Tionscadal Éireann
Project Ireland
2040

Emerging Potential Options Public Consultation Information Booklet

OPW Oifigí nOibreacha Poiblí / Office of Public Works
Comhairle Chontae na Gaillimhe Galway County Council
ARUP
Hydro Environmental Ltd
RYAN HANLEY

Ballinasloe Flood Relief Scheme

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Introduction

This booklet has been produced to provide further information about the technical assessment process behind the emerging potential options presented for consultation. The booklet includes:

- Information about the Standard of Protection of the Scheme
- A brief summary of the hydrology and hydraulic analysis underpinning the assessment of potential scheme options
- Information on the approach to climate change
- A brief summary of the flood risk management measures assessed, including those not taken forward to the emerging potential options

Standard of Protection

The standard of protection (SoP) of the scheme will be the 1% annual exceedance probability (AEP) (otherwise called the 1 in 100 year flood).

The scheme will also include a freeboard, to account for any residual uncertainties in the determination of design water level, and any physical processes such as settlement which may occur over the lifetime of the scheme.

The scheme will be analysed to determine the possible impacts of future climate change. A scheme climate change adaptation plan will be prepared for the preferred scheme, which will identify the measures required to maintain the scheme SoP in the event of future increases in extreme flood severity.

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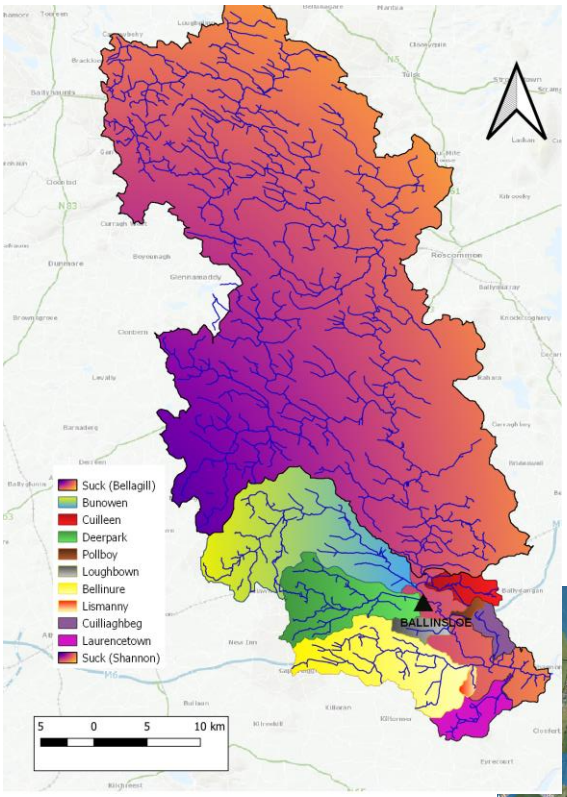
Hydrological Analysis

A detailed hydrological assessment of the River Suck and its tributaries at Ballinasloe was undertaken, to provide reliable estimates of flood magnitudes and hydrographs at Ballinasloe.

For further information, please refer to the Hydrology Report, available at: https://www.floodinfo.ie/frs/en/ballinasloe/project-info/project-documents/



Above: River Suck catchment

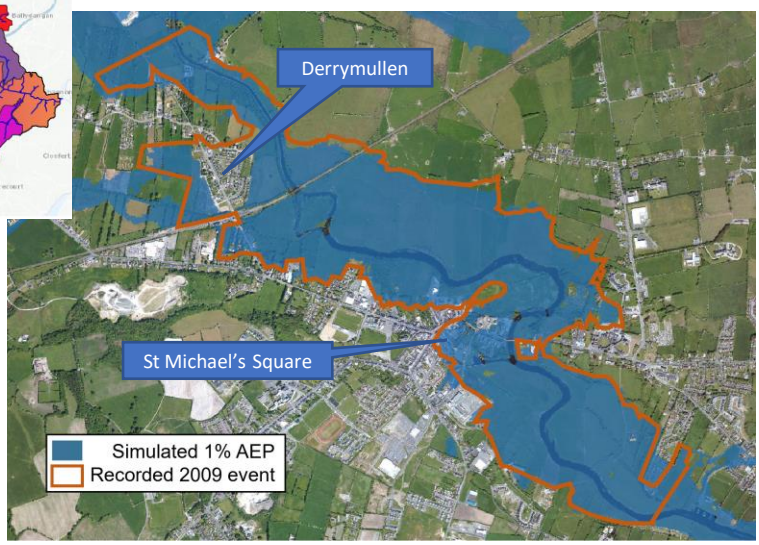
Hydraulic Analysis

A dynamic 1D/2D hydraulic model of all the relevant watercourses in Ballinasloe and associated floodplain areas was developed as part of the study in order to assess flood risk across the study area. The model simulated a range of fluvial flood events.

The 1D/2D hydraulic model was calibrated against a number of different events: two minor in-bank events which occurred in 2020 and also against the very significant out-of-bank event from November 2009.

A good match was achieved between the modelled and measured results across Ballinasloe. It is therefore evident that the model is able to reproduce maximum flood extents and maximum water levels within the specified tolerances across the study area for large flood events.

For further information, please refer to the Hydraulics Report, which will be available on the “project documents” section of the project website in the coming days.



Right: Comparison between the flood extent recorded in November 2009 and the design 1% Annual Exceedance Probability flood extent (1 in 100 year flood), as simulated by the hydraulic model

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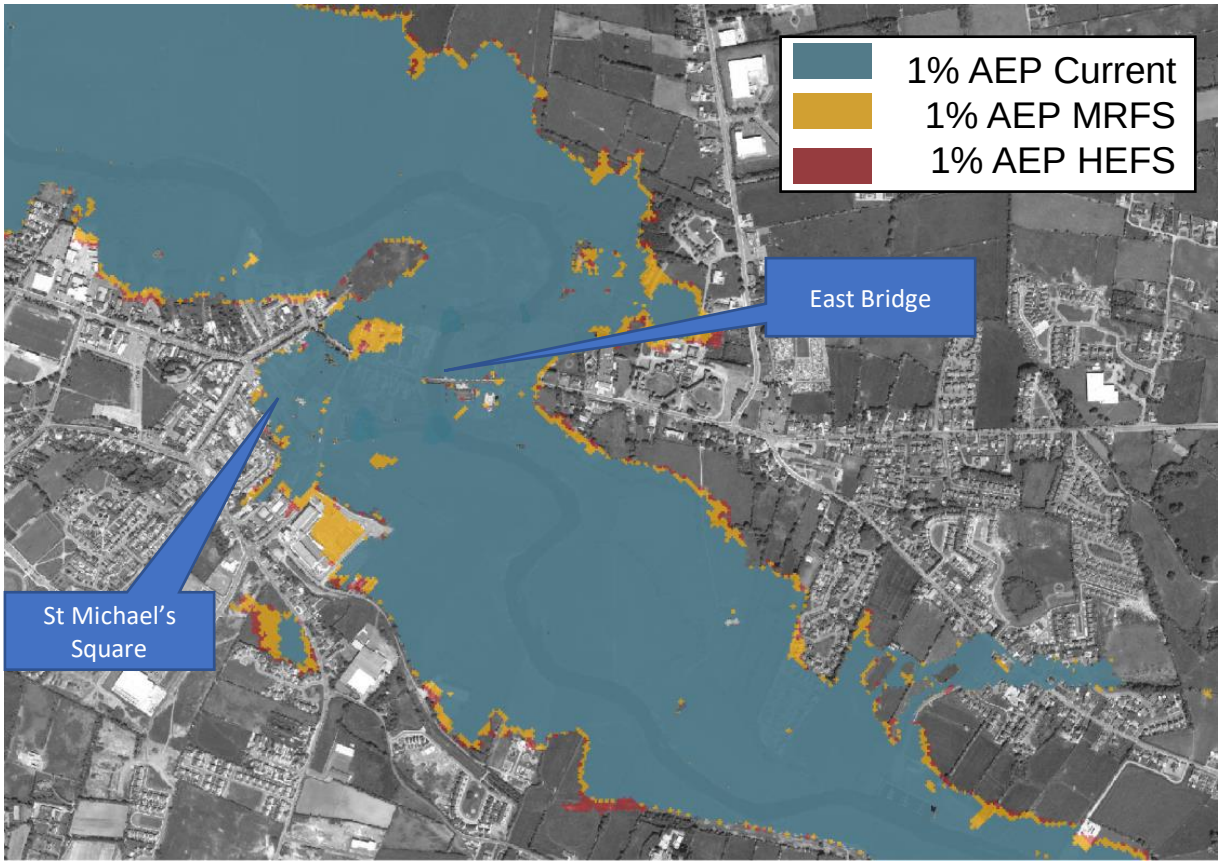
Climate Change

A scheme climate change adaptation plan (SCCAP) will be prepared for the preferred scheme, which will identify the strategy for maintaining the standard of protection of the scheme in the event of future increases in extreme flood risk.

Possible strategies include:

- The 'Adaptive' approach to design involves building or implementing a measure to address the existing flood regime, but with specific design provision to permit low-cost enhancement or amendment to address potential future flood regimes; or
- An 'Assumptive' approach involves design to an assumed potential future flood regime. This might be applied where future low-cost adaptation of the measure is not possible (e.g., culverts and bridges); or
- A combination of the above approaches.



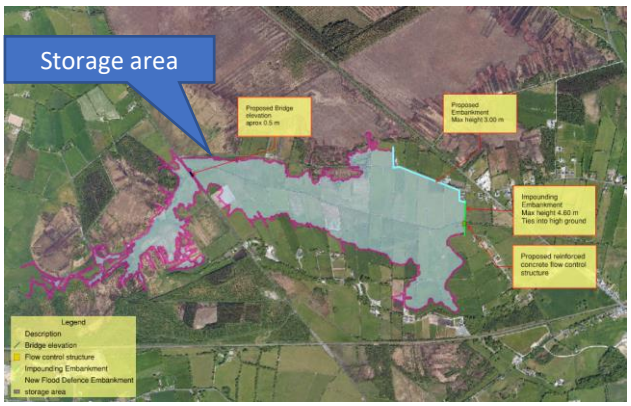
Above: Predictive flood mapping for different climate change scenarios:
Mid-Range Future Scenario (MRFS) (20% increase in extreme flood flows), and
High-End Future Scenario (HEFS) (30% increase in extreme flood flows)

Measures Considered

Upstream Storage and Upstream Washlands

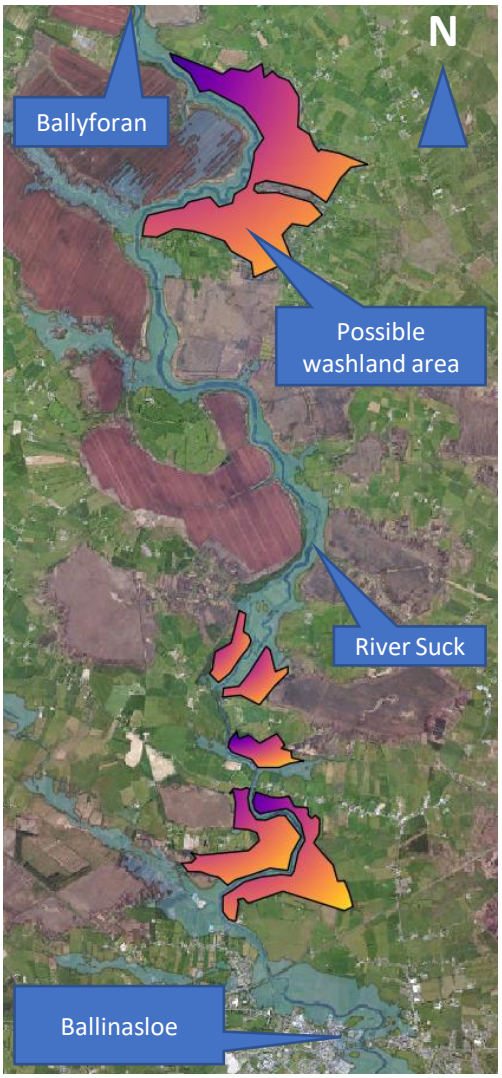
Flood storage is designed to reduce the peak flood flow passed downstream, spreading the overall volume passed downstream over a longer period and therefore reducing peak flood levels. The following types of flood storage were considered for Ballinasloe:

Online storage, where the water is temporarily stored within the river channel and its floodplain. This type of arrangement was investigated in detail for the minor tributaries in the town including the Deerpark River and Ballyhugh stream. Potential storage areas were identified, however in order to mobilise sufficient storage volume, impoundments of over 4m height would be required. As the measure does not reduce the main source of risk from the River Suck, the benefit of this storage was limited to a small number of properties and was therefore not taken forward.



Online Storage example (River Deerpark)

Offline storage (washlands), where flow onto the floodplain is controlled by constructing embankments and weirs along the river banks. This type of arrangement was investigated for the main River Suck, due to its wide floodplain. However the volume of storage available is insufficient to alleviate flood risk in Ballinasloe due to the very long duration of high flows in the design event. The measure would also have significant cost and environmental impact. This measure was therefore not taken forward.



Possible Washland areas (River Suck)

Measures Considered

Natural Water Retention Measures (NWRM)

NWRM is the alteration, restoration or use of landscape features to reduce flood risk. The design philosophy is to create features that 'slow, store and filter' runoff and peak flow in the landscape.

A detailed feasibility study for NWRM has been completed as part of this project. The study identified potential NWRM opportunities in the Suck catchment and completed an assessment of NWRM feasibility on the River Deerpark and Ballyhugh stream.

Based on the analysis, NWRM was found to only have modest benefit in terms of reducing the impact of the design 1%AEP flood event. Therefore has not been included in the emerging potential options as a primary means of reducing flood risk. However it will still be considered as a potential complementary measure to be implemented in combination with structural works.

For further detail, please refer to the Natural Water Retention Measures Feasibility Report, which has recently been made available in the "project documents" section of the project website.

Clockwise from top left: Tree planting; Runoff attenuation feature; Wet woodland; Large woody debris (leaky dam)

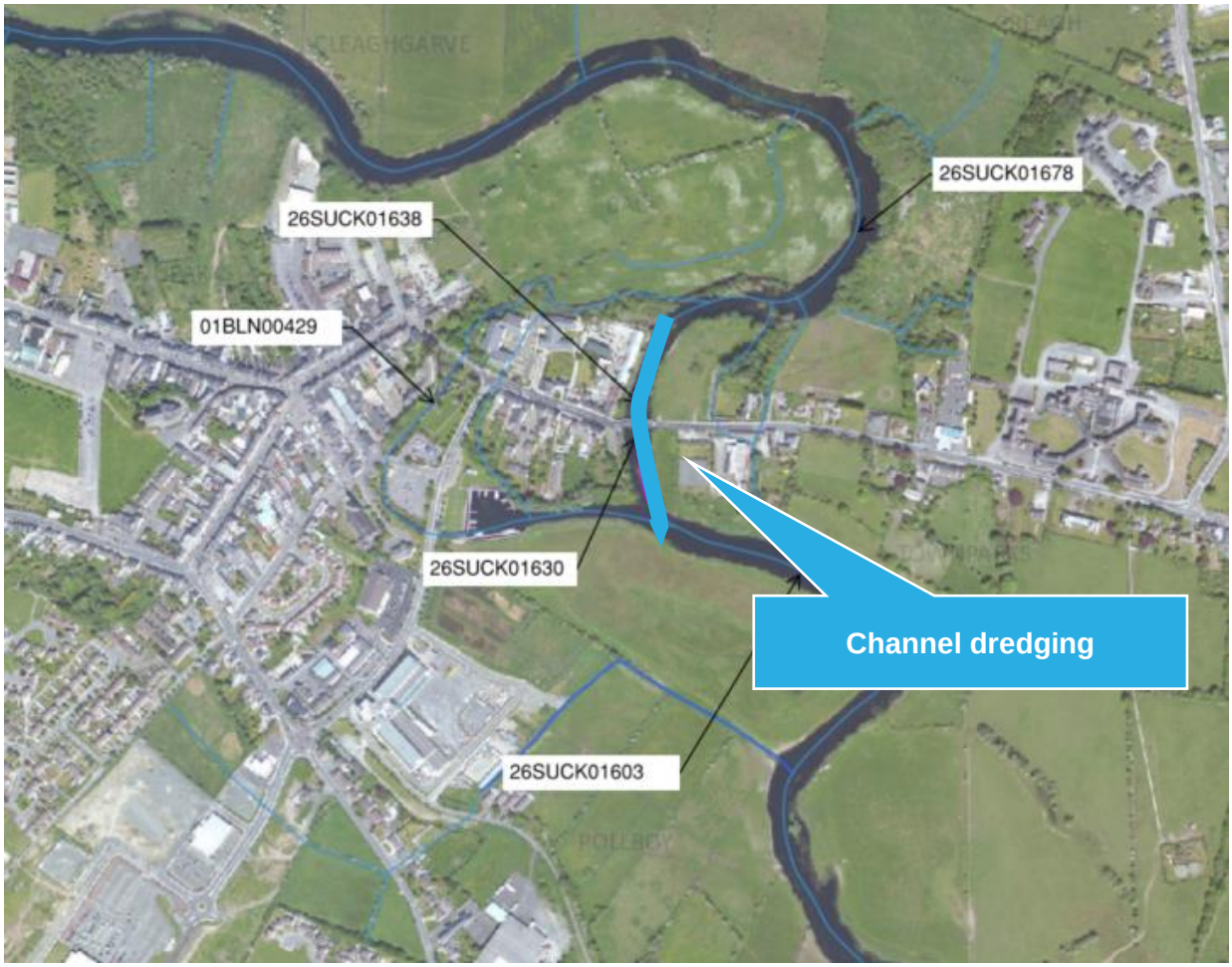
Measures Considered

Conveyance Improvement (Dredging)

The option of widening and deepening channels was reviewed. This measure would typically involve excavation of the river bed and construction of new bank stabilisation measures.

Dredging of a short length of the channel in the vicinity of the East Bridge was considered, as the channel bed is locally shallow compared to the adjoining lengths. Dredging by circa 1m depth was found to reduce predicted flood levels upstream by circa 300mm, but marginally increased flood levels downstream.

As other options were available to achieve similar reductions in flood level, with less potential for harmful environmental impact and without increasing levels downstream, this has not been included in the emerging potential options.



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Measures Considered

Conveyance Improvement (Increasing capacity of bridges and culverts)

Existing bridges and culverts were reviewed to determine whether it would be beneficial to increase their conveyance capacity (i.e. their ability to pass additional flood water downstream). The following structures were assessed in detail:

East Bridge

Recent works to the sluice gates by GCC significantly improved conveyance capacity through this structure and reduced blockage risk. However there remains scope to achieve further improvements. A number of different measures were tested and different combinations are included in several of the emerging potential options.

Crossing of west channel under R446 (adjacent to Civic Offices)

The current crossing consists of 2x 3m diameter pipes. The addition of a third culvert to increase capacity was found to reduce flood levels on the west channel by more than 100mm and is included in one of the emerging potential options.

Atlas channels

Potential conveyance improvements on the Atlas channels were reviewed, however the achievable reduction in flood level was small (less than 100mm). Therefore this measure is not included in the emerging potential options. However, ongoing maintenance of the channels may form part of the proposed scheme.

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Measures Considered

Conveyance Improvement (Usage of Pollboy Lock)

The possible benefit of utilising the existing lock structure adjacent to the M6 motorway for additional conveyance capacity was investigated.

The existing lock gates are not designed to allow both gates to open at the same time, as the opening gear is insufficient to overcome the force of water from upstream. To allow this type of operation, major works would be required. Even if such works were carried out, it was found that only modest reductions in upstream flood levels could be achieved. Therefore, this measure is not included in the emerging potential options.

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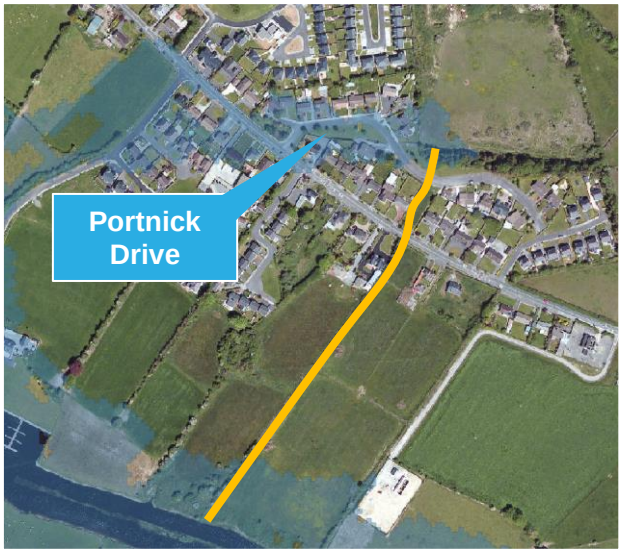
Measures Considered

Flood Diversion channels

Diversion channels (sometimes called floodways) divert excess flood water away from an area at risk of flooding. Two possible locations for such channels are outlined below. A further potential measure is presented overleaf.



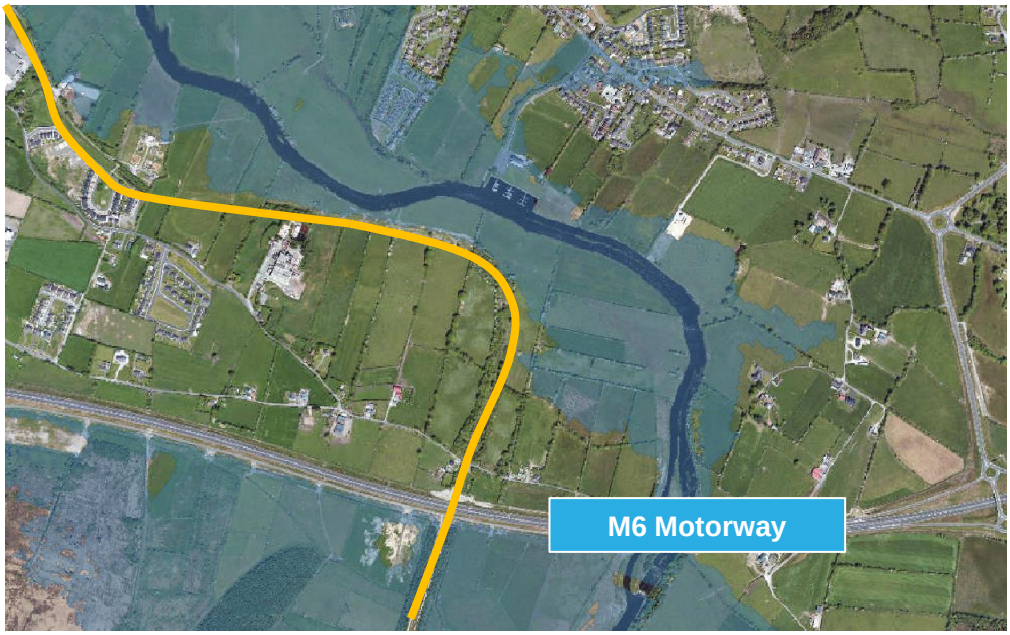
Possible diversion route for Ballyhugh Stream (orange line)

Mobilisation of former Grand Canal channel

This measure was suggested by a member of the public at the first PCD in March 2020. However, when tested this channel was found to be unable to deliver a significant reduction in flood risk. This is because the canal channel bed level is high relative to flood levels on the River Suck, so only modest flows could be mobilised in the channel.

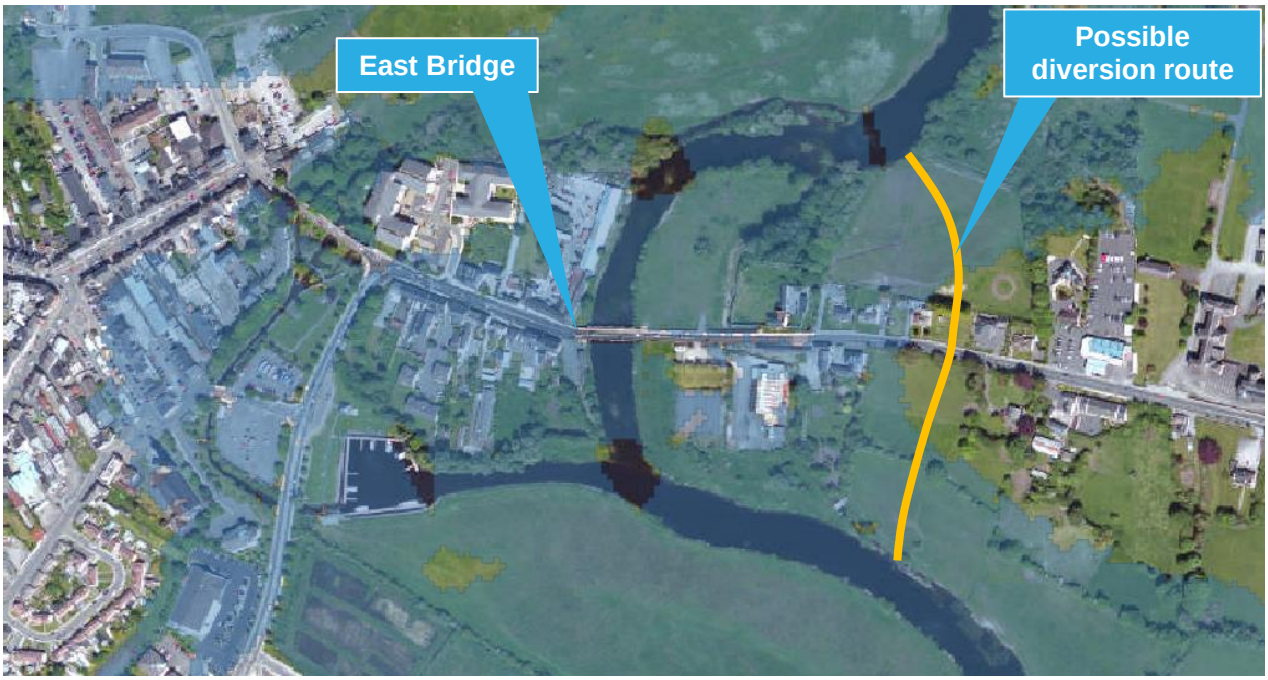
Ballyhugh flood relief channel

A possible diversion route through green space and agricultural land was identified and is included in one of the emerging potential options.



Route of former canal channel (orange line)

Ballinasloe Flood Relief Scheme



Example of a diversion channel during flooding

Measures Considered

Flood Diversion channels (contd.)

River Suck Diversion in the vicinity of the East Bridge

A possible diversion route for the River Suck in the vicinity of the East Bridge was identified in the Shannon CFRAM study. The 20m wide flood relief channel provides a significant reduction in upstream flood level. However due to the length (350m) and depth (2m) of the required excavation, and the need for a significant culvert crossing under the main road, the construction cost for the measure has been calculated at >€2m. Therefore this measure is unlikely to yield a favourable option compared with conveyance improvement measures adjacent to the East Bridge. However, this measure will be kept under review until further engineering and environmental assessment of the emerging potential options is completed.

Measures Considered

Direct Defences (Flood Walls and Demountable Barriers)

- Flood walls are expected to be necessary in certain areas of the town to contain flood waters and prevent the inundation of property. A number of lengths of wall are included in the emerging potential options.
- Flood walls could be constructed of reinforced concrete or sheet piling, depending on the relevant engineering and environmental considerations e.g. location, ground conditions, defence height, or seepage risk.
- At locations where access across the defence line must be maintained in non-flood conditions, temporary demountable barriers may be utilised (see example below)
- It should be noted that in some emerging options, the height of walls may be significant (refer to the detailed boards presented where individual wall heights are noted).

Example flood defence wall

Example demountable barrier

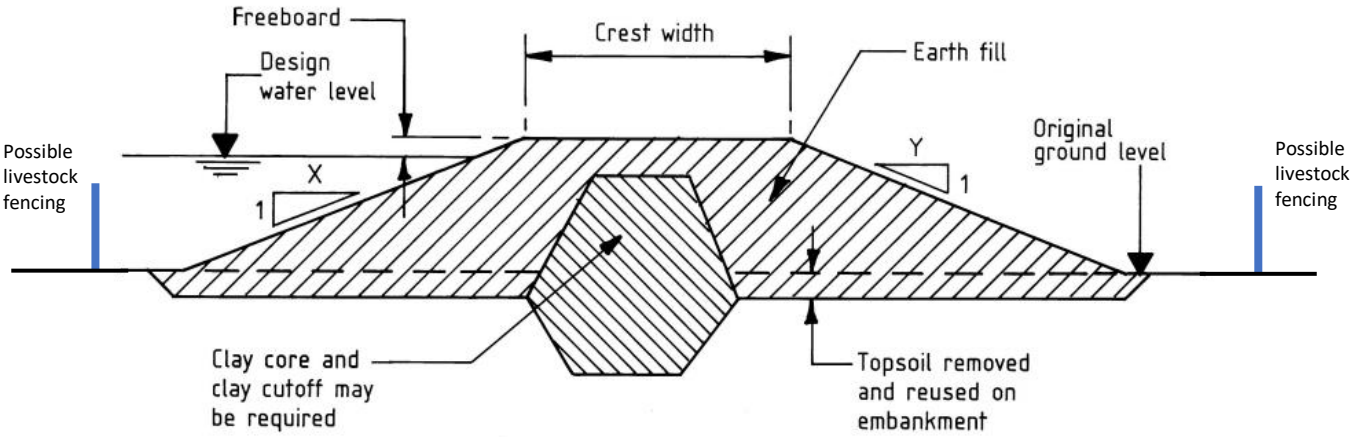
Example flood defence wall under construction

Measures Considered

Direct Defences (Flood Embankments)

Flood embankments are earth fill structures designed to contain high river levels. Flood embankments can be constructed from a variety of soil types but often contain a clay core to prevent water seepage through the body of the structure. It is also possible that cut-off may be required beneath the embankment to prevent seepage beneath the structure.

Flood embankments are expected to be suitable in a number of areas of the town, and are included in each emerging potential option.



Example flood defence embankment cross section

Example flood defence embankment under construction

Measures Considered

Isolation of the West Channel

The option of temporarily isolating the west channel during extreme floods was reviewed.

The following are the key considerations with this measure:

- The measure avoids the requirement for raised defences and demountable barriers along the west channel,
- The measure reduces the overall channel conveyance capacity, which leads to increased flood levels upstream of the East Bridge unless compensatory conveyance improvements are implemented at the East Bridge.

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Measures Considered

Incorporation of Existing Defences at Derrymullen

The existing flood defences at Derrymullen will form part of the overall flood relief scheme for Ballinasloe, and will be included in the ongoing maintenance of the overall scheme.

The project team is currently engaged in work to scope any physical works which may be necessary to include in the scheme documentation submitted for statutory consent.

To date, a defence asset condition survey on the existing flood defences at Derrymullen has been completed in accordance with OPW guidelines. This has identified opportunities for possible enhancements to the defences such as alterations to existing pumping arrangements and replacement of an existing flood gate with a passive defence structure. Further technical work is ongoing, which may identify other improvement measures which will be considered for inclusion in the scheme.

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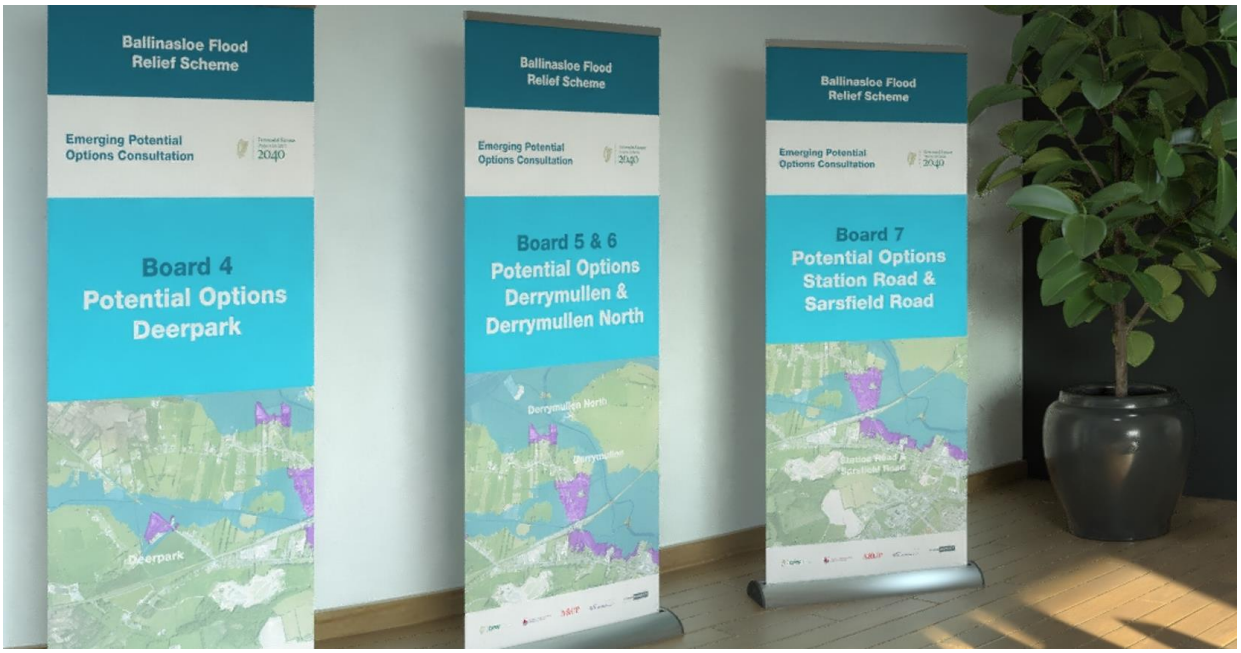

Summary

Most flood risk management measures, while providing some reductions in flood risk, cannot achieve the Standard of Protection by themselves. It is therefore necessary to combine measures into options so that they will achieve the design standard of protection throughout the town.

A number of emerging potential options have been developed to a preliminary level of detail, sufficient to undertake initial appraisals. These are now being presented for public comment at the earliest possible stage, to maximise the opportunity for public engagement.

The emerging potential options will be subjected to a Multi-Criteria Analysis (MCA), which will take into account a variety of criteria including technical robustness, social acceptability, environmental impact, and economic criteria. The public feedback received from this consultation will play a fundamental part in determining the preferred option and what that option will look like for the town of Ballinasloe.

9th – 23rd February 2022
Online Consultation Portal & Printed Displays at Ballinasloe Civic Offices and Public Library

Project website:
https://www.floodinfo.ie/frs/en/ballinasloe/

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