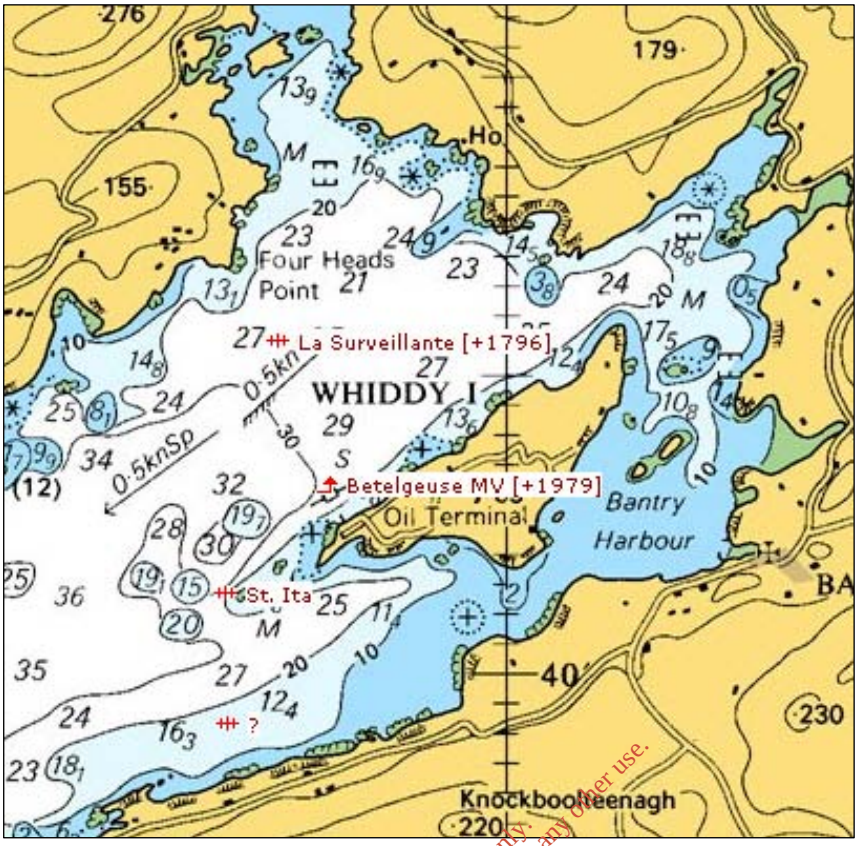

Figure 9.8 Detail from Admiralty Chart showing location of four known wrecksites close to Bantry.

Source: www.wrecksite.eu

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Aerial photography, for its part, reveals the changing nature of the narrow river channel that flows out from the town into the inner bay (Figure 9.9). The twentieth-century Ordnance Survey maps show different alignments of the channel, but an aerial image from 1995 reveals two channels cutting across the mudflats, with a lesser channel on the north side of the harbour. One can conclude from this that the river channel is a dynamic environment that is changing constantly.

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Figure 9.9: Extract from Ortho Image 1995, showing nature of channels through Bantry Harbour

Source: OSi Viewer.ie

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9.4.3 Archaeological Features

There are only a handful of artefacts recorded in the topographical files of the National Museum of Ireland that are associated with Bantry, and none can be located to a particular find-place within the town area, or those of the beach nourishment and land reclamation activity (see Appendix 2a). This absence of clearly defined archaeological features within Bantry is repeated in terms of the known monuments; what sites do exist are located away from the town, and their importance lies in the degree to which they can help to construct the narrative of the town's development within its immediate hinterland. In addition to the sites mentioned above, such as the abbey and the subsequent settlement at Blackrock and also at Balgobben/Bantry, none of which have left substantial remains above ground today, there is a series of monuments to the north of Bantry at Newtown, and also on Whiddy Island that contribute further insight.

Newtown Fort (CO118:002001) is a star-shaped bastioned fortification within which is a square-shaped fort (Figure 9.7). It is located within 450 m east of the Cove area where it is proposed to construct beach nourishment facilities as part of the present scheme. The fort was built by Lord Broghil, later the earl of Orrery, in the 1650s and was designed to protect

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against incursions by Dutch shipping and to safeguard the anchorage at Whiddy.[11] The site was referred to in contemporary sources as Bantry Fort, suggesting the aspirations that the earl had for the site, but though it was repaired in 1672 it was demolished 1689. A settlement area of the same name was developed on the waterfront to the north of the fort and coexisted with it; the two sites exploiting the fisheries in the bay and in direct competition with the settlement at Balgobben. The Down Survey map of the 1650s refers to Bantry Fort and Bantry Town at Newtown as distinct from Balgobben to the south. However Newtown did not last, and was abandoned by the end of the 1600s; Balgobben became the principal settlement in the area and emerged as the town of Bantry.

If there was a degree of settlement shift and competition on the mainland during the seventeenth century, the business of exploiting the fishing industry continued apace on Whiddy. The early seventeenth-century map of Bantry shows a settlement in the south-west corner of Whiddy. It is associated with a number of projecting coastal features, which are interpreted as the remains of a pilchard fishing station.[12] It was one of several fisheries along the coast, and Bantry more generally had a long tradition of pilchard processing, with ships landing to collect the fish throughout the seventeenth century. In the mid-1800s, it was reported that the industry had been worth several £1,000s, exporting to Spain and Portugal, but by the 1860s it was in decline.[13] Archaeological remains of these fishing activities have proved hard to find, but one should expect that the coastline around Whiddy and the adjacent mainland could retain discrete features that show the fuller extent of the Bantry fishery.

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The failure of the French to land in Bantry in 1796, two years before the Rebellion of 1798, has presented the final archaeological chapter of what is known to exist within the surrounding landscape. Theobald Wolfe Tone, a leader of the United Irishmen, had travelled to France in February 1796 determined to lobby the Napoleonic government to support an invasion of Ireland. His efforts were rewarded eventually, and it came to pass that a French armada sailed from Brest in December with this purpose in mind. However a series of calamities ensued, led by bad weather, and the diminished force that made it to Bantry Bay was never able to put their invasion plans into effect, abandoning the expedition in January 1797. One of the legacies of the attempted invasion was the scuttling of the French frigate *La Surveillante* in a depth of some 38 m of water off the NW shore of Whiddy Island.[14] From an archaeological perspective, the wreck of the frigate is a most important site and highlights the wider area more generally as a zone of high archaeological potential. An anchor said to have been recovered from the NE point of Whiddy forms a public monument in Bantry, along with a bronze statue of Wolfe Tone in the principal square named after him, adjacent to the inner harbour (see Appendix 2a).

[11] Colin Breen, 'The post-medieval coastal landscape of Bantry and Beara, 1580-1850', Audrey Horning, Ruairi Ó Baoill, Colm Donnelly, Paul Logue (eds), *The post-medieval archaeology of Ireland 1550-1850*, Irish Post-Medieval Archaeology Group Proceedings 1 (Wordwell, Dublin 2007), pp 205-219, at pp 210-211.

[12] Breen, 'The post-medieval coastal landscape', p. 209.

[13] Lewis, *A topographical dictionary***, p. 148.**

[14] Colin Breen, *Integrated marine investigations on the historic shipwreck* ***La Surveillante***, Centre for Maritime Archaeology Monograph series No. 1 (University of Ulster 2001).

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The French appear to have selected Bantry Bay as the most suitable point of invasion because it was largely unprotected. This was to change in the immediate aftermath of the failed attempt, and a series of coastal defence works were built around the bay to defend it against a future such attempt.[15] Whiddy Island alone has three substantial circular redoubts built along its length (CO105:032; 118:078; 118:077), to provide defensive fire on any attempt to land ships and forces at Bantry; Bantry was considered to be the most important settlement on the road to Cork, and protection of its anchorage was a priority. A battery was also proposed for Seafield, to offer protection to the anchorage from land, and a 12-pounder gun was mounted there in 1803 on high ground overlooking the harbour.

9.4.4 Shipwreck sites

The Shipwreck Inventory in the Department of Arts, Heritage and the Gaeltacht's archive is a list of recorded instances of wrecking since 1750. The details provided describe the type of vessel, the journey it foundered on, and information on the ultimate plight of the vessel and its crew, where possible. In describing the wrecking event, the records will locate the incident in relation to the nearest headland or other topographic marker where known. This is not a record of where the wreckage lies, however, since the historic records generally only deal with the vessel before it sank. Such finer details emerge from other sources, such as fishermens' records of snag points and diver records of sites located underwater. These are included in the Inventory wherever possible, but it is the case that such entries constitute the minority proportion. It should also be pointed out that while the inventory provides a record of wrecking incidents since 1750, it does not claim to be a comprehensive record for earlier events, and therefore the medieval and prehistoric periods are not represented in this archive.

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There is a list of twenty-seven wrecking events recorded for the Bantry area (Appendix 2a), but only four instances of wreckage have been located, including the famous wreck of the French frigate *La Surveillante* (Figure 9.1). All four sites are located within Bantry Bay proper, west of Whiddy Island. There is no case where wreckage has been recorded within Bantry Harbour or at any of the locations being considered as part of the present development project.

9.4.5 Sites of architectural interest

Bantry town retains a long list of known sites of architectural interest, and a shortlist of those sites lying close to the harbour area are included in Appendix 2a, selected mostly from the National Inventory of Architectural Heritage. There is no instance however of any such site occurring within the area proposed for investigation as part of the present development project.

[15] Paul Kerrigan, *Castles and fortifications in Ireland 1485-1945* (Collins Press, Cork 1995), pp 198-204.

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The stone pier on the south side of the harbour is not deemed to be of architectural interest. It was built at some time before the Ordnance Survey First Edition map in 1845 but its historic character is of archaeological interest, and the present project provides an opportunity to make a first formal record of the structure. It may have been built in the 1820s as part of a general process of improvement across the Bantry estates. The quays were financed by Bantry House and their location in front of the original entrance to the House is no coincidence. Originally they would also have functioned more efficiently prior to the reclamation of the town square and slob which resulted in significantly higher rates of deposition in this area.[16] Some information is available in the Ports and Harbour Archive at the DAHG (see Appendix 2a). The existing pier in 1860 was deemed to be inadequate, and in 1867 work began on building a new pier, 400 feet long, 35 feet wide with bangotte and parapet at the western or weather end. It was built of local sandstone with the assistance of a government grant of £3,000. In the absence of maps or other indications, it is not clear whether this referred to new work along the existing south quay, or to the construction of the south pier to the west.

9.4.6 Site investigations

A programme of geotechnical investigations has been carried out to assess the substrate of Bantry Harbour for the present scheme.[17] The report presents the results of a programme of borehole investigations, bathymetry and a sub-bottom profile survey.

In general, the information indicates that the substrate is one of silts and clays over mudstone/sandstone. In one instance, a layer of peat was also observed. Borehole BH15, located in the northeast corner of the survey area, encountered a brown silty peat with some shell fragments, plant remains and wood, at a depth of 4.5-5.5 m below seabed level (Figure 9.10). The layer was underneath soft organic silt with shell and wood fragments and plant remains, and above firm slightly gravelly sandy organic silt with shell and wood fragments and plant remains. The observation indicates the presence of a buried peat level close to the upper end of the harbour. This is not an unexpected observation from a landscape where water levels have risen since the last Glaciation. It may refer to a former wetland ground surface. It was not observed in any of the other boreholes conducted for the project.

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[16] Colin Breen, pers. comm. 06/06/2012.

[17] Priority Geotechnical, 'Bantry Inner Harbour, site investigation, Draft Factual Report, No. PC9030', January 2010.

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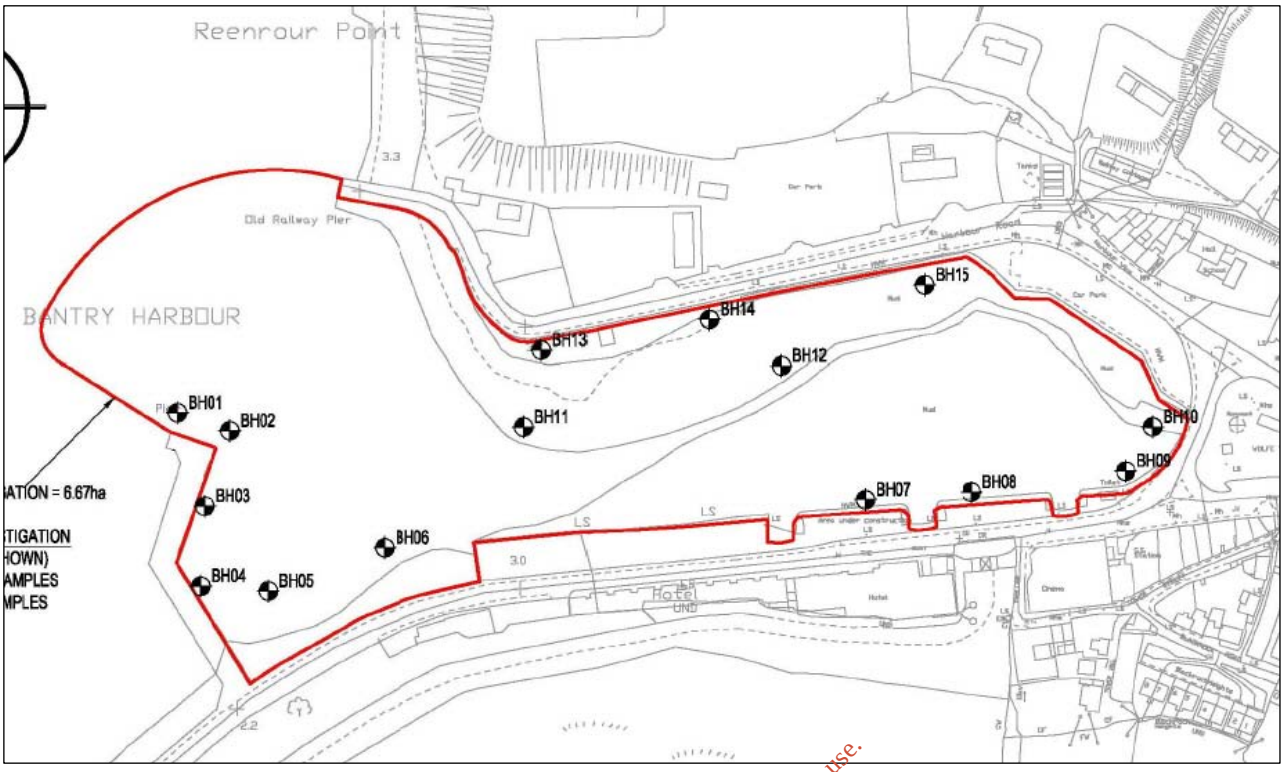

Figure 9.10: Distribution of Borehole locations, Bantry Harbour
Note location of BH15 in NE. Source: RPS

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9.4.7 Conclusions

Early maps show that Bantry developed on either side of a narrow inlet from the early seventeenth century, with two lines of houses built along each river bank. Archaeological intervention within the town is largely absent, but excavation to the west of the town in the grounds of Bantry House, in Seafield townland, has confirmed that the early maps' representations of settlement at Blackrock are genuine. It suggests that the maps remain a valid tool for archaeological assessment within the town area itself.

The Bantry Harbour Development Project lies downstream and west of where the town of Bantry was developed. The absence of known archaeological features associated with the area of the proposed harbour development supports this conclusion. However, the relative absence of archaeologically licensed work within and around the town more generally must be considered as a contributory factor to this apparent lack of data.

The fact that the Harbour Development Project area lies immediately downstream of the early modern town, and extends into a sea area that served as an intensive early modern fishery, does indicate the need for continued archaeological mitigation. The possibility remains that subsurface deposits retain archaeological material, and the harbour silts would be ideal holding areas for such material. There has been one recorded archaeological intervention within the inner harbour area to date (Appendix 2a, 07D029). This was a small-scale monitoring exercise on the south shore that did not observe any material of interest. The observation of a buried peat layer in Borehole BH15, at the upper end of the harbour, is

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of interest because it indicates the presence of much older land surfaces below the harbour that have been inundated over time. There is no known archaeological survey or record of the stone pier and related features associated with the harbour area. There has been a series of archaeological interventions associated with the construction of a slipway at Abbey Point (Appendix 2a, 06D066). An area of the seabed forming the east end of the present survey area in that location was inspected previously by ADCO and did not reveal material of archaeological interest. It is understood that subsequent monitoring for the construction of the slipway did not reveal material of interest either.[18]

9.5 Marine Geophysical Survey

Marine geophysical survey was conducted for the present project by Irish Hydrodata Ltd for RPS, under licence from the Department of Arts, Heritage and the Gaeltacht, 12D0026.

9.5.1 Scope

The survey comprised a magnetometer survey in the four locations: the Cove, Béicín Strand, the inner harbour, and Abbey Strand.

9.5.2 Operational[19]

The survey was completed on 8th May 2012, coinciding with a Spring Tide, ensuring ample water coverage over the survey areas. A Marine Magnetics Seaspy magnetometer was towed 20m behind the survey vessel. The sensor was suspended from a buoy (1m rope) to prevent it hitting bottom. Data logging was by Hypack at 4Hz.

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There were no obstacles encountered while surveying at the Cove or along Béicín Strand. Along the southern quays of the inner harbour (in front of the Maritime Hotel) there were some boats. Cars were parked right at the water's edge. Sheet piling exists for a long stretch along the south quay and some gas tanks. Such extent of hard metal provides significant background interference to magnetic data collected in close proximity to them. At the entrance to the inner harbour boats were tied up three or four deep along the inner side of the pier and a trawler was alongside at the head of the pier. A new slipway with steel piles is located at the eastern end of the Abbey Strand survey area. Mooring buoys are also present, scattered throughout the area.

9.5.3 Results

9.5.3.1 Coverage and Data

Survey was completed in the four survey locations (Figure 9.11). The data was presented in three formats for review, adjusted for towfish layback. The data was presented as separate tracklines, facilitating cross-reference with the trackplots, and as text (.txt) files and mag data

[18] Connie Kelleher, DAHG, pers. comm..2012.

[19] Information provided by Irish Hydrodata Ltd.

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profiles (.png), showing the actual magnetometer data levels. The magnetometer data was processed further, or 'cleaned', to remove background levels, leaving only the 'targets' centred on a zero level (see Table 9.1).

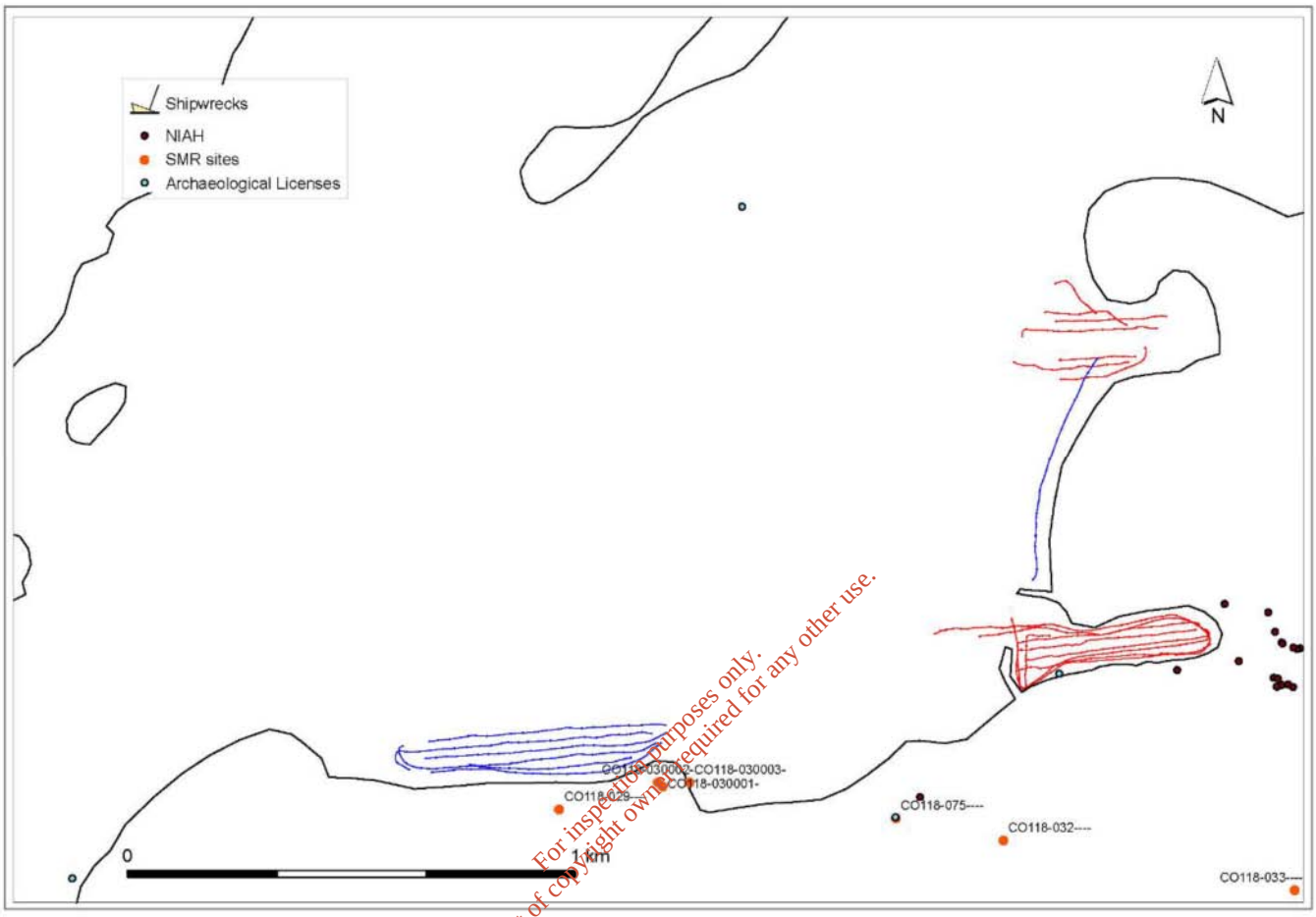

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Figure 9.11 Map showing the location of the four areas surveyed using a magnetometer.

Note: the map showing the tracklines as surveyed in all four locations. Baseline data from Irish Hydrodata Ltd.

The magnetometer operates on the basis of plotting the magnetic field of the sub-surface environment. In this way, the magnetometer will detect natural variations in the magnetic field as well as manmade features. Natural variations can relate to different bedrock formations, and such patterns can be detected most effectively when the magnetometer is used over large distances. The relatively small-scale of the four locations within the study area inhibit clear observations of natural variations.

The magnetometer has the potential to detect anomalies that retain ferrous metal, and is therefore a useful instrument for detecting manmade features. The device operates on the basis of acquiring information from directly below the instrument. It is therefore important when seeking material of archaeological interest to have line-spacing as close together as possible, since many manmade features will be small in scale. The minimum requirement for line-spacing when surveying for archaeological purposes, as recommended by the

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Department of Arts, Heritage and the Gaeltacht is within 50m (see Appendix 2b); the present survey meets this standard and indeed presents a high level of coverage, with line-spacing of between 5m and 20m.

The magnetometer's pulses can also penetrate the seabed surface into the underlying layers, and therefore can detect buried anomalies as well as those that lie on the surface. However, the instrument's detection does not distinguish features that are buried from those that are exposed on the seabed.

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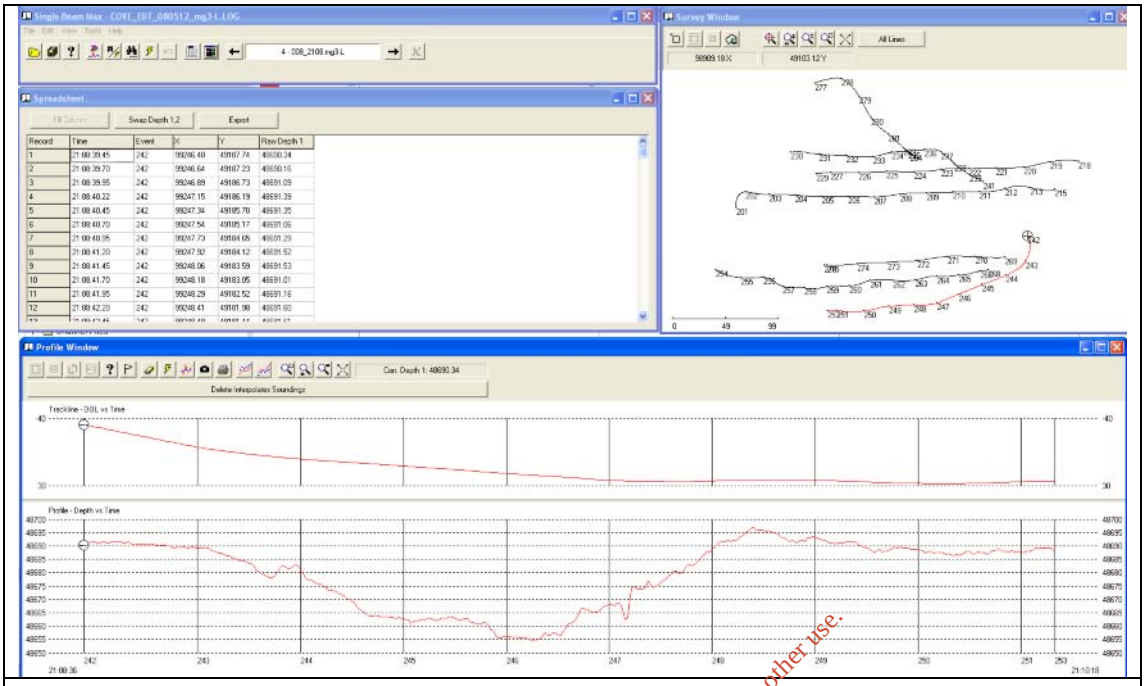
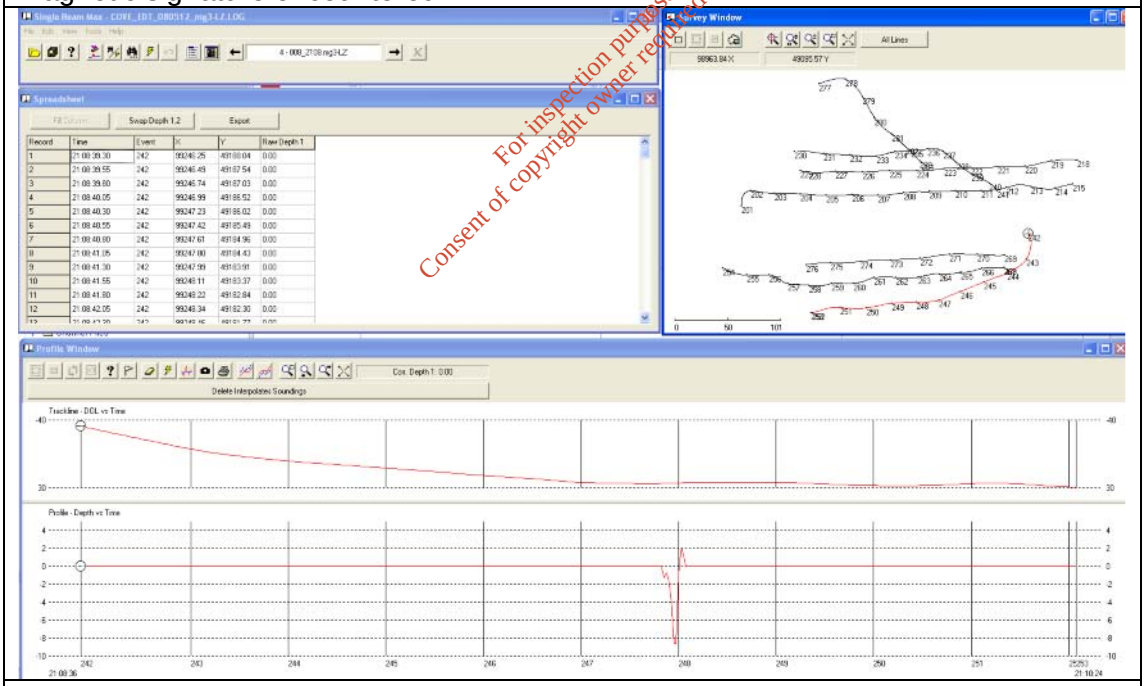
Table 9.1 Demonstration of the presentation of the magnetometer data for review, showing the unprocessed and processed versions



Example of magnetometer data from Cove, showing the southern trackline and the magnetic signature encountered.



Example of magnetometer data from Cove, showing the southern trackline and the magnetic signature encountered. The data has been processed or 'cleaned' to remove the background noise and highlight any anomalies that may exist. Compare the localized spike indicated at Fix 248 in the lower register, and how this is much less apparent in the uncleaned upper register, where only a slight trough is indicated closer to Fix 247.

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9.5.3.2 The Cove

A series of seven short survey lines were completed parallel with both shores of the Cove. The lines were spaced 15m-20m apart, extend across the intertidal zone into the sub-tidal portion (Figure 9.12), and were acquired following a zig-zag acquisition pattern.

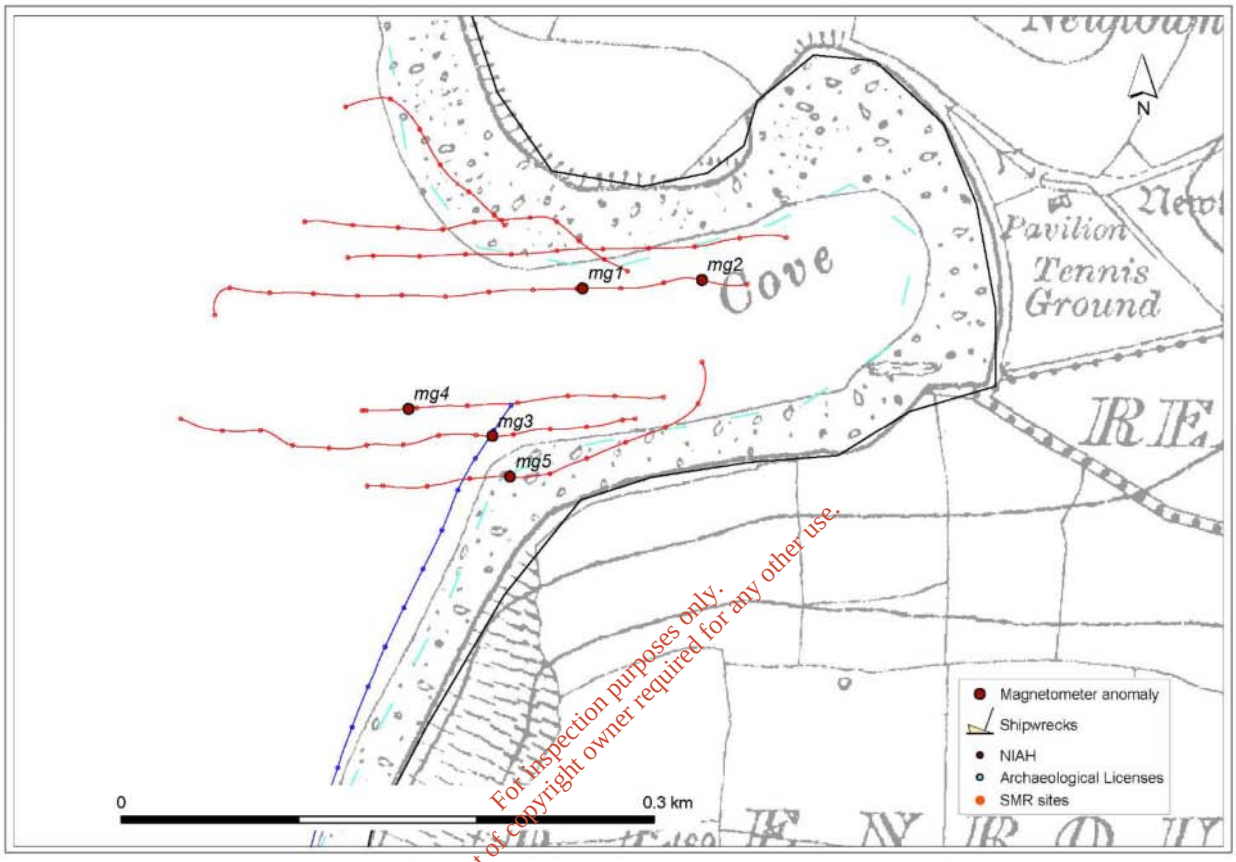

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Figure 9.12 Map showing the distribution of magnetic anomalies and the area surveyed at Cove.

Five anomalies were detected (Figure 9.12, and see Appendix 2c for detail). Two anomalies were detected off the north shore (anomalies mg 1 and mg 2) and three off the south shore (mg 3- mg 5). Anomaly mg 1 represents a sharp increase in the background magnetic signature over an extended distance, while mg 2 represents a smaller scale localised spike; suggesting the presence of two ferrous metal objects. Anomalies mg 3 and mg 5 present a reverse signature, one a trough, the other a spike, which is a feature of running the magnetometer in parallel but opposite directions (the so-called 'zig-zag') method). Anomaly mg 4 lies further offshore yet the three anomalies suggest an alignment, and the localized nature of each anomaly may indicate that they represent three observations of a linear feature, such as a metal pipe. In contrast, one end of the Béicín Strand trackplot passed directly over the location of mg 3 and did not detect any anomaly here. The Béicín Strand survey line was passing at right angles, and this may account for the absence of detection.
Intertidal and underwater inspection subsequently took place to further assess the nature of these anomalies, as reported in Section 6 of this report and as summarized in Appendix 2c.

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Magnetic anomalies mg 1 and mg 2 correspond with present-day mooring buoys. Anomalies mg 3-5 could not be verified by the dive work, which indicates that the anomalies lie buried.

9.5.3.3 Béicín Strand

A single survey line was run down the length of **Béicín** Strand, lying outside the Mean Low Water Mark, and overlapping in part with the southern survey lines in the Cove, and stopping short of the harbour (Figure 9.13).

Three anomalies were detected in the course of the **Béicín** Strand survey (Figure 9.13, Appendix 2c anomalies mg 6- mg 8). They each represent localized spikes. Dive and intertidal inspection indicates that mg 6 is a modern groyne feature (ADCO 7); mg 7 corresponds with a steel pipe; and mg 8 corresponds with a localized cluster of rock. The rock cluster may highlight the presence of a buried feature or may be the source of the anomaly itself.

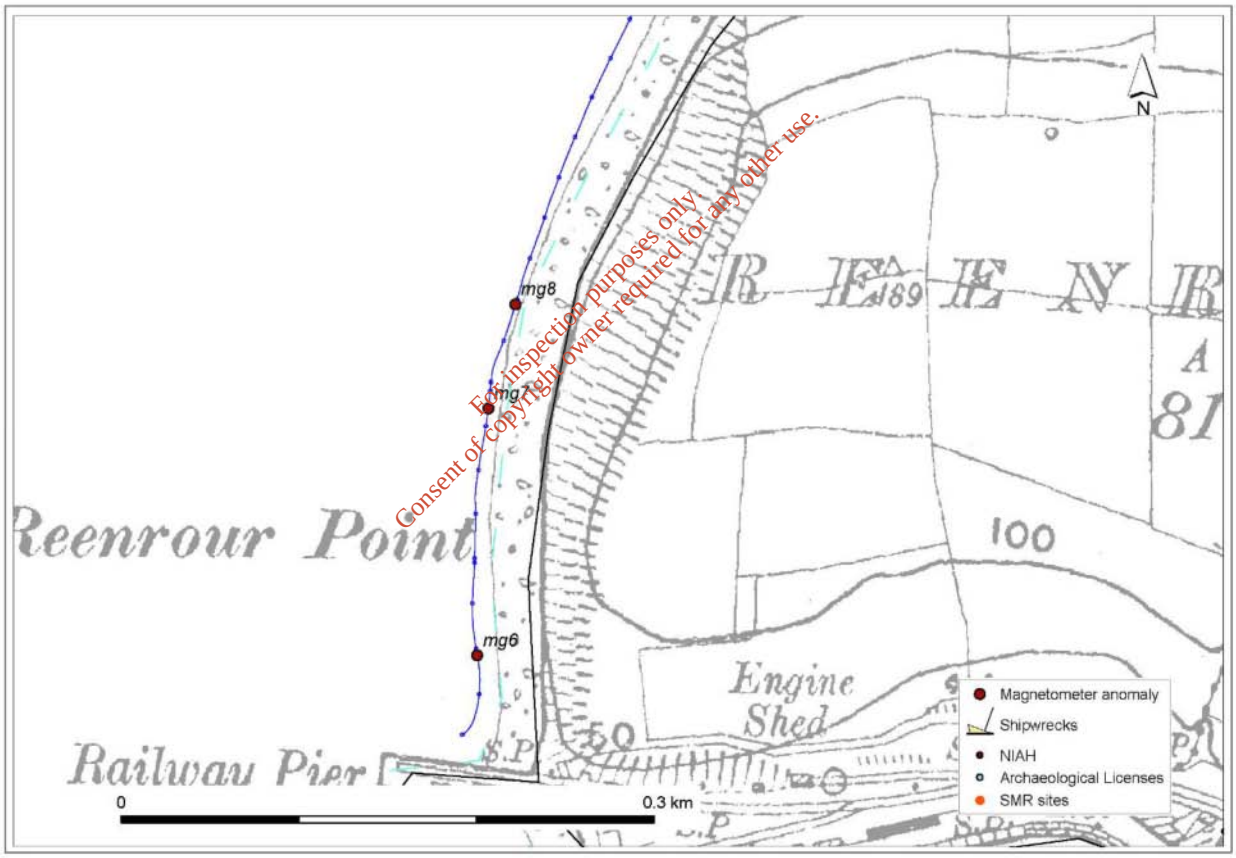

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Figure 9.13 Map showing the distribution of magnetic anomalies and the area surveyed at Béicín Strand.

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9.5.3.4 The Inner Harbour

A series of eight survey lines were run East-West parallel with the long axis of the harbour, and two lines were run at right angles inside the harbour mouth. Line-spacing varied between 18m apart in the central area of the harbour, narrowing to 5m apart by the sides, producing some overlap. Two lines extended outside the harbour (Figure 9.14).

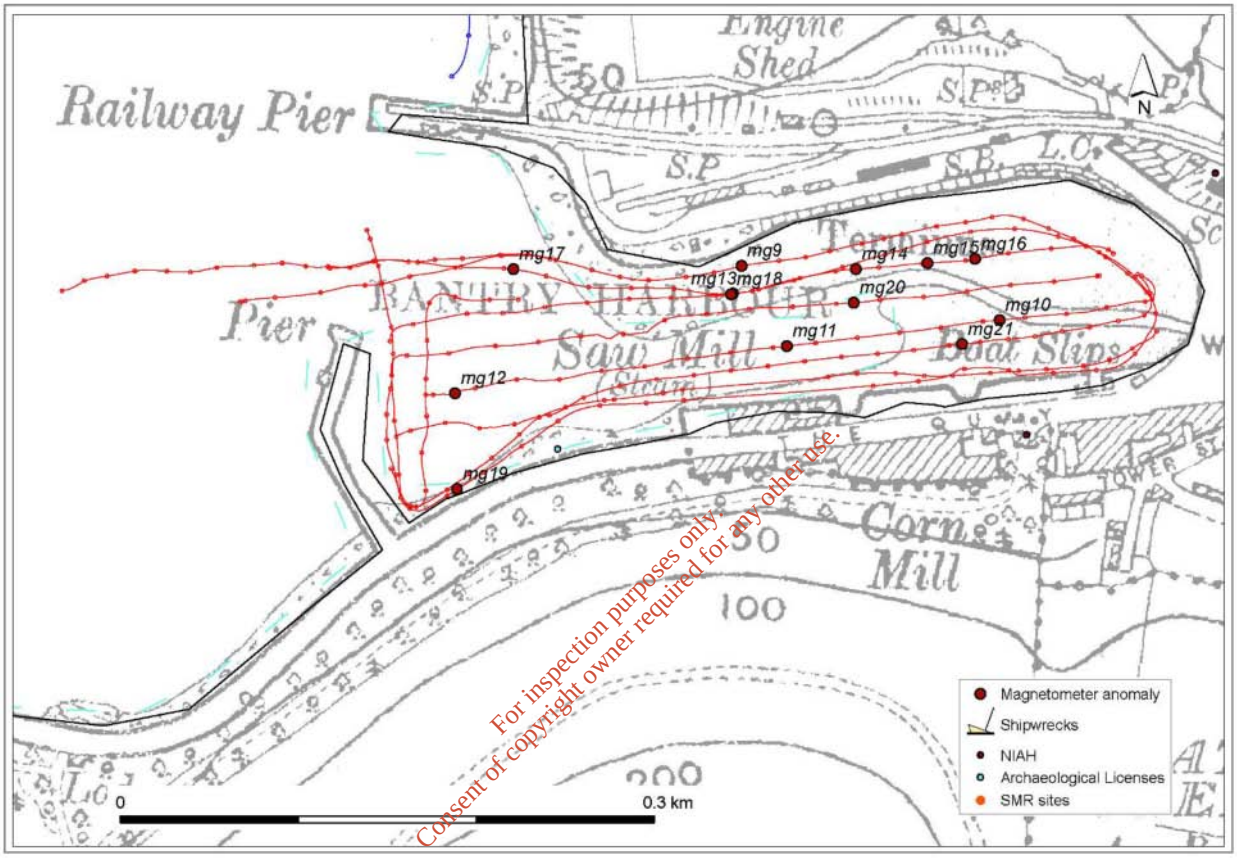

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Figure 9.14 Map showing the distribution of magnetic anomalies and the area surveyed at the Inner Harbour.

The anomalies detected within the inner harbour (Figure 9.14, Appendix 2c anomalies 9-21) tend to be sharply defined localised spikes, indicative of the presence of individual items. Anomalies mg 13 and mg 18 were detected separately when two survey lines crossed over this same location. In both instances, the magnetic reading indicates a significant anomaly in this location, which inspection showed to be a concrete mooring block with a steel eye. There is a continuation of lesser fluctuations noticeable in the profile of mg 18 which proceed eastwards and lie in proximate location to anomalies mg 20, mg 15 and mg16, suggesting further associations with other known anomalies. Inspection indicated that they most likely represent a complex of mooring features but many of the mooring blocks are buried beneath the soft silt that covers the harbour area, preventing full confirmation. A series of other modern artefacts, such as a bicycle frame (mg 10), a shopping trolley (mg 19) and a shopping trolley (mg 21) were also observed as the source of several of the anomalies. No

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material of archaeological significance was observed in the seven anomalies that could be identified of the total of thirteen.

9.5.3.5 Abbey Strand

A series of six survey lines were run along Abbey Strand, extend seaward of the Mean Low Water Mark, and spaced between 15m and 20m apart (Figure 9.15).

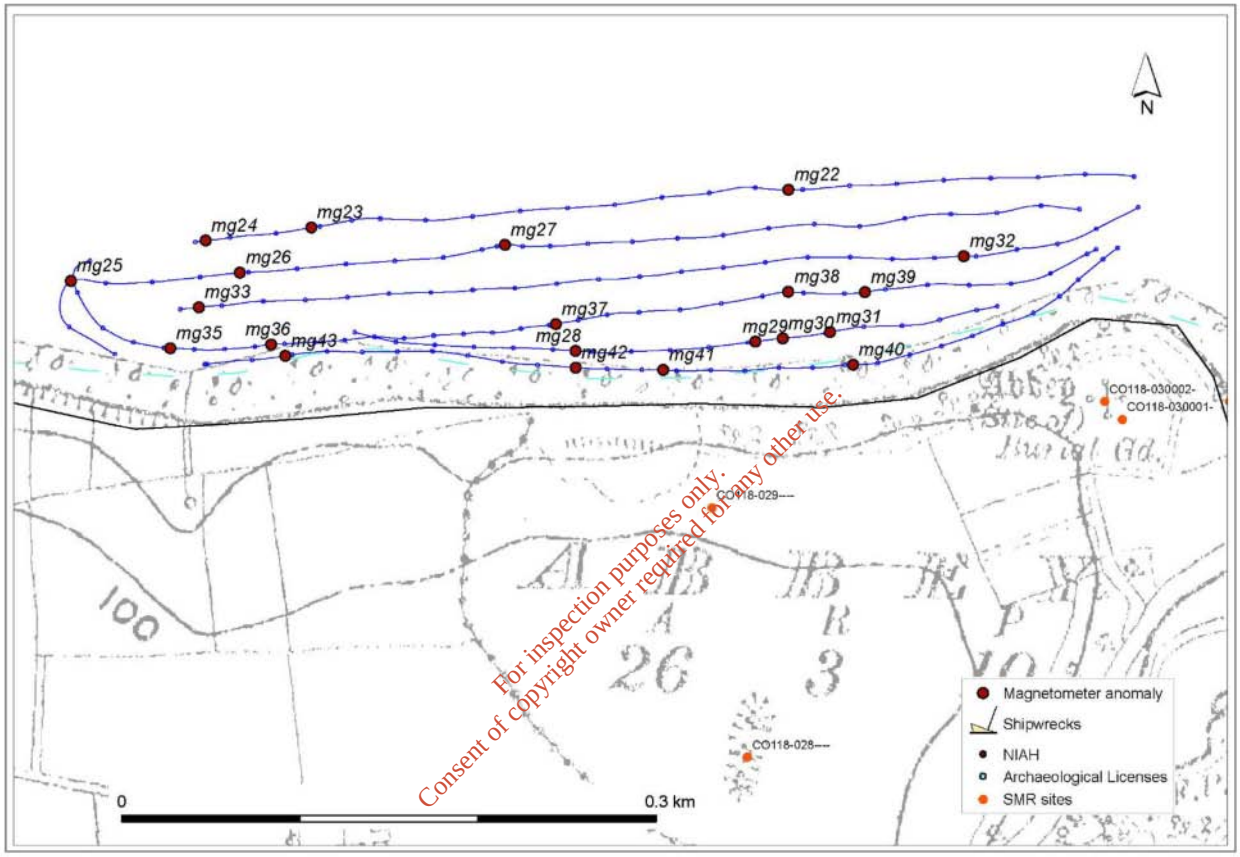

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Figure 9.15 Map showing the distribution of magnetic anomalies and the area surveyed at Abbey Strand.

The anomalies detected (Figure 9.15, Appendix 2c) are numerous but relatively small-scale, with a spatial preponderance just off the mean Low Water Mark. Intertidal and dive inspection focused on the eastern half of the area surveyed because this is where the proposed beach nourishment activity is to be located. Where they could be identified, the anomalies were moorings, with the exception of mg 38 which is a timber pole with metal fastenings (referred to as feature ADCO 20, see Appendix 2d). The timber was a ship's timber but it is unclear what function it served in its reused capacity. It lay on the seabed unassociated with other objects or fittings, suggesting that it is an isolated feature.

9.5.3.6 Conclusions

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The magnetometer survey conducted in the four locations for the Bantry Harbour Development project has been comprehensive. The survey has revealed a series of anomalies. Dive and interitdal inspection confirmed that many of the anomalies are modern in origin, including moorings and debris, but several anomalies could not be verified underwater indicating that their source is buried in the surface sediments. In addition, one former ship's timber was identified, at Abbey Strand. The piece appears to be an isolated occurrence and it is not clear what function it served after the secondary working that is evident was applied to it.

9.6 Intertidal and Underwater Inspection

Intertidal and underwater inspection was carried out for RPS, under licence from the Department of Arts, Heritage and the Gaeltacht, 12D004, 12R015.

9.6.1 Scope

The following elements were required, based on the client's scope and the recommendations of the Underwater Archaeology Unit at the DAHG:

- A walkover survey at low tide and/or a dive survey of all sites to determine their archaeological potential.
- A metal detector survey to accompany above.
- A dive survey of the dry dock walls located on the southern bank of the harbour, between the Maritime Hotel and Wolfe Tone Square.

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9.6.2 Operational

The intertidal and underwater surveys were completed on 23-24 May 2012, following receipt and analysis of the magnetometer survey data. An on-site meeting with the harbour Master took place to ensure that access and related issues were in place. Intertidal survey took place during low tide on both days, Low Water being at Noon and 13:20 hrs respectively. Dive work took place on the filling tide on both days. Work focused on the inner harbour during 23rd May, and on the Cove, Béicín Strand and Abbey Strand on 24th May. The work was conducted by a team of maritime archaeologists operating in accordance with SI 422 (Diving Operations) of 1981, and using a Surface Supplied Diving Equipment spread to ensure a safe working environment and to maximize efficiency in gathering information underwater. An MD3080 Underwater Metal Detector was used in the surveys.
Work progressed in a systematic manner in both the intertidal and underwater environments. There were few vessels in the inner harbour on the days of the survey, and no impediments were encountered.

Water conditions were good. The sea state was calm. The sky varied from overcast to clear blue and winds were light. Visibility underwater varied from a minimum of 2m to 6-7m, but this reduced if the diver's actions disturbed the covering muds on the seabed.

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9.6.3 Results

9.6.3.1 Coverage and Data

The surveys were completed in a comprehensive manner. Intertidal survey was conducted systematically moving across the foreshore from the HWM to below the LWM following a parallel pattern to ensure total coverage and the ability to observe and metal-detect the same area of foreshore from opposing directions. Underwater survey focused on the proposed impact areas in each of the four locations. Survey at the Cove moved in a parallel pattern along both shorelines, and continued south along Béicín Strand following the line of the magnetometer survey and moving in a pendulum-search pattern from side-to-side of the line to ensure a wide area of the seabed was observed. Much of the inner harbour was covered as intertidal/waded survey during low water. The underwater component was focused on the sub-tidal portion close to the harbour entrance, and extending out to cover the extent of the proposed dredge area. The outer extent of the dredge area was buoyed, and the diver was towed in a sequence of survey lines into shore and into the inner harbour, and back out to sea, moving progressively from north to south. Survey at Abbey Strand included intertidal survey, and the underwater survey comprised a towed-diver search working parallel with the shore, extending out to the outer area of the proposed beach nourishment works.

Observations were logged in writing and photographed where possible, and positioning was recorded using a hand-held GPS receiver. Positioning was accurate to 6m.

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9.6.3.2 Cove

A sequence of photographs showing different perspectives of the cove is reproduced as Figure 9.16, observations are noted on Figure 9.17, and Appendix 2d includes a more detailed description of features recorded. Reenbeg Point defines the north side of Cove, and is a low headland of boulder clay that overlooks this small shallow inlet. The boulder clay is exposed in places and shows an unsorted till over boulders which line the foot of the headland. There are no cuts into the boulder clay or other features to suggest earlier human activity above the foreshore. It is said that the inlet can dry out completely on a Spring tide, but a body of water remained within the cove when it was inspected. The shorelines are distinguished as wide flat expanses of shingle that lie above a grey till, which appears to be an estuarine version of the boulder clay on land. A slight slope away from the shore presents a narrow central channel no wider than 20 m that remains sub-tidal, but the greatest depth encountered within the dived area was less than 2 m.

The shoreline to the south has been developed as a pedestrian walkway, and a concrete pad has been constructed above the HWM, covering the natural intersection of the land with the foreshore. Development has also occurred to the east, where a residence is built in the southeast angle, between Newtown Fort and the shore.

The north shore in contrast remains undeveloped. A small stream or brook empties into the cove in the northeast angle, and this has created a thick muddy stratum in the sub-tidal portion that covers the seabed. Two slight escarpments are apparent running from the shore

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(referred to feature ADCO 1-2, Appendix 2d). They measure 15 m and 10 m in length and lie *c*. 20 m apart. ADCO 1 appears to be indicated on the more recent OS maps (Figure 9.17).

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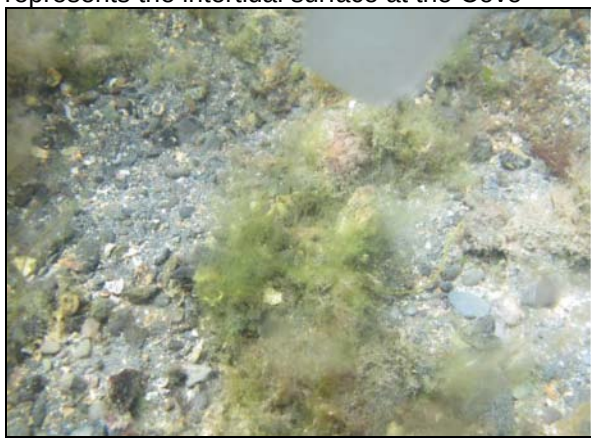
1. Boulder clay cliff of Reenbeg Point, showing boulders strewn at its base over the foreshore

2. View looking SE across mouth of the Cove

3. Grey-coloured boulder clay sediment that represents the intertidal surface at the Cove

4. View looking S across head of inlet, showing the muddy stratum over the foreshore

5. View looking E along south shore, showing gentle slope and shingle cover



6. Underwater short of the seabed in the central channel area of the Cove

Figure 9.16 Clockwise views of the Cove, from N to S.

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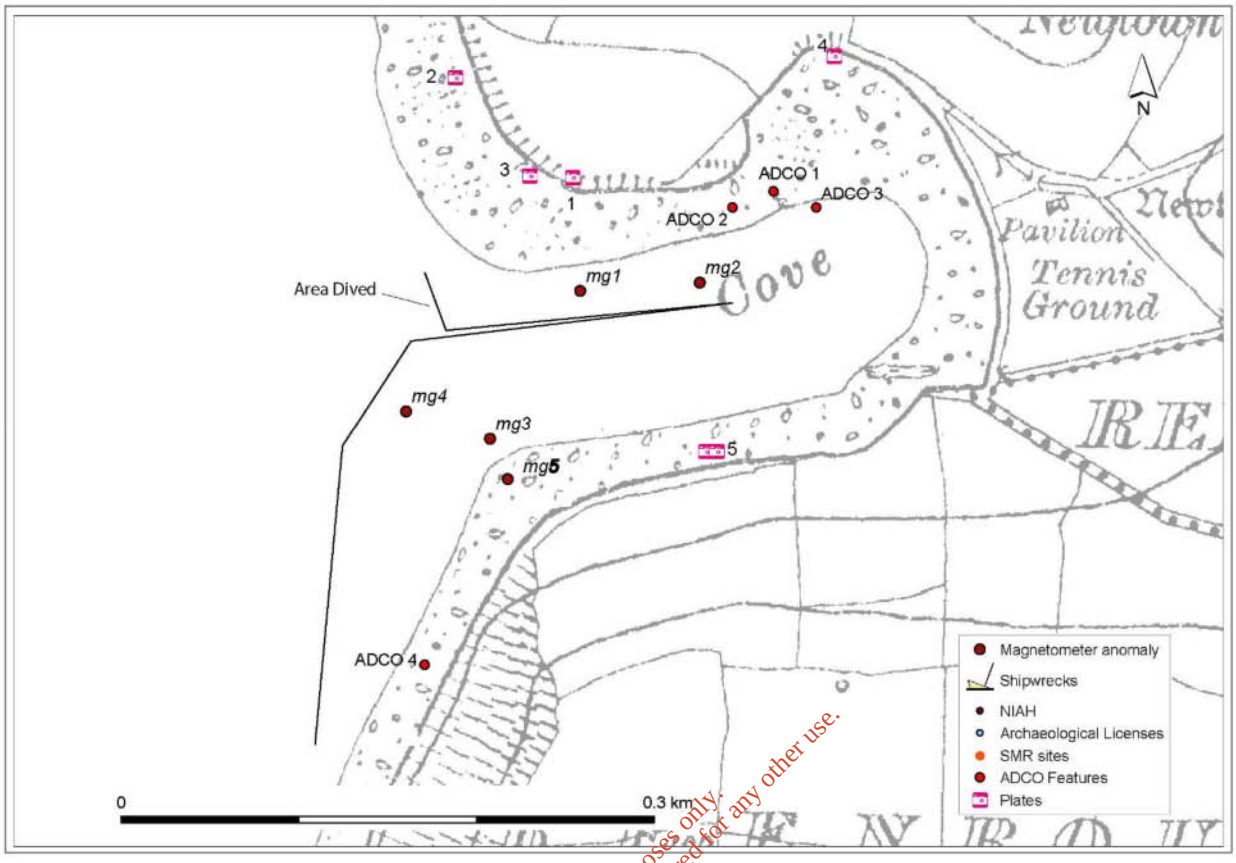

Figure 9.17: ADCO survey area and observations at the Cove.
Note Plate numbers refer to the numbers showing on Figure 9.16.

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These are very slight features, which may result from natural processes, but they also coincide with the present-day usage of this location for moorings. It is possible that such slight natural variations would have served as a hard or landing area for boats in the past.

To the west, the wider foreshore of the cove expands out and the mud does not penetrate this far out. It is on this wider expanse of foreshore that the proposed works associated with the beach nourishment scheme will be focussed. The seabed in this larger area is dominated by shingles over grey boulder clay, with seaweed covering all. No features of archaeological interest were observed.

The locations of the magnetometer anomalies were inspected. Anomalies mg 1 and mg 2 are modern moorings. In addition, site work revealed a third mooring to the east (ADCO 3). The anomalies mg 3-5 could not be identified underwater, and it is suggested that the source anomalies lie buried.

The impacts associated with the Harbour Development Project at the Cove will be direct, and they appear to be focussed on the outer areas of the north and south shores. A programme of archaeological monitoring is recommended during the development works, to safeguard against the exposure of archaeological material at this point.

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9.6.3.3 Béicín Strand

A sequence of photographs showing different perspectives of Béicín Strand is reproduced as Figure 9.18, observations are noted on Figure 9.19, and Appendix 2d includes a more detailed description of features recorded. The shoreline running south of the Cove to the Inner Harbour is a wide gently sloping foreshore that retains a similar sequence of shingles over grey-coloured boulder clay, as see in the Cove. A slight widening of the foreshore is evident at the north end of Béicín Strand, which extends a shallow area out to sea, while a pocket of deeper water (approximating 3 m in depth) mid-way along the beach reflects the natural undulating profile of the sub-tidal contours.

There is little of archaeological interest apparent on the beach. The eroded stump of a timber upright at the north end of the beach (ADCO 4) is an isolated occurrence. The survey was able to associate the magnetic anomalies with known features: mg 6 corresponds with a modern groyne feature (ADCO 7); mg 7 is a length of partially buried steel pipe running at right angles to the shore (ADCO 5), suggesting that it served as an old outfall feature; while mg 8 is a rock cluster, but it was not possible to assess whether the rocks are burying a metal object or are the source of the magnetic anomaly itself.

Two lengths of reinforced concrete were observed at the south end of the beach running at right angles to the shore (ADCO 7-8). Aerial photographs indicate a larger series of groyne features in this area. An ortho-image photograph indicates the presence of six such groynes extending over a 100 m length of the beach, of which features ADCO 7 and 8 represent the more southerly locations. The groynes, as exposed on the aerial photographs, measure between 15 m and 26 m in length and are not evenly separated but occur as close as 12 m together and as much as 30 m apart.

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As in the Cove, the shoreline along Béicín Strand has been developed as a pedestrian walkway, and a concrete pad is constructed above the HWM, covering the natural intersection of the land with the foreshore.

The impacts associated with the Harbour Development Project at Béicín Strand will be direct, with the deposition of *c*. 2000m³ of material on the strand. A programme of archaeological monitoring is recommended during the development works, to safeguard against the exposure of archaeological material at this point.

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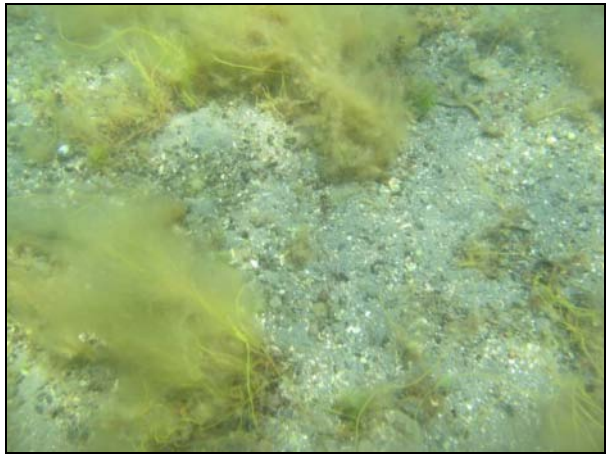
7. Foreshore looking N at Béicín Strand

8. Looking E across foreshore at Béicín Strand

9. Foreshore looking N at Béicín Strand showing the impact of the pedestrian walkway



10. Underwater shot of the seabed along Béicín Strand

11. Oblique aerial view of Béicín Strand prior to the insertion of the pedestrian walkway, and showing a line of groyne features, elements of which survive as ADCO 07-8. Source of photo: RPS

Figure 9.18 Views of Béicín Strand, from N to S

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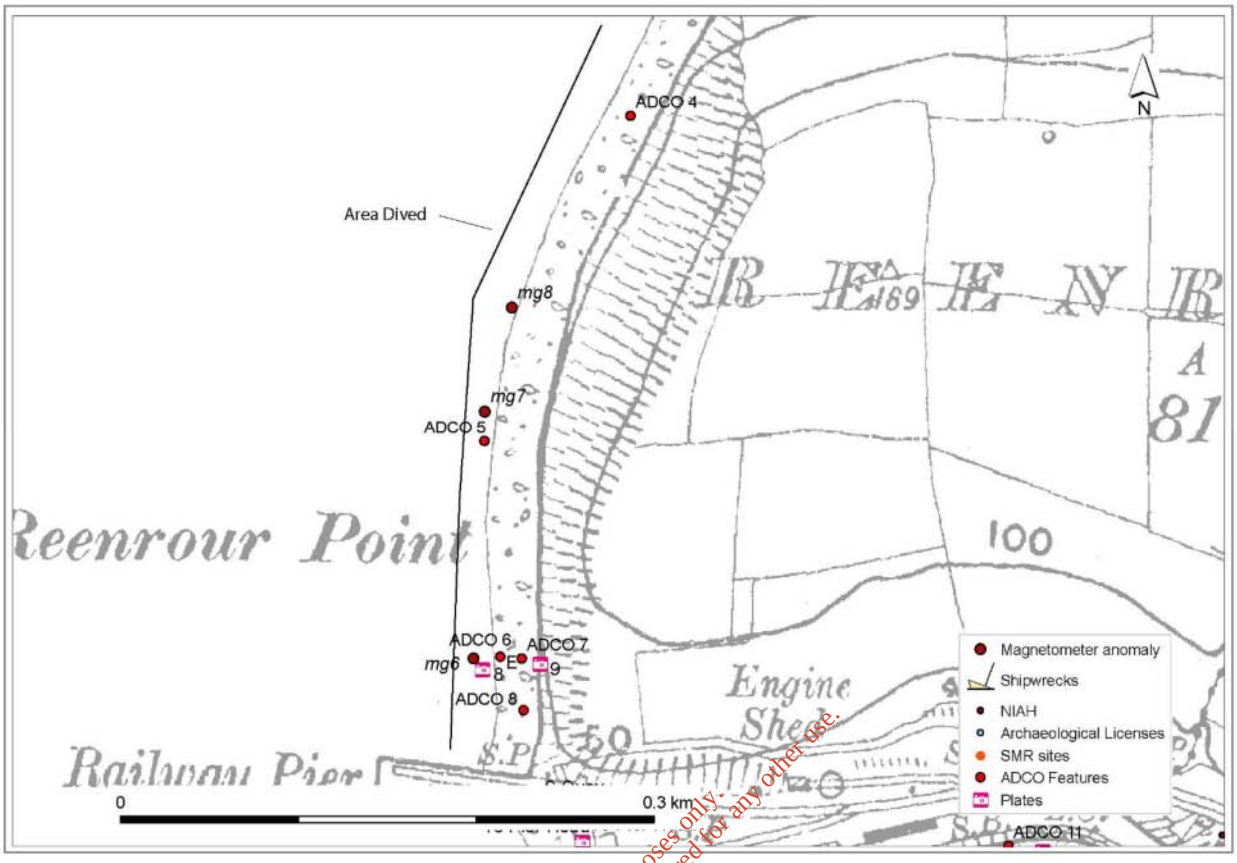

Figure 9.19: ADCO survey area and observations at Béicín Strand.
Note Plate numbers refer to the numbers showing on Figure 9.18.

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9.6.3.4 Inner Harbour

A sequence of photographs showing different perspectives of the inner harbour is reproduced as Figures 9.20 - 9.25, observations are noted on Figure 9.26, and Appendix 2d includes a more detailed description of features recorded.

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12. Pier Head from North. Notice build line in concrete indicating the extension of the pier.

13. Looking N showing the ruinous nature of the stone façade to the concrete pier head.

14. Looking E showing the stonework skin on the pier head.

15. View looking WNW out to the old pier. A series of recesses in the upper tier of concrete are putlog holes that may have supported a boardwalk feature.

Figure 9.20 Views of the Railway Pier

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16. View looking at base of revetment along the north shore, showing the distinctive edge-set stonework that is seen in many of West Cork's small harbours

17. View looking at alternative blockier stonework forming the modern revetment along the north shore

18. Looking E along base of modern revetment along the north shore.

19. View looking N across the head of the inner harbour at the recent reclamation works.

20. The muddy surface of the intertidal foreshore at the head of the inner harbour.

21. View looking W down the meandering channel of the inner harbour at low water.

Figure 9.21 Views of the north quay

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Overview from East

East slip

West slip

Exterior of east slip

Detail showing curvature of stonework

Exterior of west slip showing curvature of stonework

Figure 9.22 ADCO 19, Slipway, various views

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East from exterior

East slip

West slip

Exterior of east slip

Detail showing curvature of stonework and internal batter

Exterior of west slip showing stonework and external batter

Figure 9.23 ADCO 20, Slipway, various views

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View into east side of slip from seaward

Slip showing original stonework on east side, and reconstructed stonework on left (west) side

Newly built blockwork covering former area of slipway

Detail showing curvature of external wall

Detail showing nature of new build onto older stonework

Detail showing straight-wall return of west side slip, including a relieving-arch feature

Figure 9.24 ADCO 21, Slipway, various views

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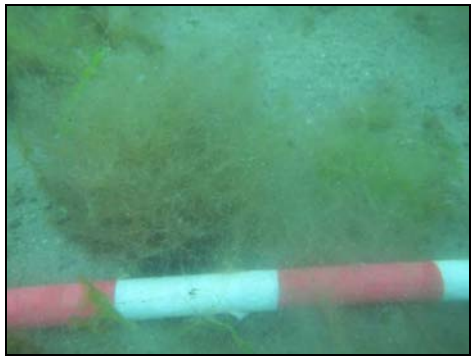
22. View looking W along south quay, highlighting a modern outfall fitted with a rubberized valve (ADCO 12) integrated into the traditional stone build.

23. View of south quay west of the third slipway (ADCO 21), showing the worn nature of the stonework in the upper levels, and an upper course of edge-set stone. The top surface has been capped with concrete.

24. Looking W along base of south quay showing the slightly battered or sloped nature of the walling and the shingle covered shore which has some fallen stonework.

25. View of south quay where the stonework of the old quay is replaced wit h poured concrete work, marking the extension of the quay.

Underwater view of seabed at mouth of inner harbour



Underwater view of seabed at mouth of inner harbour

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Figure 9.25 Views of South quay, and seabed at mouth of inner harbour

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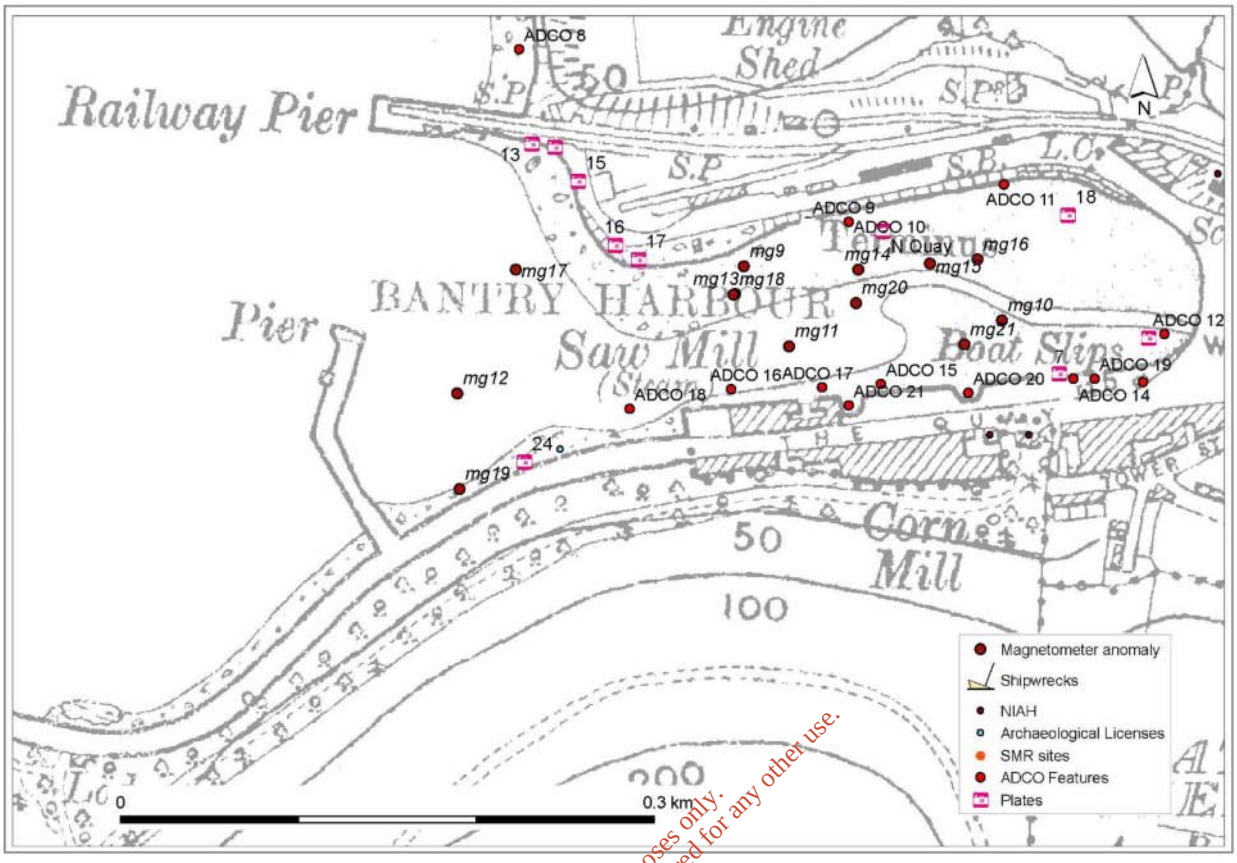

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Figure 9.26 ADCO survey area and observations at the inner harbour
Note Plate numbers refer to the numbers showing on Figures 9.20, 9.21, 9.25.

The pier head on the north side of the harbour may well be of recent origin but it retains a sequence of elements that reveal aspects of its construction history. The current pier is a sequence of concrete builds. A vertical construction line is evident on the north-facing façade today that clearly identifies the point at which the pier head was added to, to provide an additional 10-15 m of length. A stone-block façade on the south side, now ruinous, conveys the sense of a continuous build line that sweeps out from the shoreline in a curving line which is quite different from the original straight line of the railway pier (compare Figures 9.6 and 9.20). The stonework masks a simple concrete core. A series of recesses or putlog holes are built into the upper level of the concrete core on the south-facing side, and these may have supported a boardwalk feature that widened the top of the pier looking into the harbour. Intertidal survey identified a sequence of post elements on the seabed beside the pier head that may be the remnants of a timber latticework support for the railway pier.

As one progresses along the north side of the harbour, there is a series of revetments that define the north wall. Stone is used at the base. It is set vertically to present a façade of edge-set stonework in a manner that is typical of many small harbours in West Cork. The lines of stonework are sloped or battered, and they lie below more recent concreted walls at pedestrian level. Modern galvanized mooring rings are the only 'furniture' to note (ADCO 9-10). An outfall pipe (ADCO 11) encased in concrete may carry a small stream that defined the townland boundary between Reenrour West and Town Lots. The head of the inner

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harbour is also redeveloped in recent times, with a sequence of casements and culverts to channel the river from beneath Wolfe Tone Square into the inner harbour.

The south quay retains the oldest elements of the harbour area. The original date of its construction is not identified but may go back to the 1820s, and its primary elements were built by 1845 when the Ordnance Survey recorded the quay on its six-inch to the mile map (see Figure 9.5). The map shows a long quay area beside the main street, and the quay had three recessed areas before terminating as a simple end-of-wall to the west. These features are still evident today, where it is also possible to see features of repair as well as the extension of the quay wall westwards, where it joins with the modern south pier.

The old quay was built in stone, using large rectangular blocks that were cut thin and convey an elegance that highlights a horizontal dimension. Weathering has removed evidence for mortar or pointing between the stones, and the stones are also pocked by erosion, giving a rough surface today. Yet the corner stones are cut to form broad sweeping corners and the wall is slightly battered in profile. Both elements reveal the craftsmanship in the masons' work, and the attention to detail required by the patrons. One also sees a gradual deepening of the quay wall westwards as the harbour deepens, and the imperceptible manner in which this is achieved also highlights the care taken to construct the south quay. There is no indication of a stone plinth at the base of the quay wall, but this may be a feature of the sedimentation that has built up, covering over the original ground levels.

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The three recesses (ADCO 19-21) are slipways that were built into the design as an integrated element. They create small enclosed spaces in which to load and unload the fishing boats in comparative safety from the wider harbour area. The muddy nature of the seabed today obscures the original bed levels, but the slips still fill partially on a full tide. The slipways share many common points, but they were built in a traditional method and so are each unique. The eastern slip (ADCO 19, Figure 9.22) is a double slipway, measuring 22 m long and 9 m deep in overall dimensions. A pair of slips is constructed on either side of a 14.6 m long open recess providing access to vessels. Corners leading into the slipway and also those within the interior are curved, presumably to minimize damage to vessels bumping against the walls. The uppermost edges are capped with long thin slabs, while the slip features themselves are made by setting the stones on edge to create a corrugated surface, assisting traction on what are steep inclines. Mooring rings exist on the upper surfaces as the only fittings or furniture associated with the structures, and while the rings on the other slips include iron rings and iron pins, those on the eastern slipway are modern galvanized forms. The second slipway (ADCO 20, Figure 9.23) is very similar in design. It too is a double-slipway and is of similar size. The wall heights are somewhat greater, reflecting the fact that it is constructed in a location where the bed level is slightly deeper. The curvature on the western entrance wall is also greater, which possibly suggests the need to have greater freedom of movement into and out of the slipway in this location. The third slipway (ADCO 21, Figure 9.24) differs in that it is only a single slip, which is located on its eastern side. The west side is a simple straight wall that would not have been accessible. The wall height in this slipway is also that bit greater than previously.

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The original extent of the quay appears to have remained well into the twentieth century, and is recorded as such on the third edition of the Ordnance Survey mapping, but since then a *c.* 80 m long extension was added, and the revetment wall continued around to the south pier. The area behind the original south quay, downstream of the third slipway (ADCO 21) has more recently been partially developed, and sheet piling has been driven in to retain the landward site for an underground car park associated with the hotel complex that is built on the opposite side of the Quay. Various repair works are evident along the quay wall; the most noticeable of which is an old concrete slab that was added at some stage to the upper surface, downstream of the eastern slipway (ADCO 19). The addition to the length of the quay is also noticeable, where poured concrete replaces the stonework in a pragmatic functionalism. Perhaps the single most obvious place of reworking is the recessed space of the third slipway (ADCO 21), where the former stones have been replaced with a stacking of pre-formed concrete cubes. More discrete work occurs upstream, where a new outfall (ADCO 12), complete with its rubber valve, is integrated almost seamlessly with the surrounding stonework. The quay's furniture consists of various iron pin and rings for mooring, as seen before. Two stone-built culverts were recorded along the length of the quay (ADCO 15, 18), each positioned at the base of the wall, and each squared in shape with the internal passage leading under the quay at right angles from it. Such features are a further testimony to the care with which the quay was built.

The layer of mud that covers the interior of the harbour included one or two pieces worth noting. An eroded timber post (ADCO 14) is located just downstream of the eastern slipway. A modern anchor is located downstream of the third slipway (ADCO 17). Shells, earthenware, and a host of modern metal fragments litter the surface of the mud across the harbour, with particular densities noted close to the south quay, reflecting the busy nature of this location.

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As noted in section 9.5.3.4, seven of the thirteen magnetometer anomalies were identified as pieces of modern debris and/or moorings, while the remains six anomalies could not be identified in the non-disturbance survey, and it is suggested that they are buried beneath the covering mud.

The underwater survey which considered the sub-tidal portion of the inner harbour and the seabed area outside the harbour that is highlighted for dredging, observed a gently sloping seabed that reached a maximum depth of 6 m during the filling tide. Inshore, both north of the harbour and within the entrance area of the harbour, the bed is one of shingle over a stiff clay, providing a relatively hard surface where seaweed is dominant. The larger seaward area of the seabed however is covered in a soft thick mud, which provides a good holding content in terms of its ability to retain objects. Modern metal, such as drinks cans, debris and also vehicle tyres were observed, but no features of archaeological interest were noted exposed on the seabed surface.

The impacts associated with the Harbour Development Project at the inner harbour will be direct, with the dredging of *c*. 130,000m³ of material from across its interior. In addition, as programme of development will be carried out to the strand. A programme of archaeological

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monitoring is recommended during the development works, to safeguard against the exposure of archaeological material at this point.

9.6.3.5 Abbey Strand

A sequence of photographs showing different perspectives of Abbey Strand is reproduced as Figure 9.27, observations are noted on Figure 9.28, and Appendix 2d includes a more detailed description of features recorded. The shoreline running west of Abbey Point is a narrow sloping foreshore that retains a similar sequence of shingles over grey-coloured boulder clay, as seen on Béicín Strand and at the Cove. The foreshore leads directly off a wooded area, and the transition onto the foreshore is abrupt. The sloping nature of the foreshore continues into the sub-tidal area, where the same fine mud layer that is seen across the other three survey areas recurs and masks the underling clays.

Development has taken place in the Abbey Point area. A length of concrete revetment remains in place reaching west above the HWM from the Point, and the point itself has recently had a new slipway constructed on it to facilitate the ferry from Whiddy Island. Those works extended a large area of rock armour protection works around the point. Metal-detection survey revealed drinks cans and pieces of corroded modern metal, but it also highlighted one fired clay brick (ADCO 22). The brick is located close by the Abbey Point and the recent building works but it lies away from them and is not associated. A former 'iron working site' is known to have existed some 100 m away, on the far side of the point close to the shore (SMR CO118-0030003). It is logical to associate the iron-enriched brick with the iron working site, and it may reasonably be considered an outlying artefact from it. There was nothing to suggest that the brick was associated with any other feature where it was found, and it is regarded as an isolated occurrence.

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The underwater survey focused on the eastern side of the strand, where it is proposed to undertake land reclamation works. The survey was able to associate some of the magnetic anomalies with known moorings, as noted in section 5.3.5. One anomaly however was revealed as a ship's timber. Mg 38 (ADCO 23) is a long split timber that retains boreholes for treenails and is shaped at one end to fit as a tenon join. The timber is infested with ship worm and it was reused; the lengthwise split may have occurred at that point. A sequence of iron fastenings were applied to one end, and subsequently a mixed metal/alloy spike was added. It is not known what function the timber served originally, but perhaps it was a spar. Nor is it known what function it served subsequently. The timber lay on the seabed partially exposed in the surface mud, and was not apparently associated with other material.

The impacts associated with the Harbour Development Project at Béicín Strand will be direct, with the deposition of *c*. 2000m³ of material on the strand. A programme of archaeological monitoring is recommended during the development works, to safeguard against the exposure of archaeological material at this point.

It is recommended that the timber be relocated underwater away from the proposed development works.

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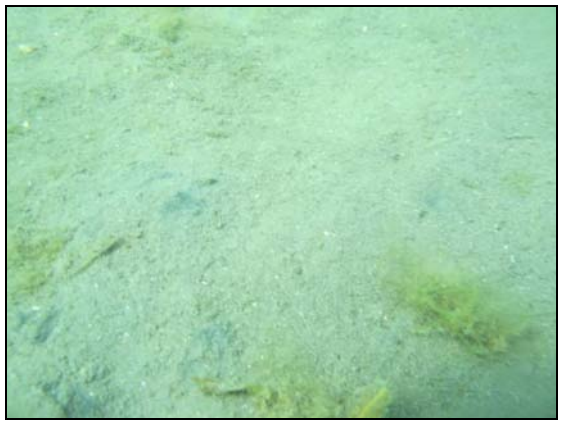
26. View looking W along foreshore at Abbey Strand

27. View looking E along foreshore at Abbey to Abbey Point and the new ferry slipway in the distance

Foreshore at Abbey strand at location of previous photograph.



Underwater view of the seabed at Abbey Strand.

Figure 9.27 Views of Abbey Strand

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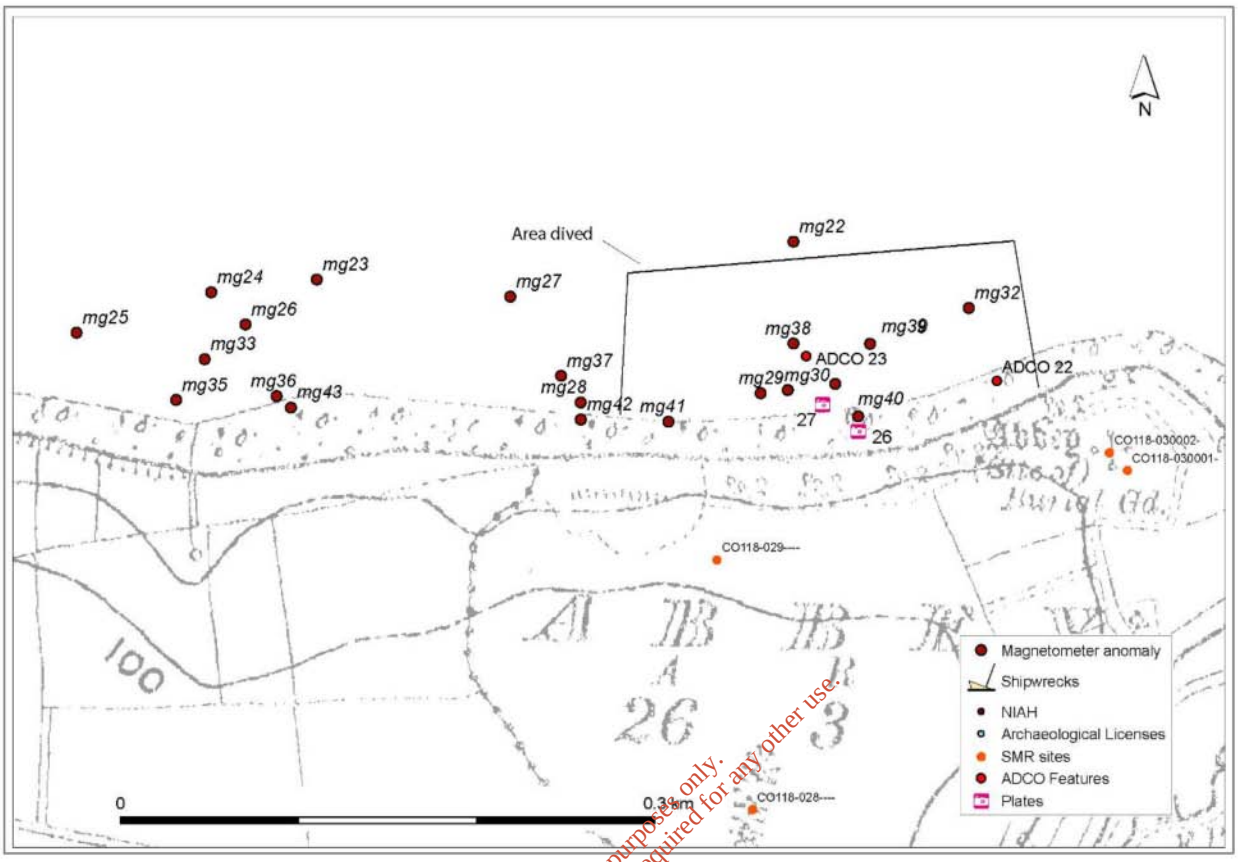

Figure 9.28 ADCO survey area and observations at Abbey Strand.
Note Plate numbers refer to the numbers showing on Figure 9.27.

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9.6.3.6 Conclusions

The intertidal and underwater/dive surveys conducted in the four locations for the Bantry Harbour Development project have been comprehensive and have completed the scope of work required.

The surveys are informed by comprehensive desktop assessment of the known archaeological and architectural record, and by project-specific information, including marine site investigations data. The surveys have provided a basic record of the topography and the archaeological potential in each of the four survey areas.

The surveys assessed the south quay and the three slipway features that are recessed into it. The quay is well built and retains certain features that suggest a conscious design combining pragmatism with elegance. It is believed that the quay was constructed as part of wider improvement works in the 1820s carried out across the estate of Bantry House. The design elements identified in the standing remains of the quay suggests a consciousness that is in keeping with the investment that Bantry House could give. The proximity of the House and the importance of the quay to the development of the town are self-evident. More detailed, measured survey is warranted as part of the proposed development, to create a fuller building record of the quay.

The surveys confirmed the location of the magnetometer anomalies and in many instances were able to identify the source. Where this was possible, there was only one occasion (mg 38) where the anomaly is deemed to retain an inherent archaeological interest. Anomaly mg 38 is a reused isolated ship's timber whose original function remains unclear. The timber should be moved outside the development area to a secure underwater location at the west end of Abbey Strand.

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9.7 Impact Assessment[20]

The Bantry Harbour Development Project proposes to carry out a series of construction and dredging works within the inner harbour and extending seawards to the site of the former Railway Pier below Reenrour Point (Figures 9.29 – 9.30). The dredged sediment will then be reused at the Cove and Béicín Strand as beach nourishment material, and at Abbey Strand as land reclamation material.

The works within the harbour will undertake improvements to the quaysides and pier structures around the inner harbour. A new pier will be projected from the existing Railway Pier, and the seabed to the south reclaimed (Figure 9.29, Figure 9.30 sections J-J, K-K, L-L). The north quay area will be used to anchor a series of pontoon walkways (Figure 9.29, Figure 9.30 sections G-G, H-H). The revetment wall at the east end of the harbour, by Wolfe Tone Square, will be extended and the space between reclaimed (Figure 9.29, Figure 9.30

[20] This section does not purport to relate precise engineering details but is rather an attempt to understand the nature of the impact on the potential archaeological environment, based on the data supplied by RPS.

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section E-E). The south quay will be covered with a new line of quay wall that sits above a sheet-pile feature (Figure 9.29, Figure 9.30 sections C-C, D-D). A series of pontoon walkways will be placed against the new wall. The slipway features will not be impacted directly but a sheet pile wall be put in front of the slipways and set low enough to provide boat access to the slipways (Figure 9.29).

Between the west end of the south quay and the south pier, reclamation will take place of the seabed, providing a *c*. 22 m-wide surface retained by a new wall that will also serve to anchor a series of pontoon walkways (Figure 9.29, Figure 9.30 section B-B). The south pier will be widened further (Figure 9.29, Figure 9.30 section A-A). In addition, it is proposed to dredge approximately 130,000 m^3 of material from the inner harbour and an area outside its entrance (Figure 9.29). The upper end of the inner harbour is to be dredged to -2m O.D., representing the removal of up to 3m of sands and muds. The lower or outer end of the inner harbour will be dredged to a depth of -3m O.D. where necessary, representing a slightly greater removal of muds on the shallower south side of the harbour than on the north side.

The sandy sediment recovered by dredging will represent some 77,000 m^3, and is to be reused in beach nourishment projects at the Cove. The construction of two protective breakwater structures is being proposed to retain the sediment at the Cove. A lesser quantity of dredged material, amounting to 2,000m^3 will be placed on Béicín Strand.

The construction of an imported rock bank and bund is being proposed to retain the sediment at Abbey Strand as part of land reclamation work (Figure 9.31).

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The construction phase measures represent direct permanent impacts on the existing environment.

The construction phase measures do not pose any direct or indirect impacts on sites of known archaeological or architectural importance, which includes those locations from which archaeological artefacts have been recovered previously, and those sites and features already listed in the Sites and Monuments Record, the National Inventory of Architectural History, and the History Shipwreck Inventory.

However, the construction phase measures represent direct and permanent impacts on the locations of the magnetometer anomalies and features observed in the course of the fieldwork conducted for this report.

In the majority of instances, the nature of the impacts will be profound in that the works will remove the feature and/or bury it, but in many cases those features are modern in date and so the long term impact will be of no consequence. The need for further archaeological or other recording work in advance of development is not considered necessary in such cases, and the most appropriate mitigation should be one of archaeological monitoring during construction work.

The south quay however warrants further attention. It is suggested that the impact will be direct and positive, marking profound and permanent change. However, the impacts will

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effectively conceal the south quay. The information gathered for the present report is a basic record of the quay and its recessed slipways. The information will help to inform development proposals, but further work should be carried out to more fully record this historic structure in advance of its development. Such work would comprise a detailed measured survey of the stonework and associated features on the south quay and including the three slipways.

It is appropriate to recover the former ship's timber (mg 38/ADCO 23) and remove it to another known location outside the works area at Abbey Strand.

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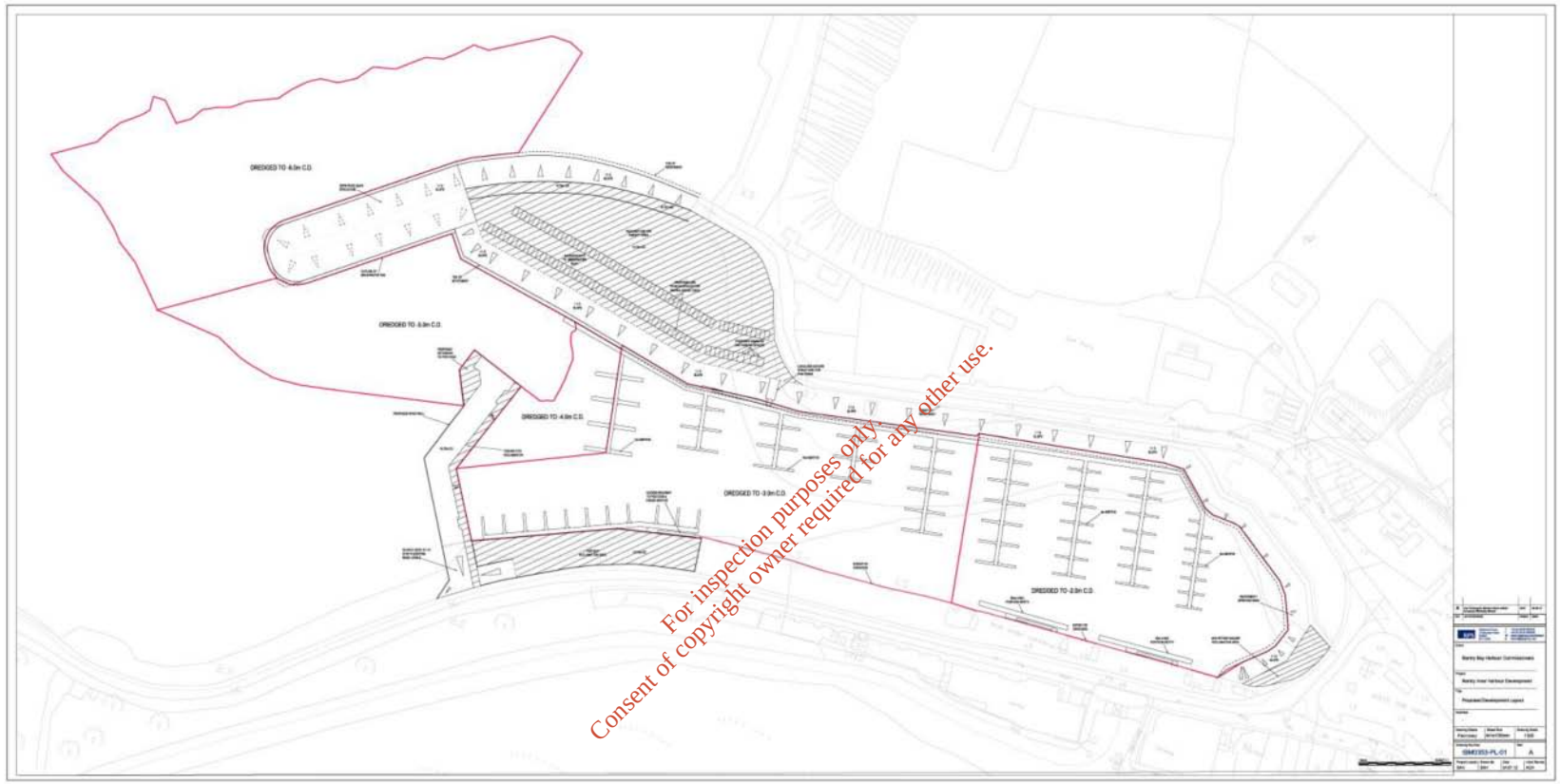

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Figure 9.29 Proposed development layout, Bantry Harbour

The drawing shows the dredge areas outlined in red, the new breakwater and land reclamation component to the north, improvements to the south pier, and the installation of floating pontoons through the interior.

Source: RPS

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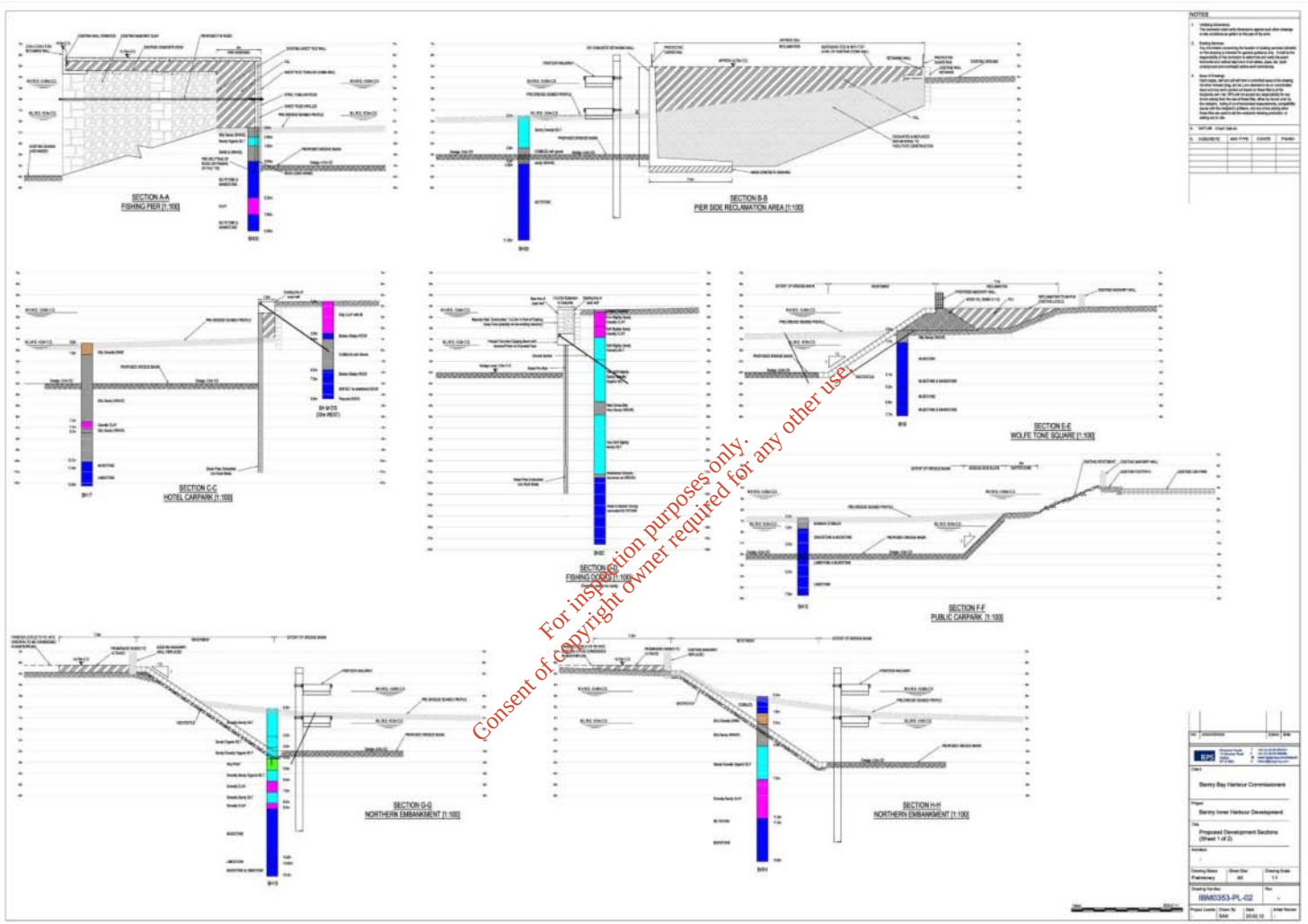

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Figure 9.30 Proposed harbour development, sections
Source: RPS

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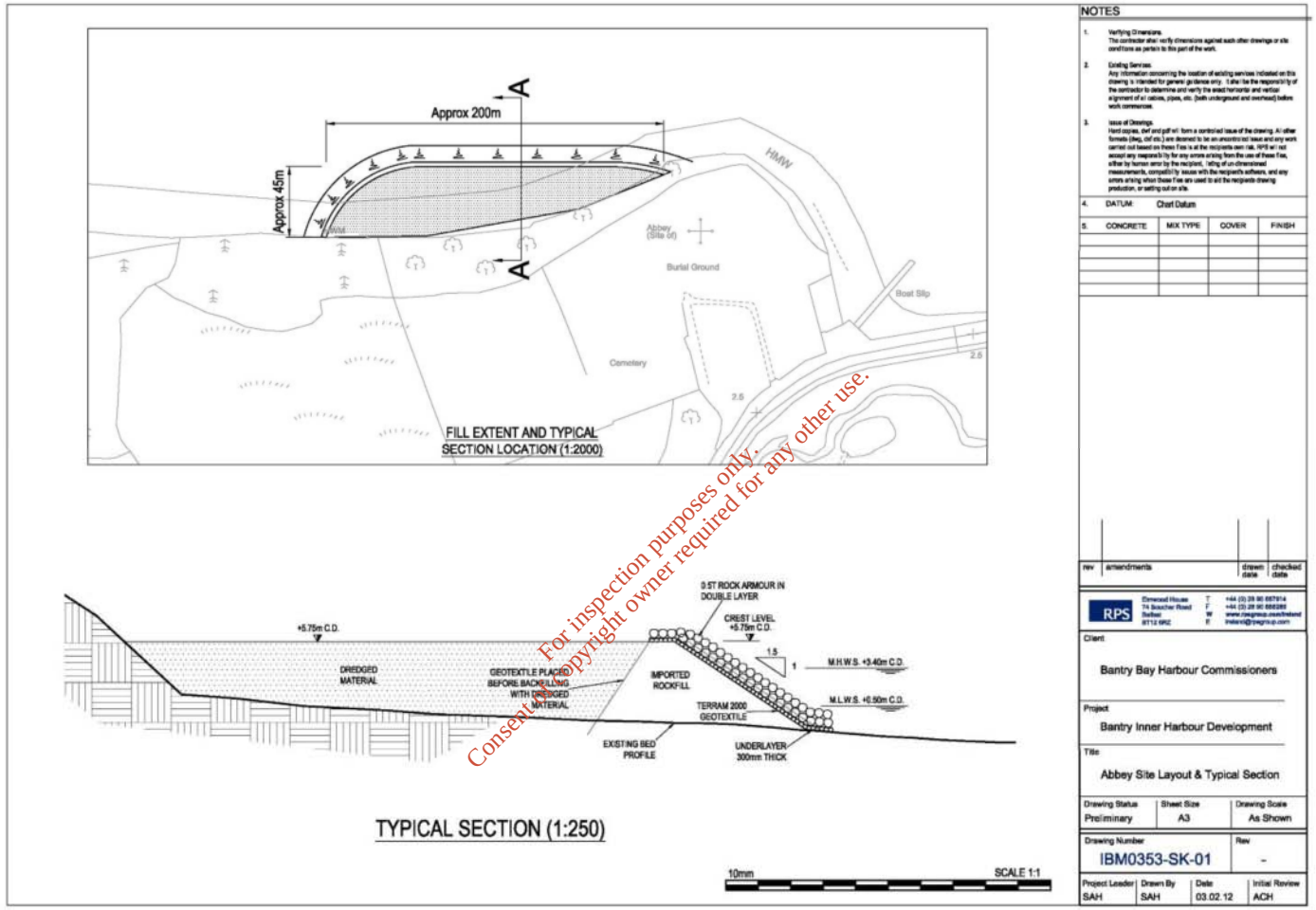

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Figure 9.31 Proposed development layout, Abbey Strand
Source: RPS

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9.8 Recommendations and Mitigation Measures

9.8.1 Pre-construction Measures

It is appropriate to move timber mg 38/ADCO 23 away from the development area on Abbey Strand if the works proceed at that location.

MEASURED ARCHAEOLOGICAL SURVEY is recommended for the south quay, to provide a fully comprehensive and metrically accurate record of the stone quay and its three recessed slipways. The information will be gathered to provide plan, elevation, and cross-sectional details at appropriate detailed scales. The information should extend from the LWM to include the full extent of the quay area, highlighting the location of culverts, mooring fixtures, and other features. Such work is licensed by the Department of Arts, Heritage and the Gaeltacht, and licence applications take a MINIMUM OF THREE WEEKS to be processed. The results will inform the redesign plans for the south quay within the Bantry Harbour Development project.

9.8.2 Construction Phase Measures

ARCHAEOLOGICAL MONITORING. It is recommended that archaeological monitoring licensed by the Department of Arts, Heritage and the Gaeltacht is conducted during all seabed and inter-tidal/foreshore disturbances associated with the development. Licence applications take a minimum of three weeks to process through the Department, and advance planning is required to ensure that the necessary permits are in place before site works commence.

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The monitoring must include a finds retrieval strategy that is in compliance with the requirements of the National Museum of Ireland.

RETAINING AN ARCHAEOLOGIST/S. An archaeologist experienced in maritime archaeology must be retained for the duration of the relevant works.

THE TIME SCALE for the construction phase will be made available to the archaeologist, with information on where and when ground disturbances will take place.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeologically significant features or material being uncovered during the construction phase, machine work should cease in the immediate area to allow the archaeologist/s to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once the presence of archaeologically significant material is established, full archaeological recording of such material is recommended. If it is not possible for the construction works to avoid the material, full excavation would be recommended. The extent and duration of excavation would be a matter for discussion between the client and the licensing authorities.

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ARCHAEOLOGICAL TEAM. It is recommended that the core of a suitable archaeological team be on standby to deal with any such rescue excavation. This would be complimented in the event of a full excavation.

ARCHAEOLOGICAL DIVE TEAM. It is recommended that an archaeological dive team is retained for the duration of any in-water disturbance works on the basis of a twenty-four or forty-eight hour call-out response schedule, to deal with any archaeologically significant/potential material that is identified in the course of the ground disturbance activities. The permits necessary for these aspects of the site work are additional to the excavation licence required by the archaeological monitor, and are generally held by the dive-team leader. The archaeological dive licence takes a minimum of three weeks to process. It is necessary to ensure that all permits are in place before site works commence.

A SITE Office and facilities should be provided on site for use by archaeologists.

Secure WET STORAGE facilities must be provided to store any water-logged objects recovered during the construction works.

BOUYING/FENCING of any such areas would be necessary if discovered and during excavation.

MACHINERY TRAFFIC during construction will be restricted to avoid any identified archaeological site/s and their environs.

SPOIL will not be dumped on any of the selected sites or their environs.

PLEASE NOTE: The above recommendations are subject to the approval of the National Monuments Section at the Department of Arts, Heritage and the Gaeltacht.

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10.0 FLORA AND FAUNA

This Chapter of the Environmental Impact Statement (EIS) assesses the impact of the proposed development on the natural environment in terms of marine mammals, Birds, Terrestrial Fauna and Benthic and Intertidal. In addition, this chapter refers to the Appropriate Assessment Screening exercise which was carried out for the proposed development.

10.1 Marine Mammals

This section details the potential risks to marine mammals and recommendations for mitigation measures related to the proposed development scheme at Bantry Harbour Co. Cork. The Bantry Inner Harbour Development Scheme aims to provide a sheltered harbour environment and marina with increased water depth and improved pier facilities in the Bantry area.

This section is based on information on the proposed works which will involve dredging of benthic sediments in the harbour, piling (sheet piles at extension to pier and some tubular piles for floating structures by breakwater) and possible rock breaking in the inner harbour. The report will also take into account deposition of dredge spoil on the beach at the Cove north of the harbour and reclamation of 200m of the foreshore to just below low tide level at the Abbey shore.

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Bantry Harbour is a narrow inlet on the south-eastern shore of Bantry Bay approximately 100 metres wide and 500 metres from its mouth to its head. The reference to Bantry Harbour hereafter in this report specifically pertains to this region in Bantry Bay.

The report is based on information from published and unpublished literature and communication with local relevant authorities.

10.1.1 Legislation pertaining to Marine Mammals in Irish Waters

Marine mammals are protected by national legislation and by a number of international regulations which the Republic of Ireland is signatory to. The main legislation that affords protection to marine mammals in Irish waters is the Wildlife Act (1976) amendment Act (2000), which prohibits willful interference to wild mammals and disturbance of resting and breeding sites.

All cetacean (whales, dolphins and porpoises) species occurring in European waters are now afforded protection under the EC Habitats Directive. All cetaceans are included in Annex IV of the Directive as species ‘in need of strict protection’ Additionally the harbour porpoise (Phocoena phocoena) and bottlenose dolphin (Tursiops truncatus) are designated Annex II species (those animals of community interest, whose conservation requires the designation of special areas of conservation). Ireland’s two pinniped (seals) species the harbour seal (Phoca vitulina) and grey seal (Halichoerus grypus) are also designated Annex II species under the EC Habitats Directive requiring the designation of Special Areas of Conservation (SAC), to protect listed species and their habitat.

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The Republic of Ireland is also signatory to conservation orientated agreements under the Bonn Convention on Migratory Species (1983), the OSPAR Convention for the Protection of the Marine Environment of the northeast Atlantic (1992) and the Berne Convention on Conservation of European Wildlife and Natural Habitats (1979).

In light of the legislation and conservation status of marine mammals, careful consideration must be given during all anthropogenic activity with potential effect on the species and their habitat. The National Parks & Wildlife Service of the DoAHG have developed a code of practice for the protection of marine mammals from acoustic disturbance resulting from Acoustic Seafloor surveys (2007). They have also recently produced 'Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters' which pertains to all sources of man-made sound in Irish waters, including coastal development works (NPWS, 2012). Whilst currently in draft format the report describes a process for informed assessment of risk and decision-making with regard to such sources and to outline risk avoidance and/or reduction measures which, in the Department's view, should be considered to minimise the potential effects of sound sources on these animals. Issues of disturbance to marine mammals in general are dealt with via the Wildlife Act licences and Derogations under the Natural Habitats regulations but in some cases where consent is given for an activity by a Regulatory Authority (e.g., coastal dredging or pile driving) the Department as a consultee may recommend MMO monitoring of works and a set of monitoring guidelines.

10.1.2 Marine Mammals in the Area

It is necessary to determine what marine mammals use the area and surrounding waters in order to estimate the likely significance of any impacts resulting from the proposed development.

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10.1.2.1 Cetaceans

A dedicated research study on the use of Bantry Bay by marine mammals during 2003–2005 identified six cetacean species using Bantry Bay. Species richness was highest in the outer bay at Mizen Head and Dursey Island, and lowest in the inner bay where only two cetacean species were recorded, harbour porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Tursiops truncatus*) (Roycroft *et al.,* 2007). Based on this study, knowledge of the species' ecology and sighting records, cetacean species most likely to use Bantry harbour include harbour porpoise, bottlenose dolphin, Risso's dolphin (*Grampus griseus*) and common dolphin (*Delphinus delphis*) (Evans, 1992, Berrow *et al*., 2001; Ingram *et al.*, 2001; Roycroft *et al.,* 2007), the most likely of these to occur in the inner harbour is the harbour porpoise. Minke whales have been recorded in the bay but not in the inner bay near Bantry harbour (Roycroft *et al.,* 2007; IWDG 2012). Pilot whales (*Globicephala melas*) have also been recorded within Bantry Bay but not in the vicinity of Bantry harbour (IWDG, 2012). It is considered highly unlikely that any of the baleen whales that occur in southwest Ireland (e.g. minke whale, fin whale, humpback whale) would use the waters of Bantry harbour.

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10.1.2.2 Harbour Porpoise

Sightings of Europe's smallest cetacean species, the harbour porpoise, have been relatively common off southern coasts of Ireland and in the Irish Sea (Northridge *et al*., 1995; Hammond *et al*., 1995; Pollack *et al*., 1997; O' Cadhla *et al.,* 2004). Reports of harbour porpoise are also common on the west and southwest coasts (Berrow *et al.,* 2001; Roycroft *et al.,* 2007; Englund, unpublished data). The small size of harbour porpoise and their erratic surfacing behaviour make them difficult to detect. Information relating to the movements of this species around coastal areas is very limited but this species has been observed between Whiddy Island and Bantry harbour by the author and is the most likely of all the cetacean species to visit Bantry harbour. However harbour porpoise are very sensitive to vessel noise and activity and are unlikely to approach areas of high activity and are therefore considered not likely to be impacted by the proposed works. Mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works if there is occasional use of the harbour by this species.

10.1.2.3 Bottlenose Dolphin

A coastal species of cetacean commonly sighted in western Irish waters (Evans, 1992, Pollock *et al.,* 1997) bottlenose dolphins are numerous on the south and west coasts (Ingram and Rogan, 2003; Ingram *et al*., 2003) and have been observed using Bantry Bay, in particular the area around Dursey Sound but have also been sighted in the inner regions of Bantry Bay (Roycroft *et al*., 2007; IWDG, 2012). The nearest known concentrations of bottlenose dolphins to Bantry Bay are the resident communities in the waters of the outer Shannon estuary (Ingram, 2000; Ingram and Rogan, 2003) Bottlenose dolphins are a wide-ranging species and individuals commonly travel between coastal regions especially during the summer months (Ingram *et al*., 2003). Bottlenose dolphins may be attracted to vessel activity, making them potentially vulnerable to physical harm from industrial activities. It is considered unlikely that the proposed works will impact upon bottlenose dolphins in the area as they do not frequent the waters of the harbour; however, mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works if there is occasional use of the harbour by this species.

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10.1.2.4 Common Dolphin

Common dolphins are the most abundant cetacean species encountered in Irish shelf and offshore waters (Pollack *et al.,* 1997; O Cadhla *et al.,* 2004). Although a mainly oceanic species, common dolphins have been frequently observed in large schools around all coasts of Ireland (Pollock *et al.,* 1997; Gordon *et al*., 2000) and it is the most commonly stranded cetacean around the Irish coast (Berrow & Rogan, 1997). Common dolphins were the species recorded most frequently and in relatively high numbers in Bantry Bay during 2003-2005 and many of the groups sighted were foraging (Roycroft *et al.,* 2007). The study suggested that Bantry Bay represents an important habitat for the species both as a foraging and a nursery ground. There are also records of groups of common dolphins (up to 125 individuals) within Bantry Bay on the Irish Whale and Dolphin Group sightings database (IWDG, 2012). Common dolphins are attracted to vessels and are easily sighted and

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identified. It is considered unlikely that the proposed works will impact significantly upon common dolphins in the area as they have not been recorded in Bantry harbour and have been sighted in the mid-outer regains of Bantry Bay mostly, but considering the importance of Bantry Bay for the species there is the possibility that they could occur in the harbour occasionally and mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works if so.

10.1.2.5 Risso's Dolphin

In Ireland Risso's dolphin have generally been recorded close to the coast with highest numbers of sightings between August and February (Pollack *et al*., 1997; 2000). Risso's dolphins were recorded in relatively high numbers in waters off southwest Ireland by Pollack *et al.* (1997) and Hammond *et al.* (2002) indicating that this region may be an important local concentration of the species. Risso's dolphins were recorded during the months of September and October in Bantry Bay during 2003-2005 study but never in inner Bantry Bay (Roycroft *et al*., 2007). The species which is readily recognised by its distinctive colouration patterns and large size will not usually approach vessels. It is considered unlikely that the proposed works will impact upon this species as they do not frequent the waters of the harbour; however, mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works if there is occasional use of the harbour by this species.

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10.1.2.6 Minke Whale

The most common species of baleen whale found around Irish coasts, the minke whale is frequently recorded around all parts of the west coast (Pollock *et al*., 1997, Berrow *et al.,* 2002; O'Cadhla *et al.,* 2004). Research conducted in UK waters suggest that the species moves southwards to inshore Atlantic Margin waters in Spring and Summer remaining until late Autumn following which numbers decline (Pollack *et al.,* 2000; Northridge *et al*., 1995). The Minke whale has been sighted in Bantry Bay (Roycroft *et al.,* 2007; IWDG sightings database) and of all whale species that use Irish waters is the species with the most near-shore distribution, and therefore potentially the most vulnerable to anthropogenic noise resulting from coastal developments. It is unlikely however that there is a direct threat to individuals from the proposed harbour works as there are no records of this species within Bantry harbour. Sound propagation outside the harbour from piling or blasting may cause behaviour changes such as avoidance, however as the area does not support significant numbers of Minke Whales it is unlikely that the proposed work will impact on this species.

10.1.3 Pinnipeds

10.1.3.1 Harbour Seal

Harbour seals (also known as "common seals") have established themselves at terrestrial colonies (or haul-outs) along all coastlines of Ireland, which they leave when foraging or moving between areas, for example, and to which they return to rest ashore, rear young, engage in social activity, etc. These haul-out groups of harbour seals have tended historically

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to be found among inshore bays and islands, coves and estuaries (Lockley, 1966; Summers *et al.,* 1980), particularly around the hours of lowest tide.

Over one third of the national minimum population estimate of harbour seals use terrestrial haul-out sites in southwest Ireland (Cronin *et al.,* 2007). Most of the harbour seal haul-out sites in this region are located within Bantry Bay and the Kenmare River. Inner Bantry Bay (Glengarriff harbour) and the Kenmare River have been designated as SACs under the Habitats Directive with the harbour seal, listed as one of the qualifying interests for inner Bantry Bay.

Haul-out sites within Glengarriff harbour, including the inner harbour, Garinish Island and the rocks at Big Point in the outer harbour (Figure 10.1.1), are significant haul-out sites for the species within Bantry Bay. These sites are used as breeding sites (June-August) and high numbers of pups have been observed at these sites during dedicated marine mammal studies in the area since 2003 (Cronin, 2007). The sites are also used for moulting during July-September. Compared to other haul-out sites in Bantry Bay, haul-out sites within Glengarriff harbour are used year-round by harbour seals, possibly because of the shelter they afford to seals during adverse weather, however abundance changes during the year. At Carrigskye (site 1) and Big Point rocks (site 4) a late summer peak in abundance occurs, probably explained by numbers increasing during annual moult. Garinish Island (site 3) and rocky skerries in inner Glengarriff harbour (site 2) are used by seals throughout the year with a peak during June-September corresponding to breeding and moulting periods.

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Harbour seals are most vulnerable to disturbance at their terrestrial haul-out sites during breeding and moulting periods. These events occur between June and September in Ireland. In addition to the identified terrestrial sites, the surrounding waters are likely to be critical habitat for harbour seals, for feeding and/or for navigation to more offshore foraging areas. Results from a study by the author on the haul-out behaviour of harbour seals in southwest Ireland in recent years suggests that harbour seals spend up to 80% of their time at sea. Moreover it appears that they are local foragers, over half of the foraging trips were within 5km of the haul-out sites (Cronin, 2007; Cronin *et al*., 2008). Unlike grey seals harbour seal adults continue to forage during the breeding season (Bonnes *et al.,* 1994). In addition the mating strategy is based on males diving and calling at aquatic display sites (Van Parijs *et al.,* 1997, 2000, Hayes *et al*., 2004). Disturbance from anthropogenic noise during this period could therefore potentially affect mating success.

Considering the relatively large population of harbour seals using terrestrial and aquatic habitat in inner Bantry Bay and their localised foraging range, they are considered the marine mammal species most at risk to potential impacts of the proposed harbour development works. Mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works.

10.1.3.2 Grey Seal

Grey seals are distributed throughout Irish coastal waters and commonly seen hauled out on more exposed shores than the harbour seal (Kiely, 1998). Bantry Bay is not an important

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area for grey seals and there are no known breeding or moulting haul-out aggregations of the species within the Bay. One or two grey seals occasionally haul out amongst groups of harbour seals near Garinish Island (Cronin, 2007) but mixed species haul-out groups are unusual. Apart from a small breeding colony on the Calf Islands in Roaringwater Bay, the nearest significant colony of grey seals to Glengarriff Harbour is on the Blasket Islands in Co. Kerry. A national census of the grey seal population in 2005 estimated between 648-833 grey seals use breeding sites in the Blasket Island Group (Ó Cadhla *et al.,* 2008). Large numbers of grey seals use the Blasket Islands for moulting (up to 1000 grey seals have been observed on the Great Blasket Island February 2008, 2009, (Cronin, *unpublished*)).

Grey seals are also most vulnerable at their terrestrial haul-out sites during breeding and moulting periods between September and March in Ireland. However as there are no known breeding or moulting colonies of grey seals in Bantry Bay the proposed works will not have an impact on breeding and moulting grey seals in southwest Ireland. Grey seals have a wider offshore foraging distribution than harbour seals and as a result seals from large breeding colonies on the west coast may potentially use the waters in Bantry Bay for foraging and/or navigation and therefore individuals could potentially be affected by the proposed works. Mitigation measures outlined in Section 10.1.6 will minimize potential impacts of the proposed works.

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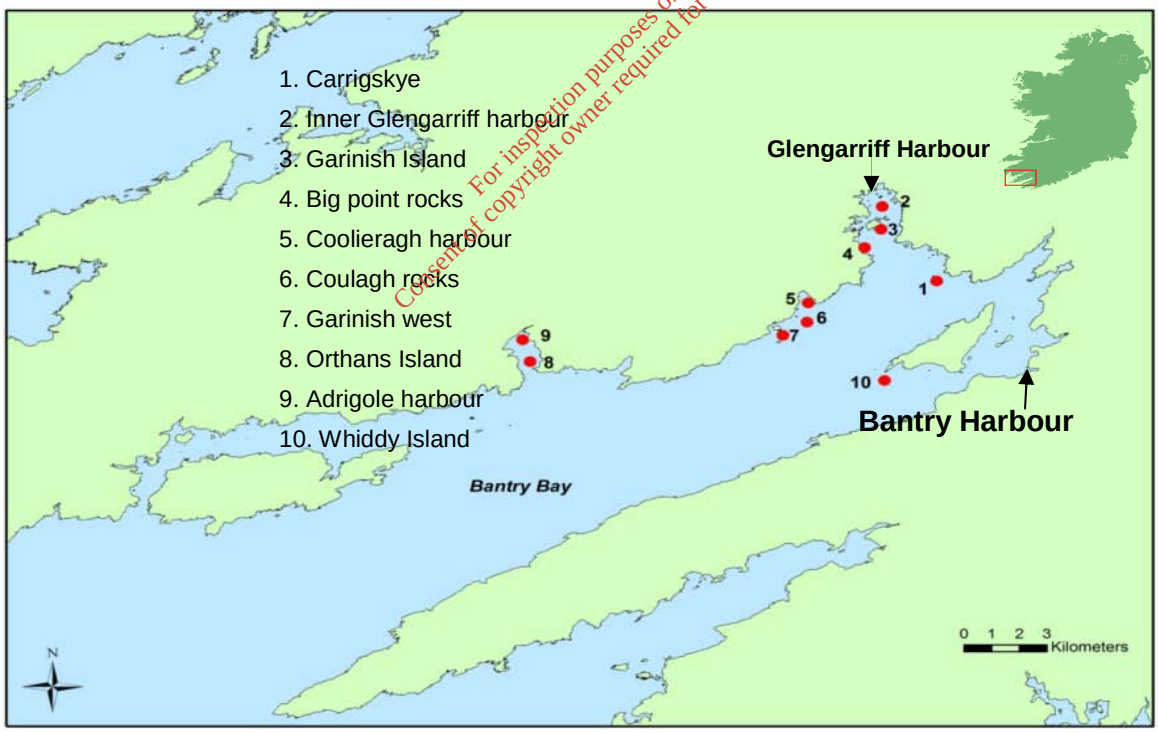

Figure 10.1.1 Harbour Seal Haul-out Sites in Bantry Bay
(source: Cronin, 2007)

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10.1.4 Potential Effects of Proposed Works on Marine Mammals

The noise associated with harbour and pier development represents a source of acoustic degradation in the marine environment. The planned works will involve dredging, piling and may involve rock breaking. These will produce sounds with combined low and high frequency components (Goold, 1996), which may potentially affect both the low frequency-sensitive baleen whales and pinnipeds and high frequency-sensitive toothed cetaceans (odontocetes).

10.1.4.1 Dredging

Benthic dredging activity can sometimes result in alterations to the biological environment. Dredging will alter characteristics of benthic habitats with subsequent effects on prey distribution and abundance and impact on marine predators. However, the severity of impact on marine mammals will be determined by the extent of dredging activity.

In addition to the physical act of sediment removal, pressure jetting and dredging activities will result in potential disturbance to marine mammals through increases in vessel activity and increases in local ambient marine noise levels. Acoustic disturbance can be a threat to marine mammals causing hearing damage (Richardson *et al.,* 1995). Furthermore, the suspension of disturbed particles in the water column can potentially affect water quality.

In summary potential effects of *dredging* on marine mammals include:

- Chronic hearing damage or disturbance/displacement as a result of noise.
- Consumption of contaminated prey items resulting from contaminants entering the food chain (where contaminated substrates are disturbed).
- Displacement resulting from impacts on available prey.

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Dredging is unlikely to affect marine mammals in the area at the population level, however considering the proximity of several harbour seal haul-out sites to the proposed work area, there is the potential for the above detrimental effects on individuals and strict mitigation measures therefore are recommended (see Section 10.1.6). Grey seals and transient cetaceans temporarily using the area will potentially be exposed to the noise and activities and precautionary measures are therefore recommended (see Section 10.1.6).

10.1.4.2 Pile Driving

Pile driving associated with the proposed development, is considered to be a potentially detrimental activity to marine mammals because it produces a very high source level and broad bandwidth sound. Sound produced during pile-driving propagates through the air into water, through the water column and, to a lesser degree, through the sediment and from there back into the water column (Thompson *et al*., 2006). Sound pressure levels in impact pile-driving are dependent on the length and the diameter of the pile and the impact energy (Nedwell *et al*., 2003). The response thresholds of cetaceans are usually the lowest for

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pulsed sounds and pile driving is one of the loudest sources of this type of noise (Richardson & Wursig, 1996).

Extended exposure to high levels of continuous noise and/or impulsive sounds with high rise times can lead to injuries of the hearing structures in cetaceans and pinnipeds resulting in permanent hearing loss and other injuries (Richardson *et al*., 1995). Such injuries have been linked to mid-frequency tactical sonar (Evans & Miller, 2004). Source levels of pile-driving noise are very similar to tactical sonar however they differ in duration, frequency content, duty cycle and directionality and it is therefore difficult to assess their potential for causing severe injury in cetaceans and pinnipeds. Animals close to the source, exposed to a sudden onset of pile-driving noise might be injured (Thompsen *et al*., 2006). Temporary threshold shift (TTS), a temporal elevation of the hearing threshold due to noise exposure, could be induced by exposure to pile-driving noise. Using a model impact pile-driving broadband sound pressure level of 229dB$_{rms}$ re 1 µPa at 1m, the resulting TTS-zones are 1.8km for harbour porpoises and 400m for pinnipeds.

In addition to potentially injuring marine mammals, pile driving and industrial noise can adversely impact behavior, communication and breeding. The radius of the zone of responsiveness to pile-driving noise has been provisionally defined as up to at least 20km for harbour porpoises and harbour seals (Thompsen *et al*., 2006). At 9kHz this noise is capable of masking strong dolphin vocalizations within 10-15km and weak vocalizations up to approximately 40km; behavioural modifications have been observed in bottlenose dolphins in response to noise produced by pile driving (David, 2006). Pile driving in the western Baltic found a significant, though temporary, effect on the haul-out behavior of harbour seals (Teilmann *et al*., 2006a) and the abundance of echolocating harbour porpoise was found to significantly decrease during pile driving activities in Denmark (Teilmann *et al*., 2006b).

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In summary the potential effects of *pile driving* on marine mammals include:

- Physical injury of individuals resulting from close range exposure
- Chronic hearing damage from short/medium range exposure
- Disturbance or displacement as a result of pile driving
- Long term effects resulting from habitat degradation
- Short term effects of sediment disturbance

Pile driving for the proposed development in Bantry Harbour is unlikely to affect either species of seal at the population level, however considering the proximity of several harbour seal haul-out sites to Bantry Harbour, and the fact that the zone of responsiveness to pile-driving noise has been provisionally defined as up to at least 20km for harbour seals, there is the potential for the above detrimental effects on individuals and strict mitigation measures therefore are recommended (see Section 10.1.6). Pile driving in unlikely to have an adverse impact on cetaceans at the population level. However, transient cetaceans, in particular harbour porpoise, temporarily using the area will potentially be exposed to the noise produced by pile driving and precautionary measures are therefore recommended (see Section 10.1.6).

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10.1.4.3 Rock Breaking

Documentation of biological damage from high-level sound may be categorized as either direct injuries (lethal, sub-lethal or non-lethal) or indirect effects (changes in behavioural or distribution patterns). Considering the proposed works in Bantry harbour there is no potential for direct injuries to marine mammals that could be caused by e.g. blasting. However there is potential impact from underwater noise resulting from rock breaking. The physiological effect of exposure to loud underwater noise can include temporary or permanent shifts in hearing thresholds, which degrade an animal's ability to forage and carry out other activities that depend on auditory acuity such as communication, navigation and mating. Playback experiments of drilling sounds in the presence of cetaceans have shown avoidance reactions and reduction of calling rates by various baleen whale species (Richardson *et al*., 1995).

Studies on the responses of marine mammals to anthropogenic noise have identified the following factors as influencing the degree of response given by animals: (i) source intensity levels, (ii) degree of background noise, (iii) distance to source, (iv) species involved, (v) behavioural state and season, (vi) prior degree of exposure and (vii) age, sex and time of day (Anguilar *et al*., 2004). The peak pressure, duration and the frequency spectrum of anthropogenic sound are important factors relating to potential biological impacts. Several studies have examined the direct and indirect impacts of underwater noise on marine mammals and in general have indicated that source levels of 180-200dB P-P re 1 µPa are sufficient to induce behavioural effects on marine mammals within a few kilometres of the sound source (Gausland, 2000).

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Phocid seals are more sensitive than small odontocetes to noise of low frequency and are therefore potentially more susceptible to disturbance from low frequency anthropogenic noise (Thompson *et al.,* 1998). Both species, the harbour seal and grey seal will be susceptible to disturbance from underwater anthropogenic noise when at sea.

In summary potential effects of rock breaking on marine mammals include:

- Chronic hearing damage from short/medium range exposure.
- Disturbance or displacement as a result of noise.
- Long term effects resulting from habitat degradation.
- Short term effects of sediment disturbance.

Rock breaking is unlikely to affect either species of seal at the population level; however, considering the proximity of several harbour seal haul-out sites to the proposed work area (see section 10.1.5), there is the potential for the above detrimental effects on individuals and strict mitigation measures therefore are recommended (see Section 10.1.6). Rock breaking is unlikely to have an adverse impact on cetaceans at the population level. However, transient cetaceans temporarily using the area will potentially be exposed to the noise and precautionary measures are therefore recommended (see Section 10.1.6).

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10.1.4.4 Deposition of Dredge Spoil

Dredge spoil from the harbour will be deposited at adjacent Cove and Abbey shores. As the dredge spoil will be deposited ashore it will not have any impact on marine mammals in the area, however the dredge will be transported to the sites by barge and therefore there may be potential impacts on marine mammals in surrounding waters from increased noise and associated boat activity. There will be risk of collision of marine mammals with barges and whilst this risk is considered low, due to high manoeuverability of these species, mitigation measures outlined in section 10.1.6 will ensure this risk is kept to a minimum.

10.1.5 Operational Impacts

The operational phase impact will essentially be an increase in pleasure craft density and associated increased noise and risk of collision. Density of craft is expected to roughly double and be in the region of 100 vessels, including 50 new vessels and 50 vessels from the wider Bantry area using the new marina. While collision of marine mammals with pleasure craft is rare due to high manoeuverability of these species, disturbance occurs when marine mammals respond to the noise or perceived risk of boat strikes (Hodgson & Marsh 2007), and persistent interruptions of important behaviours such as feeding, courtship and mating can have negative impacts on populations.

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Harbour porpoises may be attracted to sailboats, but maintain a minimum distance to ships operating regularly and on a straight course and avoid fast-moving motor-boats at even greater distances. Likewise, Risso's dolphins will not usually approach vessels, and both species are therefore considered to be at low risk from collision. Bantry Bay represents an important habitat for common dolphins, and while bottlenose dolphins and Minke whales do not frequent the waters of the harbour, these species may be vulnerable to increased boating activity in the surrounding area due to their inshore distribution. The area is not important for grey seals, but the relatively large population of harbour seals using terrestrial and aquatic habitat in inner Bantry Bay coupled with their localised foraging range, means that they are at increased risk from operational impacts through disturbance at haul-out sites and collision risk, although harbour seals may habituate to the sound of boats and ships (Thompson et al. 1998).

One of the most pervasive and significant effects of noise may be the reduction in animals' ability to detect, interpret and respond to biologically important signals in the presence of noise, a phenomenon called masking. Low-frequency communication and social calls of harbour porpoises and seals can be masked by noise emissions from boating activities, although at the density proposed for the area, this is unlikely to represent a significant impact.

With increased vessel activity in a relatively small area there will be an associated increase in the potential of collision of marine mammals with vessels (strikes). It has been shown that vessels over 80 metres in length cause the most severe or lethal injuries and that serious injuries rarely occur to marine mammals if struck by vessels travelling at speeds below ten knots, most lethal and severe injuries occur to marine mammals if struck by vessels travelling

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at more than 14 knots (Laist et al., 2001). Seasonal speed limits of ten knots have been placed along various areas along the eastern coast of the US to reduce ship strikes of vessels >19m to endangered marine mammals (NOAA, 2008). Codes of conduct for vessels operating in the vicinity of bottlenose dolphins in the Shannon Estuary provide guidance on speed and approach of vessel to minimize impact on the animals.

The strike risk is considered the highest for harbour seals as this is the most abundant marine mammal species in the area, using waters in the inner harbour year round. Mitigation measures suggested in Section 10.1.6 will minimize potential impacts on marine mammals in Bantry Harbour during the operational phase.

10.1.6 Mitigation Measures

10.1.6.1 Construction Phase

Considering the nature of the work proposed, the region where the work will be conducted and the fact there will not be any blasting or drilling it is considered that the proposed dredging, piling and rock breaking will have little likelihood of significantly impacting on marine mammals in the area. It is however recommended that vigilance should be maintained for any marine mammal approaching the area throughout operations as there will be potential effects of acoustic disturbance resulting from noise associated with the proposed works and increased boat activity associated with the development of the harbour area.

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As the nearest breeding and moulting haul-out sites for harbour seals are approximately 2-3km from the proposed works (e.g. Carrigskye and rocks west of Whiddy island – Figure 10.1.1) the proposed work will not cause disturbance at these terrestrial sites. Whilst numbers of harbour seals peaks during Summer months at haul-out sites, the aquatic environment is used year round by seals and therefore there is no one period during the year that presents less risk to seals from potential disturbance from the proposed harbour developments. Considering the significance of inner Bantry Bay for the harbour seal at a national level and the conservation status of the species it is recommended that, if possible, the proposed works are conducted during low tide when the highest numbers of seals are ashore and therefore at lower risk to acoustic disturbance underwater.

As the probability of other marine mammal species frequenting the harbour is low, seasonal patterns of cetacean abundance (e.g. minke whales) is inconsequential in informing/advising on timing of proposed works.

However, as previously discussed harbour seals, harbour porpoise and to a less degree other marine mammals may occasionally use the harbour and the following precautionary measures are therefore advised during operations in the harbour area.

- Operations should cease temporarily if a seal or cetacean is observed swimming in close proximity (<50 m) to the area of industrial activity and work can be resumed once the animal(s) have moved away.

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- Any approach by marine mammals into the immediate (<50 m) works area should be reported to the National Parks and Wildlife Service.
- The NPWS as a potential consultee in the regulatory process may recommend a qualified marine mammal observer (MMO) to monitor the works and follow a set of pre-determined monitoring guidelines. In such cases an 'MMO form for coastal works' should be completed by the MMO and submitted to NPWS upon completion of the works.
- During movement of dredge spoil by barges caution should be exercised to minimize risks to marine mammals and speed limit of 10 knots considered.

10.1.6.2 Operational Phase

Erratic movements at high speed in shallow waters increases the risk of collision with marine mammals. Recommend setting a speed limit in the area e.g. speed limits of ten knots have been placed in parts of the US to reduce vessel strikes to endangered marine mammals. Consultation with the harbour authorities (harbour master) would be necessary for the effective implementation of this measure.

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10.2 Birds

10.2.1 Introduction

This section of the EIS presents the findings of the surveys of water birds, in the winter 2011/12, within the environs of Bantry Harbour. It describes the potential impacts of the proposed inner harbour development on birds and recommends mitigation measures where appropriate. The study area for the assessment is outlined in Figure 10.2.1 below.

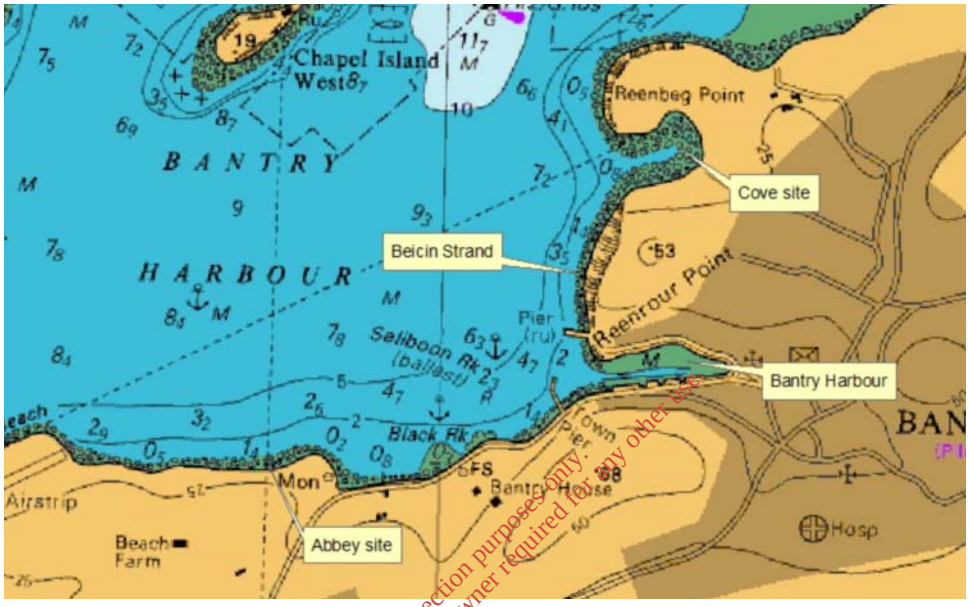

Figure 10.2.1 Location of Proposed Works

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10.2.2 Methodology

10.2.2.1 Desk Review and Consultation

A desk study was carried out to collate the available information on bird populations within the study area and surroundings. The National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government was consulted in relation to designated areas and protected species within the study area. BirdWatch Ireland was consulted in relation to previous winter counts of non-breeding birds within the study area. However, the study area including Bantry Harbour is not covered by the Irish Wetland Bird Survey (IWeBS). The Risk Assessment for Marine Mammals and Seabird populations in South-Western Irish Waters (R.A.M.S.S.I) (Roycroft *et al*., 2007) was also consulted.

10.2.2.2 Habitat Survey

A habitat survey was undertaken on the initial site visit whilst dividing the study area into sections and mapping vantage points. All habitats within each of the six sections were recorded and classified according to Fossitt (2000).

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10.2.2.3 Winter Bird Surveys

The methodology for the field surveys was as follows. All Sections numbered 1 – 6 (illustrated on Figure 10.2.2) were surveyed at monthly intervals from October 2011 to March 2012 inclusive. On each visit counts were started approximately one hour before low tide and finished one hour after, when the mudflats within the inner harbour area were exposed, along with narrow intertidal areas within the Cove Site, Beicin Strand and Abbey Site. The low tide counts were undertaken close to either dawn or dusk from November onwards so that overnight roost sites could also be identified. This was particularly relevant to determine if the Mute Swans were roosting overnight in the inner harbour. The dusk and dawn surveys also allowed bird movements into and out of the study area to be recorded, which gave a good indication of whether the birds feeding within the study area were roosting elsewhere.

Seven vantage points were selected in order to observe all parts of the study area, from the air strip in the south to Reenbeg Point in the north and west as far as Chapel Island (see Figure 10.2.2 for locations). A tidal pool, which is separated from the main harbour by the N71, was also included in Section 2 as a number of waterbirds were recorded using it. All counts were undertaken in reasonable to good visibility using a 34x telescope. Vantage point details are provided in Table 10.2.1 below.

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Table 10.2.1 Vantage Points used for Low Tide Counts

Vantage Point	Grid Reference	Location
VP1	V 99176 49106	South west corner of Section 5
VP2	V 99014 48650	South of Section 4
VP3	V 99249 48608	North of Section 3
VP4	V 98712 48318	Within Section 2 looking north over open water
VP5	V 98247 48137	Looking south over pond in Section 2
VP6	V 98158 48272	Point between Section 1 and 2 looking north over open water
VP7	V 97365 48340	North east point of air strip

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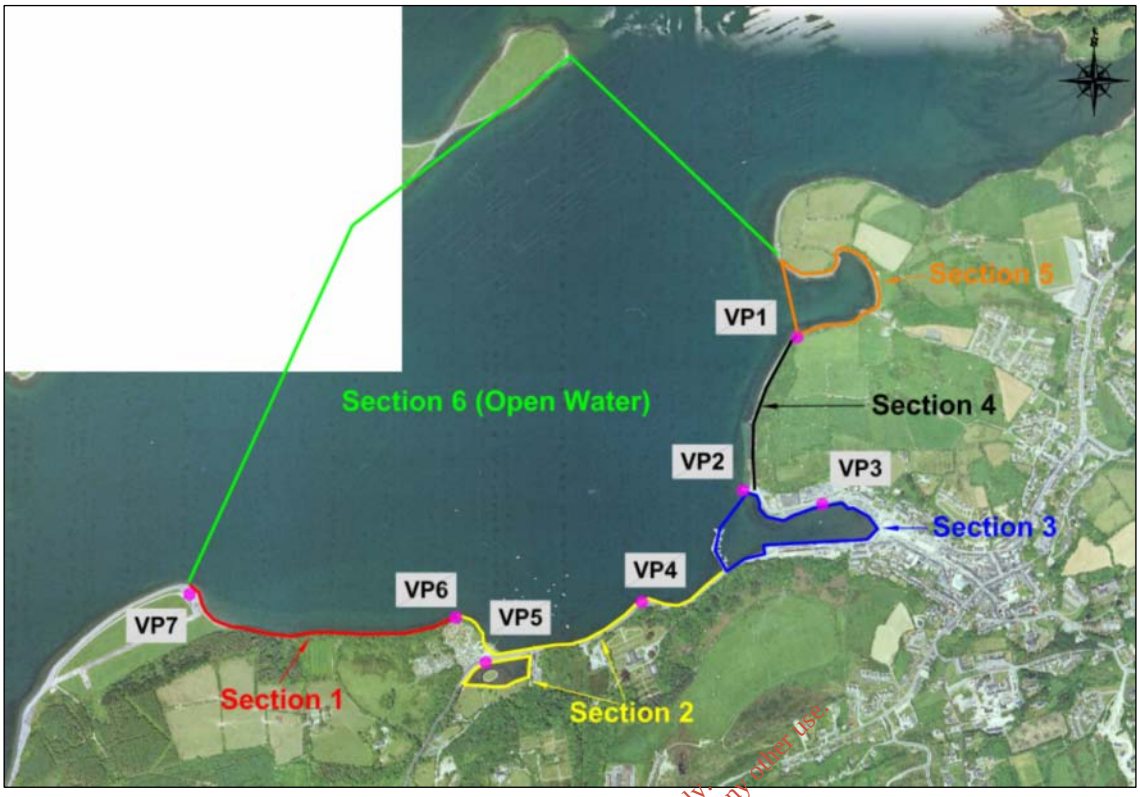

Figure 10.2.2 Location of Sections 1 to 6 and Vantage Points (VP1 to VP7)

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10.2.3 Results

10.2.3.1 General Description of the Study Area

Bantry Harbour is situated on the eastern shore of Bantry Bay in West Cork. The inner harbour, which is proposed for development, is approximately 100m wide and 500m from its mouth to its head. A small stream, known as the Mill Stream, flows through Bantry Town and discharges into the inner harbour area. The study area is illustrated on Figure 10.2.2 and includes the area stretching from the northern tip of the airstrip to Reenbeg Point in the north and the open water as far west as Chapel Island. A number of other sites including Cove Site, Beicin Strand and the nearby Abbey Site, as illustrated on Figure 10.2.1, will be included in the proposed development of Bantry Inner Harbour.

10.2.3.2 Designated Areas

The study area is not covered by any designation for nature conservation. Three candidate Special Areas of Conservation (cSAC) occur within 10km of the study area (See Table 10.2.2). None of these Natura 2000 sites are designated for birds. Two proposed Natural Heritage Areas (pNHA), which are designated for birds, occur within 10km of the study area (see Table 10.2.2).

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Table 10.2.2 Designated Areas within 10km of Study Area

Site Name	Status	Code	Approx. distance from proposed reclamation site
Glengarriff Harbour and Woodland	cSAC	000090	7km north west
Caha Mountains	cSAC	000093	8.5km north west
Derryclogher (Knockboy) Bog	cSAC	001873	9km north
Cusroe, Whiddy Island	pNHA	000110	0.5km west
Sheelane Island	pNHA	001977	7km north west

Cursoe, Whiddy Island pNHA (000110)

A colony of Arctic Terns has been known from here since 1834, the fortunes of which have fluctuated over the years. In 1984, 56 pairs were present. This comprised 28% of the Cork population at that time, and the second largest Arctic Tern colony in the region. In 1986 the colony had reached levels of national importance, with 120 pairs present, but in 1993 only 7 or 8 pairs occurred, with larger numbers then being found on Sheelane Island, (see section 1.3.2.2) some 6km to the west (NPWS site synopsis).

In 1986 Whiddy Island was recorded as having 10 breeding pairs of Cormorants, 10 pairs of Shags and 65 pairs of Herring Gulls in addition to the Arctic Terns, although these figures would apply to Whiddy Island as a whole and not just to the shingle spit. The Arctic Tern is listed on Annex I of the EU Birds Directive, and so this proposed NHA makes an important contribution to the species' conservation, even if numbers are at times quite low (NPWS site synopsis).

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Sheelane Island pNHA (001977)

Sheelane Island is situated c. 0.5km offshore in Bantry Bay, the nearest town is c. 7km to the north-east - Glengarriff, West County Cork. The site comprises Sheelane Island itself which is roughly 100m square and two small rocky outcrops either side of the larger island. A boundary is drawn 200m from the main island. These rocky islands are used by nationally important numbers of Cormorant (58 pairs, pre-1986) and also the common Herring Gull breeds here (20 pairs, pre-1986). The site is proposed for NHA designation as it is used by nationally important numbers of Cormorant and locally important numbers of nesting Herring Gull (NPWS site synopsis).

10.2.3.3 Habitats within the study Area

The habitats recorded within the study area for the purposes of the birds assessment are noted in Table 10.2.3 below.

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Table 10.2.3 Habitats within the Study Area

Section	Name of Site	Habitat types (classification follows Fossitt, 2000)	Intertidal habitats (JNCC Marine Habitat Classification as in Section 10.4 of this Chapter of the EIS
1	Abbey Site	Littoral (intertidal) mixed shores (LS and LR)	Includes LS.LCS.Sh.BarSh (Barren littoral shingle) covering most parts of the shore without seaweed cover, particularly in the mid to upper shore; LR.LLR.F.Fves.X (Fucus vesiculosus on mid eulittoral mixed substrata), which described the mid-low shore area dominated by scattered F. vesiculosus (but only a poor example due to the lack of substrate stability) and LR.LLR.F.Fserr.X (Fucus serratus on full salinity lower eulittoral mixed substrata) in the lower shore dominated (loosely) by Fucus serratus. Toward the upper shore there is also a variant of LR.FLR.Eph.EphX (Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata)
2	Outer Bantry Harbour	Sea inlet and bays (MW2) and Littoral (intertidal) mixed shores (LS and LR)	Not described
3	Inner Bantry Harbour	Estuaries (MW4)	The deeper parts are dominated by muddy sands with Virgularia mirabilis common (the area has been classified as Infralittoral Sandy Mud habitat complex [SS.SMu.ISaMu]) (V1-1).
4	Beicin Strand	Littoral (intertidal) mixed shores (LS and LR)	LS.LCS.Sh.BarSh (Barren littoral shingle) covering most parts of the shore without seaweed cover, particularly in the mid to upper shore; LR.LLR.F.Fves.X (Fucus vesiculosus on mid eulittoral mixed substrata), which described the mid-low shore area dominated by scattered F. vesiculosus and LR.LLR.F.Fserr.X (Fucus serratus on full salinity lower eulittoral mixed substrata) in the lower shore dominated (loosely) by Fucus serratus. Toward the upper shore there is also a variant of LR.FLR.Eph.EphX (Ephemeral green and red seaweeds on variable salinity and/or disturbed eulittoral mixed substrata)
5	Cove Site	Littoral (intertidal) mixed shores (LS and LR)	LS.LSa.St.Tal (Talitrids on the upper shore and strand-line) at the top of the shore / strand line; LR.LLR.F.Fspi.X (Fucus spiralis on full salinity upper eulittoral mixed substrata) in the upper shore; LR.LLR.F.Fves.X (Fucus vesiculosus on mid eulittoral mixed substrata) in the mid to lower

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Section	Name of Site	Habitat types (classification follows Fossitt, 2000)	Intertidal habitats (JNCC Marine Habitat Classification as in Section 10.4 of this Chapter of the EIS
			shore and LR.LLR.F.Fserr.X (Fucus serratus on full salinity lower eulittoral mixed substrata) on the lower shore. Toward the lower shore end of the latter, the substrate was dominated by muddy-silt coated over large pebbles with fine sand-binding reds attached. The lower shore was dominated by slightly muddy sand dominated by Arenicola burrows while toward the outer section of Cove, less fines in the sand saw the appearance of Lanice chonchilega.
6	Open Water	Sea inlet and bays (MW2)	Not described

10.2.3.4 Non-breeding Bird Usage of the Study Area

Low Tide Counts

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Overall the study area contained low numbers of birds (see Table 10.2.4 and 10.2.5 for results), with an average total of 358 over the six months. Over the six month period, gulls comprised the largest component of the birds using the study area in particular the inner harbour area. Black-headed Gull and Herring Gull were the two most common species. The number of waders and swans was quite low. The highest number of waders present in the inner harbour over the six month period was 17. No waders were present in the inner harbour in December. Oystercatcher was the most common wader present over the survey period with a peak of 54 in December. The number of divers recorded in the open water was also generally low. The peak number of Mute Swans recorded over the six months was 10. The swans were scattered throughout the survey area and in December and February no swans were recorded in the inner harbour. However, the largest number of swans recorded over the six months was in Section 3 (inner harbour). The gulls and swans within the harbour are used to being fed by the public, as noted during field surveys, and this probably accounts for the high number of gulls recorded here. Overall the inner harbour contained the largest number of birds over the six month period as shown in Table 10.2.5.

A small number of birds were recorded using the tidal pool within Section 2, these included gulls, Redshank, Curlew and Mallard. Little Egret was mostly recorded within the inner harbour (Section 3). A small group of 15 Oystercatchers were recorded feeding in the field north of Section 5.

A few rarities were recorded, mostly gulls including Mediterranean Gull, Iceland Gull and Ring Billed Gull. However, there are known to be regular sighting of these rare gulls in this area (NPWS consultation 2011). A single Black-throated Diver was recorded in October and

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November in Section 6, with 2 occurring in December. A Dipper was recorded flying in over Section 2, to the tidal pool and then heading up river. A single Kingfisher was recorded flying along the shoreline in Section 1 before disappearing.

Table 10.2.4 Numbers of water birds recorded within the study area over the winter period, (October 2011 – March 2012)

Species	Month							
	Oct	Nov	Dec	Jan	Feb	Mar	Mean	Peak
Great Northern Diver	3	5	6	2	2	2	3	6
Black-throated Diver	1	1	2	0	0	0	0	2
Cormorant	22	3	2	2	3	0	5	22
Little Egret	0	4	1	0	0	1	1	4
Grey Heron	4	3	2	0	0	0	2	4
Mute Swan	10	5	5	1	7	6	6	10
Mallard	7	33	2	4	0	2	8	33
Oystercatcher	29	31	54	38	9	14	29	54
Curlew	4	5	2	5	1	2	3	5
Redshank	8	5	15	2	6	1	6	15
Greenshank	0	2	0	0	0	0	0	2
Turnstone	0	0	2	0	6	15	4	15
Black-headed Gull	108	160	300	332	173	121	199	332
Common Gull	0	1	1	0	1	2	0	2
Lesser Black-backed Gull	0	0	2	2	0	3	1	3
Herring Gull	36	109	185	97	40	22	82	185
Great Black-backed Gull	4	5	1	1	6	2	3	6
Iceland Gull	0	0	0	2	1	1	0	2
Ring Billed Gull	0	1	1	1	1	1	0	1
Mediterranean Gull	0	1	1	0	1	0	0	1
Glaucous Gull	0	0	0	1	0	0	0	1
Shag	3	7	8	0	2	2	4	8
Kingfisher	0	0	0	0	0	1	0	1
Gannet	0	0	0	0	0	1	0	1
Black Guillemot	0	0	7	1	2	0	2	7
Dipper	0	0	0	1	0	0	0	1
Total	239	381	599	492	261	199	358	

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Table 10.2.5 Summary of total counts, peak and mean numbers of water birds recorded using each of the sections 1-6 over the winter period, October 2011 – March 2012-06-18

	Month	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6
Total water birds counted	Oct	24	24	114	10	38	29
	Nov	127	0	197	15	23	18
	Dec	193	25	334	3	20	24
	Jan	14	92	346	5	32	3
	Feb	7	57	175	6	7	9
	Mar	33	34	118	2	5	7
Peak Number		**193**	**92**	**346**	**15**	**38**	**29**
Mean Number		**66**	**39**	**214**	**7**	**21**	**15**

Dusk and Dawn Observations

In November a dawn watch was undertaken before the low tide count. A small number of waders were recorded feeding under the street lights in the inner harbour (Section 3), as well as a single Mute Swan and a number of roosting gulls. No waders were recorded arriving as it got light so no indication of roosts nearby. Approximately 70 gulls mostly Black-headed arrived at first light, along with 3 Little Egrets. These may have roosted on Chapel Island. There was one Mute Swan in the tidal pool, which probably roosted there overnight.

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In December a dusk watch was undertaken after the low tide count. The single Mute Swan in Section 5 roosted there throughout, the other in Section 6 remained there and the 3 in Section 1 stayed around the new pier. Approximately 20 Oystercatcher and 5 Redshank roosted at the northern point of the airstrip. A small number of gulls could be seen roosting at Cusroe Point on Whiddy Island (80 Black-headed and Common Gulls).

In January another dawn watch was undertaken before the low tide count. A large number of gulls were recorded in the inner harbour and these were likely to have roosted here overnight. A single Mute Swan was also recorded roosting in the inner harbour. No waders were recorded in the inner harbour other than a single redshank. A roost of 15 Curlew and 7 Oystercatchers was recorded at the northern tip of the air strip. The Curlew moved inland, but the Oystercatchers moved into Section 1 to feed. Six Curlew were recorded feeding in the field north of Section 5.

A second dusk watch was undertaken in February in addition to the low tide count. It was nearly high tide by the time it got dark. A small group of 9 Oystercatcher and 2 Redshank were present at the northern point of the air strip but were soon disturbed by a dog walker and headed off towards Whiddy Island. The gulls remained mostly in the harbour with approximately 40 heading off in the direction of Reenrour Point.

A full tidal cycle was observed during the March visit. There was very little movement of birds until the shoreline began to disappear. The few waders that were present flew off in the direction of Whiddy Island. The gulls remained in the same low tide areas despite flooding

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tide. Two swans stayed in the inner harbour but a family of Mute Swan (2 adult and 2 immature) swam north up the coast and out of the study area.

10.2.3.5 Breeding Bird Usage of the Study Area

A minimum of nine seabird species breed in Bantry Bay, with six of these occurring within inner Bantry bay (see Table 10.2.6).

Table 10.2.6 Breeding seabird numbers in Bantry Bay, including the outer bay from Bere Island to Dursey Island. Seabird 2000 results (Newton Pers. Comm) (Roycroft *et al*., 2007)

Number of Pairs	*Inner Bantry*	*Sheep's Head*	*Bere Is - Dursey*	*Total Bantry*
Northern Fulmar		11	575	586
Great Cormorant	52			52
European Shag	82		12	94
Lesser black-backed gull			4	4
Herring gull	19		21	40
Great black-backed gull	8	1		9
Arctic Tern	104			104
Razorbill*			7	7
Black Guillemot*	71	65	79	215

* Number of individuals

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There is an important colony of Arctic/Common Terns on Horse Island, approx. 1.5km north of the study area. 143 Apparently Occupied Nests (AONs) were recorded in 2009 (NPWS, 2011). In the summer of 1999 surveys found 104 occupied Arctic Tern (*Sterna paradisaea*) nests on Horse Island, 11 occupied Herring Gull (*Larus argentatus*) nests and 82 occupied Shag (*Phalacrocorax aristotelis*) nests on Whiddy Island, 8 Great Black-Backed Gull (*Larus marinus*), 29 Great Cormorant (*Phalacrocorax carbo*) and 8 Herring Gull (*Larus argentatus*) nests were recorded on Sheelane Island. Also recorded in 1999 were 23 Great Cormorant (*Phalacrocorax carbo*) occupied nests on Lousy Castle Island. In 1985 on Sheelane Island 58 Great Cormorant (*Phalacrocorax carbo*) and 20 Herring Gull (*Larus argentatus*) nests were recorded (Seabird 2000).

Determinants of seabird distribution (all species combined) differs between winter and summer, with the inner bay of greater importance in the winter than in summer (Roycroft *et al*., 2007).

10.2.4 Potential Impacts

10.2.4.1 Disturbance

Disturbance during construction works within the inner harbour, including dredging activities, is likely to result in the temporary displacement of some birds, depending on the scale of

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activity. Gulls are likely to continue to feed around the harbour as they scavenge on scraps and are used to high levels of human activity, such as weekly markets, which are held adjacent to the harbour. Waders are unlikely to continue feeding within the harbour during construction works, however the number of wader recorded using the harbour over the survey period was very small. There are no significant roost sites within the study area. Birds that were recorded roosting within the inner harbour, including the Mute Swans, are likely to continue to use this area at night time when construction works have ceased.

Development activity associated with the beach renourishment at Cove and Beicin Strands will result in the temporary displacement of small numbers of feeding birds, mostly Curlew and Redshank. These areas should continue to be used once construction activity has ceased, however the bird species composition may change as the intertidal areas will be converted from rocky shore to sandy beach.

The colonies of breeding seabirds present in Bantry Bay, during the summer months, on Horse Island, Whiddy Island and Lousy Castle Island are all over 2km from the inner harbour. The potential works at the Abbey Site will be approximately 1km from Whiddy Island. Sheelane Island is over 7km from the study area. These sites are considered to be at a sufficient distance from the development areas not to be disturbed during construction. A study of waders roosting within 150 to 200m of a major construction site in Galway Bay found that most species had either increased or remained relatively stable during the period of construction (Nairn, 2005).

During operation of the new facilities within the inner harbour it is likely that the gulls and swans will return to this area despite the increased activity as people will continue to feed them. Swans occur in many busy harbours and are unlikely to be deterred as a result of harbour activity.

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10.2.4.2 Indirect Effects of Sediment Redistribution

Disturbance of sediment during dredging activities can potentially cause a redistribution of sediments in surrounding areas of intertidal habitat, indirectly affecting the rate of sedimentation and the invertebrate prey of some of the bird species. This is not considered to be a high risk to birds within the study area as there is very little intertidal habitat that could be affected. However, a significant increase in the level of suspended solids within the water column as a result of dredging could temporarily affect open water feeding birds and their prey.

Dredging plume simulations were undertaken to investigate the fate of material spilled into the water column during dredging operations. The model simulates the dispersion, settlement and the fate of the material lost to the water column during the dredging operations by releasing particles into the model flow regime and tracking them as they are carried by the currents and gradually settle out onto the bed.

Figure 10.2.3 shows the highest suspended concentration of sediment in the water column during the dredging operation. It can be seen that the values are very low outside the confines of the harbour. Figure 10.2.4 shows the deposition of sediment lost to the water column during the dredging operation. It will be noted that most of the material falls back onto

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the bed within the harbour area. This material would of course be picked up by the dredger during the final cleanup operation. The amount of material deposited outside the harbour is very small the depth of the sedimentation in millimetres is approximately 1.5 kg per m^2.

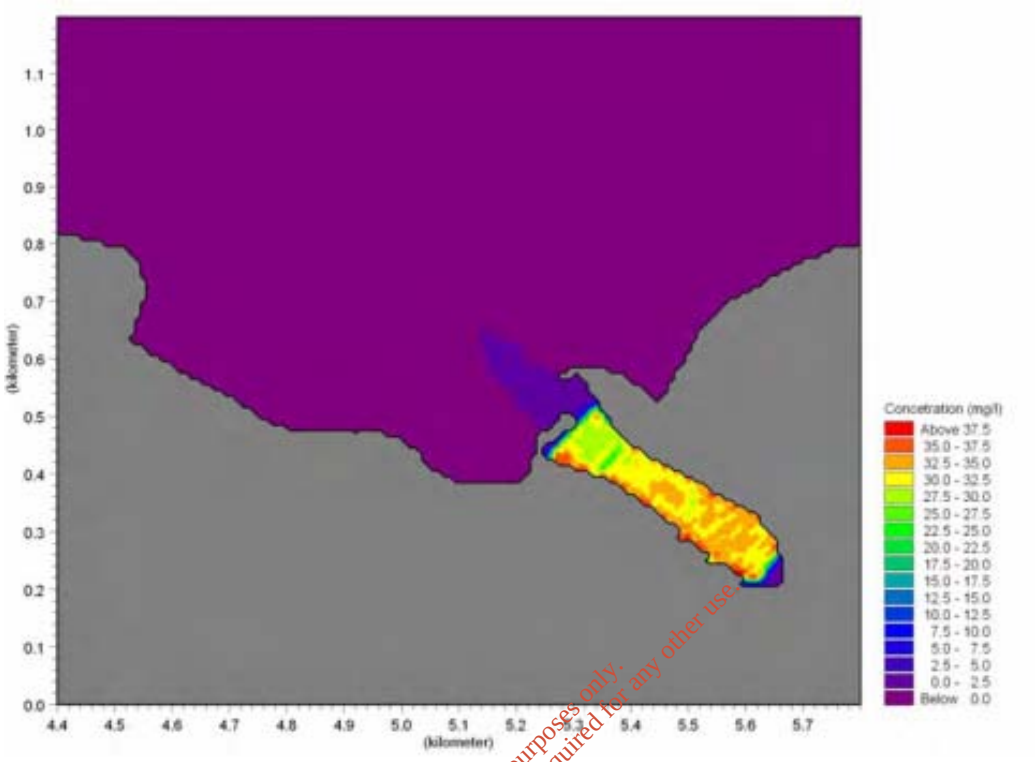

Figure 10.2.3 Maximum suspended sediment concentration in the water column during the dredging operations

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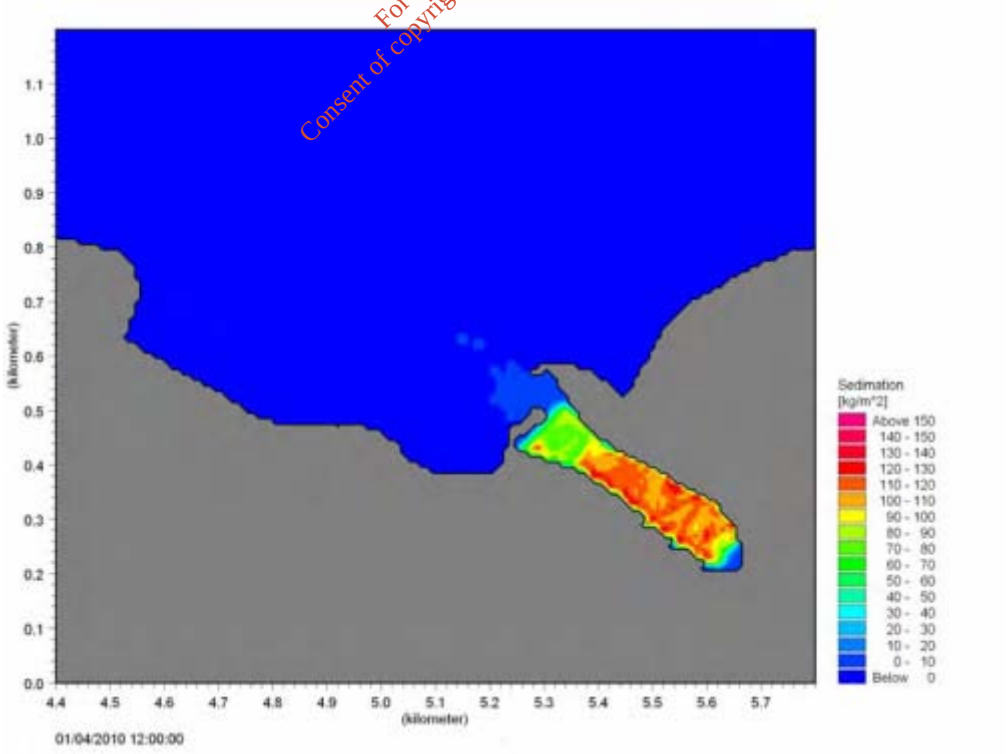

Figure 10.2.4 Sediment deposition on the seabed at the end of dredging operations

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10.2.4.3 Habitat Loss

Inner Harbour

Dredging of the inner harbour will result in an increase in water depth within the harbour at low tides. This will result in a loss of 50,000m2 of intertidal habitat used by feeding birds at low tide. The soft sediment habitats identified in the lower intertidal consist of Polychaete/bivalve-dominated muddy sand shores, with ragworm *(Hediste diversicolor)* in littoral gravelly muddy sand and gravelly sandy mud and Littoral Mixed Shores (see Section 10.4). This is not expected to be a significant impact as most of the birds recorded using the inner harbour, such as gulls and swans, are not sediment feeders.

Cove Site

A potential beneficial reuse for the dredged material is a beach renourishment scheme in the local area, at a site immediately north of the harbour, namely Beicin Strand and Cove Strand, with a focus on the naturally protected Cove Bay. The proposed new beach at Cove and Beicin Strand will replace the existing rock shore. The soft sediment areas of the Cove inlet are dominated by Infralittoral muddy sands with sand mason worm *Lanice conchilega* and lugworm *Arenicola marina* common in these areas (see Section 10.4). It is possible that this change in habitat may result in a change in bird species using the area but it may attract a greater diversity of shorebirds due to the finer sediment being present.

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Abbey Strand

An alternative beneficial reuse of the dredged material is as fill for use in part of a boat storage scheme, at the Abbey Strand. The proposed structure will consist of an imported rockfill bank which will be protected by rock armour. This structure will result in the loss of 500m of intertidal habitat. This area is used mostly by feeding Oystercatcher. The lack of rock or stable boulder or cobble here mean that faunal diversity in general is low being confined to scattered Littorinid molluscs, *Elminius modestus* barnacles and encrusting worms (*Spirorbis*) and bryozoans on *Fucus* fronds (see Section 10.4).

10.2.5 Mitigation Measures

As with most maritime dredging projects, environmental monitoring and mitigation will be required throughout the project. The requirement for monitoring will be ….

Monitoring of birds is recommended to determine the use of habitats both during and after construction. As the primary value of the area for birds is in winter, this should entail at least three counts per winter of the entire area affected, at low tide, between September and March. If there is a limit on the number of visits, priority should be given to the months of December and January which are the peak periods for most wintering bird populations. Annual reports on the monitoring should be submitted to the National Parks and Wildlife Service and to the Planning Authority.

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10.2.6 Residual Impacts

The residual impact of the proposed Bantry Inner Harbour Development on birds will be slight. The creation of a beach at the Cove and Beicin Strands may result in beneficial impacts if the change in habitat attracts a greater diversity of birds.

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10.3 Terrestrial Fauna

10.3.1 Introduction

The otter survey reported here was undertaken primarily as a baseline survey to ensure the welfare of otters utilising the area and to provide advice and recommendations for mitigation measures to be adopted during the construction and operation of the marina. The likely impacts of the development on the otters are discussed, with recommendations for mitigation or remedial measures. This section also include assessment of other mammals, amphibians, reptiles.

The general format of this report is in accordance with guidelines recommended by the EPA (1995) Draft Guidelines on the Information to be contained in Environmental Impact Statements. Recommendations and evaluation techniques utilised are in general accordance with Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, UK, 1995), Wildlife Impact: the treatment of nature conservation in environmental assessment (RSPB, 1995) and Guidelines for ecological evaluation and impact assessment (Regini, M. 2000).

10.3.2 Otter Survey Methodology and Constraints

A detailed search of c. 7km on either side of the bay was carried out on the 14th of February 2012. Weather conditions were good, with clear skies and good visibility. The searched area, mapped on Figure 10.3.1, included the area from the west beside the air strip to Newtown in the east.

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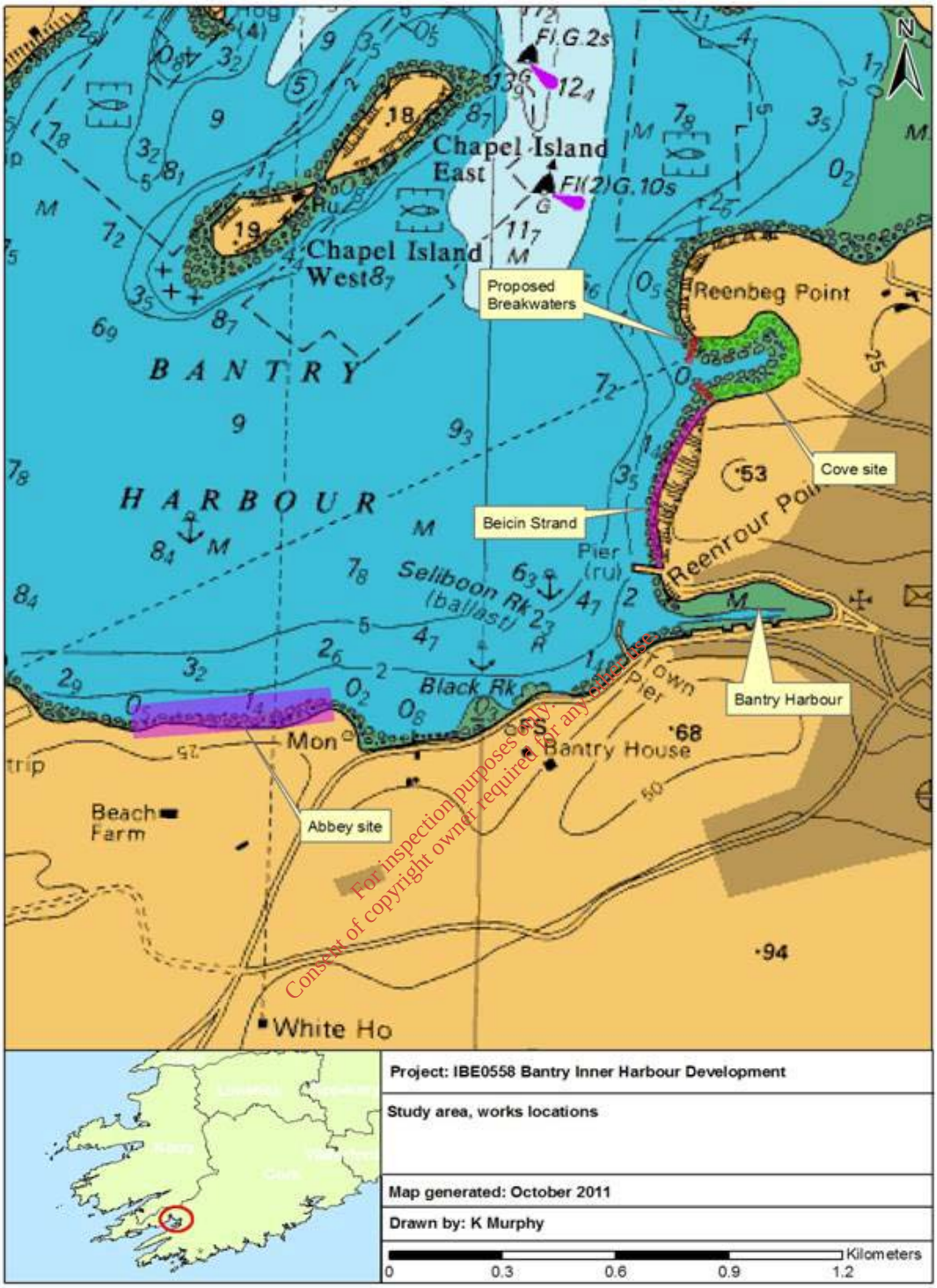

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Figure 10.3.1 Overview of search area

The survey for otters was carried out by means of search within the site and surrounding areas. Presence of otters is indicated principally by their signs, such as dwellings (Holts) or feeding signs or spraints (otter faeces) - which can be readily identified by their smell. Spraints may be washed away by rain but can persist for several months - by which time much of their scent has disappeared. Otter Holts, whilst they may be located near to the shore, are often located at some distance inland where there is a reduced risk of flooding. Otters have regular sprainting locations but also, specifically, they use spraints to mark their

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ranges or territories and for some form of scent communication. Prominent physical features are often marked. These may include ledges or rocks at bridges, stream/river junctions, significant promontory positions or large rocks pontoons etc. GPS co-ordinates were obtained for all of the sprainting sites using a Garmin GPS receiver.

The north side of the bay was surveyed during low tide giving full access to the shore and its adjacent lands. Portions of the west side of the bay were surveyed during a rising tide, making it more difficult to search or gain access in places. Relatively short sections could not be accessed because of dense scrub or where there were certain private lands along the bay – mostly, these were on stretches of shore well away from the proposed marina development.

The field survey was supplemented by evaluation of relevant literature and existing information.

10.3.3 General Description of the area

The marina site is located at Bantry Harbour, Bantry Bay. The site is accessed via a third class road off the N71 and is situated beside Bantry town. The site is located within 1km squares V9478, V9488 and V9498 of the Irish National Grid.

The principal land use of the surrounding area is urban in the centre, on the east side is agricultural, with extensive improved grasslands with boundaries of treeline, hedgerows, and a public walk way. These pastures are utilised for sheep and cattle grazing. On the west side of the bay beside the air strip is a wooded area.

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Within the study area, two streams enter the bay at Bantry town and at Seafield, to the west of the town.

10.3.3.1 Designated Conservation Areas

There are no Designated Conservation Areas within the proposed development site. The nearest being Glengarriff Harbour and Woodlands SAC (site code 000090).

10.3.4 Otter Survey

In total, c. 7km of shore in the vicinity of the proposed Marina was searched for otter signs in February 2012. The search area and the observations are mapped on Figure 10.3.1 and an annotated list of findings is given in Table 10.3.1. In total, 7 sprainting sites were identified. These were located in the near vicinity of the site and in both directions away from the site, indicating that otters are active all along the bay and beside the stream at Seafield (note that coastal otters require freshwater to wash their fur daily). Sprainting sites were found to be less frequent in the inner harbour area.

No spraints were found at the site of the Harbour – i.e. along the existing quays. Human disturbance and the high quay walls do not provide good sprainting locations – whilst otters

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will mark quays and berths on occasion (personal observations at other Marinas located in rivers).

No Otter Holts were located during the survey.
No signs were found of American mink Mustela vison.
No signs of Badgers Meles meles were located during this survey
No sightings of seals were recorded during this survey
No sightings of Amphibians or Reptiles were recorded during this survey

Table 10.3.1 Otter Signs Recorded during survey of February 2012

GPS co-ordinates National Grid	Observation	Notes
V 98711,48318	2 Spraints	Old Slipway at Blackrock beside N 71
V 98174,48288	1 Spraint	Slipway at Abbey Cemetery
V98244,48086	2 Spraints	Pond at the West lodge Hotel
V99130,49344	3 Spraints	Ferry slipway for Whiddy Island
V99128,49479	2 Spraints	On Boulders at Reenrour Point Newtown
V 99177,49407	2 Spraints	Beside Beach at Cove site
V99037,48795	1 Spraint	On Boulders at Reenrour Point Newtown

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10.3.4.1 Otter Numbers

The present study assessed otter activity within the Bantry harbour area Bantry bay, by means of survey of otter signs – principally spraints. Spraints are a poor indicator of otter numbers but they do provide a guide to otter activity and range use. These signs have indicated that otters range over most of the study area with concentrations to the east and west of the site, where cover and relative lack of disturbance are believed to contribute to this pattern of range use.

The abundance of spraints is not necessarily indicative of the numbers of otters in the area and it is not feasible to assess otter density in the area from these signs alone (Kruuk et al, 1986). However, Mason & Macdonald (1987) evaluated spraint surveys and suggested that they may be used to provide a reliable indication of the status of otters. O'Sullivan (1993a) also considered that survey of spraints was effective in determining otter distribution. Kruuk (1995) reported seasonal variation in sprainting activity, with otter's sprainting far more often on land in winter, producing fewer spraints in summer and also often defaecating in the water in summer.

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Otters are essentially solitary, with groups of otters usually consisting of a female plus young; the sexes normally remain separate except during courtship. Ranges vary enormously; in the north-east of Scotland, between 20 and 80km of stream. The overall median density of otters in the Rivers Dee and Don and their tributaries was 1 otter per 15.1km, but it varied from between 1 per 3 and 1 per 80km of stream, or 1 otter per 2 - 50ha of water (Kruuk, 1995). In Shetland, overall densities were c. 1 adult per 1.4 to 2.0 km of coastline (Kruuk, 1995) and as much as 1 otter per 1.1km of coastline (Watson, 1978).

The Bantry harbour area includes elements of marine and freshwater habitats. Without more detailed and time-consuming observational studies, it may be considered that the area provides refuge for several adult otters. It is to be expected that breeding females are present in the area but whether there is present more than one breeding female in the study remains uncertain.

The breeding season is variable, with a peak of births from May to August – though cubs may be born at any time of year. Young become active at 2 months and swim at 3 months.

10.3.4.2 Overview of otter activity in area

The area of the proposed harbour development harbours a population of otters, and, whilst no definite conclusions can be drawn, the pattern of otter activity suggests that several individuals are present. Activity is certainly lower in the inner harbour area.

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10.3.5 Legal Status and conservation issues of otters

The otter is a protected species under the Wildlife Act (1976, and Wildlife [Amendment] Act, 2000) and is also listed in Annex II and Annex IV of the EU Habitats Directive. It is also listed as requiring strict protection in Appendix II of the Berne Convention. Ireland is a European stronghold for the species, whilst the species is recovering in numbers in Britain after declines believed to have been caused by organochlorines-based insecticides and heavy metals.

10.3.6 Potential Impacts of proposed development on Otters

Otters regularly range over and forage the area of the proposed site and its vicinity. However no breeding Holts were found in the vicinity of the proposed marina, and none are considered likely to be present.

Potential impacts are considered to include:

1 Disturbance caused by noise and general activity during construction of facilities and emplacement of berthing facilities – this will affect foraging activity in the vicinity of the site and to some extent may deter otters travelling up and down the estuary to other areas in which they would usually feed.

2 The operation of the marina may result in an increase of vessels and river traffic in the estuary which could be expected to affect otter activity also. However,

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there are already in place existing quays and harbourage for boats; otters appear to be reasonably tolerant of present human activity in the area.

3 Light pollution and general activity and disturbance at dusk, dawn and during night-time hours may affect otter behaviour and range use along the estuary.

4 Pollution incidents could impact on the estuarine and downstream habitats, with potential impacts on otter use of the estuary.

Overall, the developments are not expected to significantly affect the otter habitats in the Harbour or Bantry Bay, except by virtue of increased boat traffic and resultant disturbance – and risk of pollution incidents.

10.3.7 Mitigation Measures and Recommendations

10.3.7.1 Construction Phase

Late autumn or winter is a preferred season for construction – to limit any impacts on the foraging behaviour of breeding females or females with cubs – but this is not considered to be an essential requirement as construction activity is confined to the eastern side of the river.

10.3.7.2 Operation Phase

1 Loud night-time activities at the berthing facility should be discouraged – in order to limit disturbance to otters and to wildlife in general.

2 Lighting (within reason) given that it is a working harbour should be directed and shielded downwards – to limit light pollution and general disturbance to otters and wildlife.

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3 Pollution precautions and control of waste disposal:

i facilities for disposal of chemicals, fuels and any other hazardous waste should be provided with strict regulation of disposal and use of potential pollutants at the harbourage.

ii a full waste management scheme should be provided on site for the control of litter and rubbish.

4 Reasonable measures should be taken to limit disturbance to wildlife by boat traffic – such as control of speed in the bay and close to the shores, restrictions on speedboats, and, if necessary (in consultation with National Parks & Wildlife) restrictions on the number of craft from the facility utilising the Bay at any time.

10.3.8 Conclusions

The bay provides habitat utilised by an important protected species – the otter. The proposed development is not extensive and it is to be expected that impacts on the otter

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population in the area will be Low or Negligible. However, the proposal could have some negative impacts on otters and wildlife in the area – through disturbance or contamination incidents. If a number of relatively straightforward mitigation measures are adopted, there is considered to be no expectation that otter populations and their use of the bay area will be negatively affected in the long-term.

Similarly, the development is expected to have a Negligible impact on the otter populations of the harbour, and Bantry Bay.

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10.4 Benthic and Intertidal Flora and Fauna

Aquatic Services Unit (ASU) undertook a survey of the benthos in the area. In terms of biologically defined protected areas, the survey area is not located within, or immediately adjacent to any protected areas. However, Glengarriff Harbour and Woodlands SAC (Site Code: 000090) is located approximately 7km to the North East of the proposed development.

The current survey was undertaken to assess the communities present in the area and determine the potential impacts of the proposed development on these communities. This assessment involved the completion of field assessments of both the intertidal and subtidal within the immediate vicinity of the proposed development and along the areas of Cove, Beicin Strand and Abbey (Figure 10.4.1).

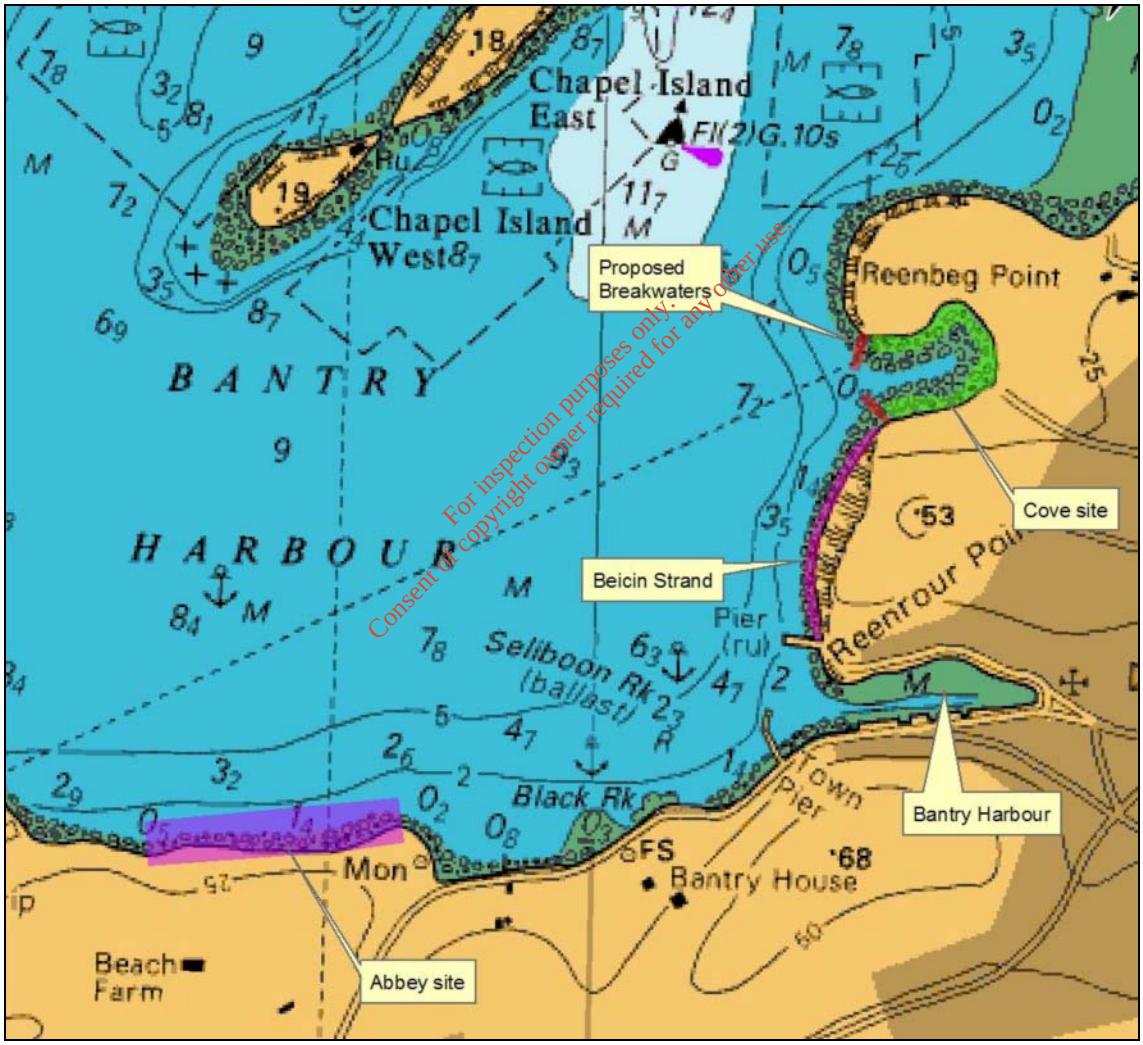

Figure 10.4.1: Proposed development areas at within the inner Bantry Bay, Co. Cork.

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10.4.1 Methodology

10.4.1.1 Intertidal Hard Benthos Survey

A total of 11 intertidal transects were surveyed from high water to low water. In all situations, samples were positioned using a handheld GPS system. The surveys were undertaken during the spring-tide cycle of 11th and 13th February, 2012.

A general shore walk-over was undertaken, taking notes of general features and dominant flora and fauna in the area. In addition, a detailed quadrat survey (0.25m^2 quadrat) was undertaken along eleven pre-defined transects in the areas to be affected by the development. These include the Abbey Shore, Bantry Harbour, Cove and Becin Strands.

A complete list of stations sampled are presented in Table 10.4.1 and these stations are displayed on a map (Figure 10.4.2)

Table 10.4.1 Positions of all intertidal quadrats

	Easting (m)	Northing (m)		Easting (m)	Northing (m)		Easting (m)	Northing (m)
	Video Locations			Video Locations			Video Locations	
T1-Q1	97690	48247	T5N-Top	99353	48592	T9A-Q1	99271	49293
T1-Q2	97688	48241	T5N-Bottom	99352	48590	T9A-Q2	99273	49287
T1-Q3	97689	48236	T5S-Bottom	99347	48513	T9A-Q3	99276	49279
T1-Q4	97690	48225	T5S-Top	99348	48507	T9A-Q4	99280	49270
T1-Q5	97690	48218	T6-Q2	99019	48692	T9A-Q5	99283	49260
T1-Q6	97688	48217	T6-Q3	99039	48686	T9B-Q1	99322	49143
T1-Q7	97689	48211	T7-Q2	99094	49039	T9B-Q2	99320	49152
T2-Q1	98038	48250	T7-Q3	99101	49033	T9B-Q3	99319	49157
T2-Q2	98040	48242	T7-Q4	99110	49029	T9B-Q4	99317	49164
T2-Q3	98041	48236	T7-Q5	99114	49021	T9B-Q5	99315	49173
T2-Q4	98043	48233	T8B-Q1	99185	49152	T10N-Q1	99333	49356
T2-Q5	98044	48228	T8B-Q2	99185	49146	T10N-Q2	99333	49354
T2-Q6	98044	48226	T8B-Q3	99186	49136	T10N-Q3	99335	49345
T3-Q1	99095	48524	T8B-Q4	99187	49127	T10S-Q1	99385	49187
T3-Q2	99094	48526	T8B-Q5	99187	49124	T10S-Q2	99384	49189
T3-Q3	99090	48533	T8B-Q6	99187	49116	T10S-Q3	99380	49202
T3-Q4	99088	48543	T8-Q1	99191	49290	T10S-Q4	99375	49217
T3-Q5	99085	48552	T8-Q2	99199	49278	T11-Q1	99117	49438
T3-Q6	99082	48564	T8-Q3	99190	49268	T11-Q2	99106	49440
T3-Q7	99080	48575	T8-Q4	99187	49259	T11-Q3	99098	49442
T4N-Q1	99237	48603	T8-Q5	99186	49249	T11-Q4	99087	49441
T4N-Q2	99237	48600	T8-Q6	99184	49240			
T4N-Q3	99237	48589						
T4N-Q4	99237	48585						

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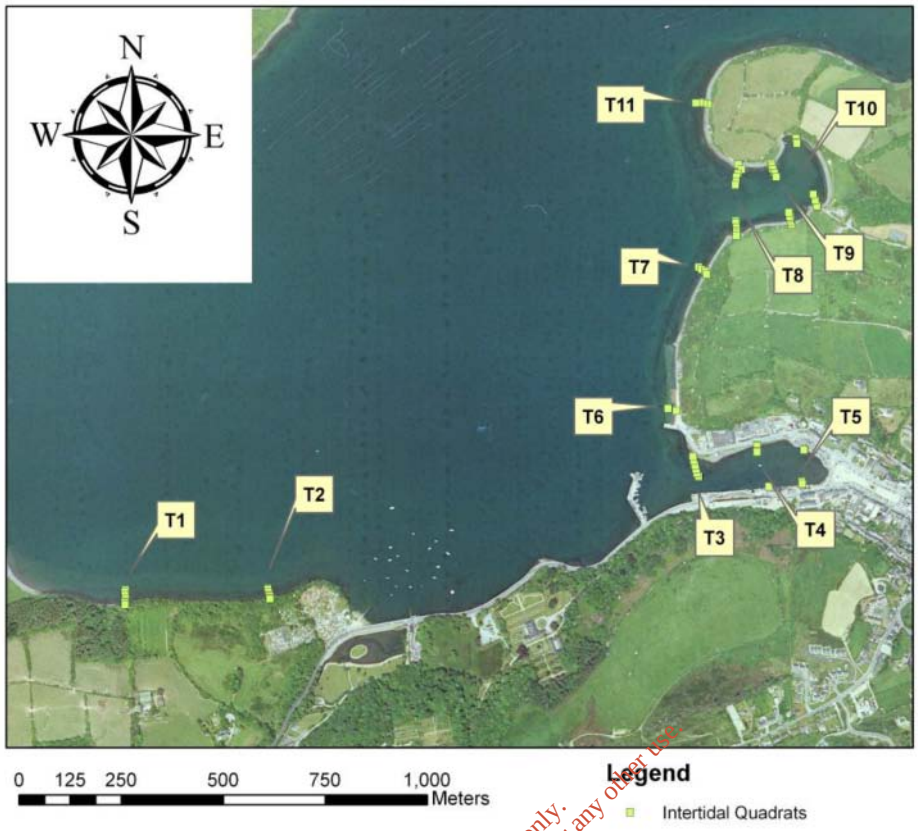

Figure 10.4.2 Map showing locations of intertidal quadrat sampling positions

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10.4.1.2 Intertidal Soft Benthos Survey

Fieldwork was carried out on the 13th February, 2012. All sampling stations were positioned using a handheld GPS system. A complete list of stations sampled are presented in Table 10.4.2 and these stations are displayed on a map (Figure 10.4.3)

Table 10.4.2 Positions of intertidal biological sampling stations

Station	Co-ordinates (Irish National Grid)	
	Easting (m)	Northing (m)
	Intertidal Soft Sediment Cores	
Core 1	99095	48516
Core 2	99247	48525
Core 3	99242	48565
Core 4	99358	48541
Core 5	99349	48573

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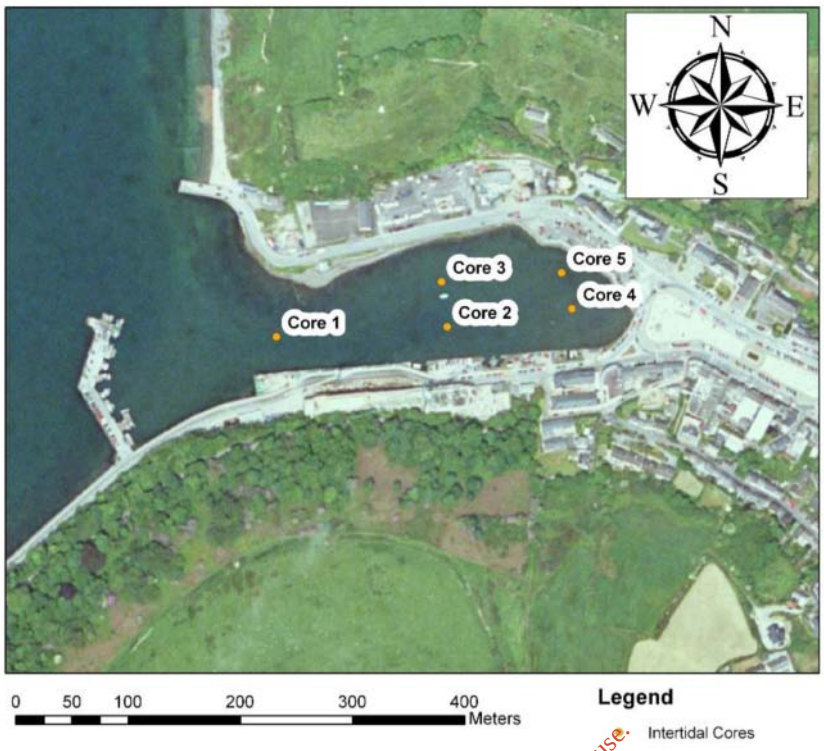

Figure 10.4.3 Map showing locations of intertidal sampling positions.

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Intertidal Core Sampling

A total of 5 stations were sampled by means of an 18cm Ø stovepipe core (Area: 0.028m2) for intertidal faunal analysis.

At each station:

- 1 x 18cm Ø stovepipe core was taken for intertidal faunal analysis and the samples were transferred to separate, labelled, plastic sacks (5 samples).
- 1 x surface sediment scrape from which 100g of well-mixed sediment was transferred to a sealed plastic container for granulometric and organic carbon analysis (5 samples).

10.4.1.3 Sub-tidal Soft Benthos Survey

Subtidal Grab Sampling

Fieldwork was carried out on two separate dates. The initial survey, looking at shallow sub-tidal communities around the shoreline of Bantry Harbour was undertaken on 26th January, 2012. A second survey, looking at soft-sediment faunal communities within the proposed dredge footprint was undertaken on the 27th April, 2012. All sampling stations were positioned using a GPS (Trimble Geo-XM). A complete list of stations sampled are presented in Table 10.4.3 and these stations are displayed on a map (Figure 10.4.4).

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Table 10.4.3 Positions of sub-tidal biological sampling stations

	Station	Co-ordinates (Irish National Grid)	
		Easting (m)	Northing (m)
		Subtidal Grabs	
26th January 2012	Grab 1	97917.1	48303.1
	Grab 2	98986.6	48514.7
	Grab 3	99000.1	48606.9
	Grab 4	98944.8	48852.8
	Grab 5	99028.7	49051.2
	Grab 6	99087.2	49196.6
27th April 2012	Grab 7	98763.7	48682.8
	Grab 8	98874.0	48653.0
	Grab 9	98953.3	48586.7

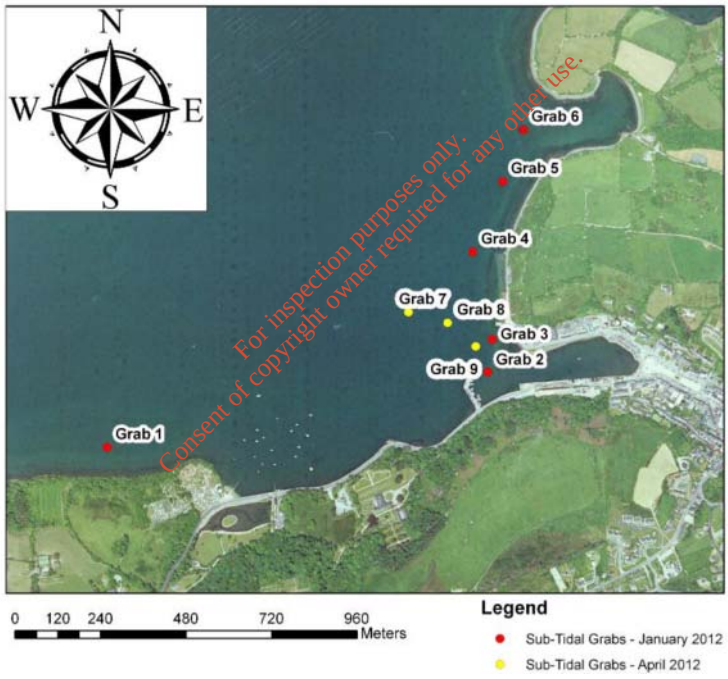

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Figure 10.4.4 Map showing locations of sub-tidal sampling positions

All sub-tidal grabs collected in January 2012 were sampled by means of a 0.1m^2 stainless steel Van-Veen Grab for benthic faunal analysis (Grabs 1-6).

At each station:

- 1 x 0.1m^2 Van-Veen grab taken for benthic faunal analysis (6 samples).
- From this, a small amount of sediment was retained for Particle Size Analysis and Loss on Ignition Analysis. The remainder was retained for biological assessment.

All sub-tidal grabs collected in April 2012 were sampled by means of a 0.025m^2 stainless steel Van-Veen Grab (Grabs 7-9).

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