



# Lower Lee (Cork City) Drainage Scheme

(Flood Relief Scheme)

## Public Meeting

10 March 2017

# The Problem

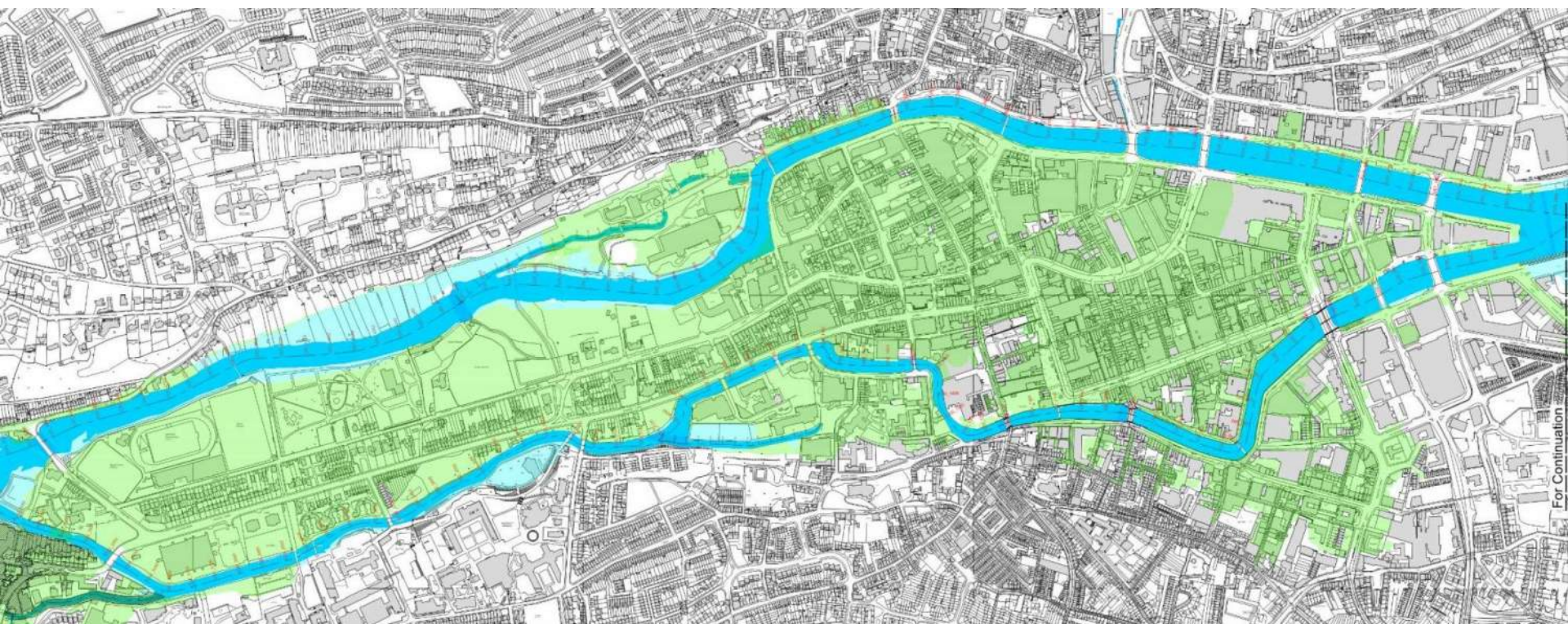


# Fluvial (2009)/ Tidal(2014)





# Flood Extents and Benefitting Lands (Central Island)



- 1% AEP Fluvial (River Lee) / 0.5% AEP Tidal Flood Extent  
(1 in 100 year fluvial / 1 in 200 year tidal flood extent)
- Benefitting Lands  
(Defended against River Lee events up to the 1% AEP Fluvial / 0.5% AEP Tidal)
- Watercourse

The 2009 event alone is estimated to have cost householders and businesses about €90m

# Developing a Solution



# Objectives and Key Issues

- Viable, cost effective and Sustainable Flood Relief Scheme, building upon the findings of the Lee CFRAM Study
- Standard of Protection (SOP) to be 1 in 100 year fluvial/ 1 in 200 year tidal event)
- Maximise Benefit of Carrigadrohid & Inniscarra Dams
- Preserve, Restore and reuse Existing Quays
- Solution to be sensitive to city heritage
- Enhance connectivity with the river, improved river walkways and public realm space.
- Keep defence heights in city centre below guarding height
- Minimise flood gates in tidal reach and avoid in fluvial reach
- Easily adaptable for Climate Change Scenario
- Ensure early and regular Stakeholder and Landowner Consultation/Engagement



# Public Consultation

Description of Event	Consultation dates
Constraints Stage	17 July 2013
Emerging Preferred Option	29 July 2014
Statutory Exhibition of Scheme	Dec 2016/Jan 2017 (submissions by 7 April 2017)

*Exhibition extensively advertised in local and national print/radio media and social media*



In accordance with the Arterial Drainage acts 1945 and 1995, the Office of Public Works is bringing forward a proposed Drainage Scheme (Flood Relief Scheme) in respect of part of the Lower Lee, which is down stream of Inniscarra, Co Cork and through Ballincollig, Co Cork and through Cork City and its tributaries for the purpose of preventing or substantially reducing the periodical localised flooding of lands in the area of that watercourse.

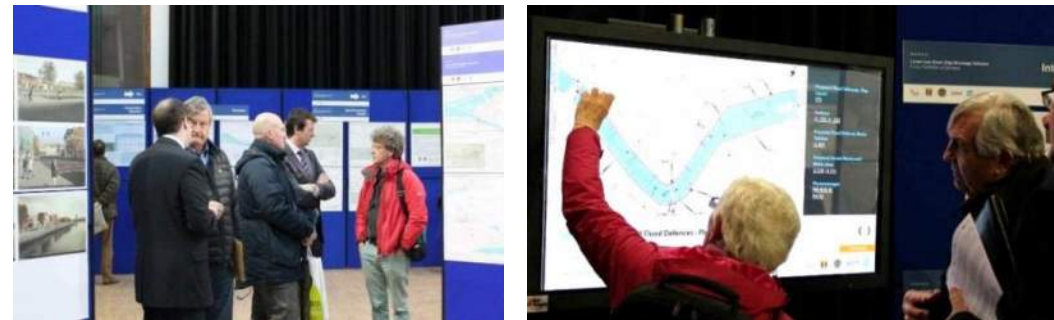
## Four Manned Statutory Exhibition Dates

Date
Monday, 12th December 2016
Tuesday, 13th December 2016
Tuesday, 20th December 2016
Thursday, 19th January 2017

Displays at:

- The Foyer, City Hall
- The Foyer, County Hall
- Public Library, Ballincollig
- Central Library, Grand Parade

- Individual Consultation Meetings with over 100 landowners directly affected by the works in advance of Statutory Exhibition
- Circa 500 statutory notices
- Previous Briefings with Cork Chamber and CBA as well as local Elected Representatives
- Ongoing Stakeholder Consultation Planned for Upcoming Stages of the Project



Project Website: [www.lowerleefrs.ie](http://www.lowerleefrs.ie)

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(Flood Relief Scheme)

ARUP

JBA  
consulting

# Long List of Options Considered

*(in Lee CFRAMS and/or in Lower Lee FRS)*

- **Modified Operation of Inniscarra and Carrigadrohid Dams**
- **Flood Forecasting and Flood Early Warning System**
- Planning Control and Building Regulations
- Public Awareness Campaign
- Upstream Flood Storage and Land Use Management
- **Washlands**
- **Direct Flood Defences**
- Channel Widening
- **In-channel Flow Regulation**
- Bridge/Weir Modifications
- Local Conveyance Improvements
- Property Occupier Relocation
- Individual Property Protection
- **Pumping**
- Tidal Barrage



# Proposed Solution

# The Solution for Lower Lee

- **Flood Forecasting System and Flood Warning Service**
- **Revised Dam Operating Procedures for Extreme Events**
- **Designation of Upstream Washlands** to facilitate greater advance discharges (up to 300m<sup>3</sup>/s) from the dams.
- **Direct Defences** downstream of Inniscarra Dam and through the City
- **Flow Regulation Structure on South Channel** to reduce flood risk in South Channel)
- **Small number of Flood Gates** at some footbridges and boardwalk locations
- Localised **Surface Water Pumps** to deal with 'back of wall drainage'



# Benefit of Solution

# Key Benefits of Scheme

- A city **free from** the regular **flooding** events of the past
- **Incentivising** significant **future investment** in the City
- Significant **local employment** during construction
- Provision of almost **1km of new river walkways** enhancing connectivity
- **€20m** of much needed **investment in repair of historic Quay walls** which could be at serious risk of collapse
- **Protection** of a significant number of **heritage assets** from future flooding
- **Improved Public Realm spaces** in collaboration with the City Council such as proposed works on Morrison's Island



# Benefitting Properties

## Properties Defended

**Circa 2100 properties which are currently at risk, will be defended to 1% AEP Fluvial / 0.5% AEP Tidal SOP**

- **1227 commercial properties**
- **878 residential**

## *Further Properties benefitting from reduced flood risk*

*A further 1079 properties currently not at risk from events up to the Scheme SOP, but which are within the current 0.1% AEP, will also benefit from a significant reduction of flood risk.*

- *613 commercial*
- *466 residential*

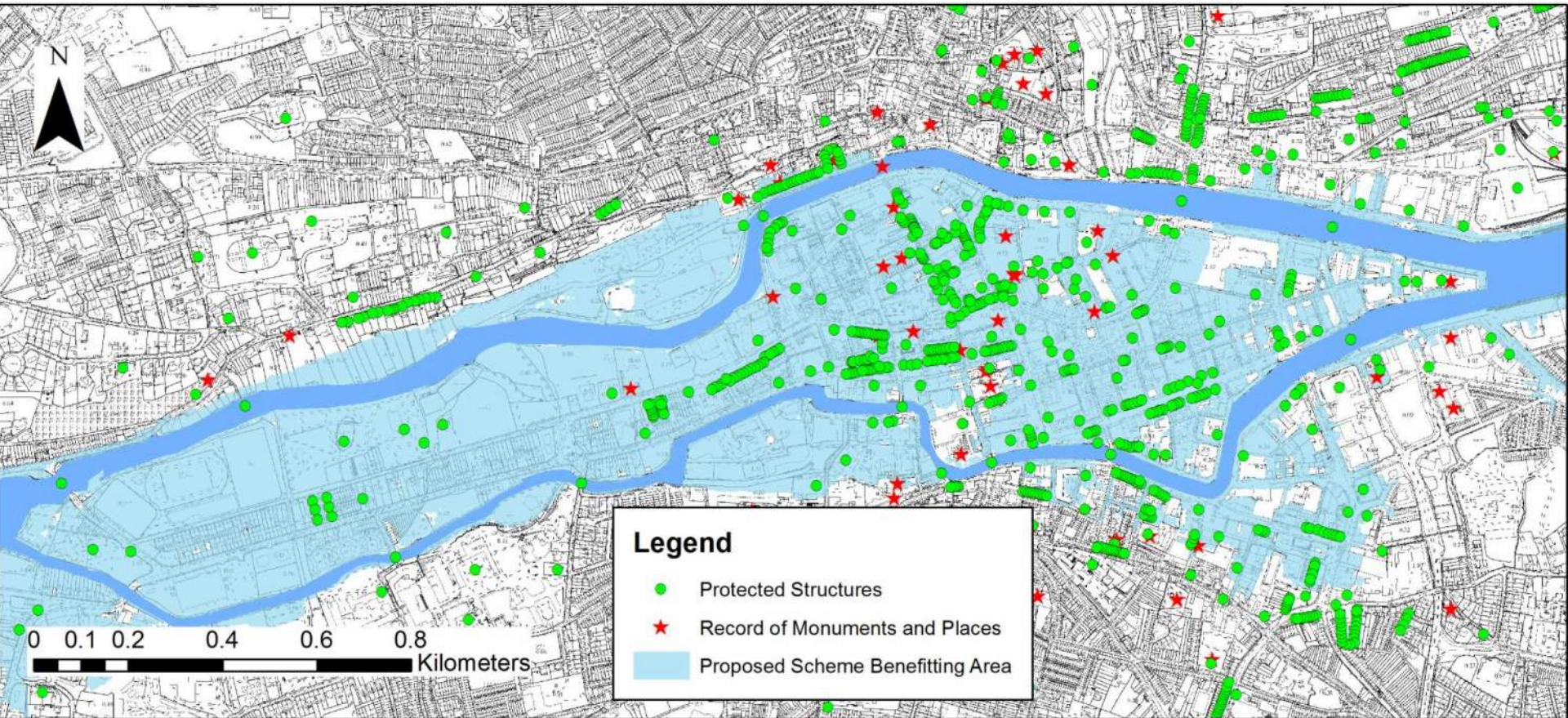
# Cost Benefit Analysis

Item	Amount (€)
<b>Present Value Costs (PVc)*</b>	€128m
<b>Present Value Benefit (PVb)**</b>	€185m
<b>Net Present Value (NPVb) (4% DR)</b>	€57m
<b>Benefit Cost Ratio (BCR)***</b>	1.44



# Cork's Heritage

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**393 protected structures and 20 RMPs in city protected by scheme**



# Restoration of Existing Quay Walls



## Key to Plan

- Existing quay walls to be strengthened and repaired where necessary (3161m - 57%)
- New sheet pile wall (371m - 7%)
- Retaining existing quay wall (2055m - 36%)



# Changes to Parapets/Railings

Mitigation of localised impacts at North Mall and

## Mitigation of localised impacts at North Mall and Sullivan's Quay

### Key to Plan

- Existing historic cut limestone parapet wall to be replaced with new limestone-clad flood defence parapet (10%)

- Historic railing being replaced by new flood defence parapet/railing (9%)

- New sheet pile wall (9%)

- Existing modern wall/railing being replaced by new flood defence parapet/railing (51%)

Wall unchanged (21%)

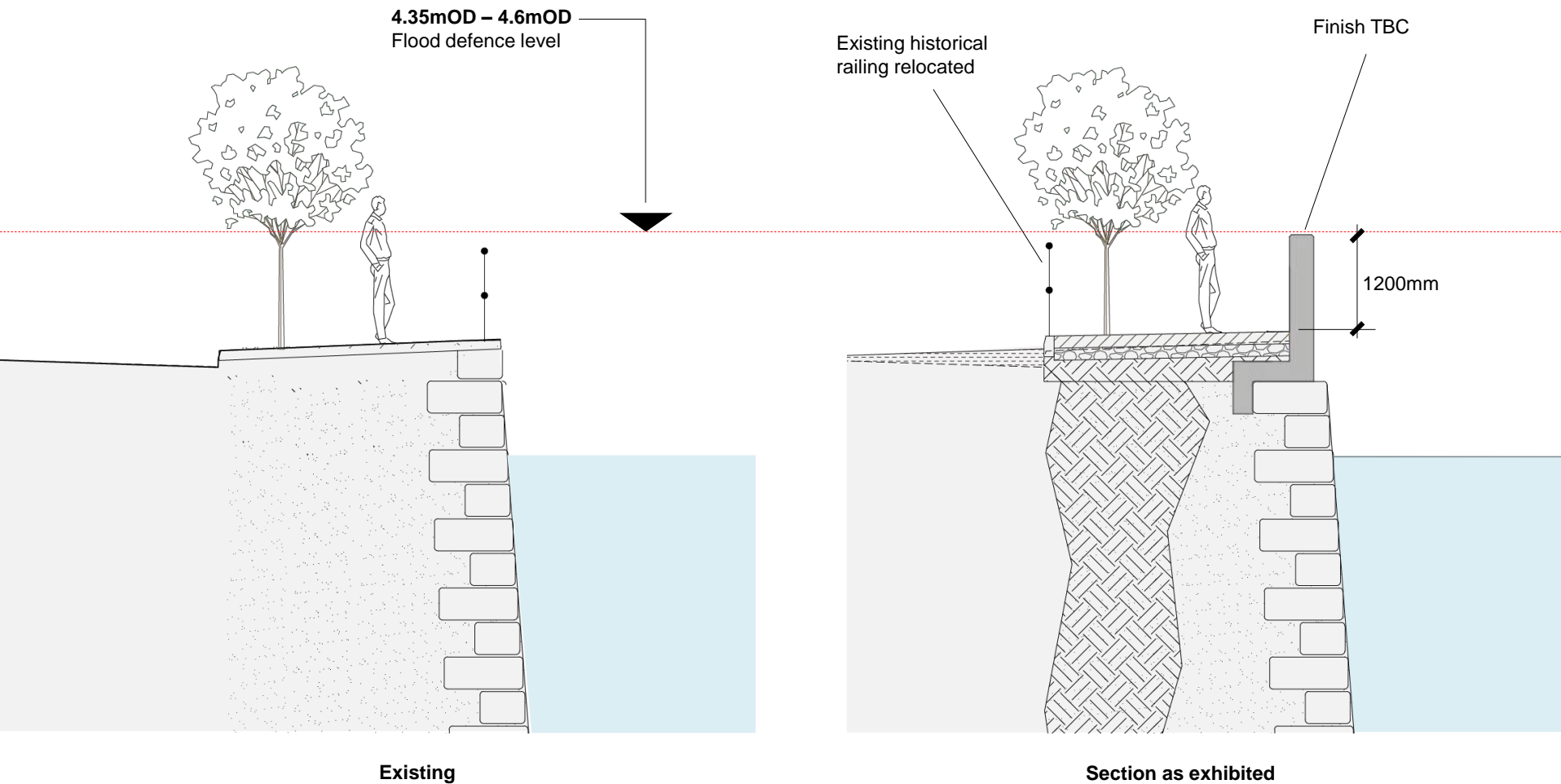






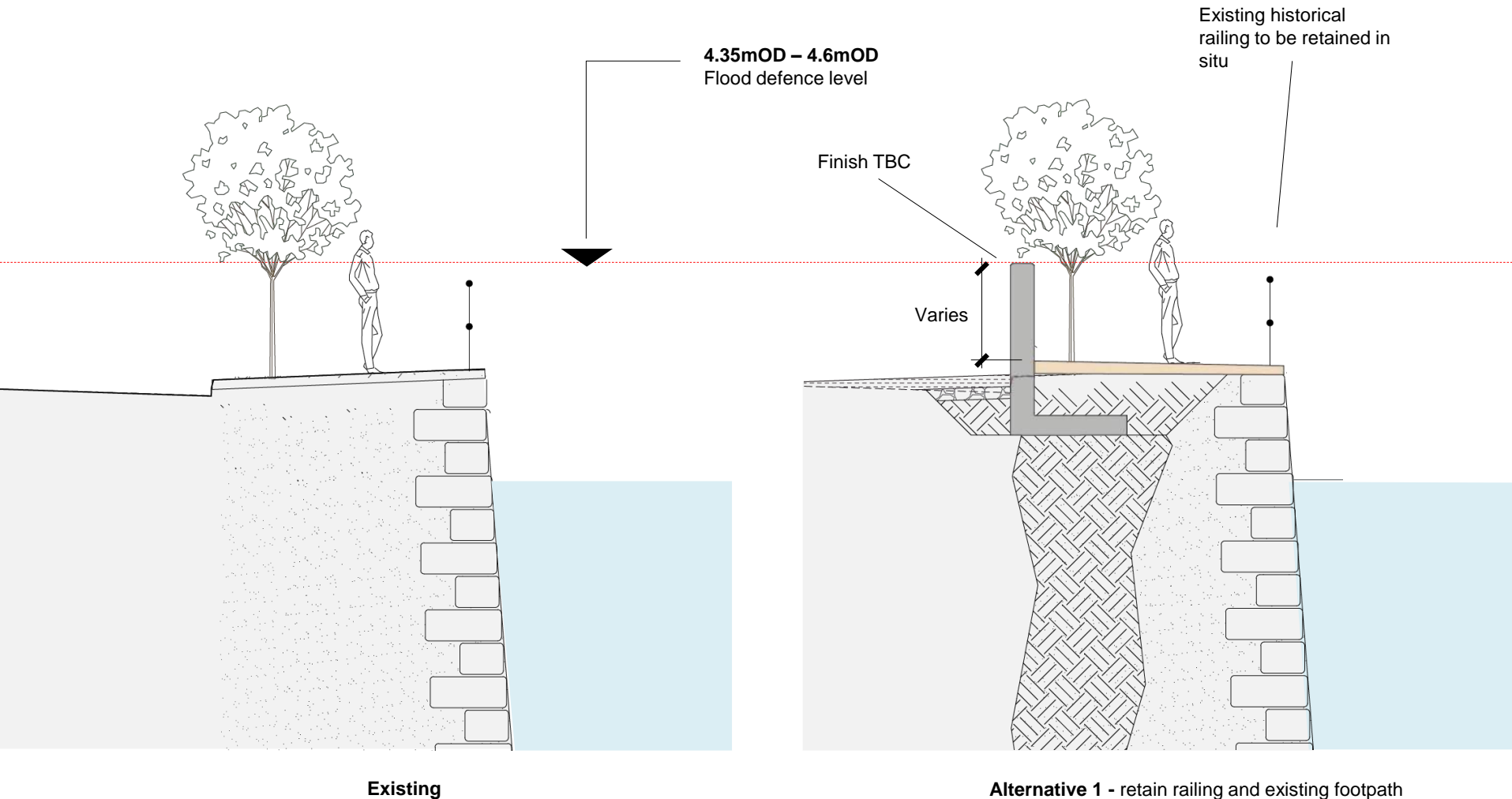


# North Mall – Exhibition Section





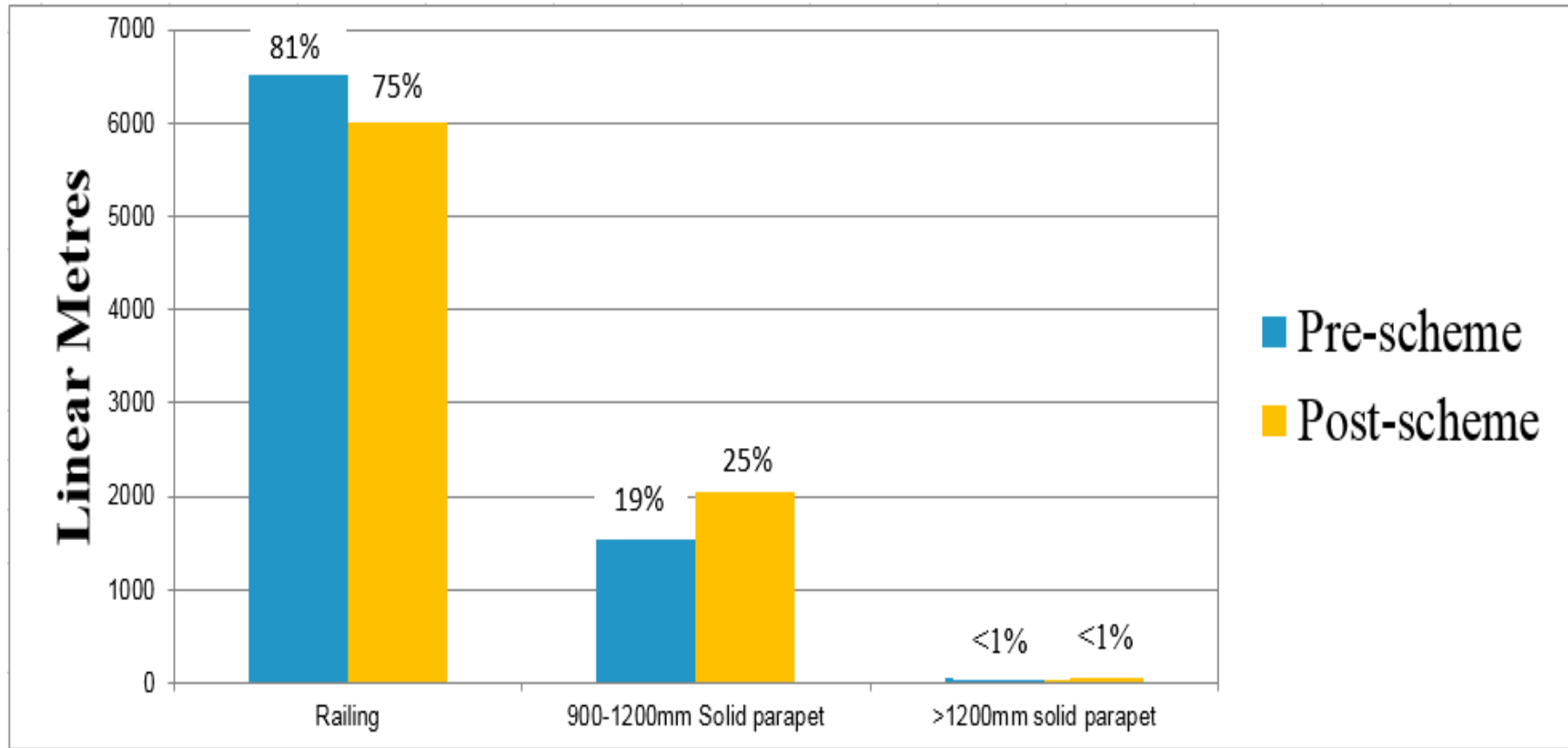
# North Mall – Alternative - Railing stays in situ



# River Amenity

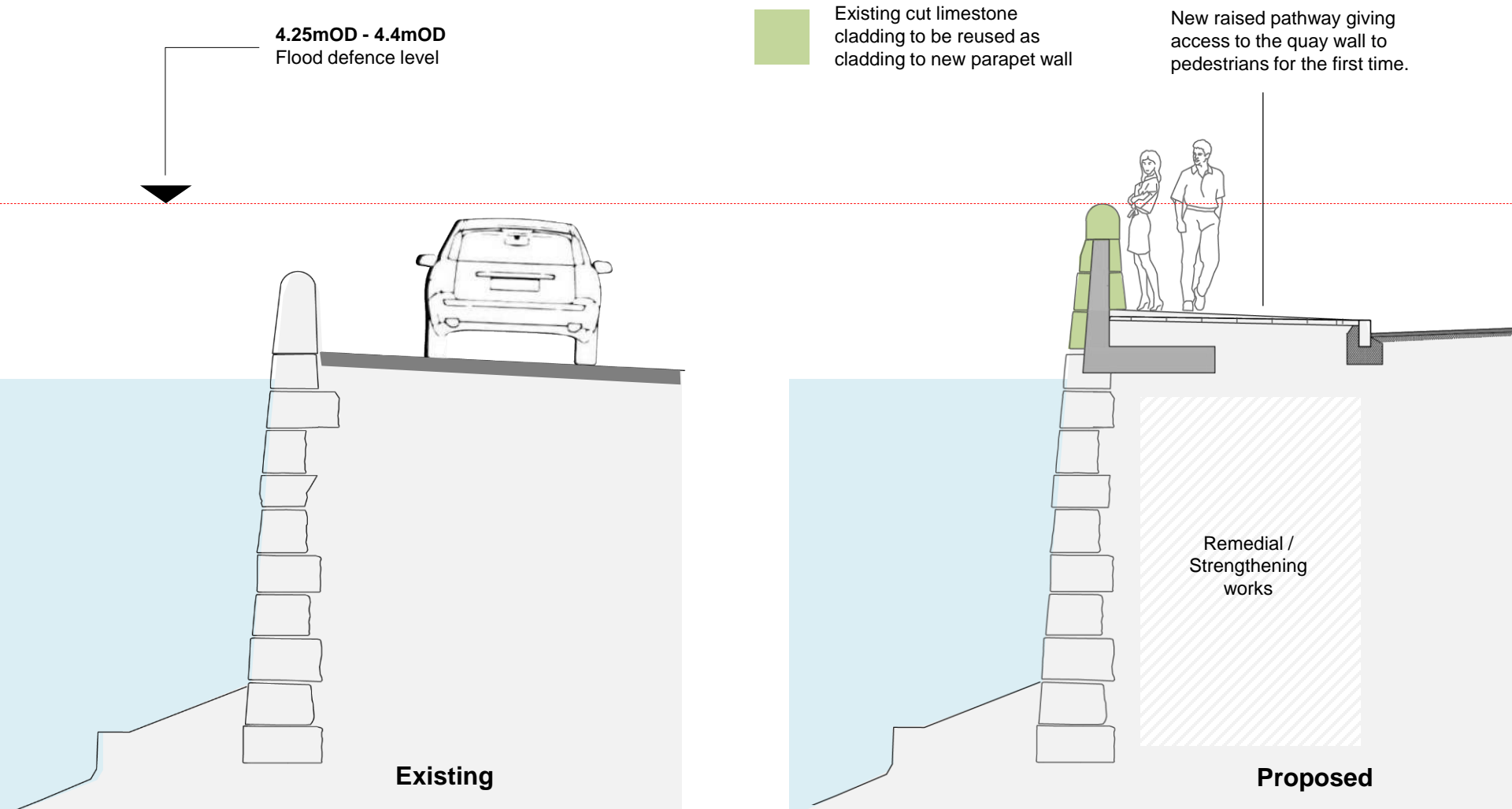


# Guarding in publicly accessible waterfront areas

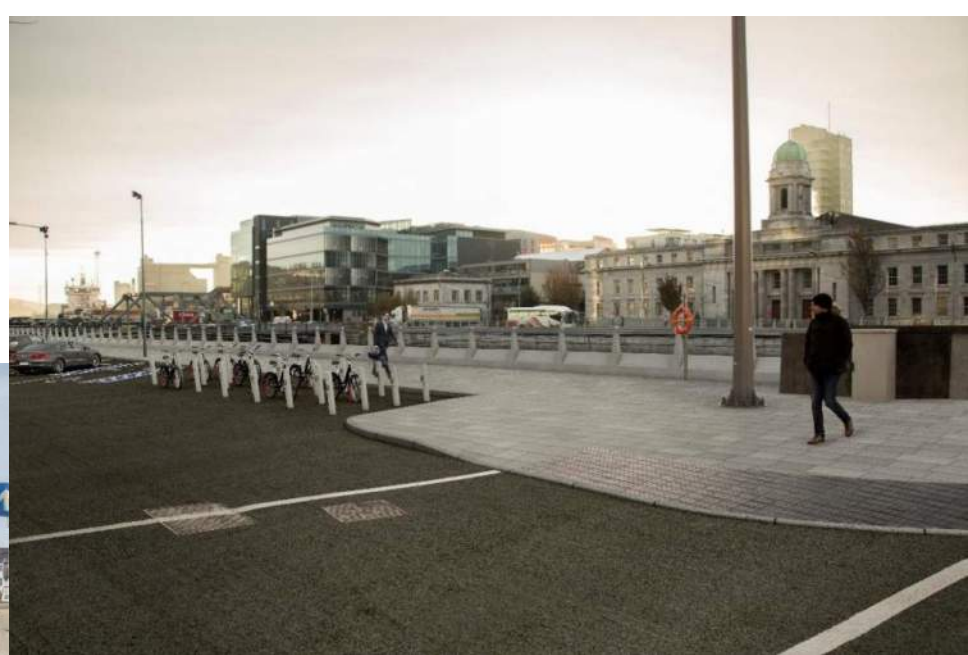




# Bachelor's Quay – Typical Cross Section



# Examples of New River Walkways/ Plaza Areas



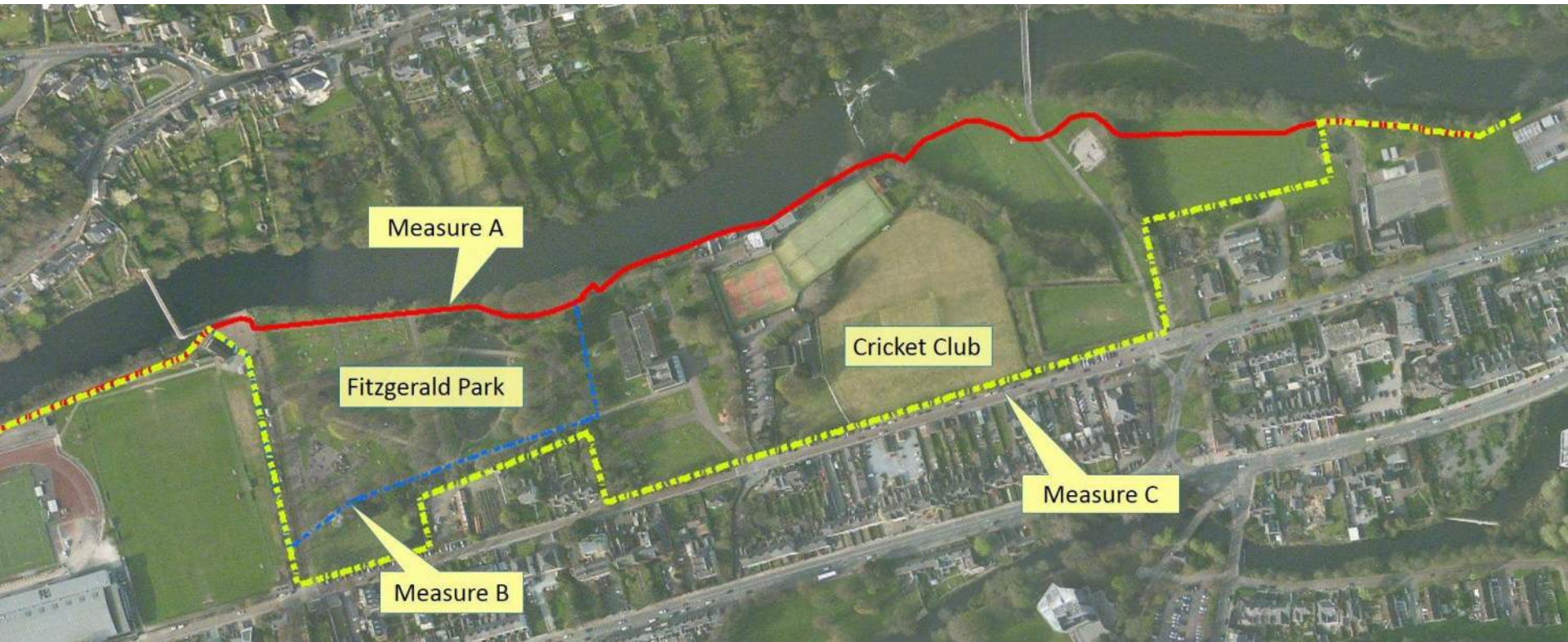
Additional 900m of  
Riverfront Public walkways  
to be provided

# Fitzgerald's Park



# FitzGerald's Park

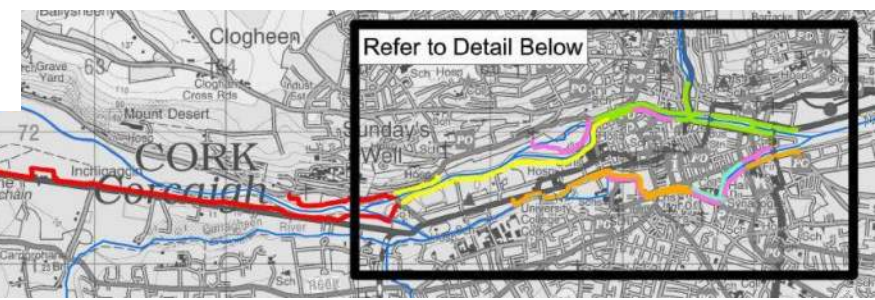
- 3 alignments considered originally
- Landscape Architect commissioned and 3 further alignments considered
- A number of workshops held
- Exhibited Option agreed between OPW, Design Team, CCC and its Landscape Architects






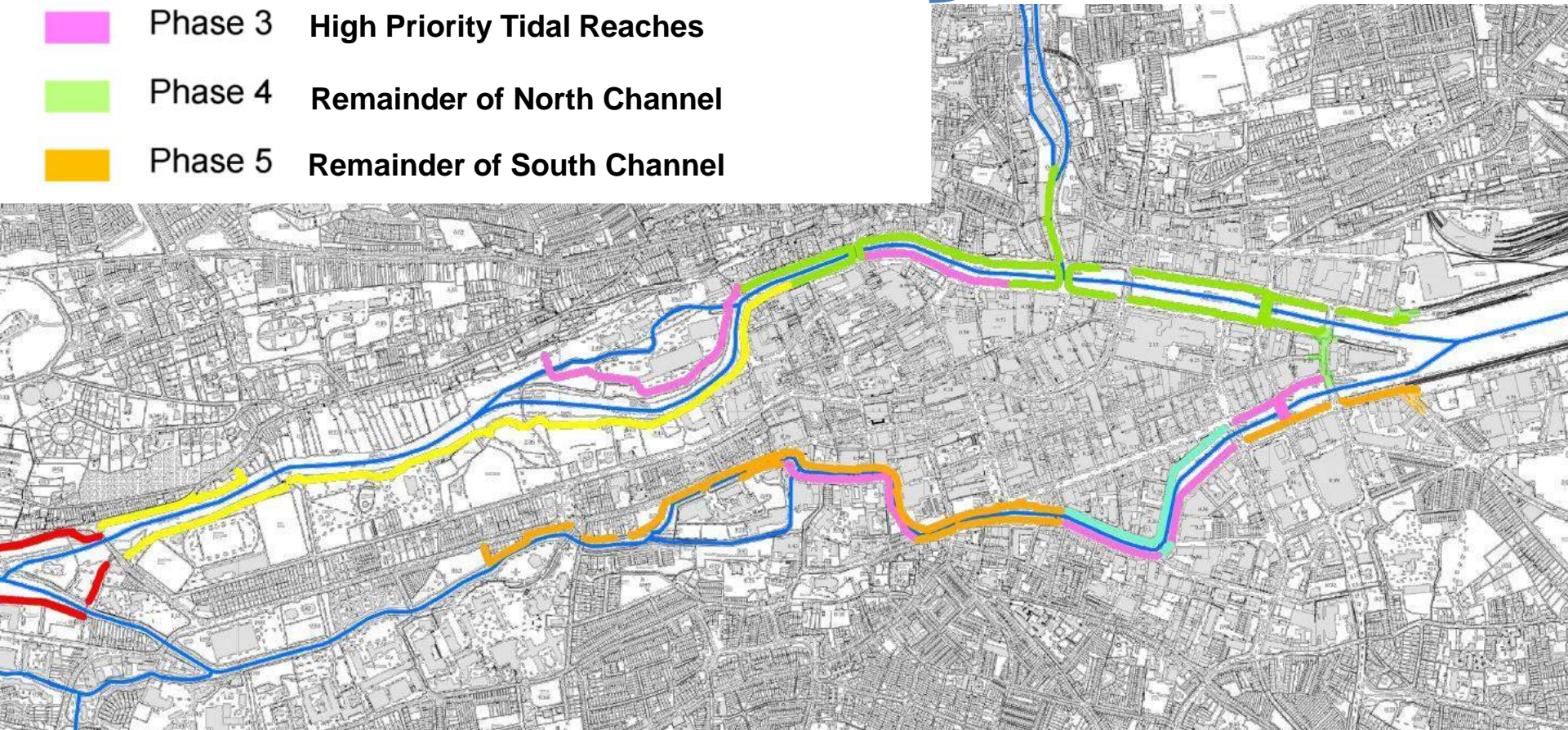
# Phasing of Works

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-  Phase 0 Morrison's Island – Commence 2017
-  Phase 1 West of City Element– Commence 2018
-  Phase 2 Wellington Bridge to Grenville Place
-  Phase 3 High Priority Tidal Reaches
-  Phase 4 Remainder of North Channel
-  Phase 5 Remainder of South Channel

Projected that Phases 0 – 2 likely to be completed by circa 2020 providing majority of protection



# Frequently Asked Questions

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Why not deal with the problem by implementing natural flood risk management measures upstream?

- Available Research indicates that such measures may be effective at small local scale in upstream headwaters but have limited benefit at larger scales such as in Cork City and at high return periods
- In Lee catchment, the reservoirs perform the key attenuation function and so negate any potential benefit
- Requires extensive change of use of large tracts of private lands which is not easily achieved.
- In summary, the approach has merits in some catchments for low return period floods, but is unsuitable for Cork



# Frequently Asked Questions

Could direct defences be avoided entirely if the dams are managed differently?

- No. Unfortunately the reservoirs are very small in volume terms relative to the design flood.
- They therefore cannot on their own provide a solution and thus direct defences are also required
- Their operation is being optimised to reduce the peak flow during the design event by 40% which allows wall heights in the city centre to be kept at or below guarding height.

# Frequently Asked Questions

Why not isolate the south channel to avoid the need for defences?

- This option was investigated in detail and was ruled out as it would require diversion of the Curraheen River and Glasheen River and unacceptably high defence walls on the Curraheen
- Would also have significant ecological impact on the Curraheen

# Frequently Asked Questions

Has Climate Change being considered?

- Yes. A comprehensive assessment of the potential affects of climate change has been undertaken.
- The climate change strategy incorporates the following:
  - Limiting CC increases in flows reaching the city through further alterations to dam operations, allowing even greater advance discharges as forecast accuracy improves
  - Constructing the fluvial direct defences to be extendable in the future by up to one metre (demountable or permanent)
  - Constructing the tidal defences to be extendable in the future by up to 0.6m (max. 1.2m high walls in city)
  - Increased tidal defences are likely to be a necessary precursor to any future tidal barrier which may become viable if sea level rise exceeds circa 1m





# Questions?

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