

2 BACKGROUND TO THE PROPOSED SCHEME

2.1 SITE LOCATION

For the purposes of the initial constraints study and assessment of flood relief options as part of the proposed Flood Relief Scheme, a broad Study Area encompassing approximately 18 kilometers was chosen. This consisted of the channel, floodplain and immediate surrounding areas of the Bandon River, extending along the main channel of the river as shown in Figure 2.1. During the course of the assessment process, the Study Area was refined to account for the more specific area within which impacts were likely to arise, on the basis of the preferred option. For the purposes of this Environmental Impact Statement (EIS) document the wider Study Area is presented, but within the introduction to each chapter the specific and relevant parts of the Study Area to each chapter are further defined.

The main population centres within the Study Area are Bandon Town and the village of Inishannon, Co. Cork. Bandon is located approximately 25 kilometres southwest of Cork City. The Grid Reference co-ordinates for the approximate centre of the study area are E152,500 N57,500. The land within the Study Area falls generally towards the river and its tributaries, which include the Bridewell and Brinny Rivers. The River Bandon has a relatively flat gradient within the Study Area.

2.2 PHYSICAL CHARACTERISTICS OF SITE AND SURROUNDING LANDS

The Study Area is located primarily within the Landscape Character Area: Enniskeane/ Bandon/ Ballinhassig (LCA No. 58), as set out in the Draft Landscape Strategy for County Cork. The Enniskeane/ Bandon/ Ballinhassig LCA forms part of the general Landscape Type: Broad Fertile Lowland Valley (Type 6a). The Broad Fertile Lowland Valley Landscape Type extends east and west from Bandon and is found also in the eastern parts of the county.

The eastern-most section of the Study Area extends into the Landscape Type: Indented Estuarine Coast (Type 3). While there are no areas of coastline within the Study Area, certain aspects of this Landscape Type are indeed found within the Study Area, for example undulating topography and the shallow river valley.

The topography of the study area is undulating with the river valley being the dominant topographical feature. The valley walls are relatively steep in places with elevations in the range 60 to 90 metres O.D. in general and a valley floor at approximately 10 metres O.D.

Current land-use within the study area comprises mainly pastoral agriculture with some arable agriculture. Continuous urban fabric occurs at the settlements of Bandon, Inishannon and Shippool. The outskirts of Bandon are characterised in most directions by discontinuous urban fabric, which gives way to pastoral and arable farmland. To the west of Bandon, an area of mixed forest is present. Intertidal flats are found in the eastern-most section of the Study Area adjacent to the River Bandon.

Three proposed Natural Heritage Areas (NHAs), sites designated for nature conservation of national importance, are located along the course of the Bandon River within the Study Area.

- Bandon Valley – West of Bandon pNHA (Site Code 001034). This site is important as it contains remnants of broadleaved oak woodland. The Bandon Valley is especially valuable for its woodlands and unmodified river bed.
- Bandon Valley – Above Inishannon pNHA (Site Code 001740). This area is important for its oak woodland on steep valley sides.

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MAP TITLE: **Constraints Study Area**

MAP NO.: **Figure 2.1**

SCALE: **1:50,000**

PROJECT TITLE: **100735 - Bandon River (Bandon) Drainage Scheme**

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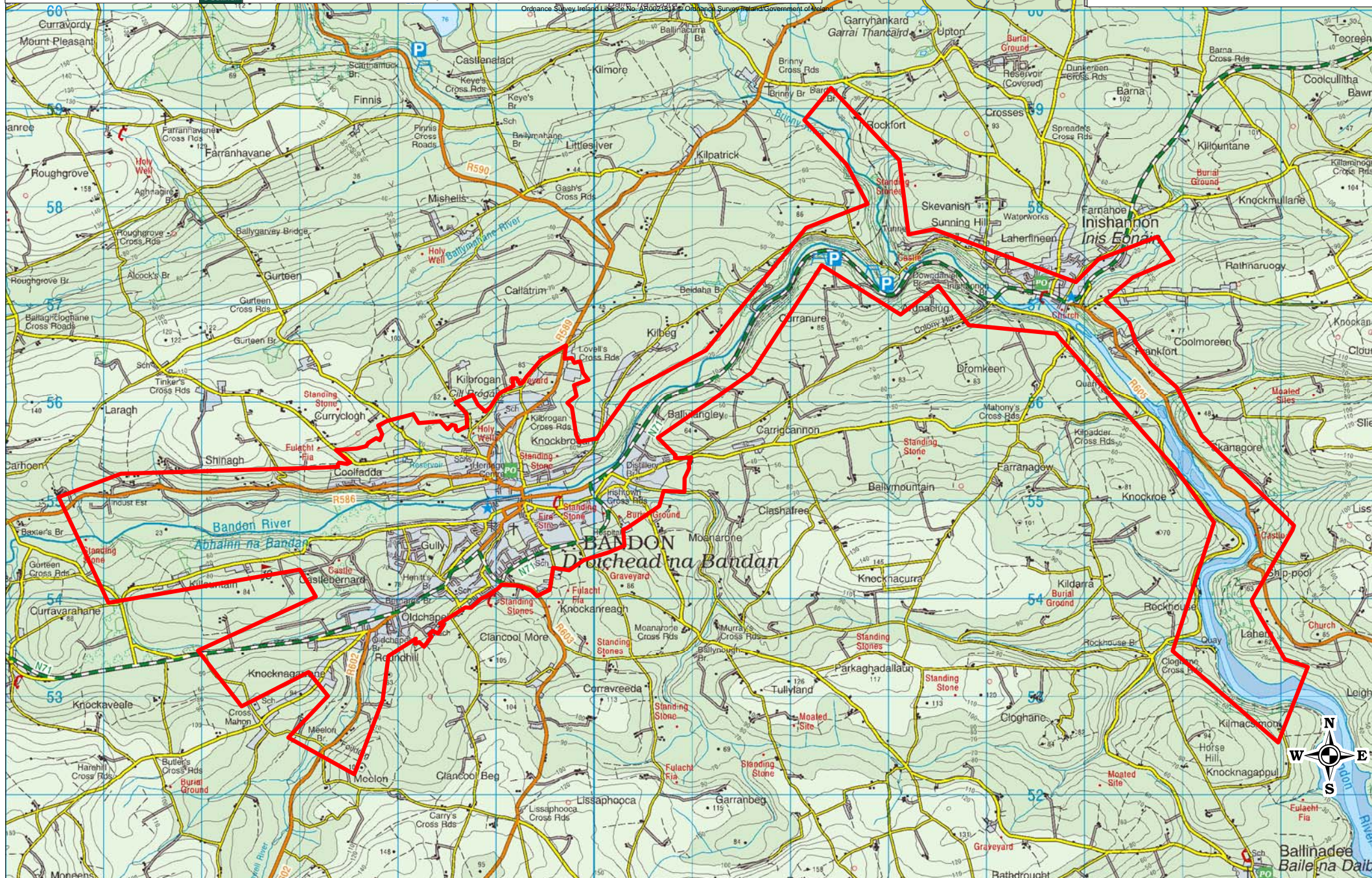
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Map Legend

 Constraints Study Area



- Bandon River – Below Inishannon pNHA (Site Code 001515) This site is important for its wetlands including the extensive areas of Common Reed and the more diverse areas of wetland vegetation. The general flora surrounding Shippool Wood may also be of interest.

There are no sites designated for nature conservation of International or European importance within or in close proximity to the Study Area. Further details regarding the designated areas are provided in Chapter 5 of this EIS on Flora and Fauna.

The study area is entirely within the Bandon catchment and also includes a number of tributaries such as the Bridewell and the Brinny Rivers.

2.3 NEED FOR THE PROPOSED DEVELOPMENT

Bandon Town has a long history of serious flooding. Flooding is primarily due to heavy rainfall in the catchment of the Bandon River and of its tributary, the Bridewell River, which joins the Bandon River immediately downstream of the Bandon Bridge. Since the previous highest recorded flood in 1975, serious flooding has occurred in the town in 1978, 1982, 1986, 1988 and November 2009. Minor flooding in the past decade has occurred in 2004, 2005, 2006 and January 2011.

The risk of flooding may increase with time. Future changes, which have the potential to affect the risk of flooding include:

- Climate change resulting in higher rainfall and higher tide levels
- Geomorphological processes, such as (i) Sedimentation transport, which affects the area of conveyance of the river channel and (ii) Erosion
- Development within the catchment of the Bandon River, which does not conform with the principles of Sustainable Drainage, and which adversely affect the response of the catchment to rainfall
- Changes in land use, including forestation and land drainage

The management of flood risk at present consists of a Flood Early Warning System (FEWS) which was installed in early 2011 and an associated Flood Emergency Response Plan (FERP). The FEWS operates by monitoring river levels at three gauging stations located at Longbridge, Bealaboy and Bandon and issuing text alerts to designated people depending on the level of the river and the associated colour of the alert – yellow (low), yellow (high), orange and red. The level of the alert determines the resulting actions by the people contacted ultimately resulting in the implementation of the FERP. In the consideration of alternatives and the selection of a preferred scheme option, it was considered that the existing scenario was not acceptable due to the excessively high level of risk and further options were examined.

2.4 STRATEGIC PLANNING AND DEVELOPMENT CONTEXT

2.4.1 National Flood Policy

The Office of Public Works has the main responsibility for devising and implementing measures to deal with flooding. This responsibility is assigned by Government Decision S 28507 of 7 March 1995. In addition, the Arterial Drainage (Amendment) Act, 1995 enables the OPW to undertake local flood relief work schemes.

The National Flood Policy that was adopted by Government in 2004 identified OPW as the lead agency in coordinating the management of flood risk in the State. The Policy introduced a shift away from solely

structural to non-structural measures to protect against flooding. The report prepared by the Flood Management Review Group decided that future Flood Management policy in Ireland would be:

"to minimise the national level of exposure to flood damages through the identification and management of existing, and particularly potential future, flood risks in an integrated, proactive and river basin based manner".

It encompasses a series of measures regarding sustainable flood prevention, protection and mitigation. An implementation plan of work programmes and associated resources that would be required to put the new policy into effect was developed by OPW.

In November 2007 the EU Floods Directive (Directive on the Assessment and Management of Flood Risks - 2007/60/EC) came into effect. The existing national Flood Policy described above is in line with the Directive.

2.4.2 Regional Level

2.4.2.1 Regional Planning Guidelines for the South West 2010 – 2022

The Regional Planning Guidelines (RPGs) for the South West Region 2010 – 2022 provide a framework for long-term strategic development in the South West Region, which comprises the administrative areas of Cork County Council, Cork City Council and Kerry County Council. The RPGs aim to ensure the successful implementation of the National Spatial Strategy at regional, county and local level. A key aspect of the RPGs is to maintain a balance between protecting and enhancing the environment and sustainable economic development of the South West Region. Flood protection is identified in Chapter 1 of the guidelines as a priority for the 2010 to 2022 period. Flood Risk Management is highlighted as an important issue for the region.

2.4.2.2 Cork County Development Plan 2009 – 2015

The Cork County Development Plan 2009 – 2015 sets out the overall strategy for the proper planning and sustainable development of the administrative area of Cork County Council. Chapter 6 of the Plan deals with the issues of Transport and Infrastructure and also contains a subsection on Flooding. One of the key needs in terms of surface water drainage identified in the plan is the construction of major flood relief schemes in Fermoy, Mallow (Blackwater and Spa Rivers), Bantry, Clonakilty, Dunmanway, Skibbereen, Ballincollig, Bandon, Blarney, and Carrigtwohill. It is noted that the responsibility for these schemes now rests with the Office of Public Works (OPW). Cork County Council also seeks to address flood risk management in new developments through the following policies:

6.5.23. *The Council is committed to avoid or minimise the threat of flooding in new developments, to minimise the impact of structures and earthworks on flood plains and river flow, and to reduce, insofar as possible, the rate and quantity of surface water run-off from all new developments.*

6.5.24. *The Council will strongly discourage development, which is sensitive to the effects of flooding, unless such development has been justified as essential in terms of sustainable and proper planning, and, if so justified, will need to incorporate measures to reduce and manage flooding risks to the development itself and elsewhere to the satisfaction of the planning authority, as developed through an appropriate flood risk assessment.*

6.5.25. *Developments consisting of the construction of embankments, wide bridge piers, or similar structures are discouraged in or across flood plains or river channels as these*

structures restrict or obstruct flow and increase the risk of flooding to property and land upstream. If it is considered necessary, in exceptional cases, to permit such structures, they should be designed to minimise and/or compensate for any potential negative effects.

6.5.26. *Appropriately designed developments, which are less sensitive to the effects of flooding may be permissible in flood plains, provided they do not significantly reduce the flood plain area or otherwise restrict flow across the floodplain. Such developments, which would include park areas, sports pitches and car parks, should include adequate measures to cope with the flood risk, e.g. adequate drainage systems. Development within flood plain areas should have provision to reduce the rate and quantity of runoff, i.e. minimisation of concrete surfaces and use of semi permeable materials.*

The specific Objectives of the Planning Authority with regards to flooding include:

INF 5-12 Prevention of Flooding:

It is a general objective to manage surface water catchments and the use and development of lands adjoining streams, watercourses and rivers in such a way as to minimise damage to property by instances of flooding and with regard to any conservation objectives of European sites within the relevant catchments and floodplains.

INF 5-13 Drainage and Flooding:

(a) It is a general objective to implement the policies and guidelines of the Department of Environment, Heritage and Local Government and of the Office of Public Works in relation to flood plains and areas sensitive to flooding.

(b) It is an objective of this Plan to strongly discourage development, which is sensitive to the effects of flooding, unless justified as essential in terms of sustainable and proper planning, and, if so justified, incorporates measures to reduce and manage flooding risks to the development itself and elsewhere to the satisfaction of the planning authority, as developed through an appropriate flood risk assessment. Developments that are less sensitive to the effects of flooding, such as playing pitches, parks and car parks, may be permissible in flood plains, provided they do not significantly reduce the flood plain area or otherwise restrict flow across floodplains.

2.4.3 Local Level

2.4.3.1 Bandon Electoral Area Local Area Plan

The Interim Bandon Electoral Area Local Area Plan (August 2011) makes specific reference to flood risk. The introduction to the plan states that one of the main changes from the previous plan is the inclusion of

‘the assessment and management of flood risks in relation to planned future development and the inclusion of ‘Indicative Flood Extent Maps’ for the settlements of this electoral area’.

In addition,

‘a significant increase in concerns over the incidence and effects of flooding’

was cited as having a significant influence on the preparation of the Interim Plan.

Section 1.8 of the Interim Plan deals with Flood Risks. The overall approach described in the Interim Plan confirms that the Council had regard to the Guidelines for Planning Authorities ‘*The Planning System and Flood Risk Assessment*’ issued by the Minister for the Environment, Heritage and Local Government and

the Minister for State at the Department of Finance with special responsibility for the OPW in November 2009 and also the EU Floods Directive (2007). Officials in the OPW were also conferred with in the preparation of the Interim Plan. The assessment and management of flood risk is planned future developments is regarded as '*an important element of this local area plan*'. The Council's approach involves the avoidance of development in areas at risk of flooding and where development cannot be avoided in flood plains, the adoption of a sequential approach based on the avoidance, reduction and mitigation of risk. A 'Draft Indicative Flood Extent Map' has been prepared and is used as the basis for the Flood Risk Assessment accompanying the Interim Plan.

In areas where there is a high probability of flooding - 'Zone A' - it is an objective of this plan to avoid development other than 'water compatible development' as described in section 3 of 'The Planning System and Flood Risk Management' – Guidelines for Planning Authorities'. In areas where there is a moderate probability of flooding - 'Zone B' - it is an objective of this plan to avoid 'highly vulnerable development' described in the same document. 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. Proposals for development identified as being at risk from flooding will need to be supported by a site-specific flood risk assessment. Where the planning authority is satisfied that it can be satisfactorily shown in the site-specific flood risk assessment that the proposed development will avoid significant risks of flooding, then, subject to other relevant proper planning considerations, permission may be granted for the development.

Where the site specific flood risk assessment shows that there are significant residual flood risks to the proposed development, it is an objective of this plan to, normally, avoid development vulnerable to flooding unless all of the following are satisfied:

- The development is within an urban settlement, targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans
- The development of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement.

Section 3 of the Interim Plan describes the flood risk in Bandon as follows:

'1.2.30. Parts of Bandon have been identified as being at risk of flooding. The areas at risk follow the path of the Bandon River through the town and are illustrated on the settlement map. Government Guidelines require, and it is an objective of this plan, that future development is avoided in areas indicated as being at risk of flooding. More detailed information on the approach to flooding and how development proposals in areas at risk of flooding will be assessed is given in Section One of this Plan and within the Guidelines for Planning Authorities 'The Planning System and Flood Risk Management,' issued by the Minister of the Environment, Heritage and Local Government in 2009.

1.2.31. In addition, there is a fully funded Flood Relief Project to be carried out in the town. This project is OPW led and is estimated to cost in the region of €9.6 m. The prequalification of consultants has been completed and the necessary surveys are being advanced in parallel.'

2.5 SCHEME DESIGN PROCESS

The design process comprises a number of steps involving co-ordination of project engineering and environmental teams. The design and assessment process consists of the following steps:

- Constraints Study
- Hydrology Study
- Hydraulic Modelling
- Site Investigation
- Flood Risk Assessments
- Selection of Preferred Option
- Appropriate Assessment Screening
- Cost Benefit Analyses
- Environmental Impact Assessment

The consultation and outcome of the above assessments are discussed below and within the various relevant EIS chapters in this document. Previous engineering and environmental reports have been completed and are available to access online at <http://www.bandonfloodwarning.ie/bandonfloodrelief.htm>

2.5.1 Constraints Study

An environmental constraints study was completed at the outset of the project to identify the key environmental issues relating to the Bandon River (Bandon) Drainage Scheme Study Area. These included features which had the potential to be impacted by the possible flood alleviation measures and/or impose constraints on the viability or the design of the measures proposed.

Environmental constraints were investigated under the following headings:

- Human Beings
- Ecology
- Water
- Soils and Geology
- Archaeology and Cultural Heritage
- Landscape
- Air and Climate
- Material Assets

Desk studies on the status of the receiving environment under each heading were undertaken and a summary of the key constraints and implications of any proposed scheme was completed. In addition to the assessments undertaken, public consultation was undertaken and is outlined in more detail in the second on consultation below. A summary of the key constraints identified is summarised in Table 2.1 below. The full constraints document is available to access online at <http://www.bandonfloodwarning.ie/bandonfloodrelief.htm>.

HUMAN BEINGS
In designing the proposed scheme, the value (both cultural and economic) of any buildings (Residential, Retail, etc) close to river edge or likely to be adversely affected by the scheme should be taken into account. In addition, adverse impacts on buildings or structures of conservation interest should be minimised or avoided where possible.
Any design proposals should ensure that Bridge links between north and south sides of the town are maintained so that temporary or permanent disruption on local transport links in the town and on the main tourist route to West Cork are minimised.
The design of the scheme should consider the public amenity value of the study area. Impacts on public amenity areas adjacent to river such as the riverside walks in town, parks and playground adjacent to the river, should be considered, with replacement mitigation proposed if necessary.

Similarly, specialist amenity areas include angling areas, areas used by rowing clubs and gun clubs should be given consideration
Properties and businesses currently accessed by culverted sections or bridges over the Bridewell River will need to have access maintained/re-established, if works on these areas are proposed.
Impacts on especially sensitive receptors e.g. schools, crèches, nursing homes, hospital should be considered in the flood risk assessment.
The proposed scheme should take consideration of the proposed zoning objectives set out in the Draft Local Area Plan.
Ecology
Given the sensitivity of the river habitat, factors that materially affect the function of the river under normal flow conditions such as water depth, velocity and changes to the shape of the bed should be given consideration, so that the existing function of the river can be maintained. Impacts to areas up and downstream of the Study Area should also be considered as part of the assessment.
In design of the proposed scheme, consultation with both the IFI and NPWS will be necessary, together with an appropriate amount of survey work (including electro-fishing) to establish baseline conditions in the river. Constraints may be placed on the times of year that in-stream works may be carried out depending on the results of the various surveys and the requirements of the IFI and NPWS. Constraints may also be placed on the time of year/weather conditions that the surveys may be undertaken.
In salmonid spawning areas (such as are located throughout the study area), in-stream works are generally not permitted during the period October – March (inclusive), as this is the sensitive time for spawning. Given that the river is also an important angling and nursery area, it is likely that further constraints will need to be considered.
Pearl Mussel Surveys and Otter surveys can be undertaken at any time of year but are dependant on water levels. Pearl Mussel surveys require that there is good visibility in the water column and can only be undertaken in sunny, bright weather when water levels are not high and sediment loading on the river is low. Where such surveys are required, climatic conditions will constrain the timing of these.
Kingfisher surveys should be carried out during the summer nesting period (April – September)
It must be ensured that there are no significant impacts on Natura 2000 sites (SAC/SPA). There are no such designations within the Study Area but there is an SAC on the Upper Bandon River (Bandon River cSAC) that is located approximately 20km upstream of the Study Area. Negative impacts on migrating fish have the potential to negatively affect the status of this designated site.
Consideration should be given to areas of higher biodiversity and ecological sensitivity, such as woodlands, wetlands and riparian vegetation along the river corridor, including the designated pNHA. If works are required in these areas, care should be taken to mitigate significant effects.
Appropriate measures should be taken to ensure that the spread of Japanese Knotweed and other invasive species is not accelerated by any proposed works.
Water
The design of the proposed scheme should take into account the water requirements (both Quality and Quantity) of existing and future abstractions from the Bandon River at Inishannon and Baxter's Bridge.
The design should also take into consideration the impact that any proposed flood relief scheme will have on the yields of existing groundwater abstractions from the Bandon Ground Water Body, taking into account the extreme vulnerability rating of the local aquifer and presence of productive gravel aquifer's in the area.
The design of the proposed scheme should take into account the main objectives of the Water Framework Directive River Basin District Management Plan (RBDMP) by ensuring that any works proposed do not result in the deterioration of water quality.
The design should also take into account the presence of protected and sensitive areas identified in the RBDMP. These include the Bandon Estuary Upper and Lower, nutrient sensitive areas and the Upper Bandon Pearl Mussel populations. The scheme should also take into account the Sub Basin Management Plan to protect the Pearl Mussel on the Bandon River.
Soils & Geology
It is recommended that a geotechnical investigation be carried out once the potential flood alleviation measures are developed in order to identify local geology and ground conditions.
Archaeology & Cultural Heritage
Given the provisions of the National Monuments Acts, no disturbance to, or interference with, any known archaeological sites can take place without first consulting the National Monuments Service of the Department of Environment, Heritage and Local Government (DEHLG).
It is recommended that consideration should be given to the avoidance of impacts on identified cultural heritage sites as part of the design of the proposed scheme. Should avoidance not be possible then the formulation of detailed mitigation strategies for cultural heritage sites in the vicinity of or directly impacted by the proposed scheme is recommended. It is advised that this takes place well in advance of main construction works in order to allocate adequate time and resources to implement the agreed mitigation measures..

Should this not be possible then archaeological investigations are recommended for cultural heritage sites in the vicinity of, or those that would be directly impacted by the proposed scheme. It is recommended that this programme take place well in advance of construction works in order to allocate adequate time to evaluate and record any archaeological features that may be revealed.
It is recommended that any ground disturbance works associated with the proposed scheme be assessed for archaeological monitoring. Appropriate mitigation should be determined during the design phase in consultation with the National Monuments Service (DEHLG).
It is recommended that the Underwater Archaeological Unit (DEHLG) be consulted during the design of the proposed flood relief scheme in order to agree appropriate underwater archaeological assessment and mitigation strategies. Depending on the flood relief scheme chosen, the riverine assessments required by the DEHLG may consist of river bank and underwater archaeological survey pre-works, possible testing around the bridges and other sites along the river course, and full monitoring of all works.
All Record of Protected Structures sites have statutory protection and avoidance of these features is recommended.
The National Monuments Service of the Department of Environment Heritage and Local Government should be consulted at all stages of the scheme development.
Landscape
In the design of a proposed flood relief scheme, the following recommendations of the Cork County Development Plan should be taken into account in relation to Broad Fertile Lowland Valley Landscape Type, in which the majority of the Study Area is located: <ul style="list-style-type: none"> ▪ Protect and preserve the Bandon River and its surrounding floodplains as unique landscape features in this Landscape Character Type and as valuable resource for scenic and amenity values. ▪ Conserve and enhance the characteristics in this Landscape Character Type that are important to tourism. ▪ Have regard to the rich and diverse natural heritage in this Landscape Character Type and the concentration of pNHAs that are designated for protection. While protecting these areas it is also important to recognise their potential as key recreation and amenity sources. ▪ Protect the existing character and setting of villages and village nuclei which are under pressure from population growth particularly those villages which are located close to Cork City. ▪ Recognise that the lowlands are made up of a variety of working landscapes that are critical resources for sustaining the economic and social well being of the county.
In the design of a proposed flood relief scheme, the following recommendations of the Cork County Development Plan should be taken into account in relation to Broad Indented Estuarine Coast Landscape Type, in the eastern-most section of the Study Area: <ul style="list-style-type: none"> ▪ Minimise disturbance of hedgerows in rural areas. ▪ Encourage appropriate landscaping and screen planting of proposed developments by using predominately indigenous/local species and groupings, ▪ Protect the existing character and setting of villages and village nuclei, which are under pressure from population growth. ▪ Continue to promote agriculture as a major land use in this LCT. This will help maintain the existing features of the landscape while also supporting the local economy and rural diversification.
Appropriate design, siting and mitigation measures will be required to integrate the proposed scheme within the landscape. Particular regard should also be had to the potential visual impact on views available from the three stretches of designated Scenic Route and the areas of Scenic Landscape, which are located within the Study Area.
Air Quality
Prior to the selection of a preferred flood relief scheme as part of the Engineering Study, it is recommended that the short listed flood alleviation measures be assessed in relation to the impact of noise and vibration during the construction phase of the project.
It is recommended that mitigation measures be put in place to reduce the impacts on air quality and the noise environment during the construction phase of any proposed flood relief scheme.
It is recommended that the affects of vibration during the construction phase be considered in the selection process for potential flood alleviation measures.
Material Assets
It is recommended that the existing and proposed location of watermains and underground services in the vicinity of any proposed flood alleviation scheme be ascertained as part of the Engineering Study. It is recommended that Cork County Council and other utility providers with services in the area be consulted regarding the location and priority of existing and proposed services. It is further recommended that the services be protected as part of any proposed flood relief scheme.
There are three Wastewater Treatment Plants in the Study Area. It is recommended that these are

kept operational at all times.
The Wastewater Treatment Plant in Bandon is at risk of flooding, posing a serious risk to the environment within the Study Area. It is recommended that reducing this risk is given a high priority in choosing a flood relief scheme from the Engineering Study.
It is recommended that any proposed change in the hydrological regime of the River Bandon and its tributaries be assessed in relation to the assimilative capacity of the river at the locations of the fourteen discharges from Wastewater Infrastructure within the Study Area.
It is recommended that Cork County Council and the National Roads Authority be consulted in relation to any affects on the existing and proposed roads infrastructure in the Study Area from a proposed flood alleviation scheme.
It is recommended that the requirements of the County Cork Development Plan be observed in relation to Waste Management Assessments.

Table 2.1 Summary of Constraints from Constraints Study

2.5.2 Consideration of Alternatives

This section of the EIS contains a description of the alternatives that were considered for the proposed works, in terms of flood alleviation works design and location of the works.

Article 5 of the Environmental Impact Assessment (EIA) Directive (85/337/EEC) states that the information provided in an Environmental Impact Statement (EIS) should include an outline of the main alternatives studied by the developer and an indication of the main reasons for the final choice, taking into account the environmental effects. The consideration of alternatives typically refers to alternative sites, designs and processes.

The consideration of alternatives is an effective means of avoiding environmental impacts. The Environmental Protection Agency document '*Guidelines on the Information to be Contained in Environmental Impact Statements*' (EPA, 2002) states that it is important to acknowledge however the existence of difficulties and limitations when considering alternatives. These include hierarchy, non-environmental factors and site-specific issues, as described below.

2.5.2.1 Flood Risk Management Options Report

A copy of the Flood Risk Management Options is provided as Appendix 2A. There follows a summary of the information regarding alternatives considered as part of the options assessment.

The possible flood risk management (FRM) methods were initially screened to identify those that would be applicable and viable considering the risks to society, the environment, cultural heritage and the economy and the objectives of the flood risk management plan for the project. The potentially viable options were developed so that they could be evaluated in more detail. This involved hydraulic modeling of options where flood levels and extents had to be considered. The options were assessed against the flood risk management objectives with the use of local weightings. The preferred option was then identified following discussion with the OPW and steering group. The design standard to be adopted for the scheme, as instructed by the steering group is the 1% AEP flood level with provision for adaptability to the Medium Range Future Scenario. The 1% AEP flood event has been used in this assessment of options.

2.5.2.2 Possible Flood Risk Management Methods

The possible flood risk management methods which could be utilized in a flood relief scheme include:

- a) Do Nothing (i.e., implement no new flood risk management measures and abandon any existing practices)

- b) Continue Existing Regime (i.e. Flood Early Warning System and Flood Emergency Response Plan)
- c) Do Minimum (i.e. implement additional minimal measures to reduce the flood risk in specific problem areas without introducing a comprehensive strategy)
- d) Non-Structural Measures
 - i. Implement Planning and development control measures
 - ii. Enact building regulations relating to floor levels, flood-proofing, flood resilience, sustainable drainage systems, prevention of reconstruction or redevelopment in flood-risk areas, etc.
 - iii. Enact regulations for sustainable urban drainage systems
 - iv. Carry out targeted public awareness and preparedness campaign
 - v. Individual property flood resistance
 - vi. Land use management, including creation of wetlands, riparian buffer zones, etc.
- e) Structural Measures (potential future risk where necessary floodplain development may occur)
- f) Structural Measures (existing risk)
 - i. Upstream flood water storage
 - ii. Upstream restriction on river flows
 - iii. Flow diversion
 - iv. Increase conveyance
 - v. Construct flood defences (e.g. walls, embankments, demountable defences, etc)
 - vi. Rehabilitate and improve existing defences including localised protection works (e.g. minor raising of existing defences/levels, infilling gaps in defences, etc.)
 - vii. Relocation of properties
- g) Channel or flood defence maintenance works/programme

The criteria used for the screening of the various options included:

- Applicability to Area
- Social
- Environmental
- Cultural
- Economic

Based on the initial screening, the options considered to be viable and which were given further consideration, were:

- Increased conveyance
- New flood defences

- Rehabilitation/improvement of existing defences when used with other methods

It was also considered that other options, which would not manage the risk to an acceptable level on their own, should be incorporated into the flood risk management plan. These included the implementation of Flood Early Warning System (FEWS) and a Flood Emergency Response Plan, the use of non structural measures such as planning and control measures to ensure that potential risk for future developments is properly managed and the use of structural measures for future risk by ensuring that future development is appropriate for its location and set at an appropriate level to ensure no increase in flood risk for existing development.

2.5.2.3 Flood Risk Management Option Assessment

Increased river flow conveyance can be achieved by a number of means, including increasing the width of the channel over some or part of the channel depth, increasing the depth of the channel, removal of local constrictions and a combination of any of the aforementioned measures. The hydraulic computer model created for Bandon FRS was used to simulate various options. Results are presented in the Flood Risk Management Options Report in Appendix 2A.

The option of using flood defences was examined by modeling defences along both banks of the Bandon and Bridewell Rivers. This option (which is discussed in more detail in Appendix 2A) would require defences of up to 2.33m along McSweeney Quay and up to 4.83m height on the left bank of the river upstream of Bandon Bridge, resulting in a significant visual impact and significant residual risk to health and safety due to the potential of the defences overtopping or in the event of a failure of a defence.

The option of improving existing flood defences was examined in a similar way, but this option was only effective along the right hand bank from Lidl supermarket to Bandon Bridge and along the Bridewell River. This option would leave large areas of Bandon undefended if used on its own.

Four combined options using dredging and flood defences were examined. These varied from very minor dredging up to reducing the bed depth by 1.6m downstream of the weir.

2.5.2.4 Flood Risk Management Options Conclusions

It was considered that removal of local restrictions and local increase in channel width would provide very limited reduction in flood levels. Dredging to 8.0mOD downstream of the weir would provide effective protection but would require dredging extended over 5.2km of the river. Dredging to 9.0mOD would result in dredging extending over 4km of the Bandon River, with the bed level reduced by up to 2.2m at the weir. Dredging to a bed level of 9.5mOD would require the use of flood defences to provide full protection but would reduce the required extend of dredge to 3.6km of the Bandon River.

The various options were appraised using a multi-criteria analysis. The indicators, minimum requirements and aspirational targets, along with the global weightings and local weightings were agreed with the OPW for each objective to ensure consistency with the appraisal of options in other schemes nationally. The results from the multi-criteria analysis show that the combined dredging and defences option is slightly preferable to the dredging only option and that both of these are strongly preferable to the defences only option. It is considered that the option of dredging only would result in too great an environmental impact both in terms of the depth and extent of dredging required. The preferred option therefore is to use flood defences in combination with dredging. Details of the proposed scheme are provided in Chapter 3 of this EIS.

2.6 SCOPING & CONSULTATION

Consultation in relation to the project has been completed on a number of occasions at various stages in the design process. These have included broad general consultation at the Constraints Study stage and an associated Public Information Event and Questionnaire. Subsequently, the emerging preferred option was presented to the public in another Information event in Bandon and formal scoping as part of the Environmental Impact Assessment process was undertaken. The following sections outline the consultation completed to date.

2.6.1 Constraints Study Scoping

Consultation with statutory and non-statutory consultees was undertaken as part of the initial scoping process for the constraints study. Comments and information was sought from the list of consultees as provided in Table 2.2. A copy of the scoping letter and consultation information is included as Appendix 2B. Copies of written correspondence received is provided in Appendix 2C.

2.6.2 First Public Information Day

The first public information day was initiated with a presentation to the Members of Bandon Town Council on Tuesday the 25th of January 2011. The purpose of this was to present the Study Area to the elected members, prior to the Public Information Event, and to outline the process involved in the preparation for the Bandon Flood Relief Scheme.

The presentation was held in Bandon Town Hall, between 2.00pm and 3.00pm. Following the presentation, members of staff from the Office of Public Works, Cork County Council, Environmental Team (Ryan Hanley and McCarthy Keville O'Sullivan) and Design Team (WYG Ireland and JBA Consulting) were available to answer questions from the members of the Council.

Following on from the Councillor Presentation on the 25th of January, the exhibition was opened to the public between 3.00pm and 9.00pm. The event was held in Bandon Town Hall in a room adjacent to the Council Chambers. The formal presentation was given by the OPW on two occasions during the evening for members of the public in attendance.

2.6.2.1 Advertising of Public Consultation

Advertising of the Public Consultation Event was undertaken by the Environmental Team, in the local press in the week preceding the event. This included an advert in the local publication; The Southern Star, in addition to adverts in two national daily newspapers; The Examiner and The Evening Echo. In addition, notices were placed on the local radio in the week and weekend preceding the event and notices were placed in local parish newsletters on the Sunday preceding the event. The event was also well published locally through distribution of posters, flyers and on local websites and text alerts.

2.6.2.2 Literature Available for the Consultation

Brochures and Questionnaires were available at the exhibition on the 25th of January. Stamped addressed envelopes were provided to those who wished to return questionnaire by post with a return date for the questionnaires of the 28th of January. Information in addition to the questionnaires was also accepted on the evening of the event or subsequently by post.

A Constraints Study Public Consultation brochure was produced for the scheme, which showed the Study Area under consideration and provided a brief explanation as to the process involved and the options being considered. Brochures were freely available to the members of the public and interested parties, both during and after the exhibition. A copy of the brochure is attached in Appendix 2D.

A questionnaire with pre-printed questions was provided to each attendee, in association with the brochure. This provided an opportunity for members of the public to express their views on the Study Area shown and to provide information regarding flooding in their area, in addition to other comments they may have had relating to the design or the Environmental Constraints Study. A prepaid envelope was also provided for the return of the questionnaire. A copy of the blank questionnaire is attached in Appendix 2E.

2.6.2.3 Public Consultation Exhibition Posters

The format of the Constraints Study Consultation exhibition was based on a number of scheme posters. The posters included:

- Scheme Objectives and Overview
- Constraints Study
- Study Area Map – Archaeological & Ecological Sites
- Statutory Process
- Public Involvement

A copy of the exhibition posters are included in Appendix 2D.

2.6.2.4 Public Attendees and Response to Public Information Day

Members of the public visiting the exhibition were invited to sign a visitor's book to enable a record of the number of attendees to be maintained. A total of 108 attendees signed the attendance book at the event in Bandon Town Hall.

Visitors to the exhibitions are considered to have in the main understood the proposals as presented at the exhibition. Comments received generally related to the level of flooding in the past, and most especially during the November 2009 event. Some members of the public brought photographs or maps of their property or demonstrated to project team staff the location of their property and their general concerns regarding the level of flooding and damage which arose from the events. In addition to provision of information about flooding, members of the public also provided information regarding previous maintenance of the river and their suggestions relating to potential flood alleviation measures.

Engineers from Cork County Council were available to discuss the Flood Early Warning System (FEWS) with members of the public who enquired in that regard. Contact details were taken from members of the public who had additional information or had recorded flood levels, for the purposes of calibrating the hydraulic model. Approximately 180 questionnaires were distributed at the event, or subsequently by email, with a total of 52 questionnaires returned within the suggested timeframe. Submissions were made by a number of members of the public both at the public consultation event and by post following the event. The information generally provided related to flood levels, photographs of flooding in November 2009 and articles regarding flooding history in Bandon town. This information was provided to the Design Team to assist in the production of the flood model when ascertaining the levels of flooding in previous events.

Overall feedback from members of the public was that they were happy to have been involved in the Public Consultation; they felt like their views were being heard, but wanted to see action arise out of the information as soon as possible.

2.6.3 Second Public Information Day

The second Public Information Day for the Bandon Flood Relief Scheme was held in the Town Hall in Bandon on Friday 21 October 2011. The purpose of this second Public Information Day was to provide information to the local community on the emerging preferred flood relief scheme which comprises a combination of dredging and defences. The event started with a presentation to the Town and County Councillors which ran from 2.30pm to 3pm. After this presentation, the event was opened to the public from 3pm to 9pm. Approximately 90 people attended the event over the course of the day.

Posters were displayed describing the process to date, the various options assessed, a preliminary impact assessment, summaries of surveys undertaken and drawings showing the emerging preferred flood relief scheme. A photo montage of the emerging preferred scheme was also on display. A brochure was distributed to attendees and people were invited to provide their comments. This material is provided in Appendix 2F.

The majority of people that attended the Public Information Day reacted positively to the proposals presented on the day and felt that the proposals are appropriate for Bandon.

The following was noted in relation to people's verbal and written comments on the day:

- People expressed concern that the scheme may not proceed in the short to medium term due to funding difficulties.
- A number of people had queries in relation to the maintenance of the scheme, for example, how often maintenance would be required, who would be responsible for maintenance etc.
- A number of people raised the issue of gravel getting into the river from upstream of the town and what measures would be put in place to deal with gravel deposition on an ongoing basis.
- A small number of people expressed the opinion that the flood relief scheme would be a waste of money and that the focus should be on stopping gravel from getting into the river from upstream of Bandon. It was also suggested that Bandon Town should invest in 200-300 tonne sandbags as it would be cheaper than the proposed scheme.
- Queries were raised in relation to the status of existing fishing rights on the river during the construction phase and thereafter.
- Some concerns were raised in relation to dredging the area between the weir and the footbridge, as this area is perceived to be particularly environmentally sensitive.
- A query was raised in relation to the short term impact on flood levels of the flood wall/embankment at Lidl proceeding in advance of the rest of the scheme.
- The suggestion was made that the Bridewell River should be piped away from the town so that it does not join the Bandon River at the bridge.
- A couple of people commented that shores in the town need to be maintained.
- A query was raised in relation to whether the slipway at the Allen Institute would be walled off.
- Concern was expressed that there may be structural damage to buildings in the town as a result of the machinery required for the dredging and that it would be preferable to commence the dredging downstream of the town.
- It was suggested by one attendee that a flood storage system should be constructed to the west of the town.
- It was noted by one attendee that flooding has not been experienced previously at O'Driscoll's Bridge where the proposed dredging will end.

- A query was raised as to whether the proposed flood defence walls will narrow the river.
- Some people enquired whether the flood scheme and the main drainage scheme were to be integrated.
- The provision of a glass wall rather than a stone wall at the riverwalk was suggested by one attendee.
- It was suggested by another attendee that the river gravel removed during the dredging should not be re-used and not dumped.
- A query was raised as to whether the proposed deepening of the existing channel will cause an increase in the speed of the water.
- A query was raised in relation to the height of the weir and whether it could be reduced.

The comments and queries raised at the Public Information Day were considered in the scheme design and during the preparation of the Environmental Impact Statement.

2.6.4 EIA Scoping

Scoping is the process of determining the content, depth and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an Environmental Impact Assessment (EIA). This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment likely to be affected by the proposal. These organisations are invited to submit comments on the scope of the EIA and Environmental Impact Statement (EIS) and the specific standards of information they require. Comprehensive and timely scoping helps ensure that the EIA refers to all relevant aspects of the proposed development and its potential effects on the environment and provides initial feedback in the early stages of the project, when alterations are still easily incorporated into the design. In this way scoping not only informs the content and scope of the EIA, it also provides a feedback mechanism for the proposal design itself.

An EIA scoping report, providing details of the works footprint and emerging preferred flood relief option, was prepared by Ryan Hanley in association with McCarthy Keville O'Sullivan Ltd. and circulated on 20th January 2012. Comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIA process were requested.

A copy of the EIA scoping document, cover letter and list of consultees is presented in Appendix 2G. Copies of all scoping responses received by 6th June 2012 are included in Appendix 2H of this EIS and a summary of the responses is outlined in Table 2.2 below. The recommendations of the consultees have informed the EIA process and the contents of the EIS.

Consultee	Summary of Response
Cork County Council Environment Directorate	No additional comments other than those raised during initial consultation in January 2011.
National Federation of Group Water Schemes	No threat to GWSs in the vicinity are anticipated and so no further comment at this time.
Irish Farmers Association	Suggest consideration be given to downstream impacts on river banks following dredging. State that it is crucial that farmland is not more vulnerable to flooding following alleviation works for the town.
Teagasc	No negative consequences from an agricultural perspective anticipated.
South Western River Basin District	Scheme should comply with the Water Framework Directive. Sections 4.2.3, 6.1.1 of SWRBD referred to in relation to sustainable development and land use planning. Updated WFD Status information on EPA website.
Dunmanway Anglers	Noted problems upstream in relation to gravel in pools. Willing to meet with project team and identify flash points.
An Bord Pleanála	No comments or observations at this stage.

Waterways Ireland	No comments on the proposal.
National Roads Authority	Refer to NRA Guidelines and circulars. Consultation with relevant Local Authority regarding existing and future road schemes, N71. Concerned with any potential significant impacts on the N71. Assessment of visual impacts from existing national roads should be undertaken. Have regard to NRA EIA Guidelines. Traffic and Transport Assessment be carried out. Contact NRA DMRB to determine whether Road Safety Audit is required.
Irish Aviation Authority	No observations on the proposal.
Department of Agriculture, Food and the Marine	Has been brought to Minister's attention and to relevant officials in the Department.
Railway Procurement Agency	No specific comments to make.
Department of Arts, Heritage and the Gaeltacht	Awaiting results of Freshwater Pearl Mussel survey and Archaeological Survey before making any further comment.
Bandon Angling Association	Accept that a flood relief scheme is essential but are disappointed that some work in the catchment is not proposed which may have lessened the depth of excavation proposed. Are concerned that the lowering of the river bed on a fixed gradient will affect migrant salmon and trout. Compromise suggested – to consider creating resting pools and placing boulders at intervals. Request that access to river via e.g. styles, would be provided and ask that these measures are given consideration by designers.
National Transport Authority	No comments to make.

Table 2.2 Scoping Consultees

2.6.5 Consultation Meetings

Consultation meetings have been held with the National Parks and Wildlife Service and Inland Fisheries Ireland in relation to the proposed scheme.

A meeting with the Local Ranger (Mr. Daniel O'Keefe) from the National Parks and Wildlife Service was held on site in Bandon Town on the 24th January 2011. At this meeting, it was discussed that the pNHA's within the study area had been designated primarily for the protection of the broadleaved woodlands surrounding the river but that the area supported and had the potential to support species that are protected under Annex I of the EU Birds Directive and Annex II of the EU Habitats Directive. Specific species mentioned included Otter, Freshwater Pearl Mussel, Lamprey species, Salmon and Kingfisher. It was also concluded at this meeting that the river valley with the combination of fast flowing river, woodlands, agricultural grasslands and wetlands was of considerable biodiversity value.

The Environment Officer (Mr. Michael McPartland) from the Inland Fisheries Ireland (Macroom) was also present at this meeting on-site and provided subsequent information about the river and its value as a fishery (full details provided in Chapter 5 of the EIS) as outlined below:

'The Bandon River is one of the premier salmonid fisheries in the South West Region, rising in the West Cork mountains and flowing for some 45 miles main channel length before discharging to the sea in Kinsale Harbour. It drains a catchment of approximately 235 sq. miles in area. The Bandon River offers a great variety of game fishing including salmon, sea trout and brown trout fishing. Salmon fishing is available over the vast majority of the main channel of the Bandon and extends upstream to Togher Castle in the upper reaches of the river. Sea trout are caught up to Ballineen. The vast majority of fishing on the Bandon is under private ownership or controlled by syndicates or angling associations.'

Subsequently, additional meetings were held with Inland Fisheries Ireland in the Galway and Limerick offices on the 17th of October 2011, to present the emerging preferred scheme; and on the 27th of February 2012, to present a draft version of the findings of the Flora and Fauna chapter of the EIS.