

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

As described in Chapter 2, the Preferred Option for the Bandon River (Bandon) Drainage Scheme comprises a combination of flood defences and dredging. The proposed works are detailed in the scheme drawings included in Appendix 3A and are described generally in the following section. The Preferred Option will be designed to cater for the 1% Annual Exceedance Probability (AEP) flood event (also known as the 100 year flood event). The design of the proposed works includes for potential climate change impacts in accordance with the Office of Public Works guidance in relation to climate change and also includes for a freeboard allowance.

The Flood Early Warning System described in Chapter 2 will continue to operate on completion of the scheme, as will the Flood Emergency Response Plan currently in place.

3.1 PROPOSED WORKS

The proposed works comprising the Preferred Option for the Bandon River (Bandon) Drainage Scheme are generally as follows;

- Detailed Site Investigation comprising trial pits, dynamic probes, boreholes, rotary cores and archaeological test trenches;
- Deepening of the existing riverbed by 1.8m just downstream of Bandon Weir to 9.5mOD and dredging for 3.6km (to O'Driscoll's Bridge) at a gradient of 1/1000;
- Underpinning of Bandon Bridge;
- The replacement of the existing Pedestrian Bridge with a new Pedestrian Bridge;
- The provision of flood defence walls at various locations on the right and left banks of the Bandon River through Bandon Town;
- The provision of flood defence walls on the left and right banks of the Bridewell River on New Road;
- The provision of flood defence embankments downstream of Bandon Town on the right bank and in localised areas along the left bank in Bandon Town;
- Improvements to the existing flood defences on the Bridewell River in Bandon Town;
- Improvements to the existing flood defences at the Bandon wastewater treatment plant;
- The provision of removable flood barriers in particular areas;
- The upgrading of an existing culvert and the provision of localised flood defences at the Mill Stream;
- The provision of a rock ramp fish pass and fish counter at Bandon weir;
- The provision of fisheries mitigation measures within the dredged channel including the provision of a thalweg which will generally emulate the existing riverbed features, in so far as possible;
- Miscellaneous ancillary works including local drainage works behind flood defences.

The proposed flood defences will comprise a combination of earthen embankments and reinforced concrete walls.

It is noted that an existing flood defence embankment located on the right bank of the Bandon River upstream of the existing weir, is currently being improved by the owner. On completion of these improvements, the embankment will become part of the Bandon River (Bandon) Drainage Scheme.

3.1.1 Site Investigation

A detailed Site Investigation will take place in advance of the construction works to inform the detailed design of the drainage scheme. Within the river channel itself, rotary cores will be taken at regular intervals along the 3.6km length of the section proposed for dredging, to determine the depth at which rock can be expected to be encountered in the channel. A number of boreholes will be carried out along the riverbanks and at the locations of the other proposed works around the town. A number of archaeological test trenches will also be constructed.

3.1.2 Dredging

The drainage scheme includes for the dredging of a 3.6km length of the Bandon River channel from 43m downstream of the weir in Bandon to O'Driscoll's Bridge, upstream of Curranure. This dredging will cause the riverbed to be deepened by 1.9m in the vicinity of the weir, gradually grading back to the existing river bed level, 3.6km downstream, at a gradient of 1/1000. The bed will be approximately 1.7m deeper than the existing bed level at Bandon Bridge, approximately 1m deeper than the existing bed level in the vicinity of the wastewater treatment plant and approximately 0.4m deeper than the existing bed level, 600m upstream of O'Driscoll's Bridge. Once the dredging is completed, fisheries mitigation measures will be constructed in the channel including provision of a thalweg complete with pools and riffles, to emulate the existing bed profile, in so far as possible.

3.1.3 Underpinning

As a result of the deepening of the existing riverbed, by approximately 1.7m at Bandon Bridge, underpinning works will be required to the foundations of the bridge, to deepen the foundations to meet the proposed bed level. The proposed methodology for this work will be guided by the detailed site investigation which will take place prior to the construction works.

3.1.4 Pedestrian Bridge

The current riverbed level at the existing Pedestrian Bridge in Bandon town, will be deepened by approximately 1.9m. As a result, the existing bridge would require underpinning (as per Bandon Bridge above) or replacement. The Office of Public Works (OPW), in conjunction with Cork County Council has decided that the drainage scheme poses an ideal opportunity to replace the existing Pedestrian Bridge with a new Pedestrian Bridge.

OPW Architects have developed a concept for the new bridge. Extracts from the design concept statement are provided below:

"The overall structure of the bridge has as its origins the idea of the salmon travelling upriver to spawn. The two supporting columns on which the deck rests are as two fish swimming upriver, supporting the people as they cross overhead. Then, in order to rest and enjoy the view from the river itself, there is a seat. There again is the salmon, this time appearing in the form of a bench, for one or two to rest, offering his back for the tired passer-by or maybe the children who want to stop and see if there are any ducks swimming below the bridge.

Overhead, the heron, assuming the form of a street light, awaits the chance to have his lunch, poising gracefully. The ballustrading itself is unassuming enough to allow the river to be seen through the railings and in places this will be widened slightly to allow views to be enjoyed at lower levels. The timber handrail will be tactile and inviting to the touch to those wishing to stroll along the deck, offering its support.

The town of Bandon will be demarcated on the river line, on plan, by a casting which will represent the design of the Bandon Coin, minted in 1646, which happened to feature a bridge with a linear and a beaded circle.”

3.1.5 Flood Defence Walls

Flood defence walls will be required at the following locations on the left bank of Bandon River:

- Location 1 In the vicinity of the weir at the Mill Place apartment block
- Location 2 Upstream of Bandon Bridge between Tyre Store and Bridge House

Flood defence walls will be required at the following locations on the right bank of Bandon River:

- Location 3 Immediately downstream of Bandon Bridge, to a point upstream of the roundabout on Glasslinn Road
- Location 4 Upstream of the Bandon Wastewater Treatment Plant

Flood defence walls will also be required adjacent to the New Road in the vicinity of the GAA pitch and adjacent to Mill Stream in the vicinity of Old Quay Road.

Existing flood defence walls will be improved along the Bridewell River and in the vicinity of Fluke Hole Lane on the on the Bandon River.

Table 3.1 below summaries the approximate lengths and heights of the proposed flood defence walls on the banks of the Bandon River.

Location	Approximate Length of Proposed Defence Wall	Approximate Height of Proposed Defence Wall above Existing Ground Level
1	100m	Ranges from 1.43m to 1.92m
2	87m	Ranges from 2.25m to 3.17m
3	443m	Ranges from 0.34m to 3.90m
4	122m	Ranges from 0.53m to 1.60m

Table 3.1 – Summary of Proposed Flood Defence Walls on the Bandon River

3.1.6 Flood Defence Embankments

Flood defence embankments will be required at the following locations on the left bank of the Bandon River:

- Location 1 In the vicinity of the weir at the Mill Place apartment block, perpendicular to the riverbank
- Location 2 Downstream of Fluke Hole Lane

Flood defence embankments will be required at the following locations on the right bank of the Bandon River:

- Location 3 Adjacent to Glasslinn Road
- Location 4 Downstream of the Bandon Wastewater Treatment Plant

Localised sections of flood defence embankment are also proposed near the junction of old Quay Road and the N71 along the banks of the Mill Stream. A small section of embankment is also required to finish the existing flood defence embankment at Riverview Shopping Centre.

Improvements will be made to the existing flood defence embankments at the Bandon Wastewater Treatment Plant. The existing flood defence embankment at the Riverview Shopping Centre is currently

being improved by the owners and once completed will form part of the Bandon River (Bandon) Drainage Scheme.

Table 3.2 below summaries the approximate lengths and heights of the proposed flood defence embankments on the banks of the Bandon River.

Location	Approximate Length of Proposed Defence Embankment	Approximate Height of Proposed Defence Embankment above Existing Ground Level
1	52m	Ranges from 1.58m to 2.33m
2	39m	Ranges from 0.99m to 1.54m
3	220m	Ranges from 1.24m to 1.71m
4	230m	Approx 1m

Table 3.2 – Summary of Proposed Flood Defence Embankments on the Bandon River

3.1.7 Other Proposed Works

In addition to the dredging and flood defences described in sections above, the existing Mill Stream culvert, through the provision of a new overflow culvert which will provide additional conveyance capacity during flood events.

A rock ramp fish pass and other fisheries mitigation measures are also proposed which are described in further detail in Chapter 5 Flora and Fauna.

The construction of localised drainage pipework is proposed on the Glasslinn Road.

3.2 LOCATION OF PROPOSED WORKS

The proposed works described above and detailed in the scheme drawings in Appendix 3A are located in and downstream of Bandon Town. The majority of the proposed works are located on the banks and within the channel of the Bandon River. The works on the river channel extend downstream of Bandon Town for 3.6km as far as a property access bridge across the river, generally referred to as “O’Driscoll’s Bridge”. Proposed works on the banks of the Bandon River extend from just upstream of the weir on the left bank to just downstream of the wastewater treatment plant on the outskirts of the town along the N71 towards Inishannon.

The improvements to the flood defences on the Bridewell River are located in the town centre along Market Quay. The new flood defences on the Bridewell River will be located along the Clonakilty Road to the south west of Bandon Town centre.

The proposed works on the Mill Stream culvert are located on the outskirts of Bandon town close to Old Quay Road, off the N71 towards Inishannon.

3.3 ANTICIPATED CONSTRUCTION METHODS

The most significant part of the construction activity required in relation to the proposed works will be the dredging of the river bed. The expected volume of dredged material is approximately 150,000m³ and will be in a mixture of gravel, silts and rock.

It is anticipated that the majority of the excavation would be carried out with conventional excavating equipment using excavator buckets with rock teeth, rock ripping and localised use of rock breakers where required.

The dredging of the softer materials eg silts, clays, is likely to take place from the river bank, where suitable access is available. The removal of heavier materials, such as gravels, cobbles, boulders and rock is likely to be carried out from within the channel itself, when flows are suitably low.

A portion of the dredged material is likely to be stored on the riverbank within the construction easement for re-use in the proposed works. Dump trucks will be used to remove the dredged material which cannot be re-used from site. Indicative access routes to and from the site and construction easements are detailed in Drawing 401 of Appendix 3A. Generally, construction easements are 20m wide.

The construction of the reinforced concrete flood defence walls is likely to be carried out by traditional methods comprising the following activities:

- temporary works including silt barrages;
- excavation for foundations;
- blinding of formation;
- fixing of reinforcement;
- placing of formwork;
- placing of concrete;
- stripping of formwork;
- reinstatement of area.

In certain locations, where there is a possibility of flood water passing underneath the flood defence wall foundations, either sheet piles or grouting techniques will be required to provide a cut-off. The sheet piles may be metal or plastic and would be driven to the required depth using a piling hammer or similar.

The construction of the earthen flood defence embankments is likely to comprise the following activities:

- temporary works;
- excavation for formation;
- placing and compaction of suitable clay material;
- stripping of formwork;
- reinstatement of area;
- grass seeding.

In certain locations, where there is a possibility of flood water passing underneath the flood defence embankments, sheet piles or grouting will be required to provide a cut-off. The sheet piles may be metal or plastic and would be driven to the required depth using a piling hammer or similar.

The construction of drains is likely to comprise the following activities:

- temporary works;
- excavation of trench;
- placing and compaction of granular bedding material;
- placing of pipes;
- backfilling and compaction of trench with suitable granular material;

- reinstatement of area.

The design of the underpinning required at Bandon Bridge will be guided by the detailed site investigation which will take place prior to the construction stage. It is anticipated that the bridge piers are founded on rock and as such the proposed works are likely to comprise:

- excavation to remove unsuitable material including soft, fractured or weathered rock from around each of the existing bridge piers;
- grouting of the retained rock to seal any cracks etc;
- placing of reinforced concrete around each existing pier to extend the existing piers down to the proposed bed level;
- stone cladding, if required, to existing bridge piers to match existing.

The removal of the existing pedestrian bridge between the weir in Bandon and Bandon Bridge and the construction of the new pedestrian bridge is likely to comprise the following proposed works;

- dismantling and removal of the existing bridge deck, piers and abutments;
- excavation of foundations;
- blinding of formations for abutments and piers;
- fixing of reinforcement for abutments and piers ;
- placing of formwork for abutments and piers;
- placing of cast in-situ concrete for abutments and piers;
- stripping of formwork;
- the placing and fixing of a precast concrete bridge deck;
- construction of bridge parapets;
- reinstatement of area.

3.4 CONSTRUCTION PROGRAMME AND SEQUENCING OF PROPOSED WORKS

The proposed dredging works are likely to be carried out in the first summer season following commencement of the construction works and it is anticipated that the proposed dredging works will take place over two summer seasons. The proposed fish pass at Bandon Weir will be constructed during the first summer season.

During the second summer season, dredging works will be completed and the proposed fisheries mitigation measures will be implemented within the portion of the channel where dredging works will have already taken place in the first summer season. It is likely that the proposed fisheries mitigation measures will be constructed on the remaining portion of the dredged channel during the summer following the final portion of the proposed dredge works.

The construction of the proposed flood defences, culverts, drainage works and other ancillary works will be ongoing over the duration of the contract.

The actual construction programme will be dependent on the appointed contractor's works proposals, selected construction methods and the time of year when the contract will be awarded. For the purposes of the Environmental Impact Statement, a 24 month construction period is envisaged. This will include the two 5 month summer periods involving the proposed dredging work. The second part of the fisheries

mitigation measure implementation will most likely not take place until the first summer after the final dredging works take place.

It is expected that normal working hours would be 8:00am to 6:00pm from Monday to Friday but these working hours are likely to be extended to 7:00am to 9:00pm from Monday to Saturday to facilitate the river dredging work during the summer period.

3.5 TEMPORARY CONSTRUCTION WORKS FACILITIES

Prefabricated temporary buildings will be provided for the site workers during the construction works in the location shown on Drawing 401 in Appendix 3A. These facilities will include welfare facilities and office space as required. Any effluent generated from the welfare facilities will be discharged to the public sewer.

Plant and machinery may also be stored at this location.

A wheelwash will be provided at exit points from the works site to ensure that vehicles leaving the works area do not carry excess soil and material onto the adjacent public road infrastructure.

3.6 ESTIMATED COST OF PROPOSED WORKS

The current estimated construction cost of the proposed works is €9.075 million excluding VAT. Other non-contracted costs are estimated at €4.725 million, which brings the total cost of the Bandon River (Bandon) Drainage Scheme to approximately €13.8 million excluding VAT.

3.7 OPERATION AND MAINTENANCE OF SCHEME

The main maintenance requirement of the proposed scheme, once it comes into operation, will be in relation to the dredged section of the riverbed. It is anticipated that maintenance dredging will be required at an estimated interval of 5-7 years, depending on the frequency and magnitude of flood events that might occur within the intervening period. Maintenance dredging, when required, will take place during low flow conditions and only deposits visible above low water levels will be removed. No maintenance dredging of deposits below low water level will be required. Maintenance dredging will be carried out in accordance with the OPW Environmental Management Protocols and Standard Operating Procedures which have been drawn up in consultation with Inland Fisheries Ireland.

Regular strimming of the proposed embankments will be required to control vegetation growth. Periodic maintenance of the proposed flood defence embankments may also be required on localised sections of the proposed embankment as a result of minor settlement or flood damage.