



# SANTRY RIVER RESTORATION & GREENWAY

**Dublin City Council, Fingal County Council, National Transport Authority of Ireland**



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# 1. Introduction

# Team

Client: Dublin City Council, Fingal County Council, National Transport of Ireland.

Main consultant: Nicholas O'Dwyer Ltd Consulting Engineers

The project is a collaboration with a team of specialists led by Nicholas O'Dwyer Ltd Consulting Engineers including REDscape Landscape & Urbanism and Cbec Eco Engineering.





# Project mission

The overall objective of the project in conjunction with the development of Greenway infrastructure is the identification, design, and submission of a river improvement works to restore natural behaviour of the river system and mitigate flood risk



Restore the Santry River to improve physical habitat, flow connectivity, sediment, wood and nutrients.

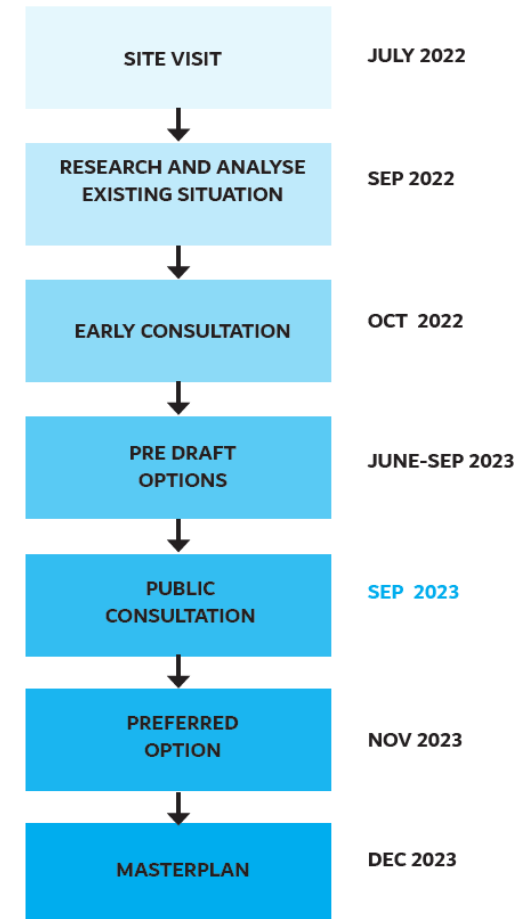


Prevent flooding of properties up to the 1% AEP flood event.



Develop a new green infrastructure project to facilitate nature, pedestrians, and cyclists and form a route from the biosphere of Dublin Bay at St Anne's Park to Dublin's wider hinterlands at Sillogue.

## Masterplan programme

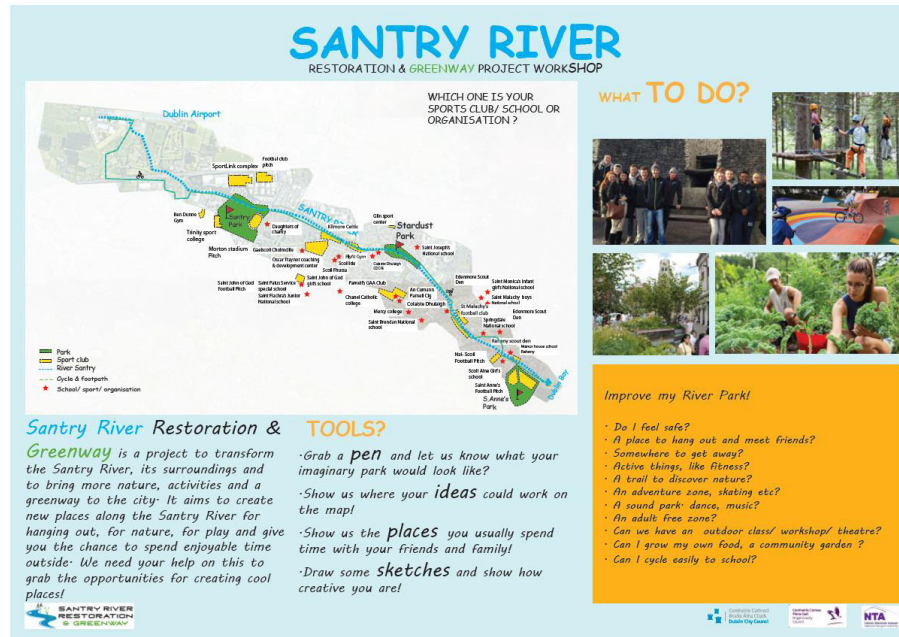


# Previous workshop

## Challenges and opportunities

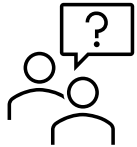
1. Participation: Your input of ideas for flood mitigation, restoration, greenway & amenity programme, ecology.

2. Analysis: policy, restoration, flood mitigation, destinations and routes, junctions, schools, play, sport, environment, future development



# Objective of the current workshop

- The objective of the current workshop is to present the options for **River Restoration**,
- **Flood Mitigation** and **Greenway**
- A variation on these options is possible.



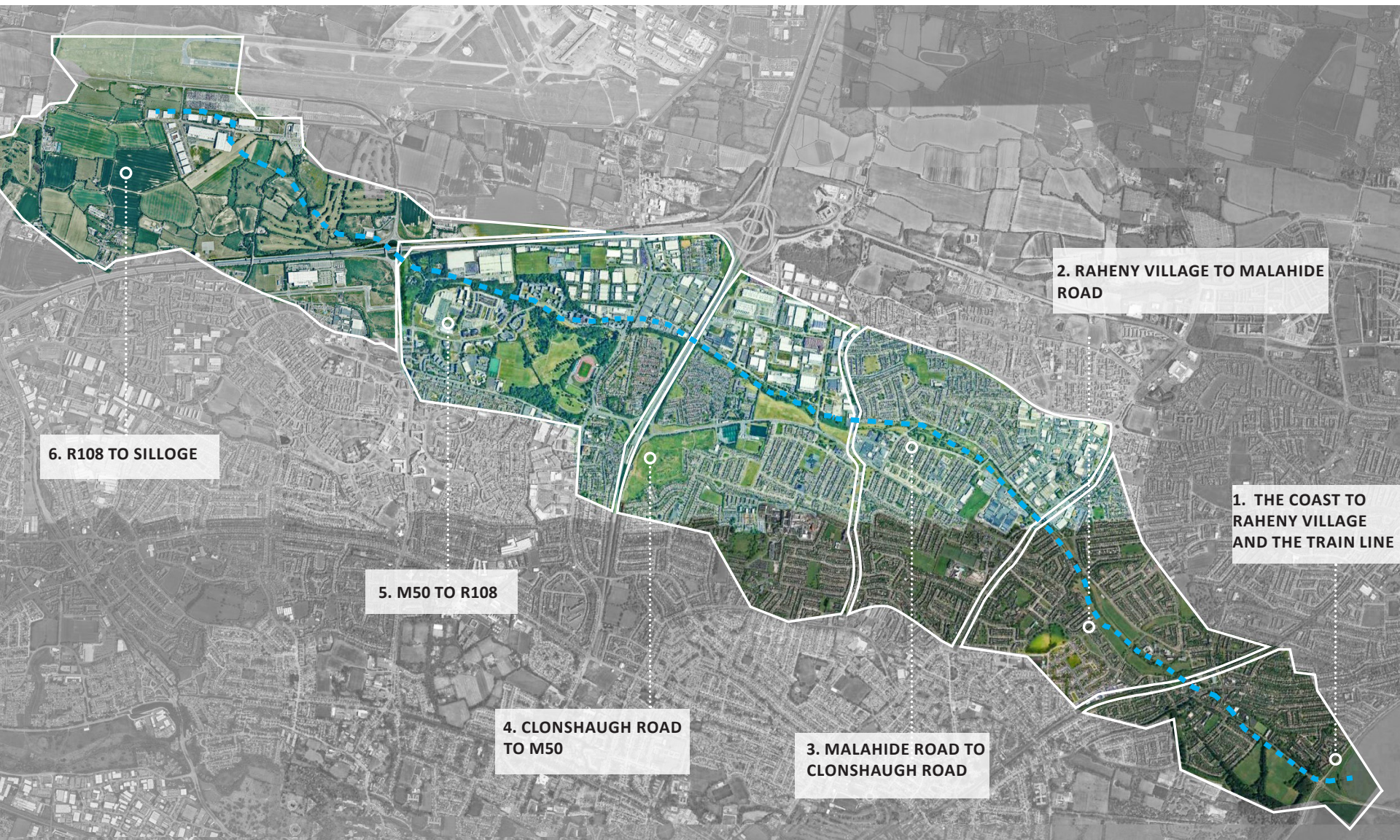
We would appreciate your insights and responses to the options.

Based on your feedback we will develop a single preferred option to be developed in the next stage.

## 2. Study Area



# CATCHMENT AREA



The catchment area is roughly 15km long and is divided into six zones.

# Study Area

## Catchment Overview



The Santry River originates from the Dublin Airport and flowing into Dublin Bay at Raheny.

The catchment has an area of 15.6 km<sup>2</sup> and it is relatively steep - highest elevation is 85.75 mAOD to 0.560 mAOD.



Maps dated 1829 to 1841 indicate that the Santry catchment was once a predominantly rural catchment, which has been developed over time due to the expansion of industry.



Modern aerial photography indicates that sections of the river have been straightened and confined to make way for urban development on the floodplain, particularly in the lower catchment at Raheny.



The existing Santry River catchment is heavily urbanised (62%) as it flows through North Dublin and the districts of Santry, Kilmore, Coolock and Raheny.

## Constraints

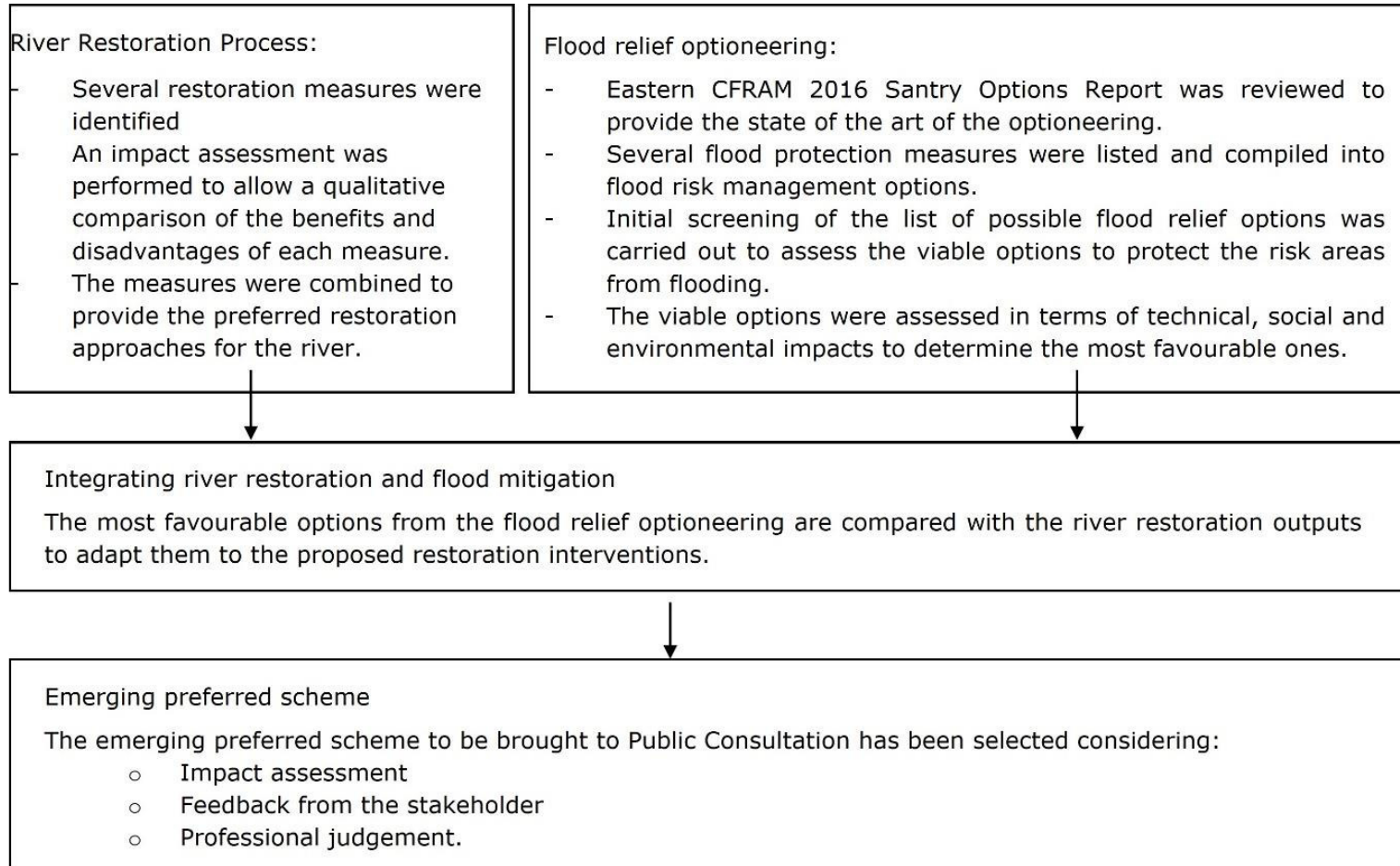
River channel heavily modified with several and straightened from its original meandering. Significant in line modifications include:

- M50 culvert
- Santry Park penstock, Pond and overflow chamber
- Range/Lidl carpark culvert, Coolock
- Stardust Park Lake
- Channel straightening and concrete bed lining from Malahide Road to Edenmore sensory Garden / Coláiste Dhulaigh
- Harmonstown Road Bridge flow restriction
- Railway Bridge
- Channel re alignment at Supervalu Raheny
- Culvert from Watermill Lawn to The Village Road (Jameson Court)
- Culvert from James Larkin Road to sea outfall

# 3. River Restoration and Flood Mitigation



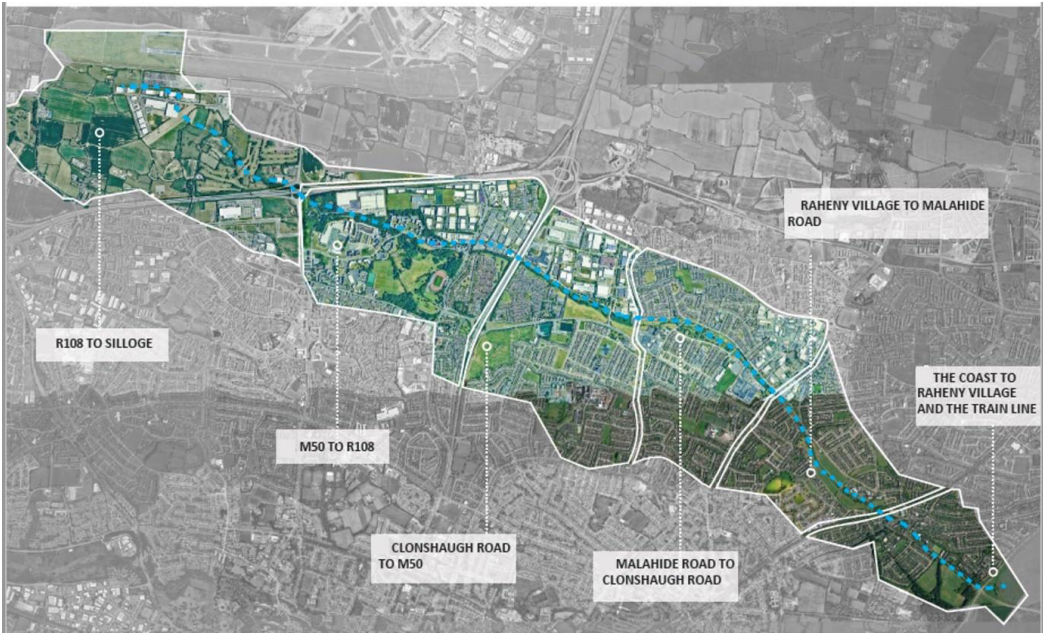
# Nature-based approach for River Restoration and Flood mitigation





# River Restoration

## Fluvial Audit



Santry River key reaches (1 to 6) from the Santry River Restoration: Hydrogeomorphological Assessment Report

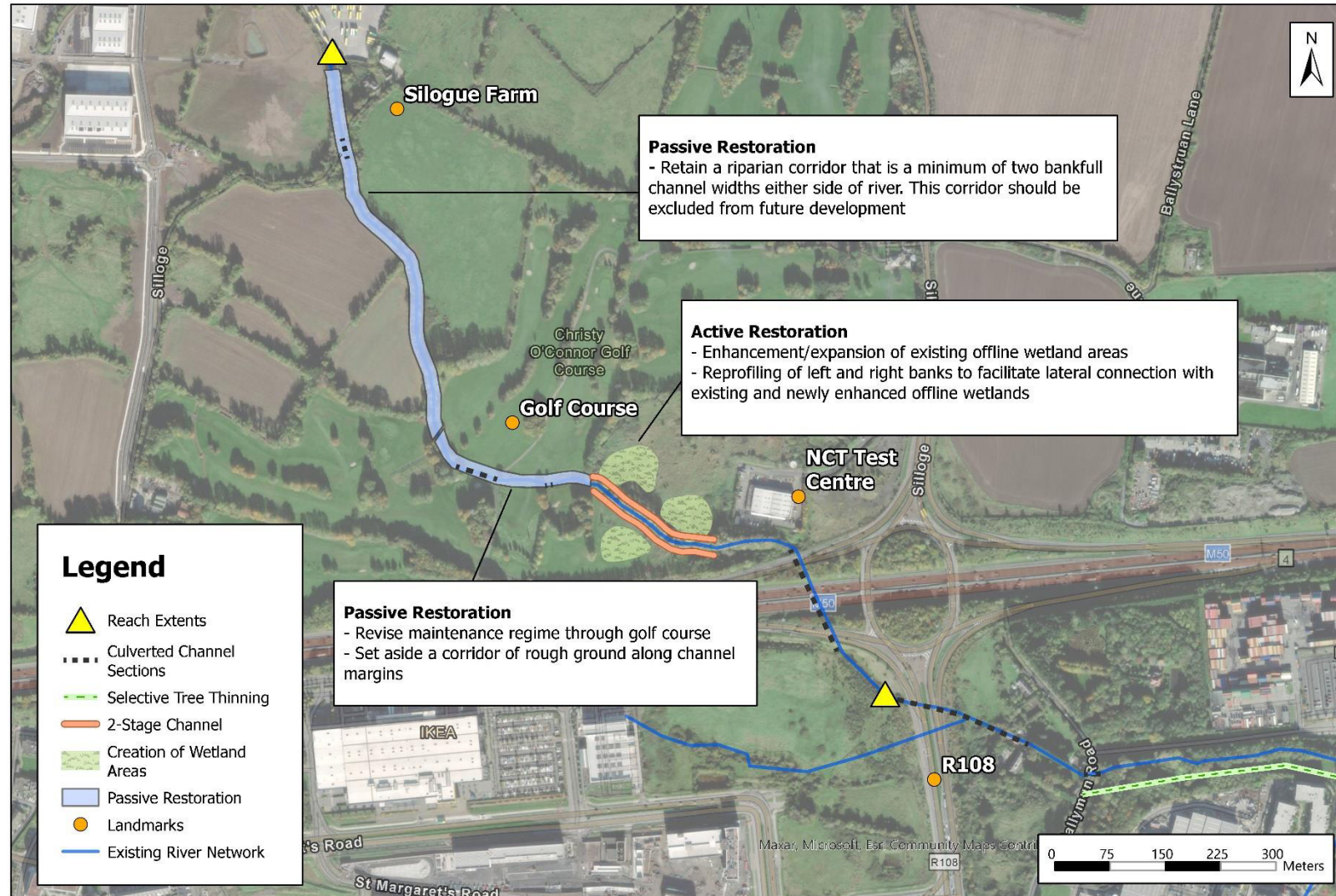
- In Reach 1 above the M50 motorway, pressures include Dublin airport, agricultural land, and a golf course.
- Reaches 2-5 reflect a mixture of channel modifications resulting from the neighbouring urban area.
- Reach 6 is faced with heavy urban pressures and lack a riparian fringe. Instead, urban development has encroached up to the channel edge and, in one case, over it, where an apartment block straddles the channel leaving the Santry culverted before it empties into Dublin Bay

## Restoration measures

Approach	Description	Examples of measures
Passive Restoration	Measures with the potential for natural self-recovery or if the prospect of other measures is limited. They are usually non-structural measures and are implemented within the context of catchment management planning.	Revise maintenance of riparian vegetation along the banks
		Selective vegetation thinning along the banks to increase sunlight access.
Assisted Recovery	Approaches generally consist of combining multiple smaller-scale interventions and the removal of constraints to promote a trajectory of natural recovery in the river's channel morphology and functioning.	Removal of hard bank and bed protection
		Barrier removal  Use of large wood structures to promote heterogeneity of channel habitat.
Active Restoration	Measures include a range of generally extensive physical works required to restore more natural conditions in river reaches with little capacity for 'self-healing'.	Reprofile banks and creation of two stage channel
		'Daylighting' a currently culverted reach  Creation / Enhancement of existing wetlands

# Restoration Approaches

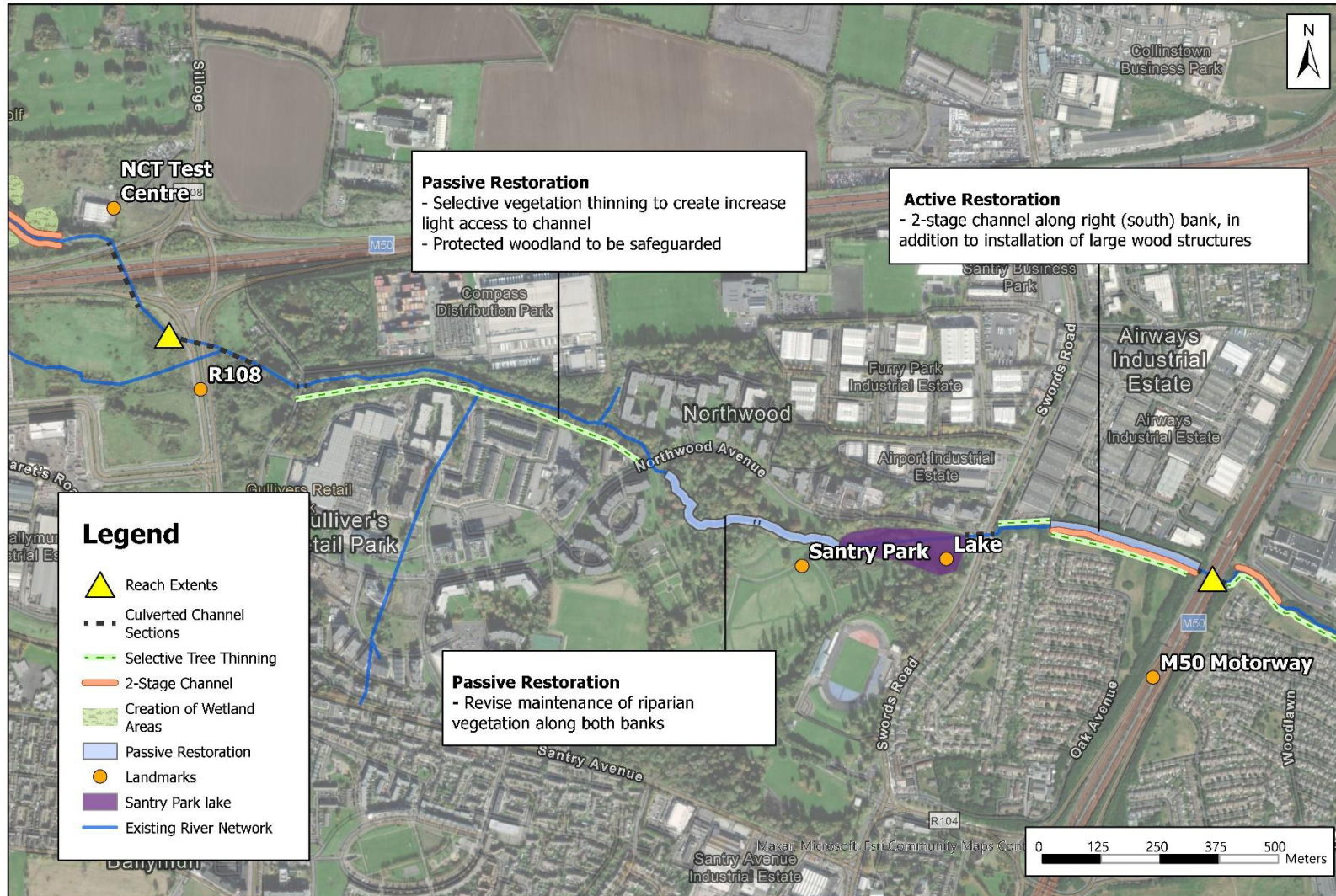
## RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 1





# Restoration Approaches

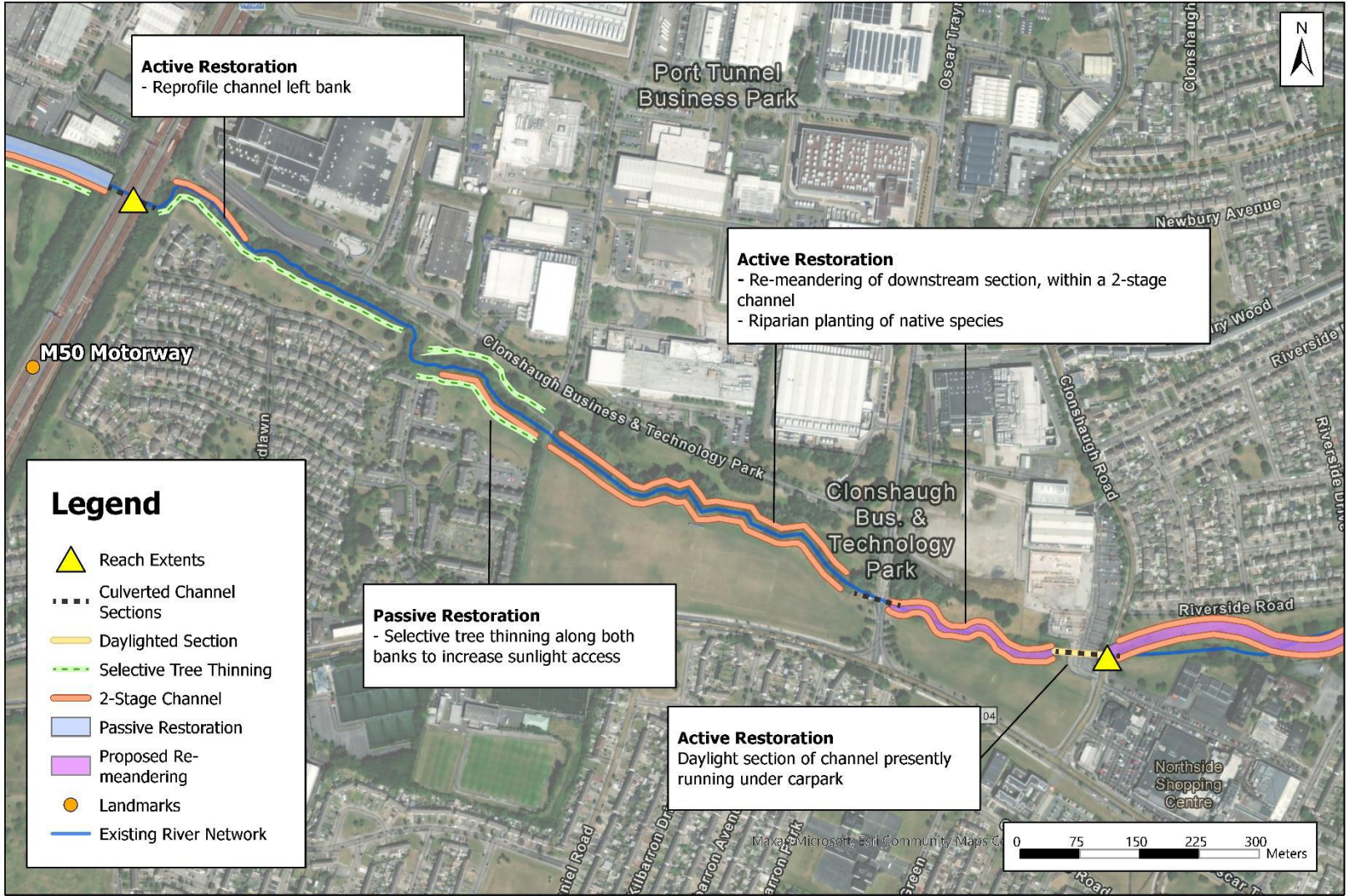
RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 2





# Restoration Approaches

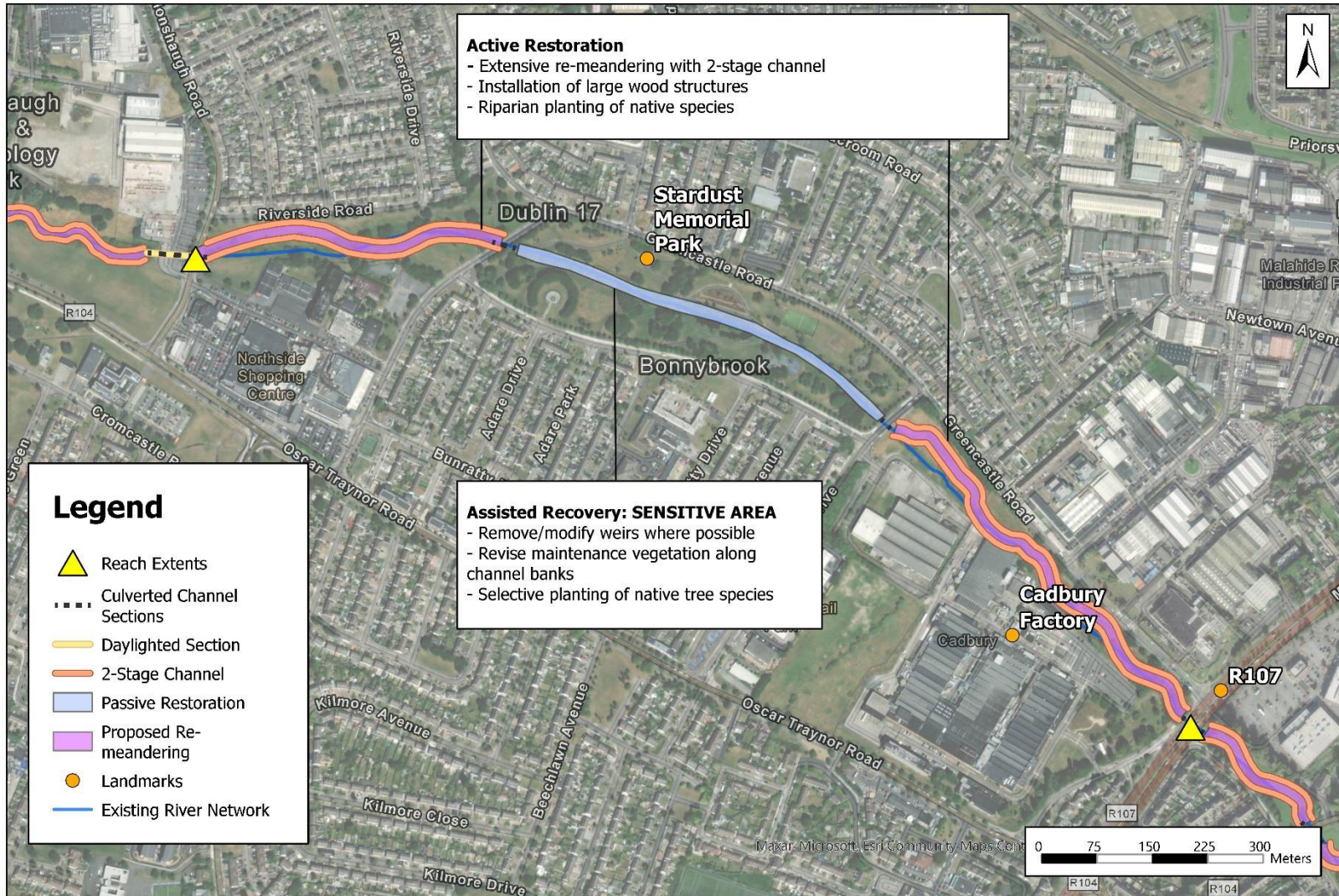
RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 3





# Restoration Approaches

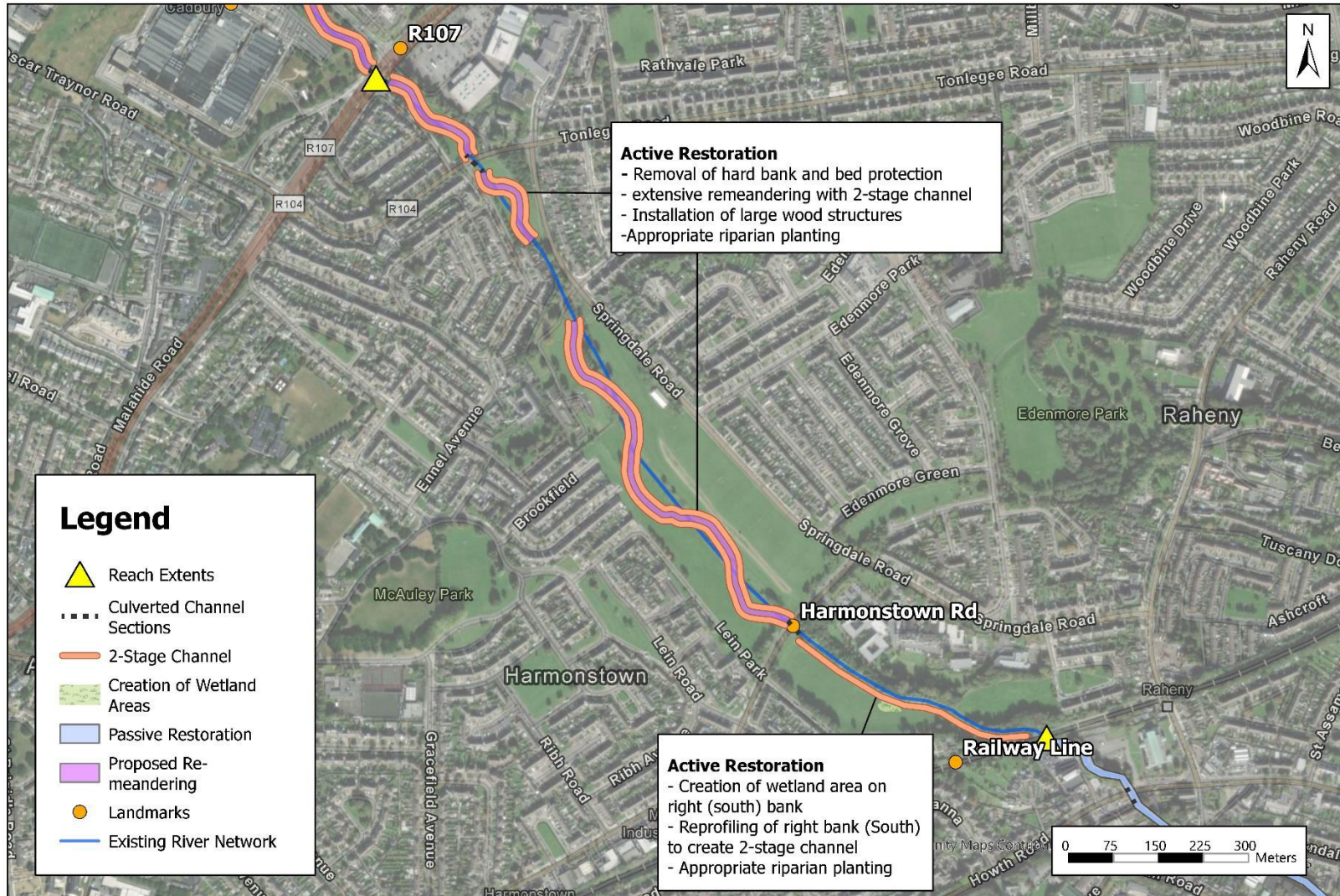
## RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 4





# Restoration Approaches

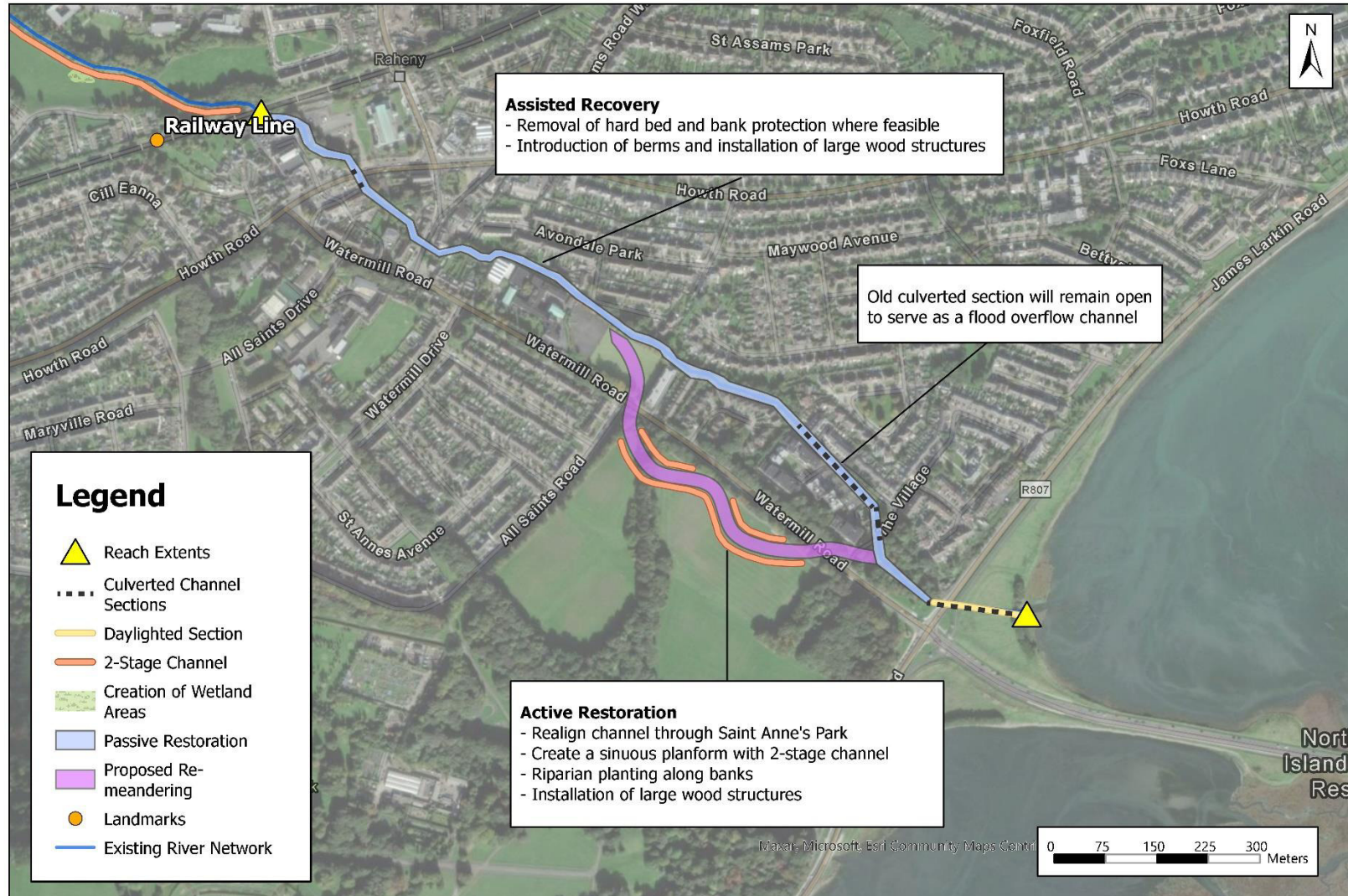
## RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 5





# Restoration Approaches

## RIVER SANTRY - PREFERRED RESTORATION APPROACHES - REACH 6



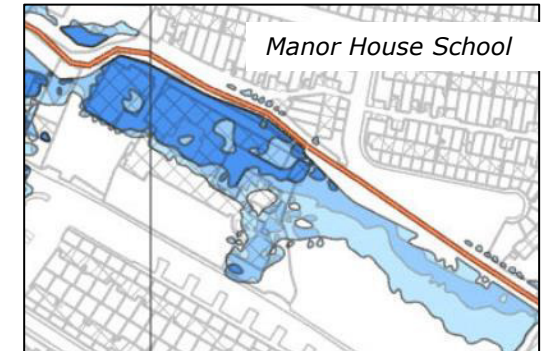
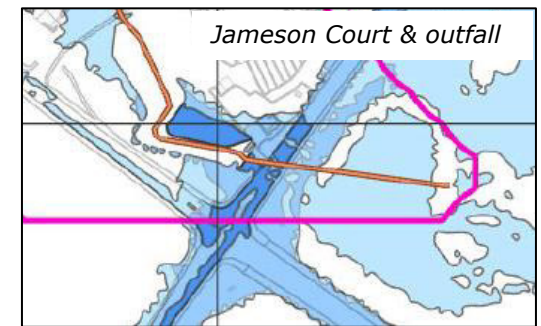
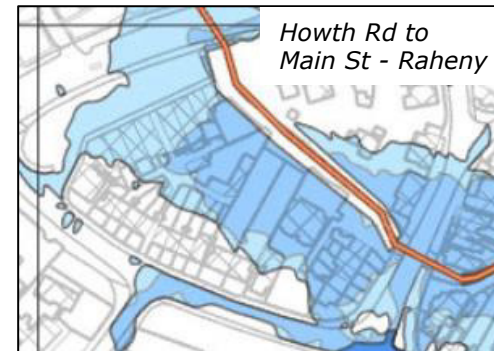
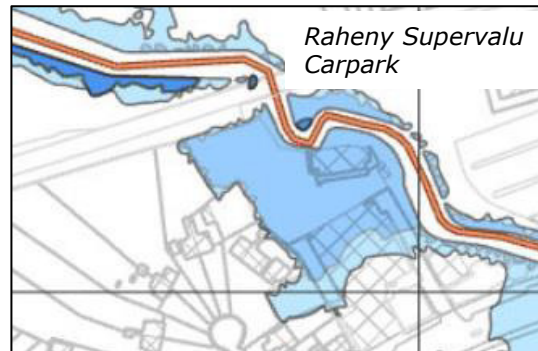
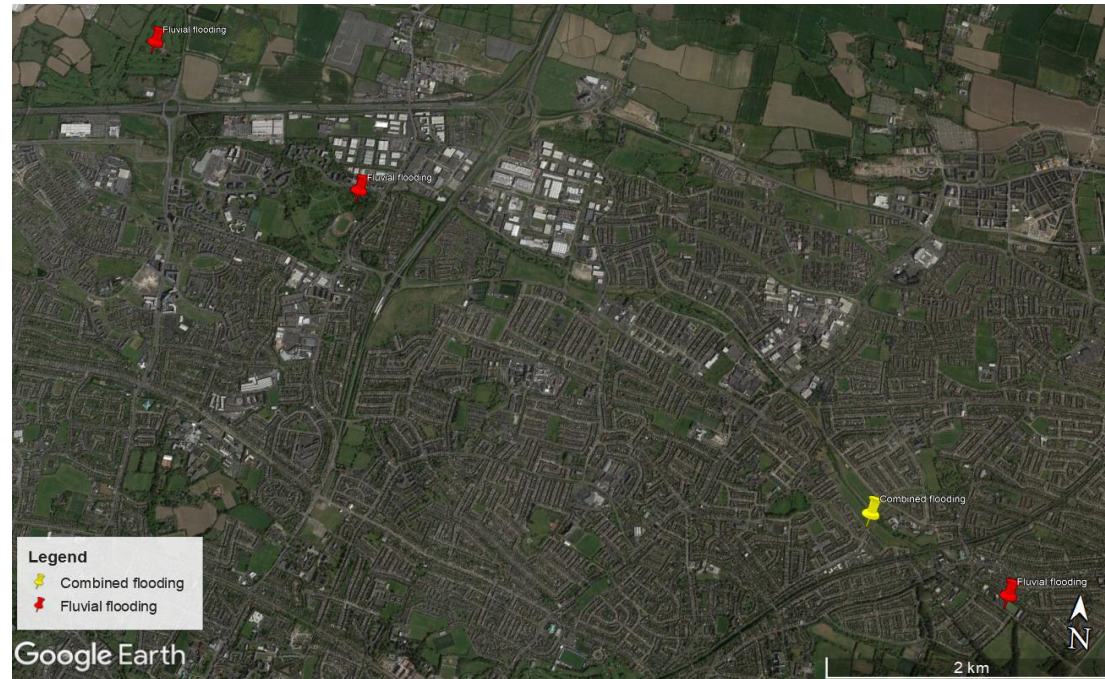
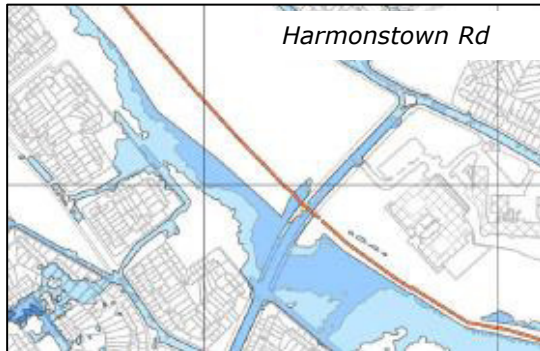
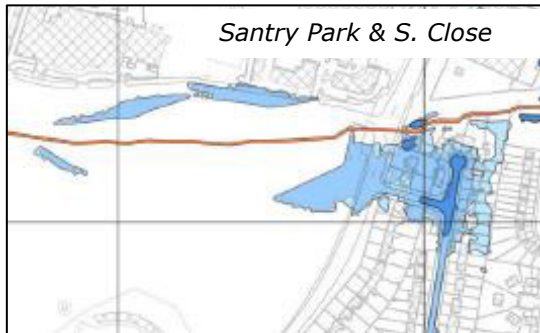
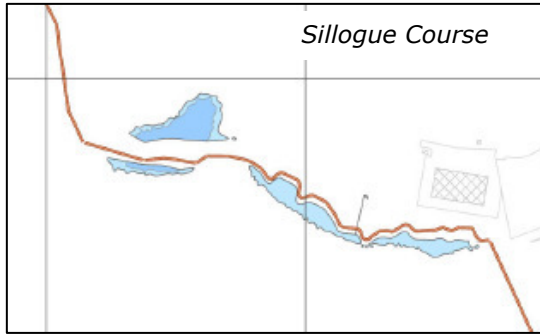


# Flood Hazard – Baseline Design Event

The Target Standard of Protection of the Scheme is to prevent flooding of properties and assets within the Scheme Area during flood events with a 1% AEP (e.g. the 1% AEP event has a 1% or 1 in 100 probability of happening in any year)

## Flood Extent

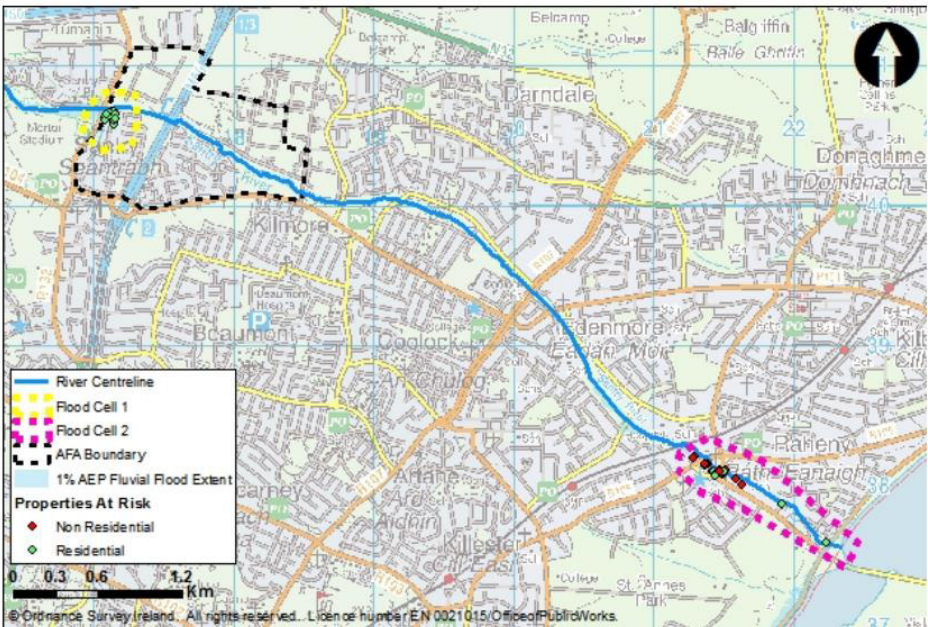
- 10% AEP Extent
- 1% AEP Extent
- 0.1% AEP Extent





# Flood Hazard – CFRAM

Santry HPW/AFA Flood Cells within a 1% AEP Fluvial Flood Extent



- Fluvial flooding at Santry Close, caused by the limiting capacity of the culverted outlet from the pond in Santry Demesne.
- Flooding from Santry Lake crossing the R132
- Flooding in Raheny village caused by restricted capacity of the river channel and bridges at Howth Road and Main Street, the limiting capacity of the river channel adjacent to Manor House School and of the culverted outlet to Dublin Bay.

Flood protections measures considered in the Santry HPW/AFA

- CFRAM Storage at Santry Park, Coolock Lane Park, Stardust memorial Park, Harmonstown Road
- CFRAM Improvement of channel conveyance at the outlet culverts from Santry Demesne and in Raheny Village
- CFRAM Hard defences at Santry Close and in Raheny.
- CFRAM Diversion of flow was considered but no suitable locations were identified.

Flood protections options considered in the Santry HPW/AFA

Method	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Storage FC 1	✓	✓	✗	✗	✗	✗
Improvement of Channel Conveyance FC 1	✗	✗	✓	✓	✗	✗
Hard Defences FC 1	✗	✗	✗	✗	✓	✓
Improvement of Channel Conveyance FC 2	✓	✗	✓	✗	✓	✗
Hard Defences FC 2	✗	✓	✗	✓		✓

# Flood Risk Management Options

Options were developed to provide flood protection up to 1% AEP in the areas of Santry Lake, Harmonstown Road and Raheny Village.

Option	Description
Op 0	Do minimum -maintenance of the channel
Op 1	Storages + Flood walls in Raheny
Op 2	Storages + Flood walls in Raheny + Diversion of flow

1



- Storage at Santry lake: volume of water stored around 15 000m<sup>3</sup>
- Storage upstream of Harmonstown Rd: volume of water stored around 5 000m<sup>3</sup>
- Wall alongside Harmonstown Rd and Lein Park approx. 440m long and 1m high.
- After crossing Howth Rd, a wall approx. 70m long 1m high on the left bank side and a wall approx. 125m long 1m high on the right bank side.
- After crossing Main Street, a wall about 58m long 0.55m high on the left side.
- Wall about 205m long 1.2m high on the right bank side at Manor House School.
- Wall about 170m long 1.2m high on the right bank side at Watermill Estate.

2



- Storage at Santry lake: volume of water stored around 15 000m<sup>3</sup>
- Storage upstream of Harmonstown Rd: volume of water stored around 5 000m<sup>3</sup>
- Route 1: open channel from Manor School to Watermill Rd for 170m. Culvert under the road for 65m. Open channel through St Anne's Park for 330m.
- Route 2: open channel from Manor School to Watermill Rd for 170m. Culvert under the road for 107m. Open channel north of Watermill Road along the Village for 265m.

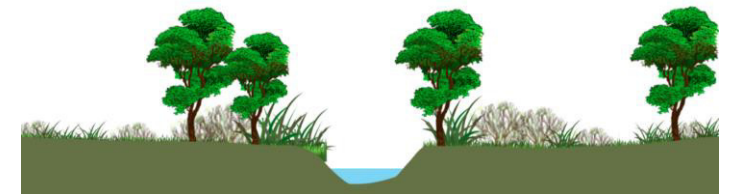
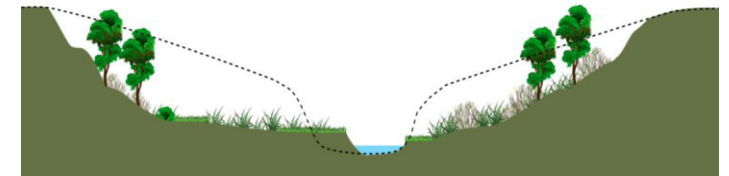
With respect to Option 1, the diversion reduces the flood walls height at about:

- Wall 205m long 0.7 m high on the right bank side at Manor House School
- Wall 115m long 0.7 m high on the right bank side at Watermill estate.



# Integrating River Restoration & Flood Mitigation

Restoration Approach	Restoration benefit	Flood management pro/cons	Flood measure
<b>Creation of wetlands</b>	Increase in water quality and wildfowl habitat	Increase water storage	Storage SuDS
<b>Two-stage channel</b>	Increase in flow velocities during low flow conditions which encourages a greater range of morphological units and micro-habitats.	Creation of floodplain, thus increasing the water storage	Storage SuDS
<b>Re-meandering/ removing hard bank and bed protections</b>	Improving in the hydro-morphological condition of the river	Reduction in water velocity, causing backlog of water and thus increasing the risk of flooding.	
<b>Planting vegetation</b>	Returning river to natural state	Runoff reduction thanks to the interception, transpiration, and root uptake. However, maintenance should be needed to avoid falling leaves to obstruct the river.	SuDS
<b>Diversion channel</b>	Improving in fisheries habitat	Remove of pressure of the main river, thus avoiding flooding.	Flow diversion



*Restoration approaches proposed, pros and cons of those with respect to the flood risk management and the relative viable flood measure. SuDS measures are included as a steer for the potential future surface water concept design.*

# Outcomes



The restoration approach proposed was informed by data gathered during desk- and field-based assessments to combine restoration measures which are geomorphologically appropriate at the reach-scale.



The flood mitigation optioneering has led to two preferred options:

Upstream storage + Flood walls (Option 1) & Upstream storage with Flood walls + flow diversion in Raheny (Option 2).



4 possible locations for the upstream storage were identified - Santry Park, Coolock Lane Park, and upstream of Harmonstown road – to be used to store water thanks to the creation of floodplains derived from the 2-stage channel.

At this stage, storages at Santry lake and upstream of Harmonstown road were considered as the most beneficial in terms of flood protection.



The flow diversion through St Anne's Park was assessed as beneficial for both restoration & flood protection.



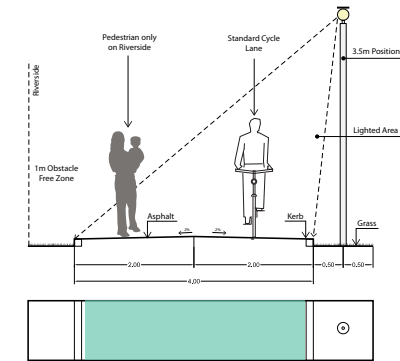
The flood walls represent a structural flood protection measure necessary to protect sensitive area in Raheny. However, they represent a cheap and quick option and glass walls can be considered to preserve the visual amenity and to reduce the impacts to short-term impacts related to the construction phase.

## 4. Greenway options and furniture handbook

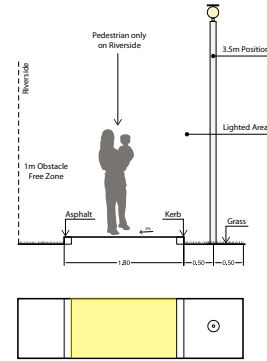
# GREENWAY OBJECTIVE OF CURRENT WORKSHOP

- Two (or three) options for greenway
- Based on your feedback (questionnaire) we will develop a single preferred option to be developed in the next stage.
- Feedback for Furniture proposals
  - + Junction realignment
  - + Additional pedestrian connections & bridges
  - + Public realm enhancement (eg Raheny Main Street)
  - + New amenities (e.g. adventure play area, hangouts)
  - + New trees and biodiversity planting
  - + Removal/ replacement of industrial railings & opening up enclosed areas
  - + Signage and information

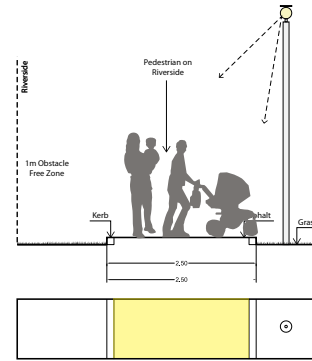
# A SEGREGATED CYCLE AND WALKWAY



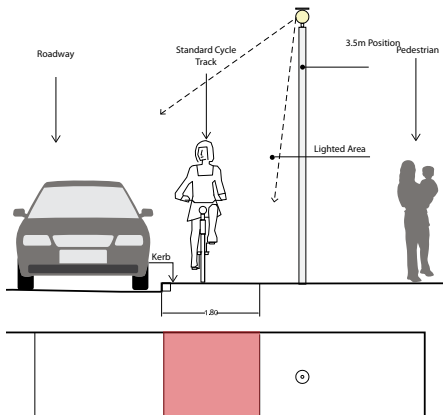
Greenway (shared Pedestrian/Cycle)



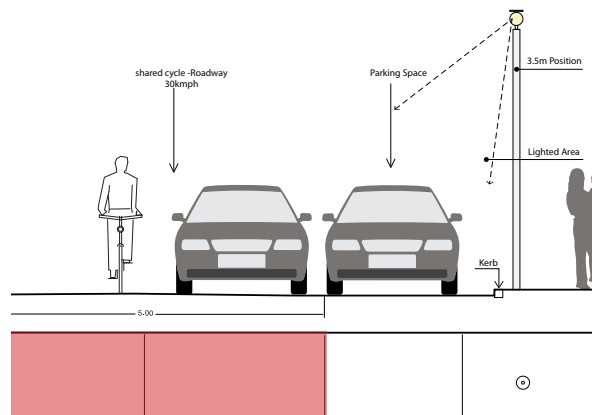
Pedestrian Only (default option) for example in historic situations.



Pedestrian Only, the minimum requirements for two wheelchairs/ buggies to pass. (DMURS)



Single direction cycle Track, 1.8m wide beside a traffic lane. ( Safety Cycle Manual).



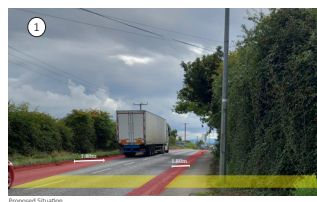
On-Road Shared cycle - roadway of 5m wide at 30kph. (DMURS)

- Greenway (shared Pedestrian/Cycle)
- Pedestrian route
- Single cycle route (on-road)
- Two way cycle route ( on-road)

The greenway is a segregated cycle and walkway about 4m wide using the 'share with care' approach and complimented with pedestrian-only and on-road cycle routes.

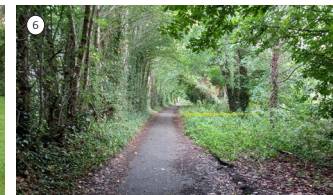
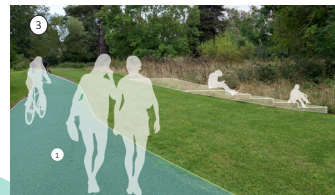
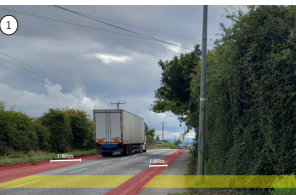


# Dublin Airport to M1 underpass - Option 1



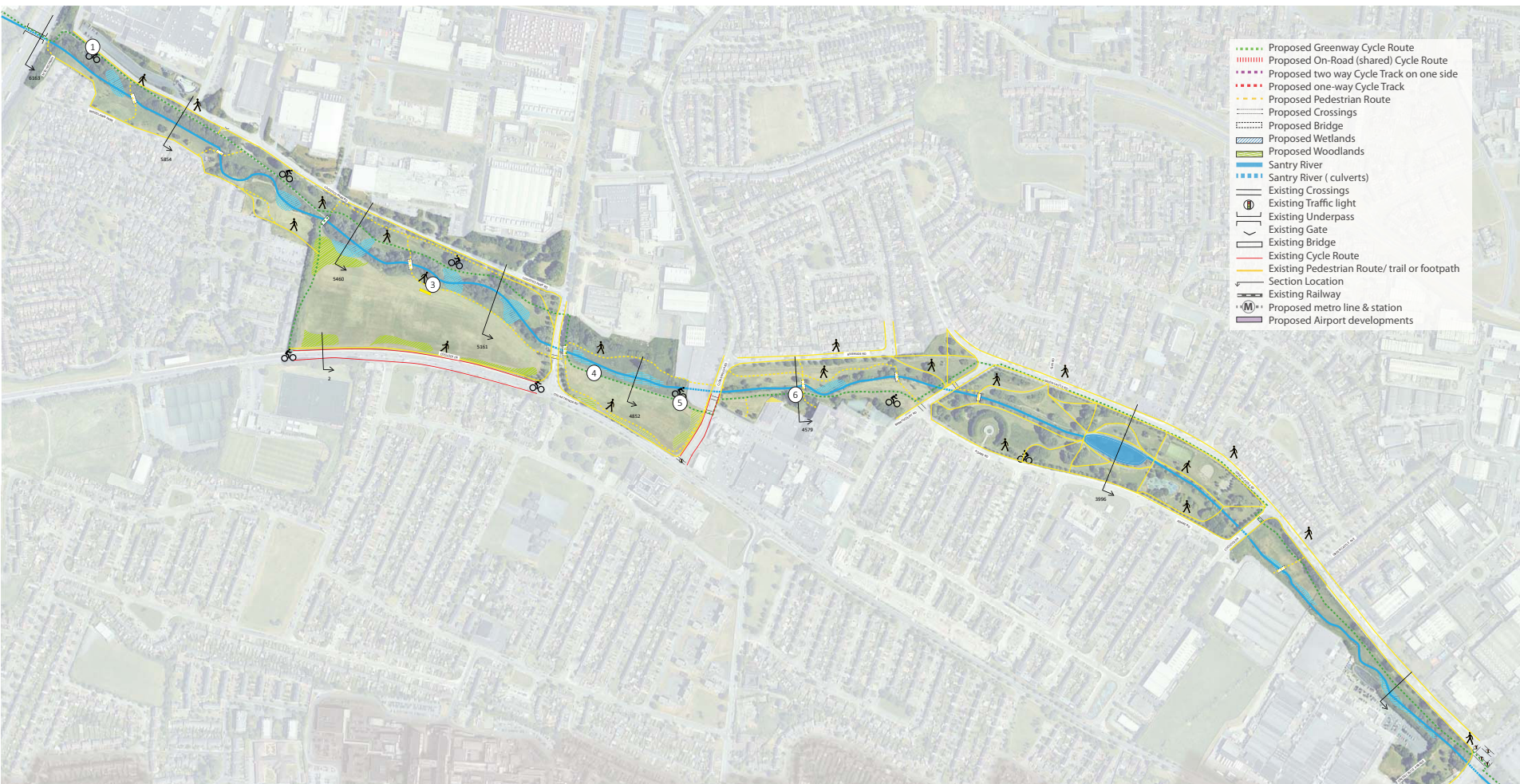


# Dublin Airport to M1 underpass - Option 2



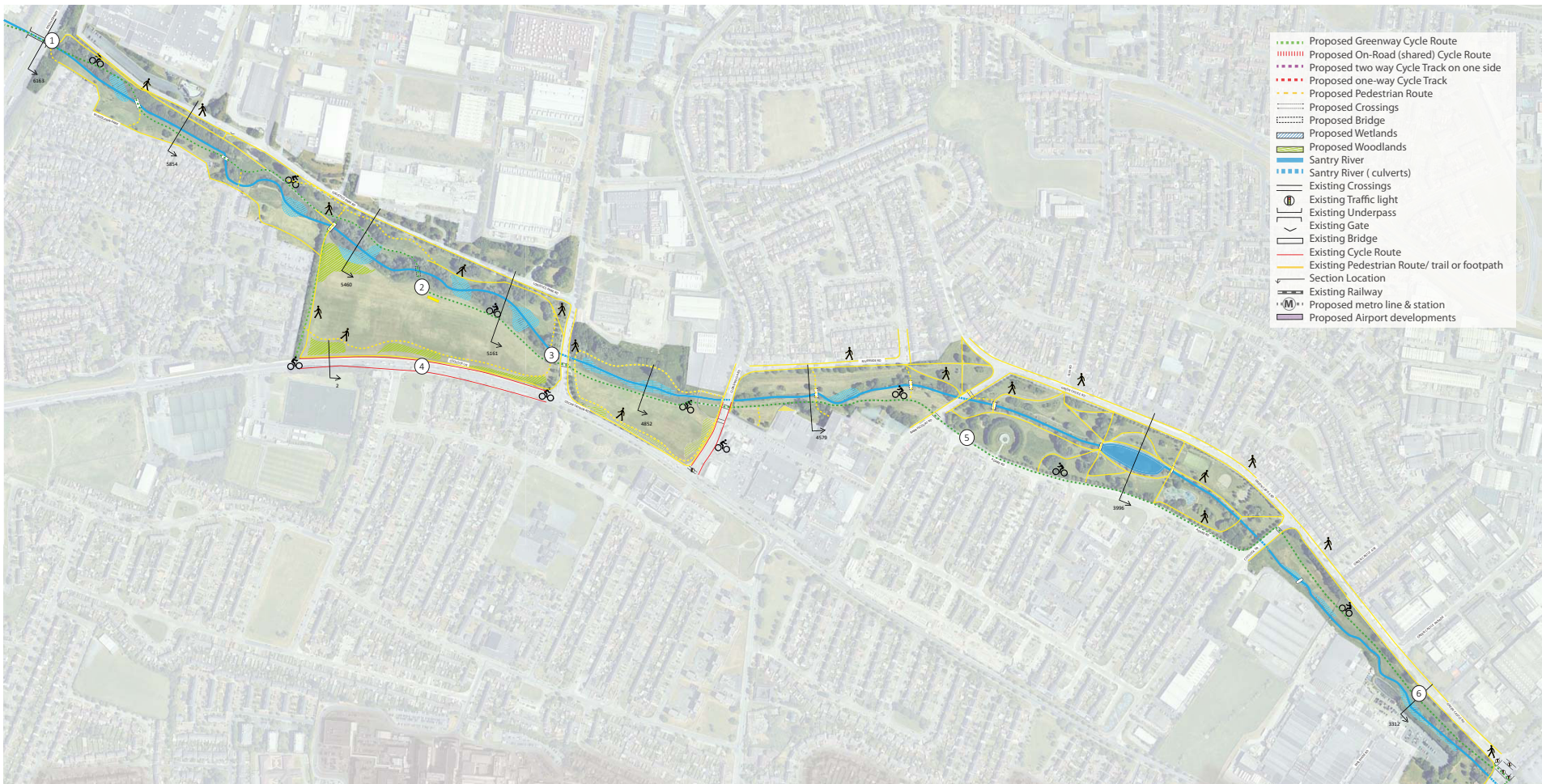


# M1 underpass to Malahide Road - Option 1



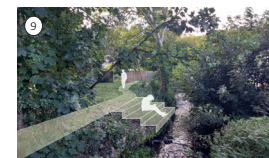
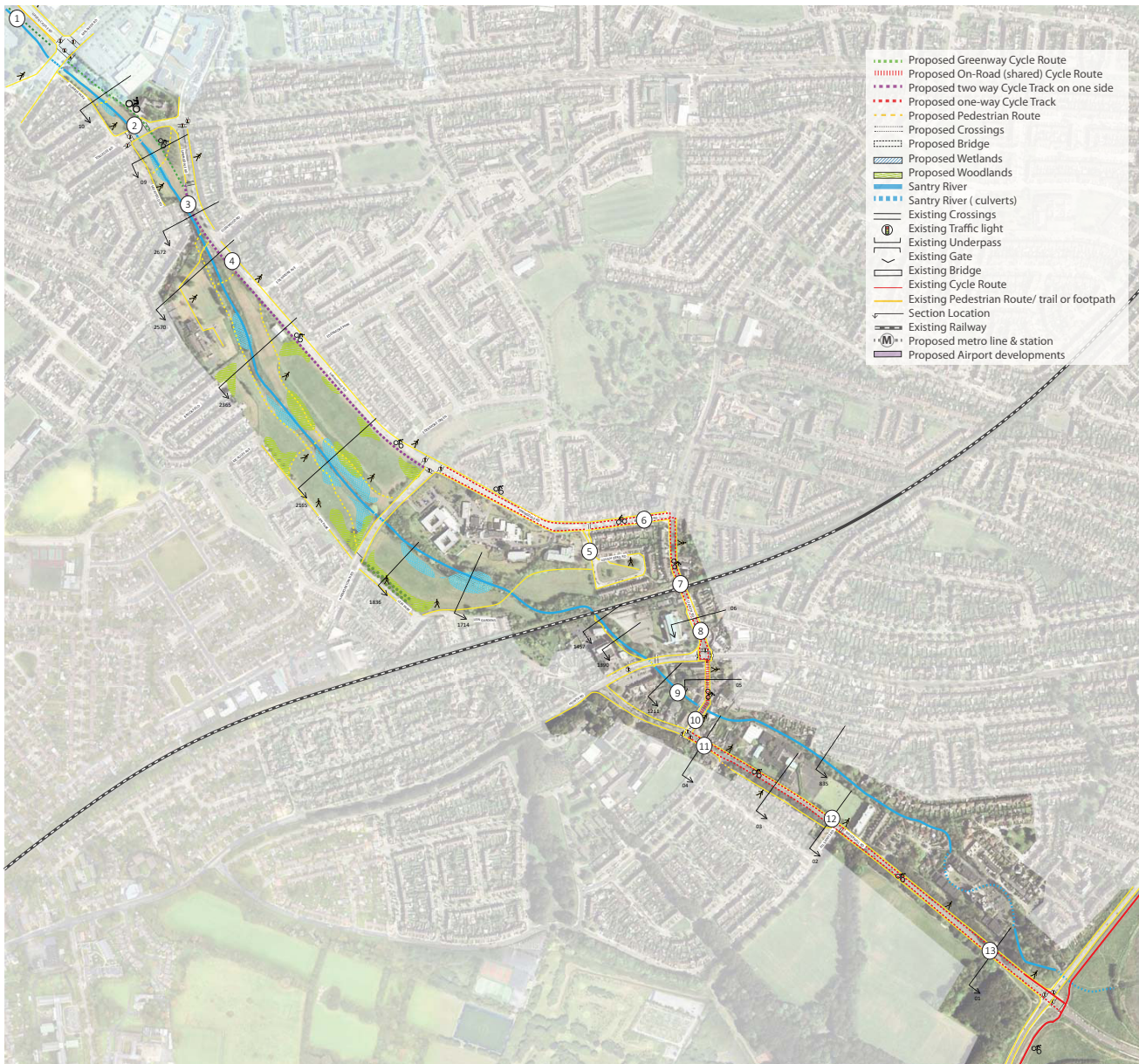


# M1 underpass to Malahide Road - Option 2



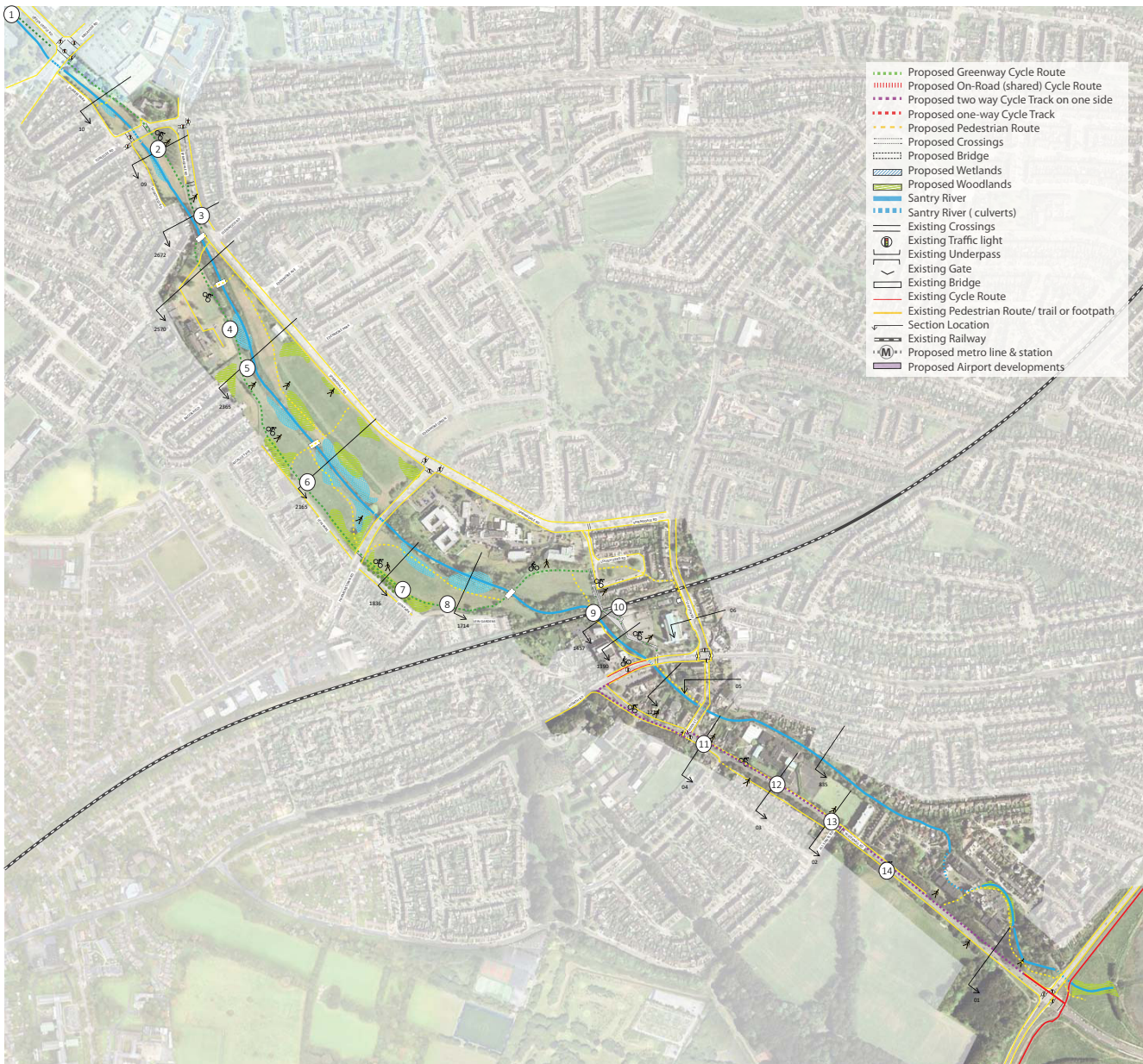


# Malahide Road to Coast - Option 1



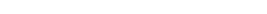
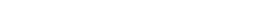
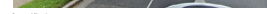
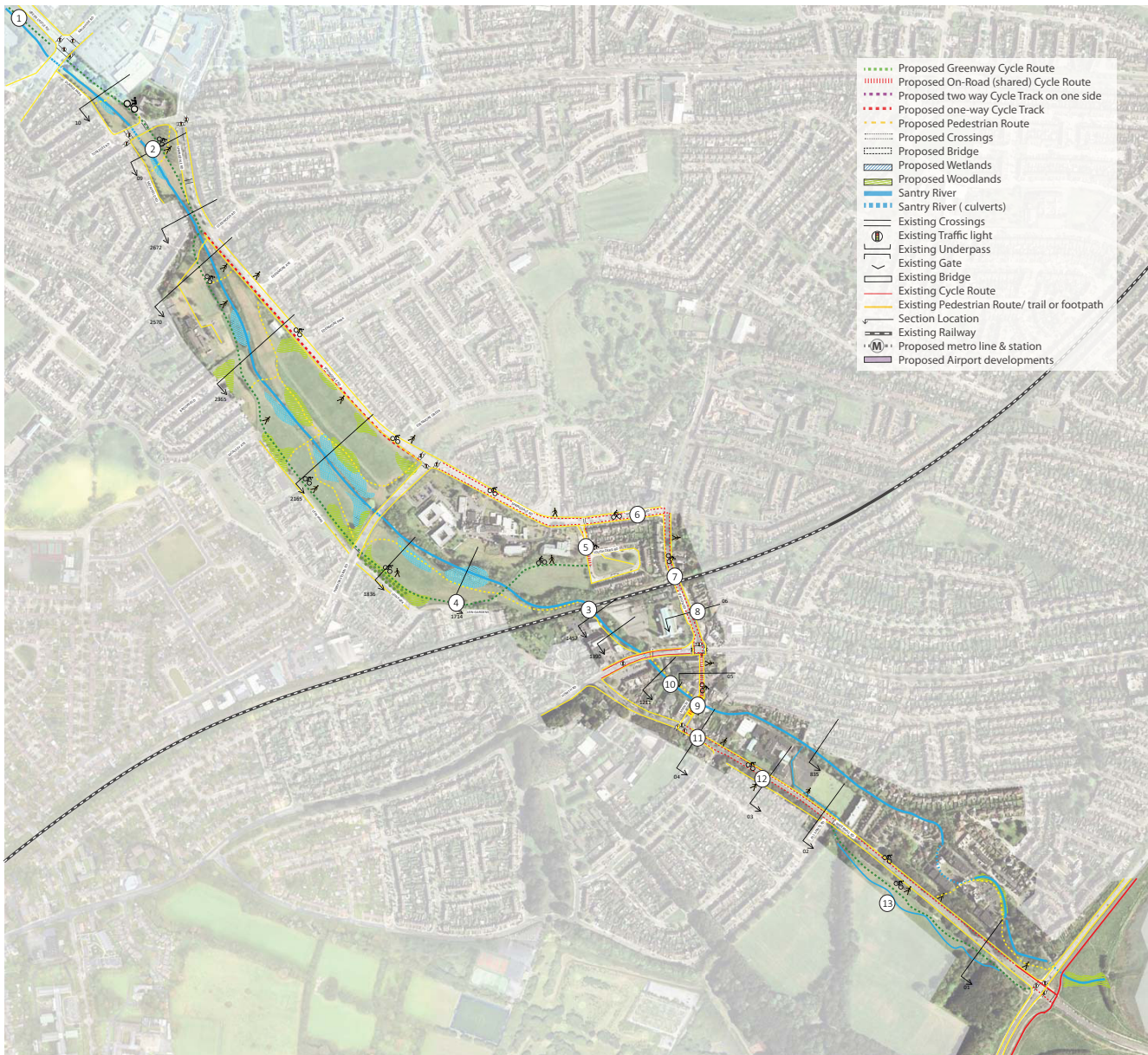


# Malahide Road to Coast - Option 2





# Malahide Road to Coast - Option 3



# OBJECTIVE OF FURNITURE HANDBOOK

The handbook proposes an overarching design for an attractive, robust, low maintenance set of furniture that reflects the nature-based qualities of the Santry Riverpark and strengthens its visual cohesion.



Corten steel



FSC class 1 Irish oak



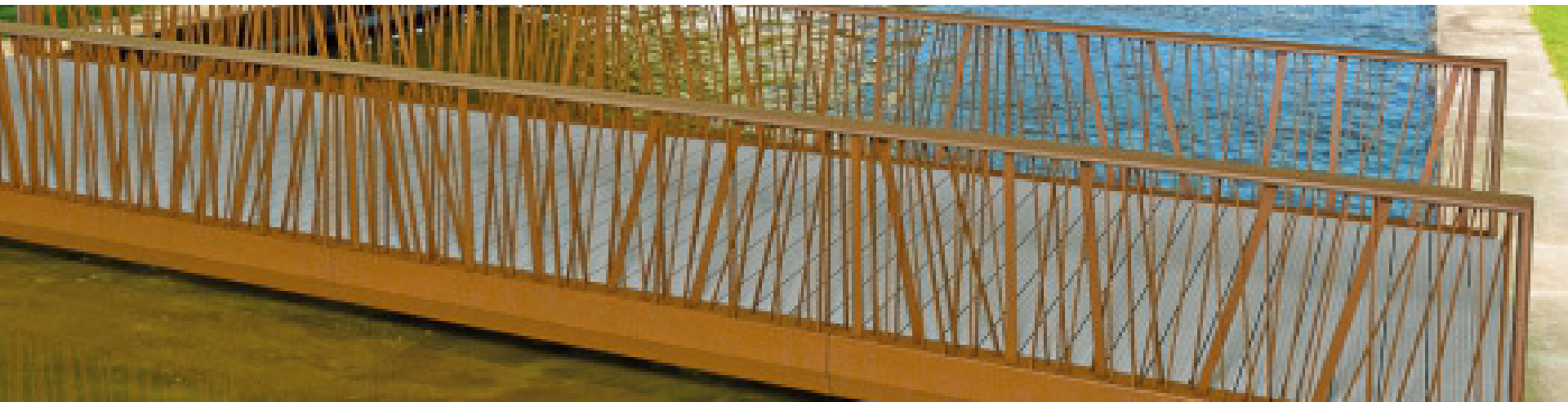
Asphalt



Concrete



## Pedestrian and cycle bridges

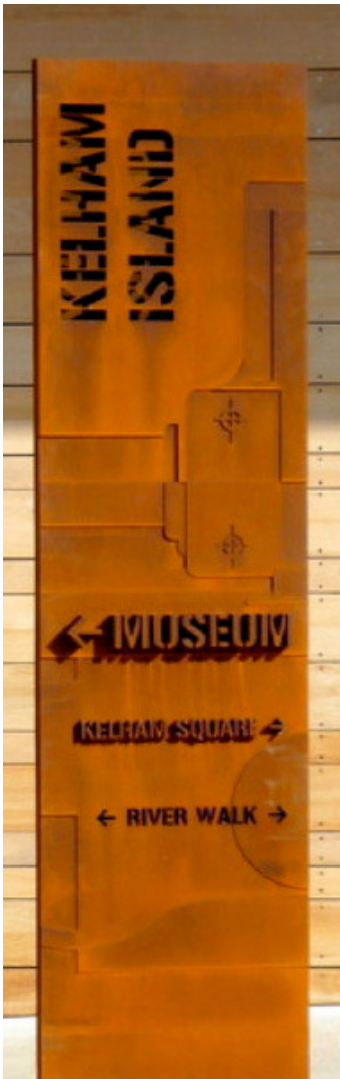




## Stepping stone crossings



Information holders/ signage / wayfinding





# Seating & Viewing points

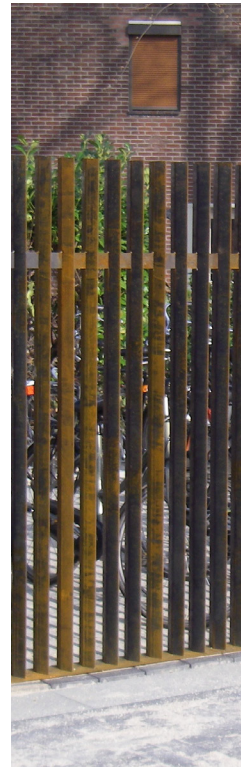


## Viewing Platforms & Retaining walls/steps





## Railings





Adventure play in wet areas





Hangout canopy for teenagers, bollards, bike parking



# 5. Feedback



# Next Steps

- Collection of outputs from this public consultation
- Identification and selection of an emerging preferred scheme
- Move to the preliminary design by carrying out surveys and field investigations
- Development of the masterplan

Looking forward to your feedback and comments

