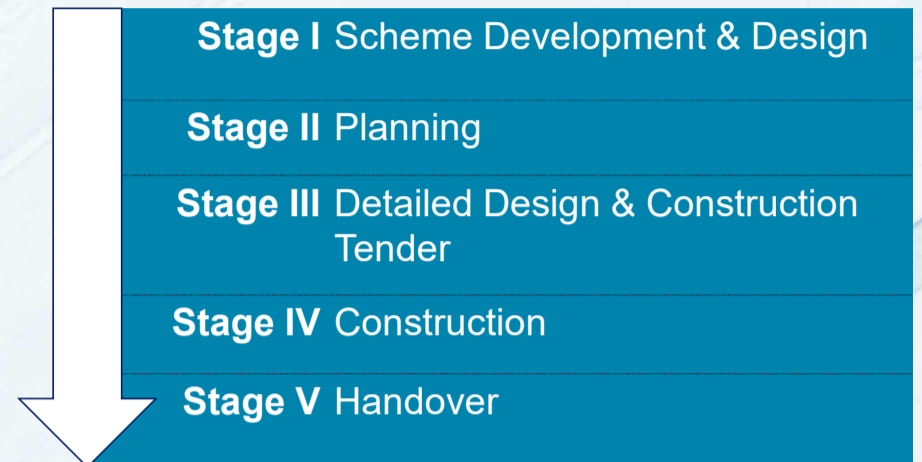


Carrickmines Shanganagh River Flood Relief Scheme

Introduction

- Welcome to the 2nd Public Consultation Event for the Carrickmines Shanganagh River Flood Relief Scheme.
- Since the last public consultation event, the project team has been working to identify and design a scheme to alleviate the risk of flooding the 1% Annual Exceedance Probability (AEP) flood event (1 in 100-year event) within the catchment of the Carrickmines Shanganagh River.
- Today, we will present the measures which form the Preferred Option.
- In addition to the technical feasibility; the scheme must be socially, environmentally and economically acceptable.
- **We welcome your thoughts and feedback on the preferred option.**
- Feedback will be considered prior to the finalisation of the preferred option and submission of a planning application for the scheme in Autumn 2024

Project Roadmap

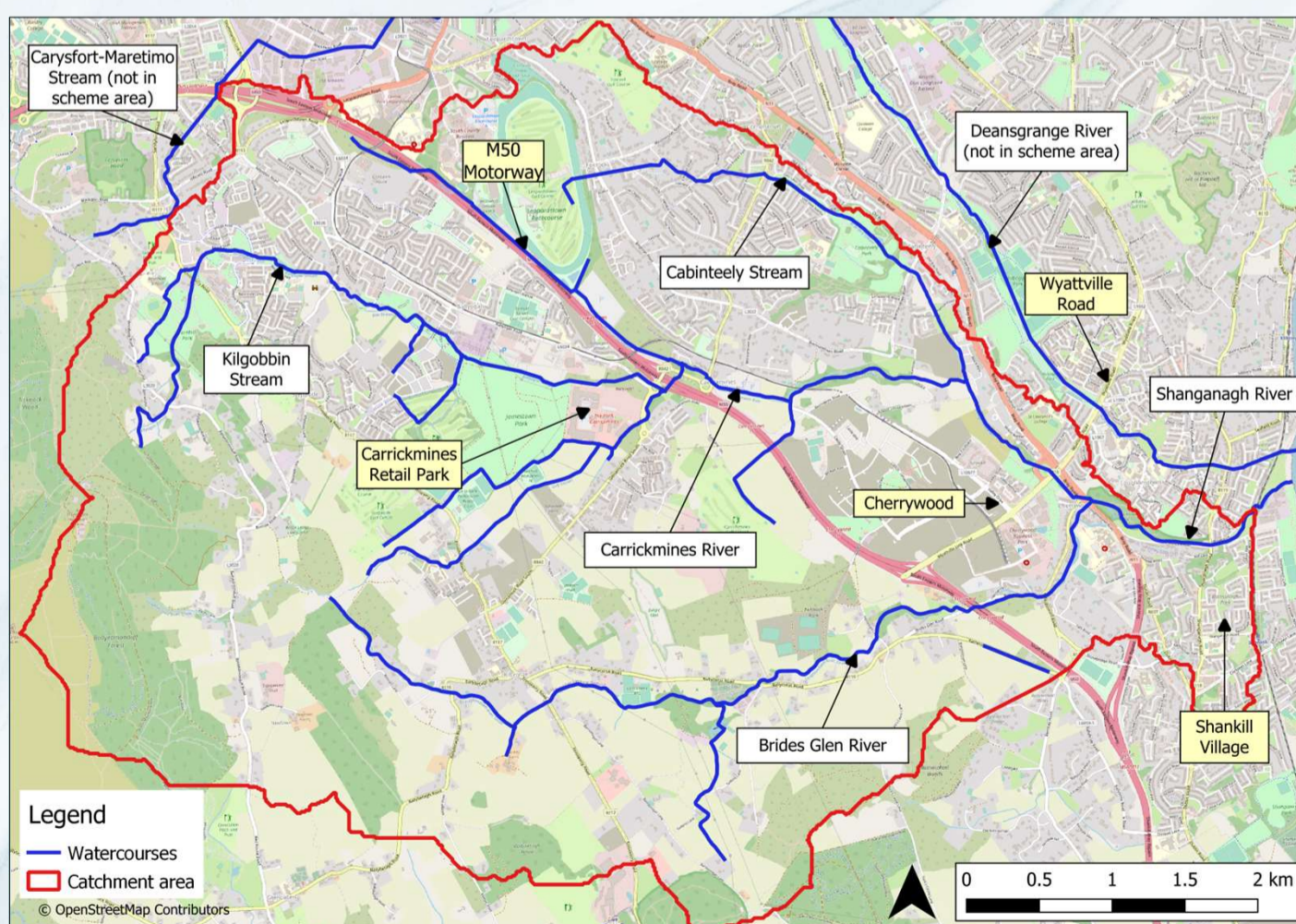


Stage I activities

- ✓ Hydrological Analysis
- ✓ Hydraulic Modelling
- ✓ Site Surveys
- ✓ Ecology and Environmental Surveys
- ✓ Options Appraisal
- ✓ Preliminary Design
- ✓ Environmental Assessment
- ✓ Option Selection
- Public Consultation ← **We are here**
- Environmental Impact Assessment

Stage 2 activities

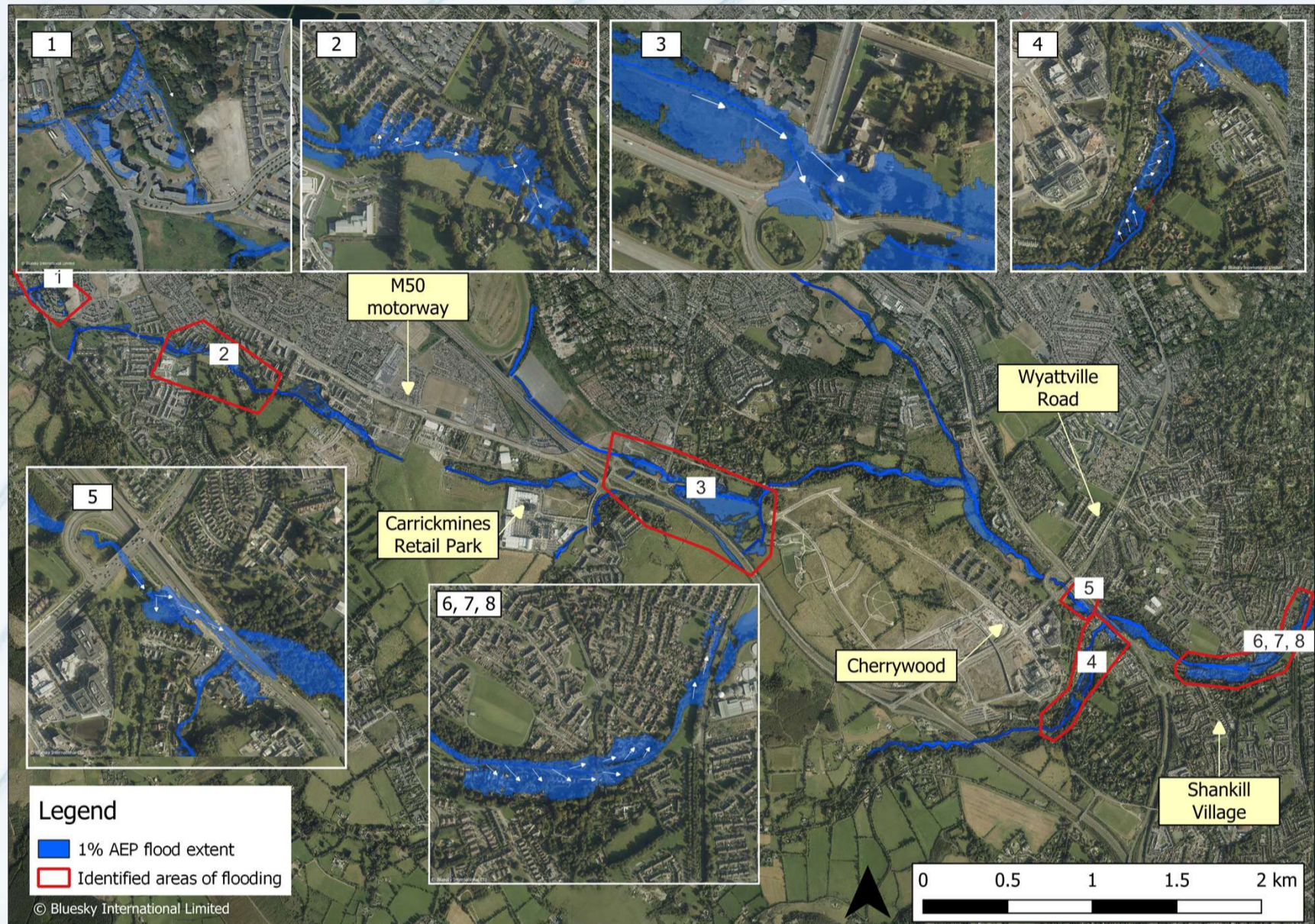
- Planning Application



Scheme area overview

Carrickmines Shanganagh River Flood Relief Scheme

Identified Areas at Flood Risk



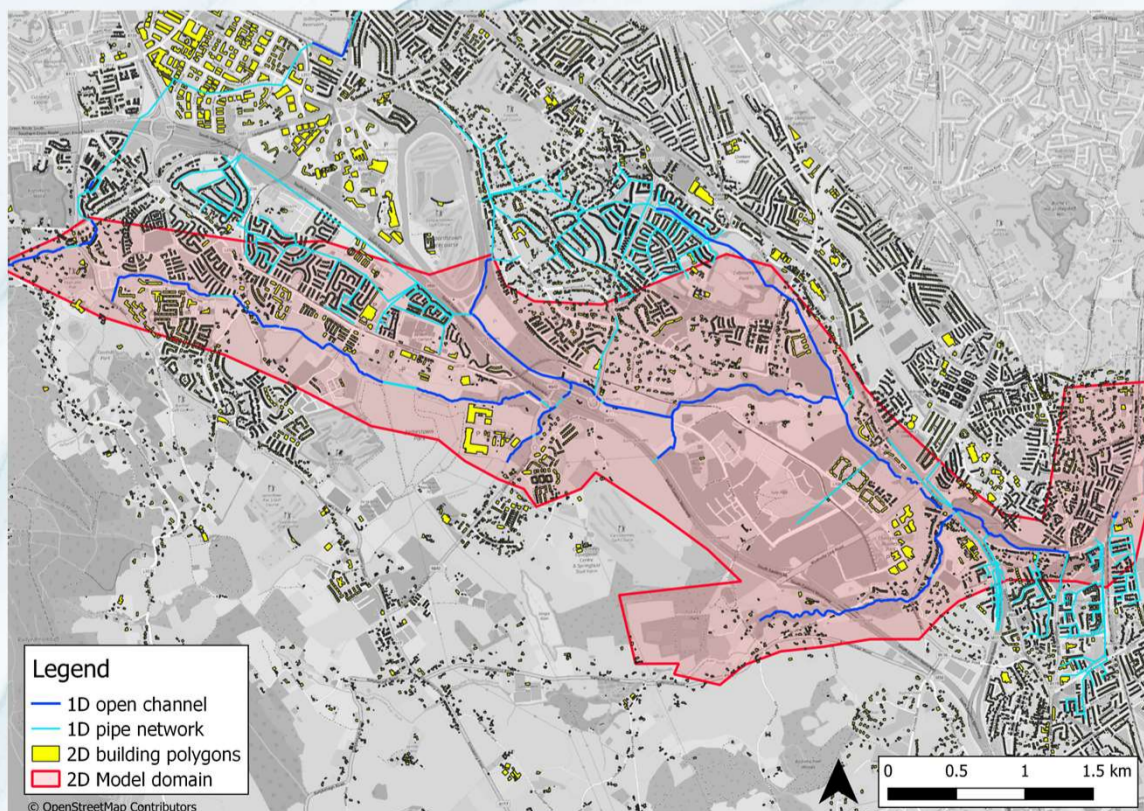
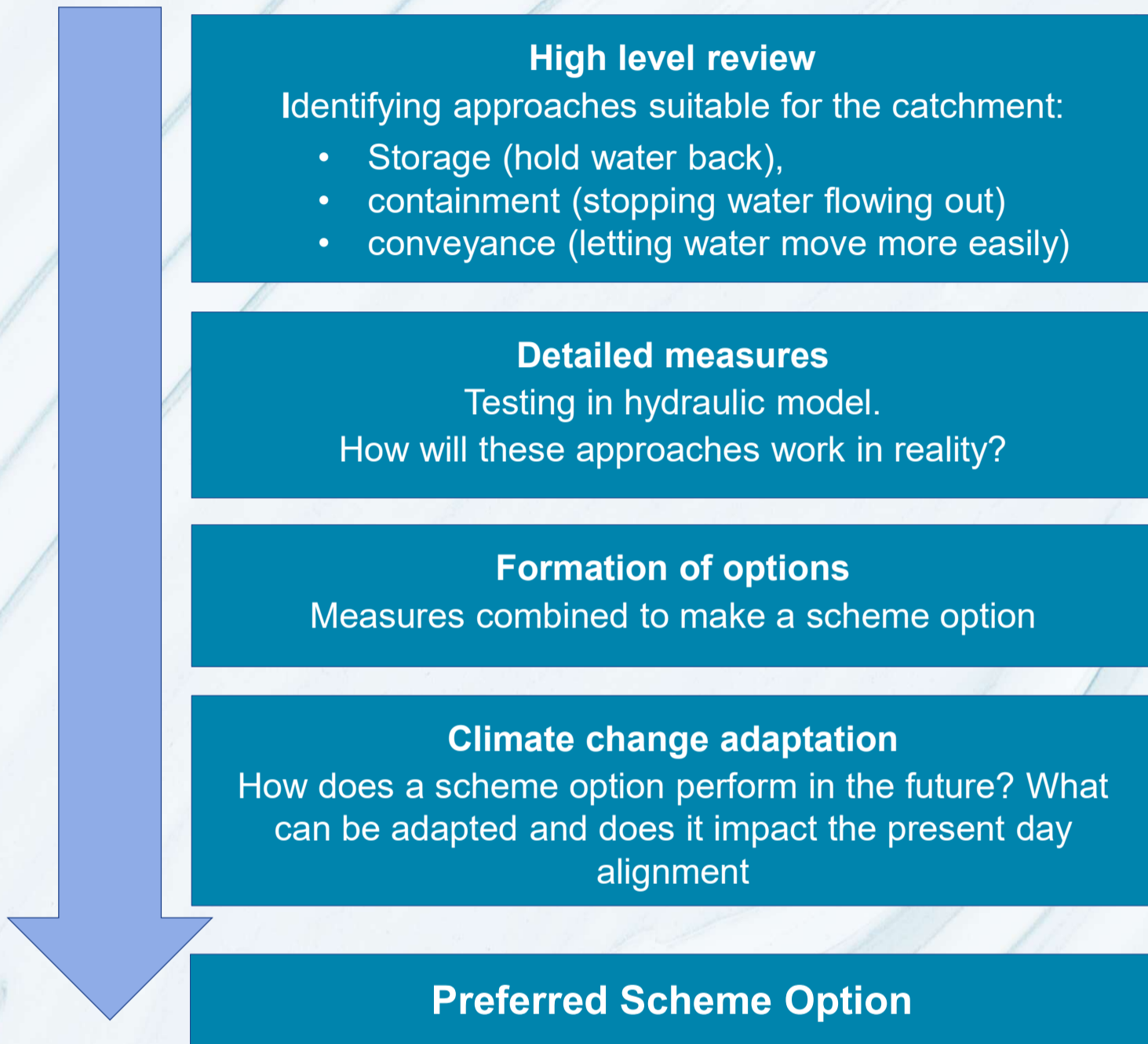
Identified Areas of Flood Risk – Baseline Scenario

- During the 1% AEP flood event, the following areas are at risk:
 1. Clon Brugh
 2. Belarmine green space, Sandyford Hall and Kilgobbin Road
 3. Glenamuck Road North
 4. Cherrywood Road and the N11 National Road
 5. Bray Road – old cul de sac
 6. Commons Road
 7. Brookdene Estate
 8. Bayview
- The main flood mechanisms in the scheme area are:
 - Constriction of the design flow at existing structures which increases water levels upstream causing out of bank spill.
 - Areas where there are low bank levels and flood flows are allowed to escape.
 - Narrowing of existing river channels which forces water levels to rise and overtop as flows increase.
- Looking into the future and considering climate change we see the same areas are impacted but the depth and frequency of flooding increase.

Carrickmines Shanganagh River Flood Relief Scheme

Strategic approach to managing flood risk

How did we arrive at the preferred option?



Schematisation of 1D-2D hydraulic model of scheme area used in options development

Carrickmines Shanganagh River Flood Relief Scheme

Strategic approach to managing flood risk

Key Management Approaches

Storage

- Storage – has the potential to hold water back to reduce peak flows and levels.
- Storage alone does not achieve the Standard of Protection even where all areas tested are used. Additional measures are still required.
- At certain locations storage is a useful contribution and has been tested in key areas.
- Considered in the future as climate change adaptation as flow management more critical in the future.

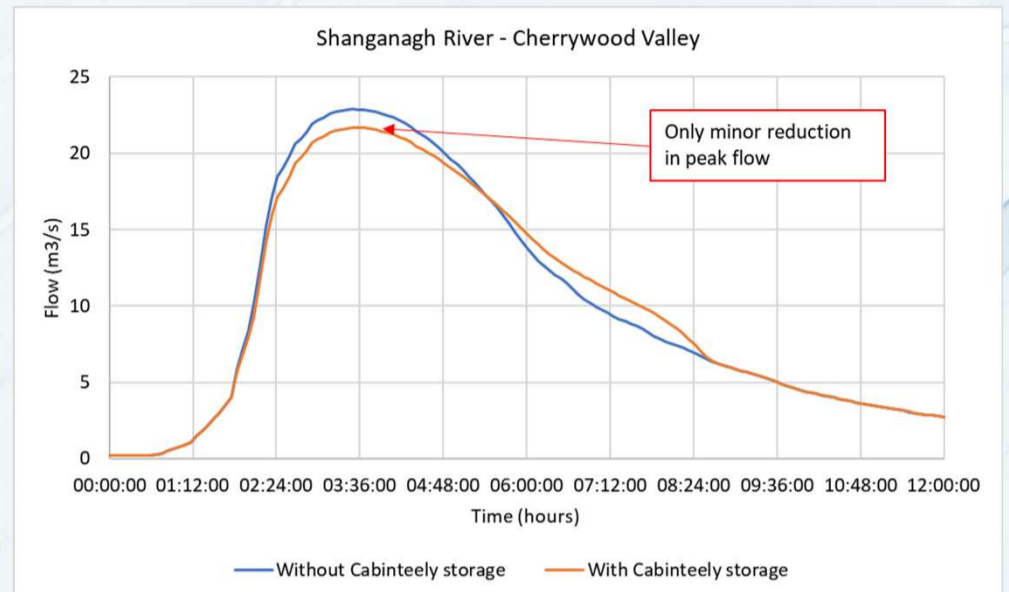
Conveyance

- Conveyance – remove restrictions to flow and let water move more easily.
- Found to have benefit at the following locations – Belarmine culvert inlet, Kilgobbin Road Bridge and the N11 crossing at Cherrywood Road.
- Does not resolve all flooding, other measures still required.

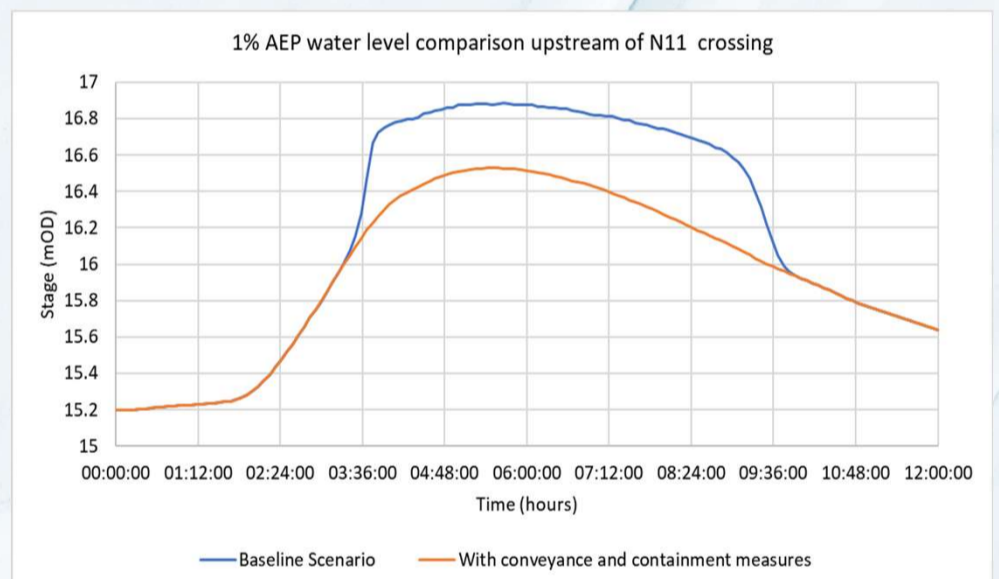
Containment

- Containment – prevent water from spilling out of bank.
- Only effective approach for providing the Standard of Protection.
- Required in all at risk areas in some capacity to contain flow.

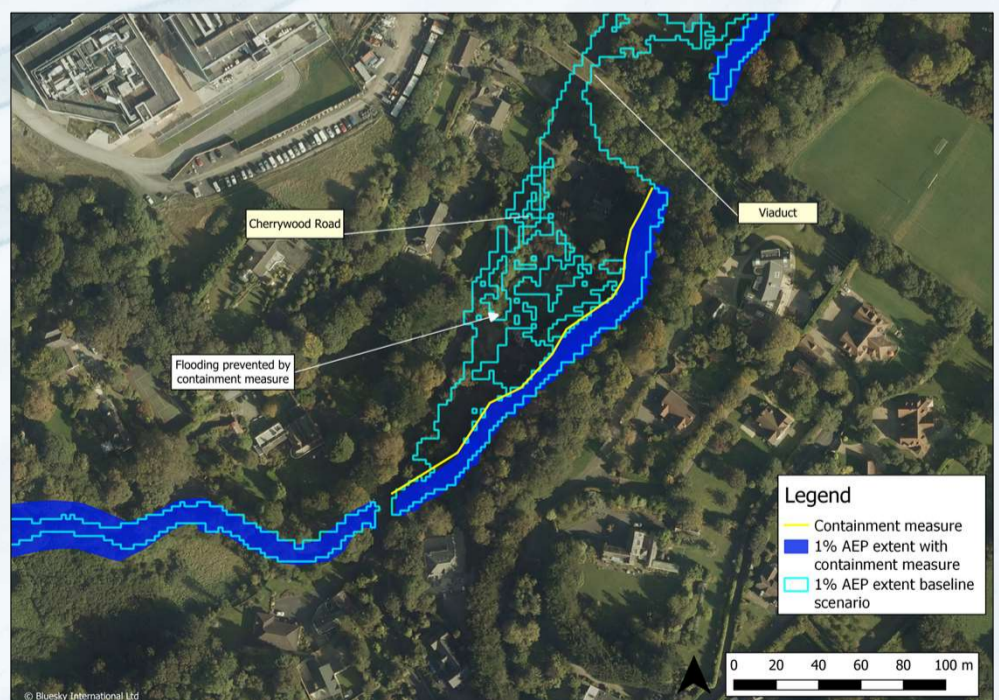
Multiple measures were tested at a catchment and flood area level but only measures that were hydraulically beneficial, environmentally, and socially acceptable were brought forward. This resulted in only one integrated preferred option.



Modelled hydrographs showing impact of storage at Cabinteely Park on peak flow at Cherrywood valley



Modelled hydrographs showing impact of conveyance and containment measures upstream of the N11 overflow culvert on the Brides Glen River (Cherrywood Road)



Example of containment measures along Brides Glen River (Cherrywood Road)

Nature Based Solutions

What is it?

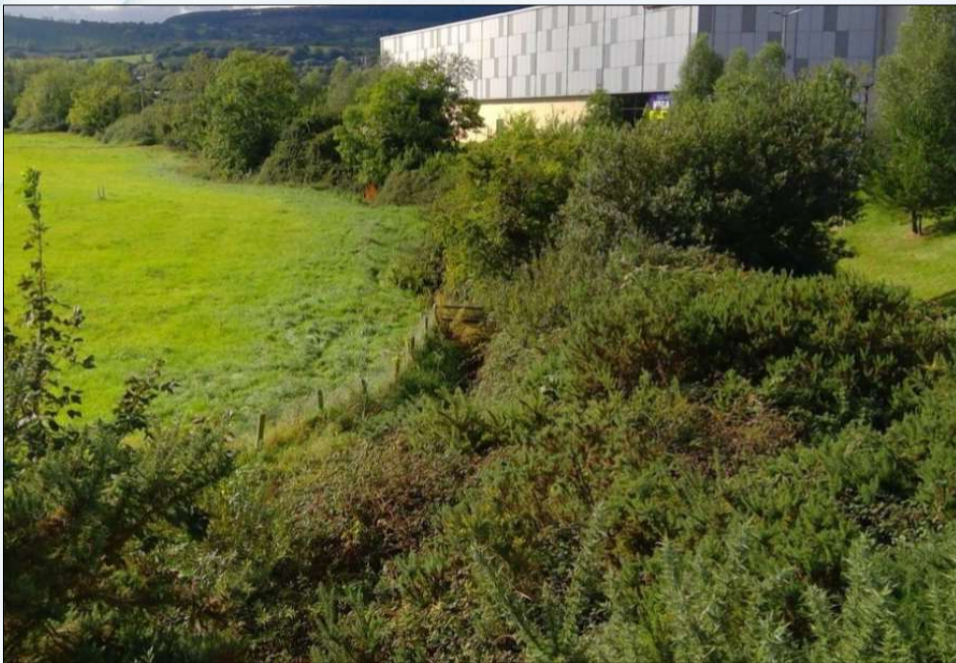
- Nature based Solutions (NBS) is the use or implementation of natural features and processes to address issues such as flood risk.

What NBS was looked at in scheme development?

- Natural storage is a key NBS for addressing flood risk. To look at this potential storage areas were identified within the catchment.
- These areas were then reviewed and tested in the hydraulic model to understand the benefits in terms of reducing flood levels.

What are the issues?

- Analysis shows that storage alone does not provide the necessary Standard of Protection for the scheme.
- The catchment is steep and constrained which limits the amount of storage space available.
- Interaction with utilities, cultural heritage features and existing areas of ecological interest also limit where NBS storage can be implemented.



Existing reach of riparian zones long the Ballyogan Stream



Existing reach of riparian woodland at Loughlinstown Woods

Other NBS features considered

- While not able to deliver sufficient flood benefits, NBS can provide environmental benefits to the wider area.
- NBS measures that can complement the flood relief scheme:
 - Retaining flood plain connections.
 - Creation of riparian buffer strips along river channels.
 - Effective land and ditch management.
 - Tree planting and woodland creation.
 - Bankside rewilding.
- These will be looked at and implemented where possible as part of the scheme.

Carrickmines Shanganagh River Flood Relief Scheme

Environmental Aspects

All environmental aspects identified for the Constraints Study were considered during Options Selection and influenced the design and placement of measures. The Preferred Option will be subject to environmental assessment at the planning stage. The Environmental Impact Assessment Report and Appropriate Assessment Screening will form part of the planning submission.



Biodiversity-Vegetation - The proposed flood defence measures at locations including Commons Road (above), Castle View, Ballyogan Grove and Priorsland will comprise new reinforced concrete walls, finished in natural stone or decorative impressed concrete finish. To accommodate these proposed defences, trees, hedgerow and riparian planting will be removed, and will be replaced as part of the ecological compensatory measures.



Biodiversity-Fisheries - Fish surveys have been undertaken at seven locations along the Barnacullia Stream, Carrickmines Stream and Shanganagh River to inform the baseline aquatic studies for the ecological impact assessment. Fish species recorded were brown trout (image above), brook lamprey and sea trout. No Atlantic salmon was recorded.



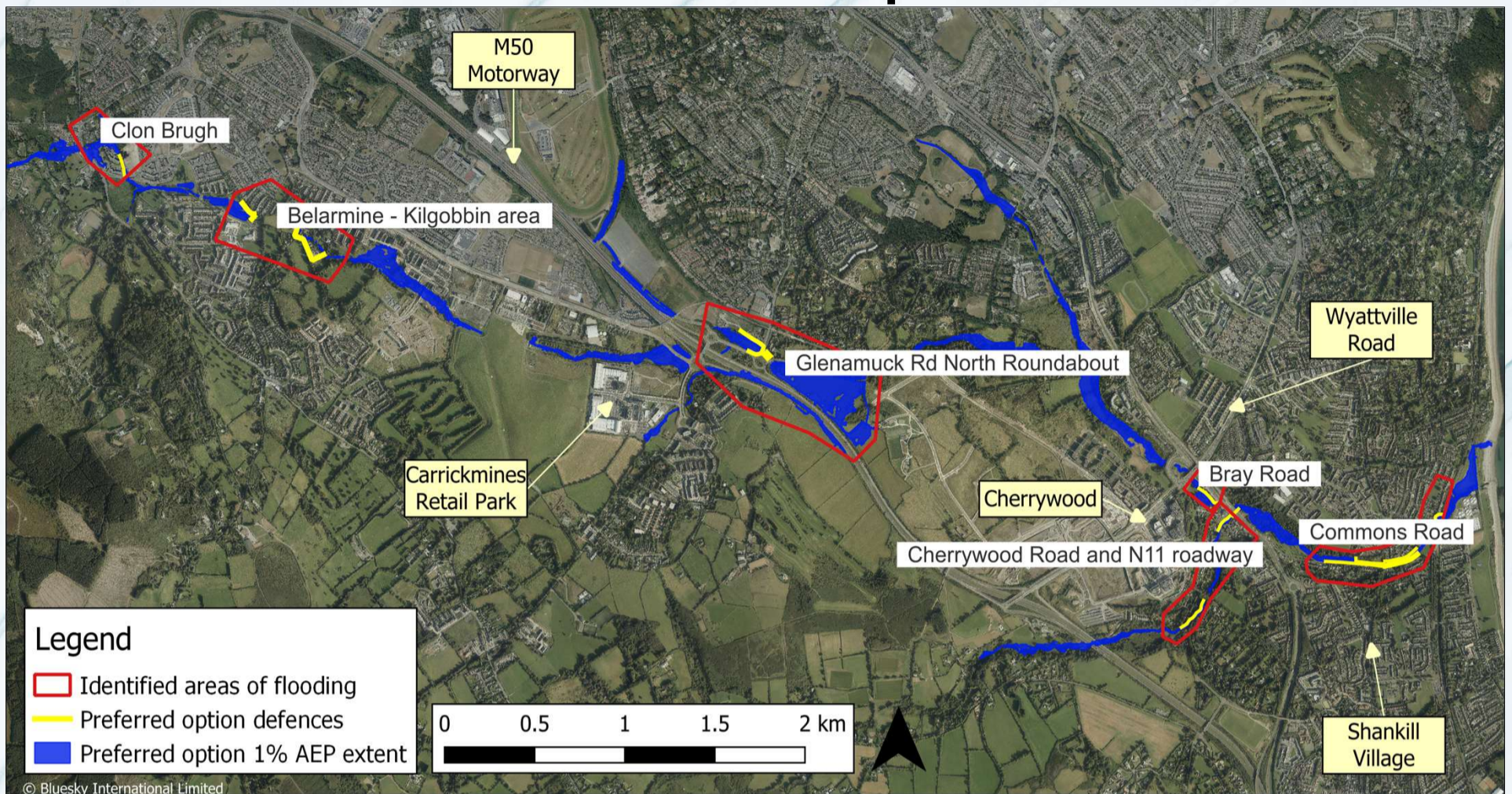
Cultural Heritage-Sites of Interest - The study area includes several sites of historic and cultural heritage interest, including Carrickmines Castle, Kilgobbin walls, Shanganagh Bridge, Waterfall and Rose Cottages. Shanganagh Bridge (photo above), (RPS Ref: 1773, NIAH 60260118) will be protected from future flood damage.



Cultural Heritage-Carrickmines Castle- A flood relief wall will be constructed within the Zone of Notification of Carrickmines Castle (DU026-005002). The Castle is in the ownership of the Local Authority, it is not a designated national monument however, it is of significant archaeological potential. Ministerial consent will be required for any development works in this location.

Carrickmines Shanganagh River Flood Relief Scheme

Preferred Option



Flood Extents for 1% AEP Preferred Option Scenario

Location	Proposed Measures
Clon Brugh	<ul style="list-style-type: none"> New flood defence walls on the existing channel banks adjoining Clon Brugh.
Belarmine Park	<ul style="list-style-type: none"> Upgrade of the existing inlet structure and channel to improve hydraulic performance. Existing boundary walls adjoining Sandyford Hall to be replaced with new flood defence walls upstream of the existing culvert. New flood defence wall and railing within Belarmine Park.
Kilgobbin Road	<ul style="list-style-type: none"> Existing boundary wall adjoining Kilgobbin House to be replaced with new flood defence wall. New flood defence wall on the right bank upstream of Kilgobbin Road Bridge. New overflow pipe at Kilgobbin Bridge to increase conveyance during high flows.
Glenamuck Road North	<ul style="list-style-type: none"> New flood defence walls on the existing riverbanks adjacent to Castle View and Glenamuck Road North.
Cherrywood Road	<ul style="list-style-type: none"> New flood defence walls upstream of the viaduct on the Brides Glen River adjoining the existing properties of Cherrywood Road.
Bray Road	<ul style="list-style-type: none"> New flood defence wall to the rear of the existing Bray Road properties. Widening of the existing riverbank, new culvert and flood gate.
Lower Brides Glen & N11 Crossing	<ul style="list-style-type: none"> New overflow culvert beneath the N11 dual carriageway to increase conveyance during the design event. New flood defence walls upstream of the N11 overflow culvert to protect low lying properties.
Commons Road and Brookdene	<ul style="list-style-type: none"> New and upgraded flood defence on both banks along Commons Road up- and downstream of Shanganagh Road bridge. Structural engineering works to protect and preserve Shanganagh Road bridge.
Bayview	<ul style="list-style-type: none"> New and upgraded flood defence walls along the left bank of the Shanganagh River.

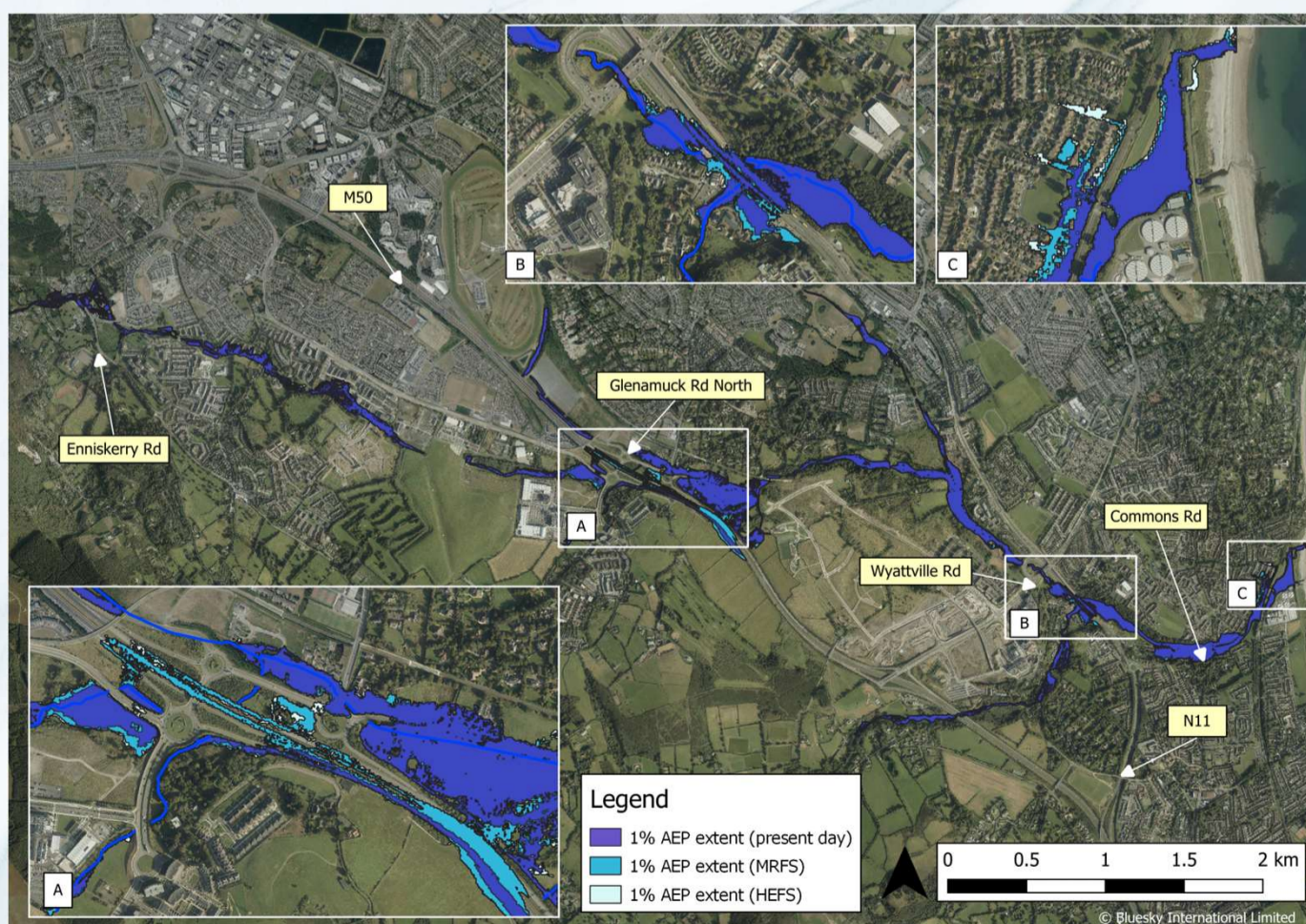
Carrickmines Shanganagh River Flood Relief Scheme

Climate Change Adaptation

- In the future flows, tides and rainfall are to increase, putting more pressure on the system.

Scenario	Flow/ rainfall increase	Tide increase
Medium Range	+20%	+0.50m
High End	+30%	+1.00m

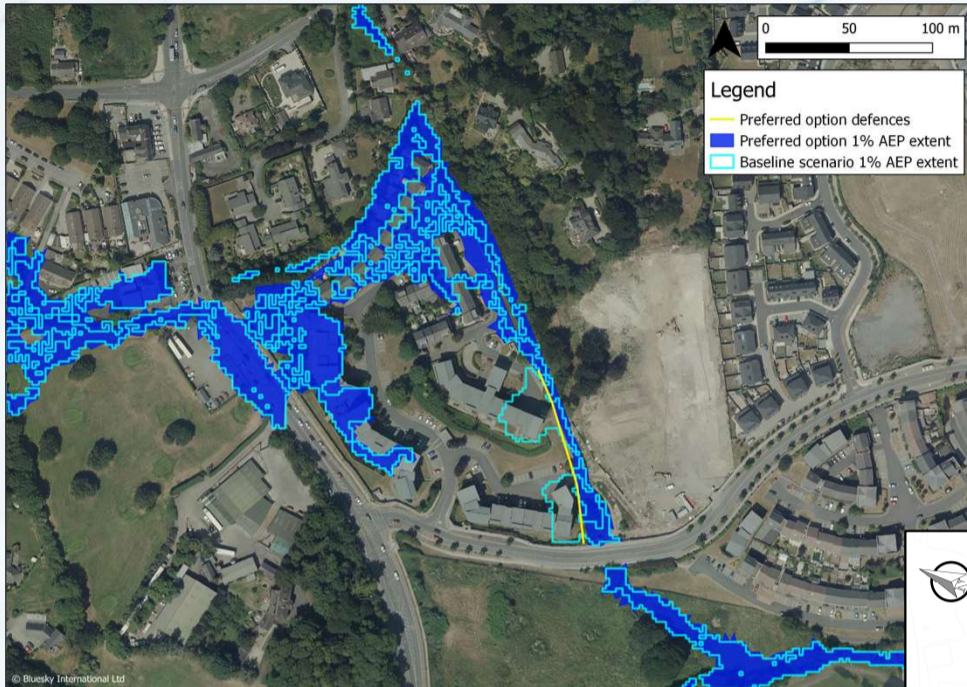
- The scheme is adaptable. This means that it protects now and can be modified to protect in the future.
- Key adaptations of Present Day scheme for the future scenarios are likely to include:
 - Storage at Belarmine Park
 - Storage at Cherrywood Valley
 - Reconnection of key areas of the existing flood plain at Commons Road (removal of defences and access bridge on left bank to allow water to flow on flood plain area).
 - Storage upstream of the M50 along the Brides Glen River.
 - Increasing flood defence heights and extents where necessary.
- Storage is not a viable solution on its own but is a critical adaptation measure to manage flows into the future.
- In some cases, it is beneficial to build the defences to the heights and extents required to protect against climate change now, being so incorporated into the present-day scheme at Belarmine Park, Kilgobbin, Glenamuck Road, Cherrywood Road, Lower Brides Glen, Brookdene and Bayview.
- This is an economical approach with less disruptive impacts to the environment and landowners.
- All proposed culverts proposed have been designed for the High End Forecast Scenario.



Flood extents map without defences in place for the present day and climate change (increased rainfall) situations.

Carrickmines Shanganagh River Flood Relief Scheme

Clon Brugh

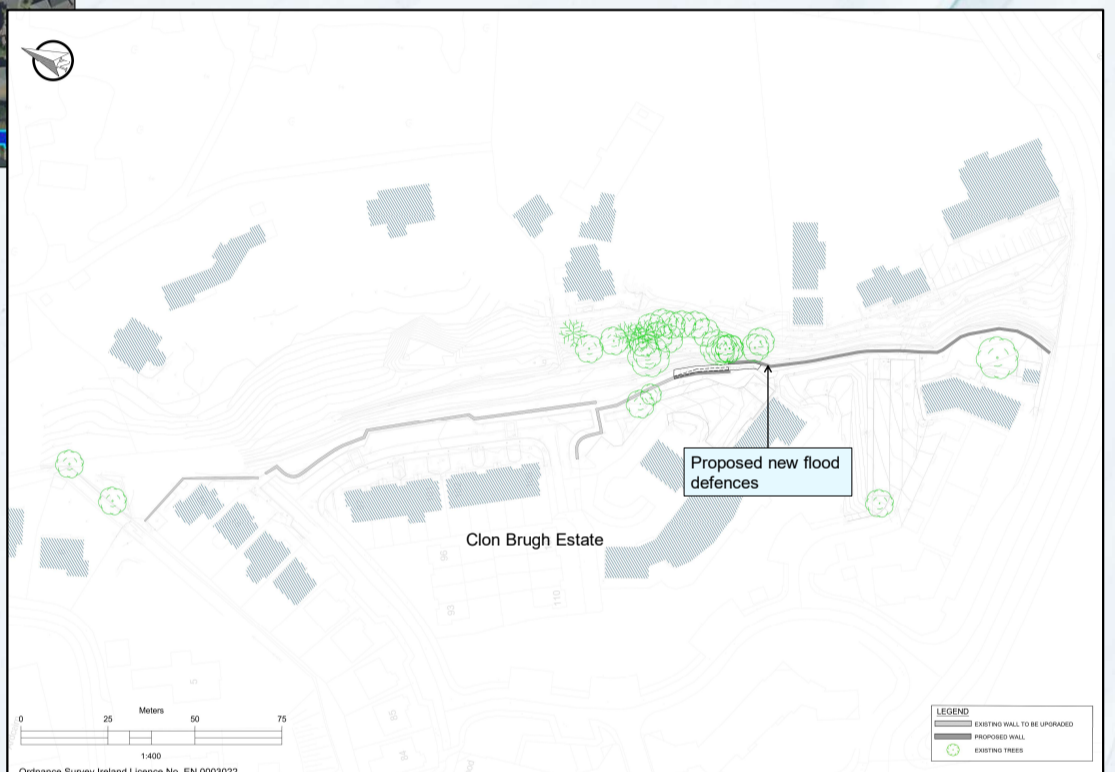


Connection to the Carysfort-Maretimo Stream Existing Channel & Wall

Comparison of Flood Extents of 1% AEP for Baseline & Preferred Option Scenarios



Existing Overland flow channel at Clon Brugh



Site Plan of Proposed Measures at Clon Brugh

Flood Defence Walls

Current Situation

- Cross flows from the Carysfort-Maretimo Stream spill onto areas of low-lying ground along an existing flow pathway connecting the Carysfort-Maretimo and Kilgobbin stream putting existing residential properties within the Clon Brugh estate at risk of flooding.

Proposals

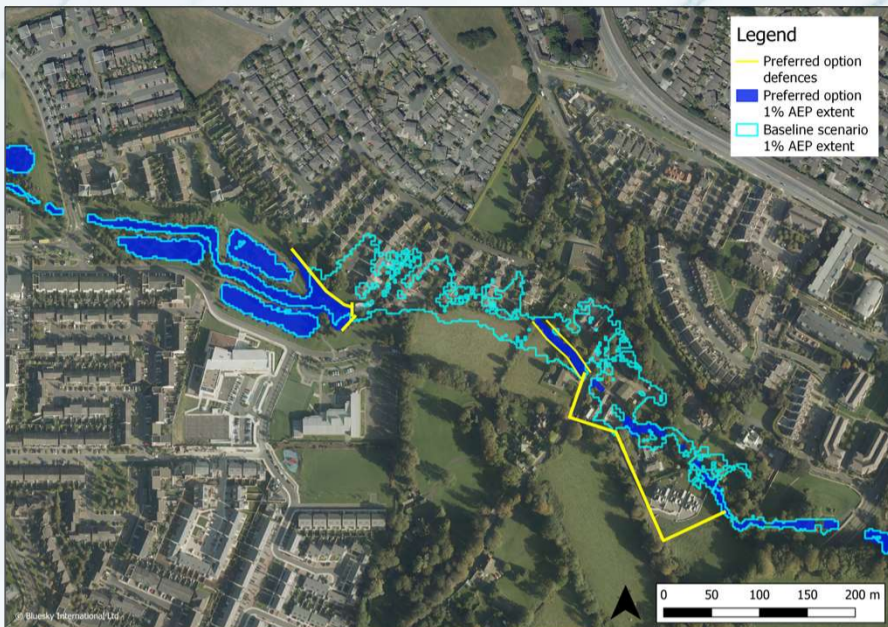
- Install new flood defence walls (c.1.1m high) on the western bank of the existing overland flow channel which traverses in a north south direction through the Clon Brugh estate.
- The proposed flood defence walls will protect properties along Clon Brugh from the flows travelling along the existing flow path channel from the Carysfort Maretimo Stream into the Kilgobbin Stream.

Constraints

- Temporary working areas and construction routes in a residential area.
- Proximity to residential areas.

Carrickmines Shanganagh River Flood Relief Scheme

Belarmine Park



Comparison of Flood Extents for 1% AEP for Baseline & Preferred Option Scenarios



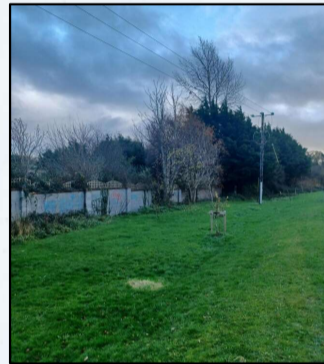
Existing Inlet structure at Belarmine Park



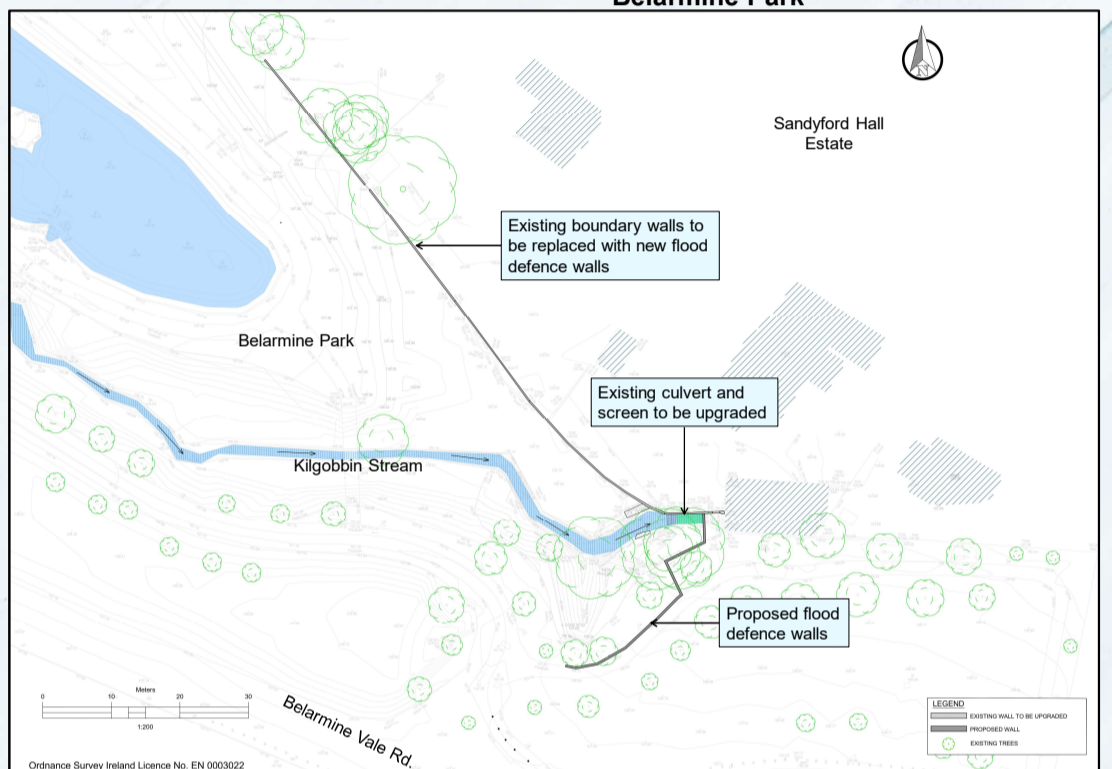
Existing stormwater ponds at Belarmine Park



Kilgobbin Stream at Belarmine Park



Existing Boundary walls to Belarmine Park



Site Plan of Proposed Measures at Belarmine Park

Flood Defence Walls and Culvert Inlet Upgrade

Current Situation

- The existing culvert at Belarmine Park cannot convey peak flows during the design flood event.
- Consequently, water levels in the channel immediately upstream of the culvert rise and overtop the banks of the river, resulting in flooding of the park and the existing properties in the Sandyford Hall estate.

Proposals

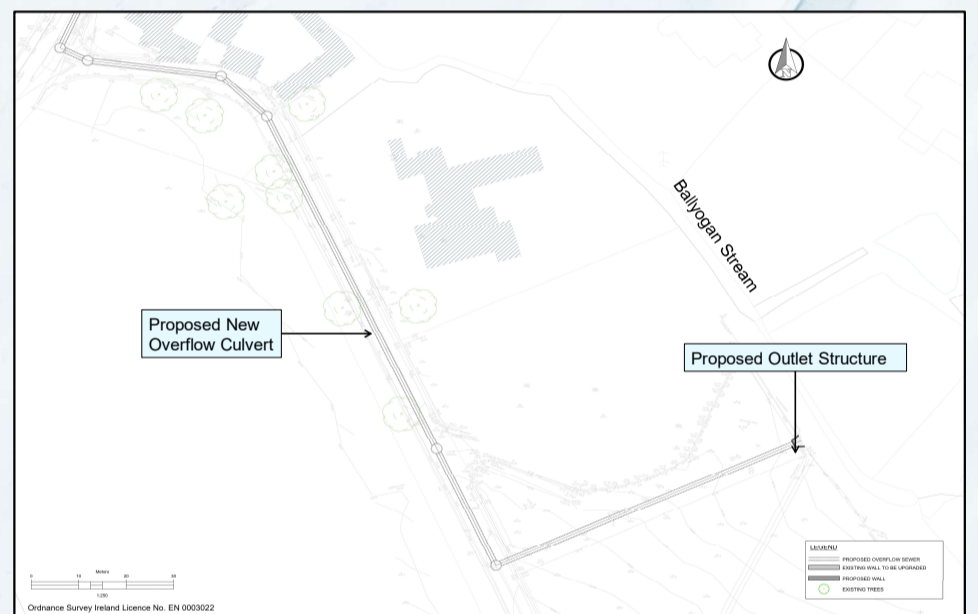
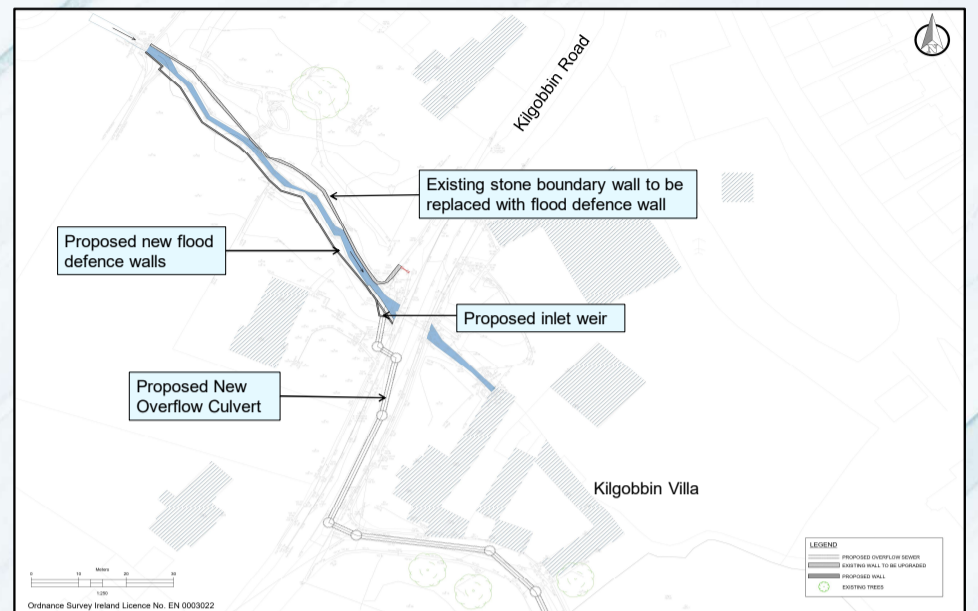
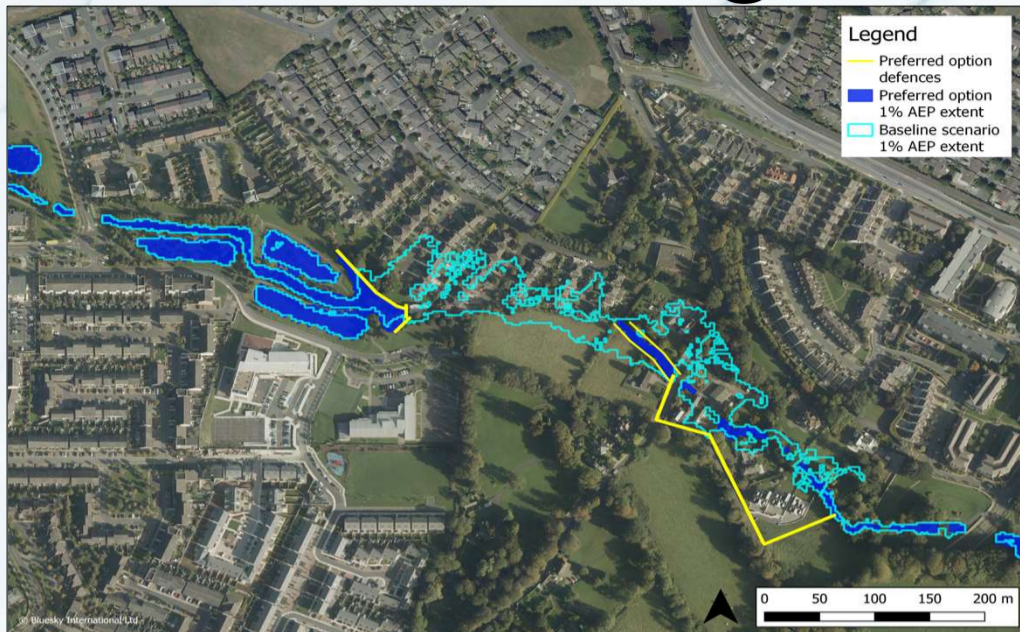
- Upgrade of the existing inlet structure and channel to improve hydraulic performance. These proposed measures include screen replacement, removing inlet restrictions (flow controls) and some minor works to regrade the existing channel.
- Existing boundary walls (1.7m to 2.5m high) adjoining Sandyford Hall to be replaced with new flood defence walls upstream of the existing culvert.
- New flood defence wall (1.1m to 1.5m high) and railing within Belarmine Park

Constraints

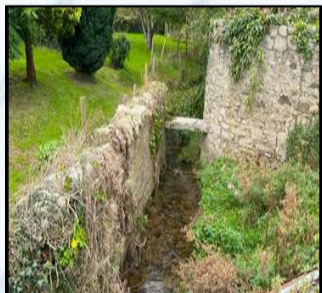
- Maintaining existing pedestrian/cycle routes and other parkland amenities during the works.
- Minimising impact on nearby schools and existing stormwater network and pond system.
- Works within existing residential areas.

Carrickmines Shanganagh River Flood Relief Scheme

Kilgobbin Road



Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



Kilgobbin Stream



Kilgobbin Road



Kilgobbin Road Bridge

Site Plans of Proposed Measures at Kilgobbin

Flood Defence Walls and Overflow Culvert

Current Situation

- The existing bridge at Kilgobbin Road cannot convey peak flows during the design flood event. As a result, water levels in the channel upstream of the bridge will rise and overtop the banks of the river. This causes flooding to the adjoining low lying lands and property (Kilgobbin House). Additionally, water will overtop the bridge onto the road and cause flooding to properties downstream of the bridge.

Proposals

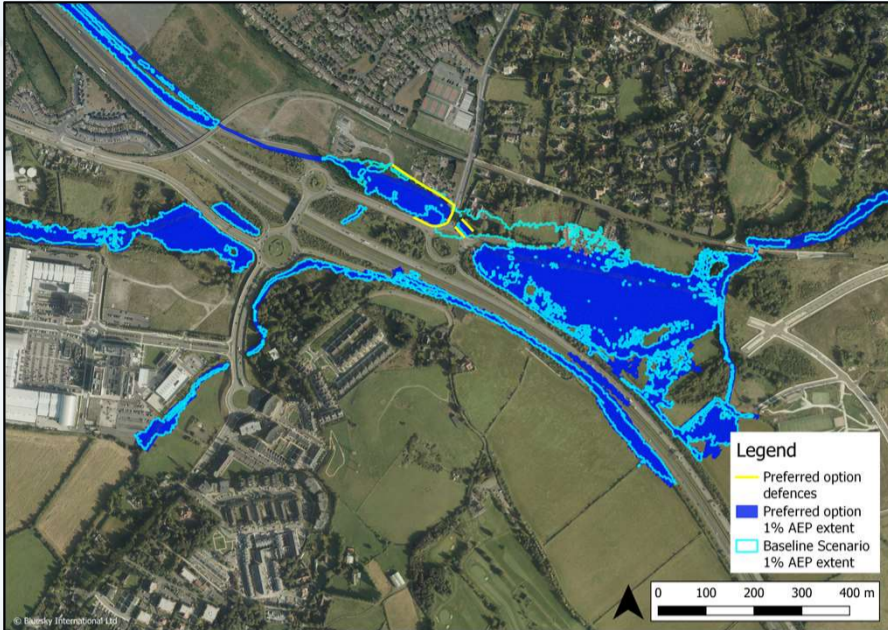
- Remove and replace the existing boundary wall adjoining Kilgobbin House with a new flood defence wall to match the existing finishes. Install a new flood defence wall (1.1m to 1.6m high) on the right bank upstream of Kilgobbin Road Bridge.
- Install a new overflow pipe and flow control structure (e.g. weir) at Kilgobbin Bridge to increase the hydraulic capacity of the system. The pipe will traverse Kilgobbin Road and a local road before discharging to the river downstream at Meadowbrook.

Constraints

- Existing utilities at Kilgobbin Road.
- Works within existing roadways and residential areas.

Carrickmines Shanganagh River Flood Relief Scheme

Glenamuck Road North



Comparison of Flood Extents of 1% AEP Event for Baseline & Preferred Option Scenarios



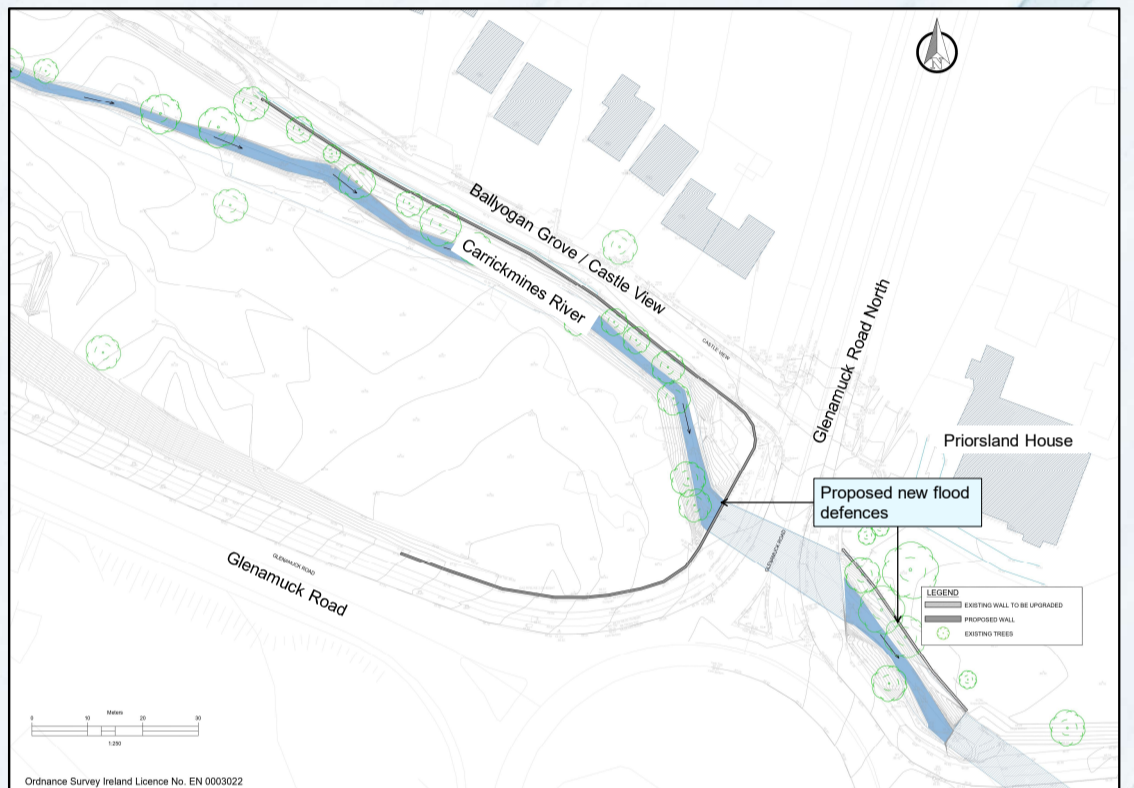
Carrickmines River at Glenamuck Road



Existing culvert traversing Glenamuck Road North



Existing wall to be replaced at Ballyogan Grove



Site Plan of Proposed Measures at Glenamuck Road

Flood Defence Walls

Current Situation

- The existing culverts under Glenamuck Road north roundabout and under the Luas Park and ride site cannot convey peak flows during the design flood event. As a result, water levels in the channel sections immediately upstream of the culverts will rise and overtop the banks of the river. This causes flooding to the adjoining roads, surrounding areas and nearby residential properties.

Proposals

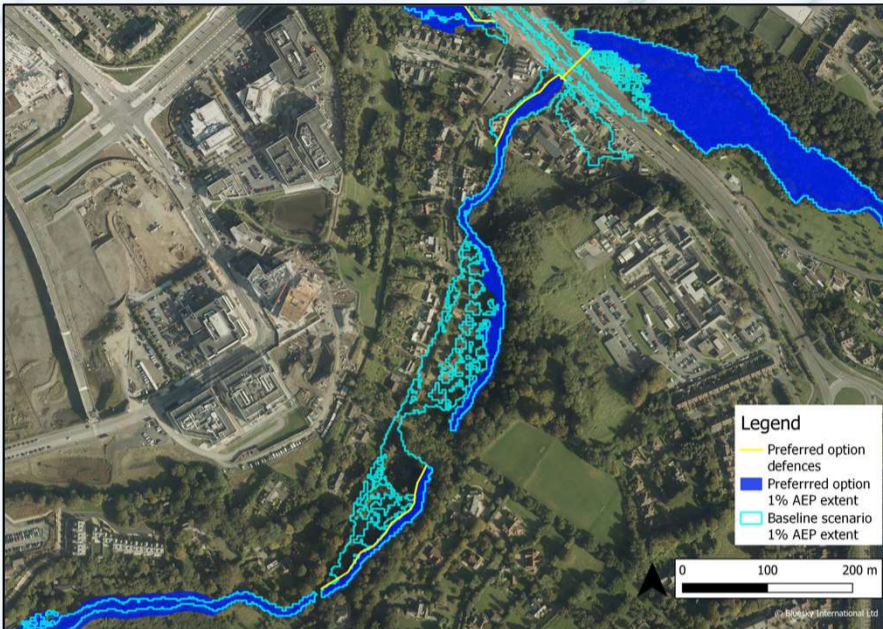
- Install new flood defence walls (1.1m to 1.6m) on the existing riverbanks adjacent to Castle View, Priorsland House and Glenamuck Road North.

Constraints

- Carrickmines Castle Zone of Notification, Ministerial consent required for any works.
- Traffic Management.
- Existing Services (Including Gas Transmission Main).
- Vegetation and Tree Removal.
- Works within residential areas, existing and adjoining roadways.

Carrickmines Shanganagh River Flood Relief Scheme

Cherrywood Road



Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



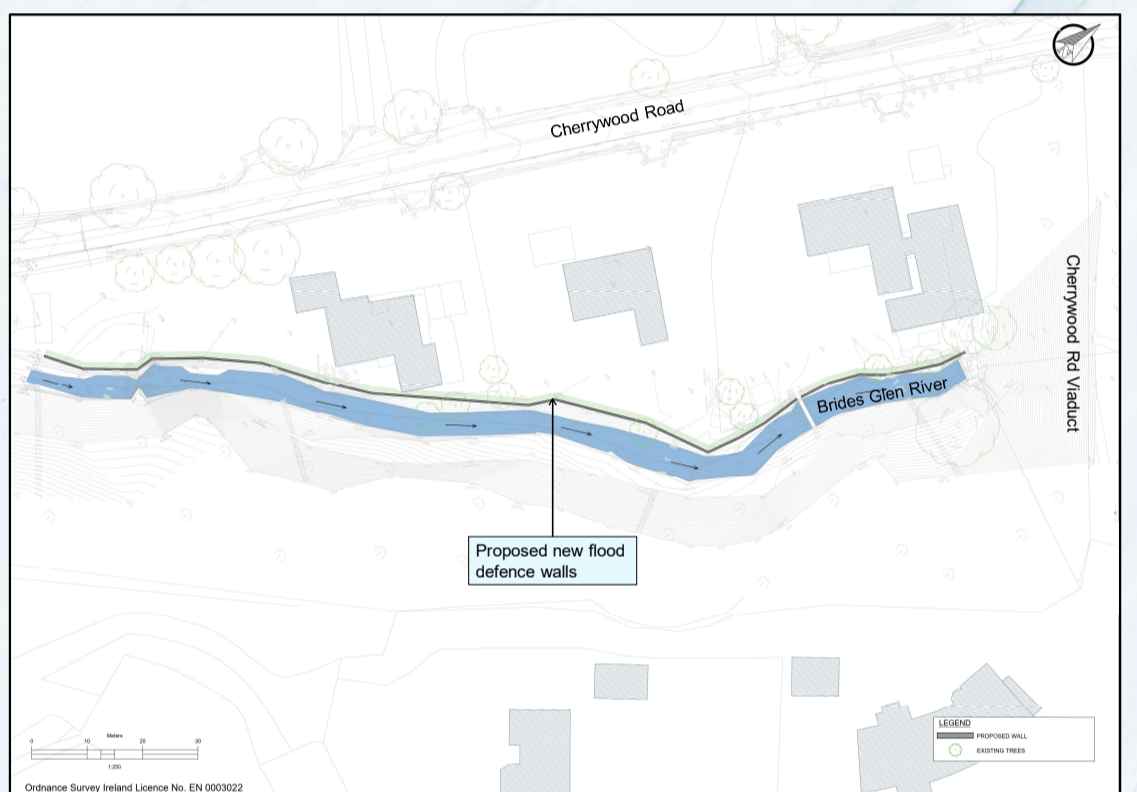
Brides Glen River adjoining existing properties



Brides Glen River



Existing inlet at Cherrywood Viaduct



Site Plan of Proposed Measures at Cherrywood Road

Flood Defence Walls

Current Situation

- The existing viaduct structure at Cherrywood constricts flow during the design flood event and as a result, water levels upstream of the existing viaduct will increase.
- This causes flooding to the adjoining properties and lands on the low lying riverbank (western) as the existing channel cannot convey this water level increase.

Proposals

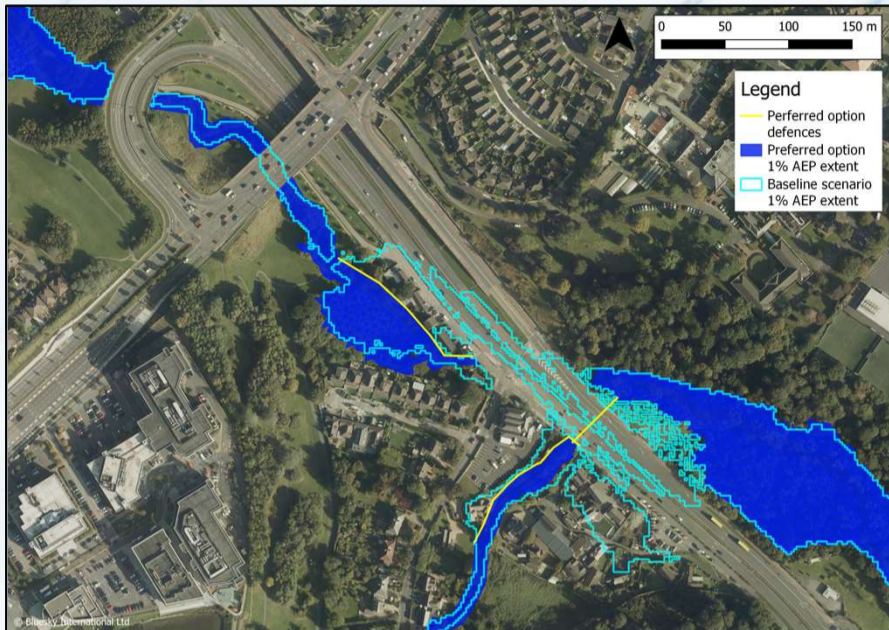
- Install new flood defence walls (1.1m to 2.75m) upstream of the viaduct on the Brides Glen River to the rear of the existing properties on Cherrywood Road.

Constraints

- Brides Glen River, sensitive to instream works
- Vegetation and Tree Removal
- Works within residential areas

Carrickmines Shanganagh River Flood Relief Scheme

Bray Road



Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



Existing footbridge across the works area



Channel widening section



Existing masonry arch upstream of the works



Site Plan of Proposed Measures at Bray Road

Flood Defence Walls

Current Situation

- The existing stream which flows to the rear of existing properties on Bray Road cannot convey peak flows during the design event. As a result, this causes flooding as water spills out of the existing channel onto several properties in the immediate vicinity of the stream and the N11 National Road.

Proposals

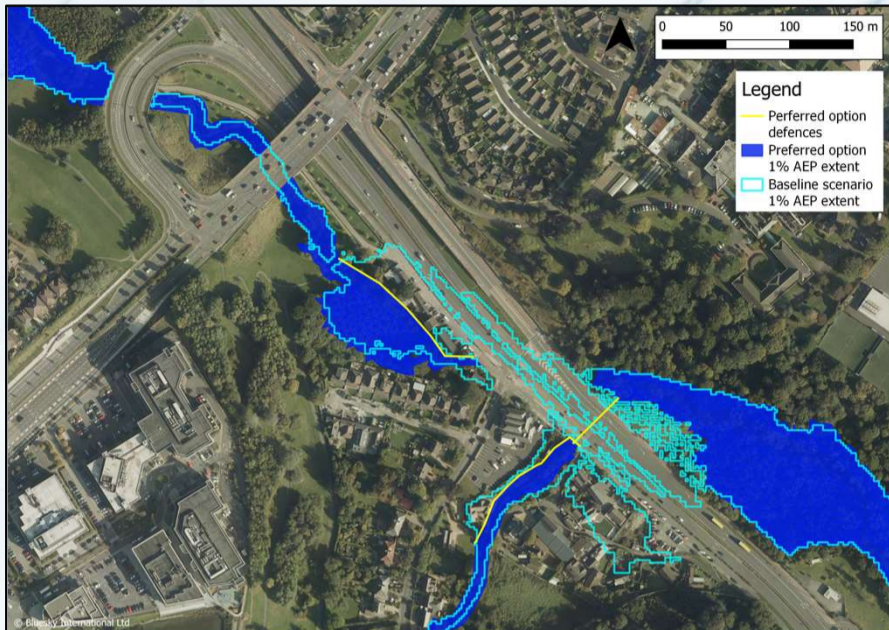
- Install a new flood defence wall (up to 1.3m above ground level) to the rear of the existing Bray Road properties & upstream of the existing culvert beneath the N11 dual carriageway.
- Realignment of the existing riverbank, new culvert and flood gate.

Constraints

- Instream works
- Vegetation and tree removal
- Works within residential areas
- Fish present in Shanganagh River (brown trout and sea trout)

Carrickmines Shanganagh River Flood Relief Scheme

Lower Brides Glen / N11 Crossing



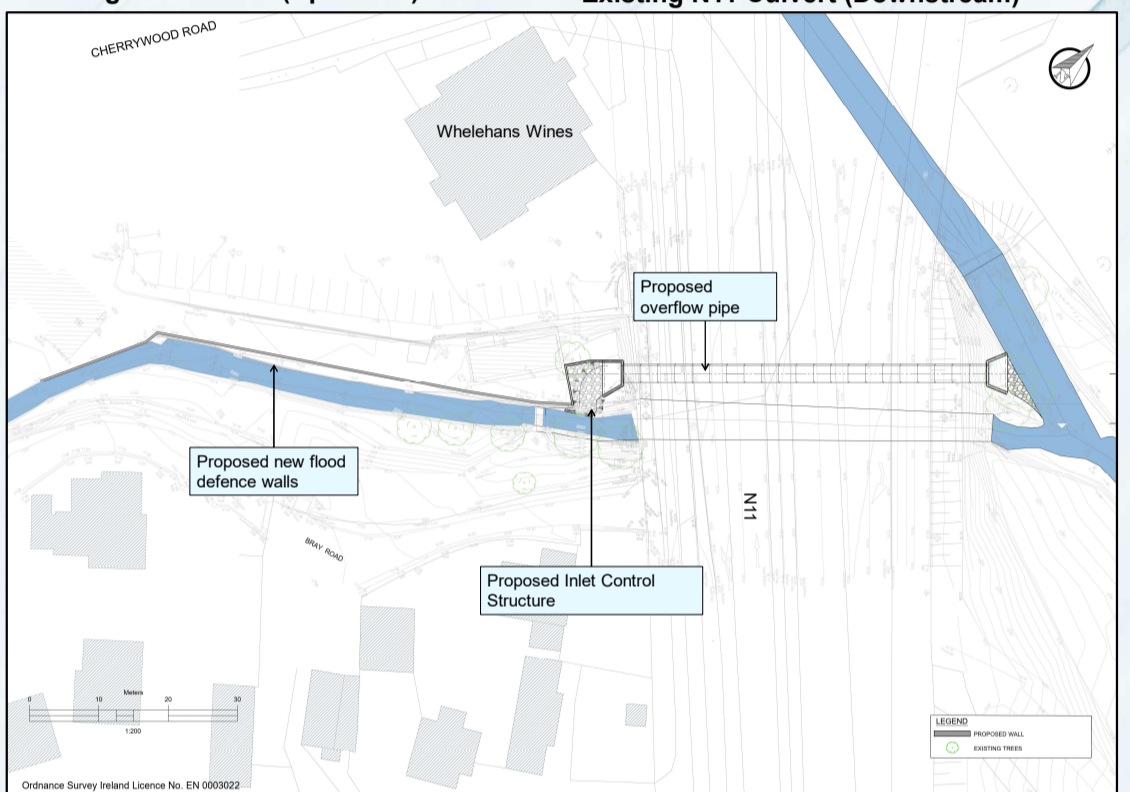
Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



Existing N11 Culvert (Upstream)



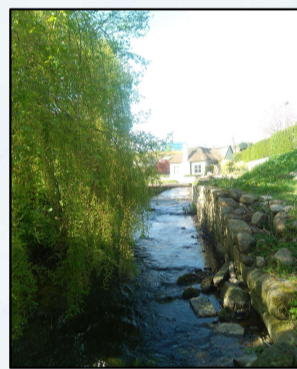
Existing N11 Culvert (Downstream)



Site Plan of Proposed Measures at Lower Brides Glen



Brides Glen River Upstream of Existing Culvert



Lower Brides Glen River

Flood Defence Walls and Overflow Culvert

Current Situation

- The existing culvert which traverses the N11 dual carriageway restricts flow during the design flood event and as a result, water levels upstream of the existing culvert increase.
- This causes flooding to the adjoining properties, N11 dual carriageway and lands on the low lying riverbank (western) immediately upstream as the existing channel cannot convey this water level increase.

Proposals

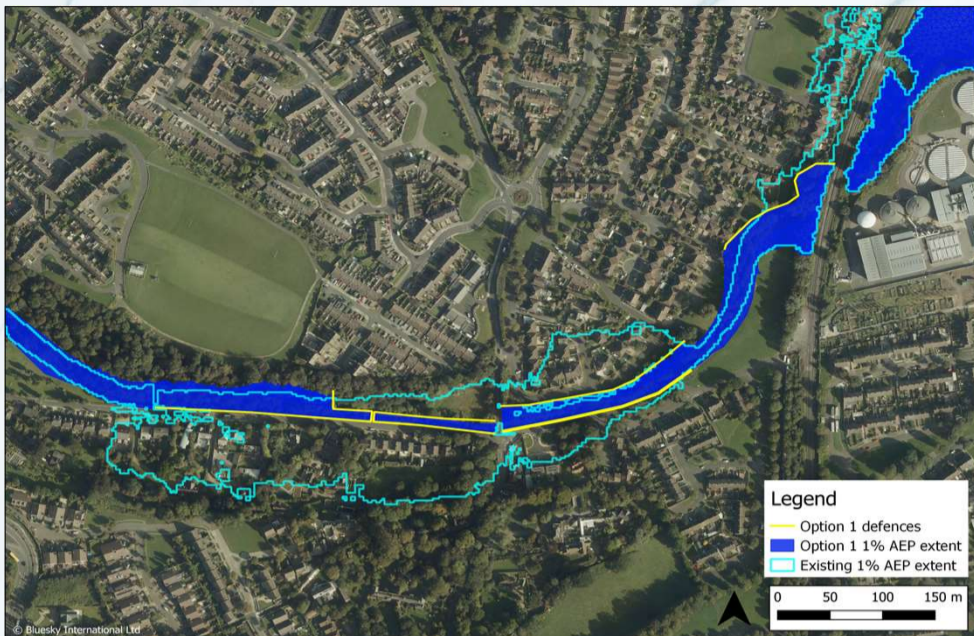
- Install a new overflow culvert beneath the N11 dual carriageway to increase conveyance during the design event.
- Install new flood defence walls (up to 1.1m high) upstream of the N11 overflow culvert to protect low lying properties.

Constraints

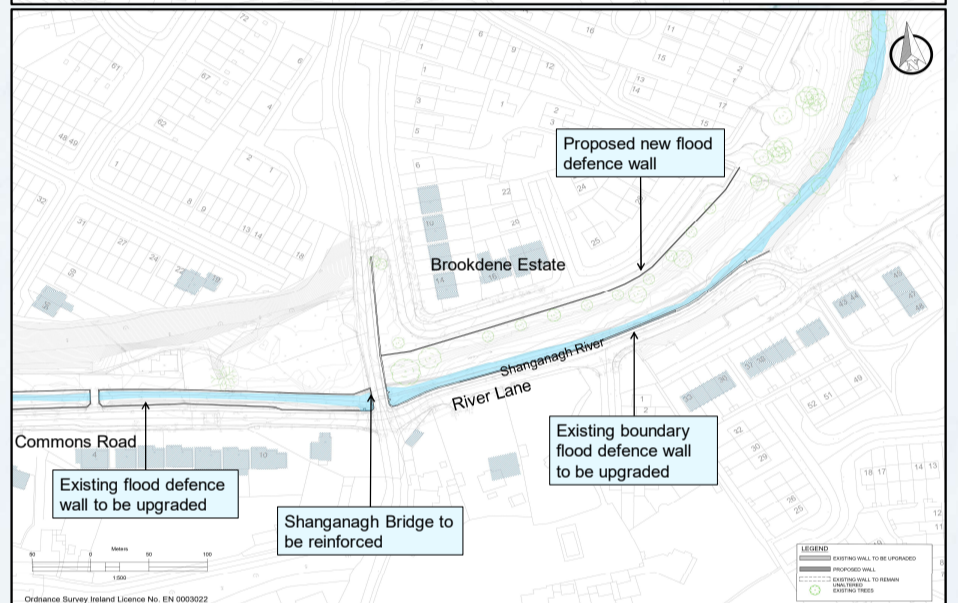
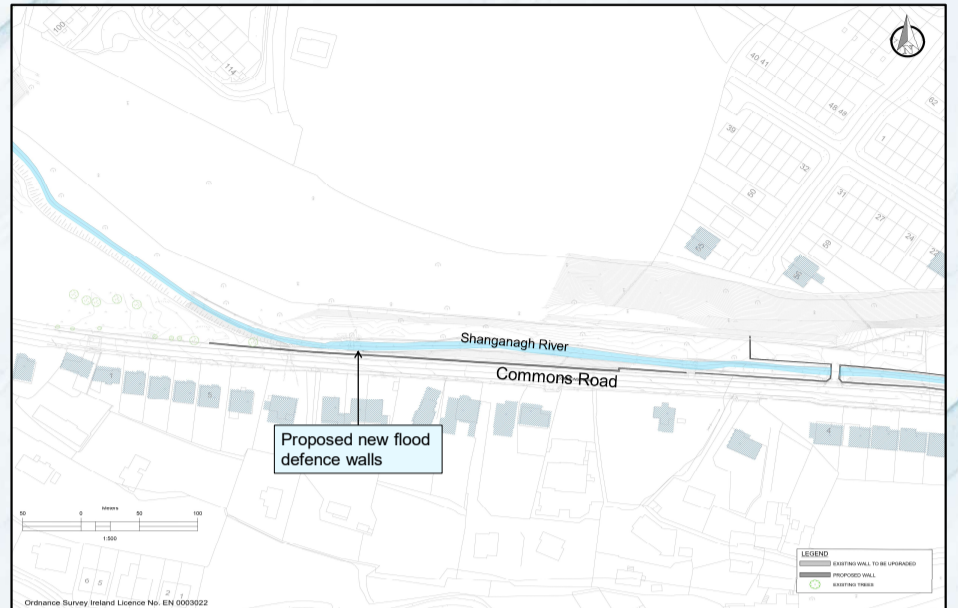
- Traffic Management at the N11
- Existing Services (including ESB)
- Vegetation Removal
- Brides Glen River, sensitive to instream works
- Works within existing residential areas, parkland and on the N11 National Road

Carrickmines Shanganagh River Flood Relief Scheme

Commons Road and Brookdene



Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



Site Plans of Proposed Measures at Commons Road



Shanganagh Bridge



Existing flood defence walls at Commons Road

Flood Defence Walls

Current Situation

- There are existing flood defence walls upstream and downstream of Shanganagh bridge. Existing bridges at Shanganagh Road and on Commons Road (access to the north bank) and the limited capacity of the river channel causes flooding onto Commons Road, River Lane and Brookdene Estate.
- The existing constriction of flows at Shanganagh Bridge and the implementation of other measures for the scheme are shown to cause water velocities to increase during the design event. This increases the risk of scour to the existing bridge foundations.

Proposals

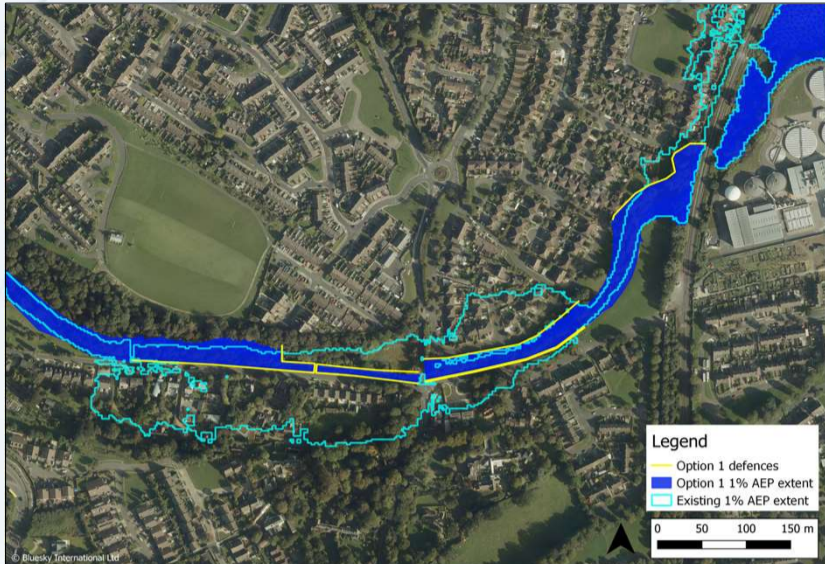
- To protect Shanganagh Bridge structure from scour risks, structural engineering works will be undertaken to reinforce the historic structure.
- Install new flood defence walls (1.1m to 2.4m high) at Commons Road and the Brookdene estate. Existing flood defence walls (c.1.35m high) will be upgraded where feasible to provide the required additional containment height of up to 1.35m.

Constraints

- Traffic Management at Commons Road & Shanganagh Bridge, works within residential areas
- Existing Services, Vegetation Removal & Instream Works. Working adjacent to pNHA with marginal increase in peak flood levels. Appropriate mitigation measures will be put in place to protect the fish populations.
- Shanganagh Bridge (RPS Ref: 1773, NIAH 60260118) needs to be preserved and protected from future flood damage.

Carrickmines Shanganagh River Flood Relief Scheme

Bayview



Comparison of Flood Extents of the 1% AEP Event for Baseline & Preferred Option Scenarios



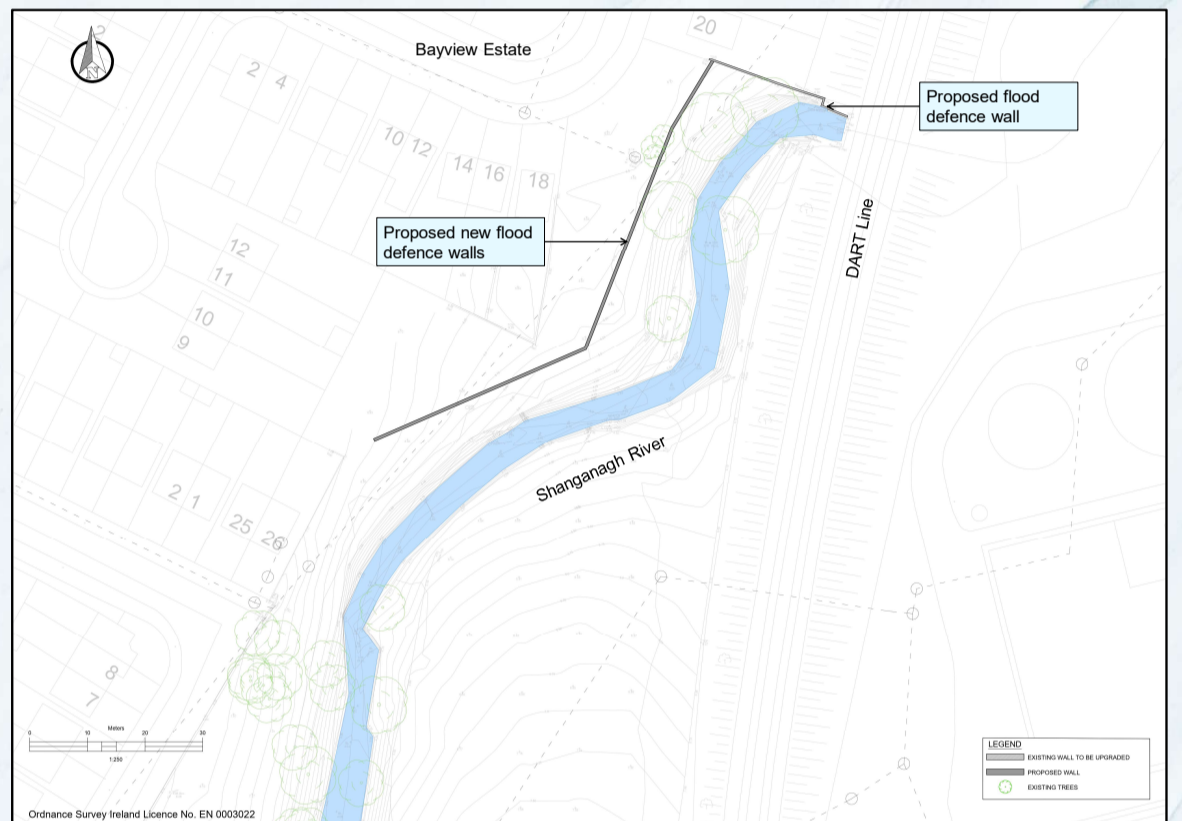
Shanganagh River in the environs of Bayview



Shanganagh River at Bayview



Trees and grassland at Bayview Lawns



Site Plan of Proposed Measures at Bayview

Flood Defence Walls

Current Situation

- The existing river channel beside Bayview is unable to convey peak flows during the design event. As a result, water spills out of the channel onto low lying lands and causes a risk of flooding for properties within Bayview Lawns.

Proposals

- Install new flood defence walls (1.1m to 1.8m high) along the left riverbank of the Shanganagh River, upstream of the railway crossing, including closing down the existing overland flow path parallel to the railway.
- Upgrade the existing boundary walls to flood defence standards where required.

Constraints

- Working in proximity of existing railway.
- Instream works
- Vegetation and tree removal
- Works within residential areas
- Mitigation measures are required to protect aquatic ecology (fish etc.) during construction.