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KING'S ISLAND
FLOOD RELIEF SCHEME

King's Island Flood Relief Scheme EIAR Scoping Report

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Contract

This report describes work commissioned by Limerick City & County Council, on behalf of JBA, The Limerick City & County Council representative for this work is Mr. Kieran O'Gorman.

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Purpose

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Executive Summary

This Scoping Report forms the first stage in the preparation of the Environmental Impact Assessment Report (EIAR) for the King's Island Flood Relief Scheme (FRS) in Limerick City. The Scoping Report introduces the proposed development, defines the location and extent of works, identifies the key environmental issues and receptors in the vicinity, the potential impacts of the proposal, and identifies the likely environmental studies that are required to inform the EIAR.

King's Island lies in the heart of Limerick City and is surrounded by the waters of the River Shannon and the Abbey River. Both rivers are tidal at this location and the island is historically susceptible to both tidal and fluvial flood risk. King's Island and surrounding areas were badly flooded in early 2014 when there was an extremely high tide that overtopped the embankments around the Island and caused them to fail. Major improvements to the flood defences are required to try to prevent re-occurrences of such flood events.

JBA Consulting/ARUP, were commissioned by Limerick City & County Council (LCCC) to provide engineering services for the King's Island Flood Relief Scheme (the Scheme). This scheme will be designed to provide protection to properties in the study area from the 1 in 200-year tidal flood event (0.5% AEP event).

The overarching objective of the project is:

"...to assess, develop and design an appropriate viable, cost-effective and sustainable flood relief scheme which aims to minimise risk to human beings, the existing community, social amenity, environment and landscape character."

The Scoping Report conclusion provides a summary of all environmental aspects which require to be considered in the EIAR and Natura Impact Statement (NIS) for the FRS preferred option in terms of potential impacts during construction and operational phases.

Consultation with the public, stakeholders, statutory consultees and non-statutory organisations is being undertaken, to ensure input from all interested parties from the earliest stages of the EIAR and NIS preparation. The completed EIAR and NIS will be submitted to An Bord Pleanála as part of the formal planning application process.

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Abbreviations

AA	Appropriate Assessment
ACA	Architectural Conservation Area
CEMP	Construction Environment Management Plan
CFRAM	Catchment-Based Flood Risk Assessment and Management
DAHRRGA	Department of Arts, Heritage, Regional, Rural, and Gaeltacht Affairs
DECLG	Department of Environment, Community and Local Government
DHPLG	Department of Housing, Planning and Local Government (Formerly DECLG)
EEA	European Environment Agency
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
ESB	Electricity Supply Board
EU	European Union
FRMP	Flood Risk Management Plan
GSI	Geological Survey Ireland
IFA	Irish Farmers Association
IFI	Inland Fisheries Ireland
INFF	Irish National Flood Forum
IPCC	Intergovernmental Panel on Climate Change
IROPI	Imperative Reasons of Overriding Public Interest
LAP	Local Area Plan
LULC	Land Use and Land Cover
MCA	Multi-Criteria Analysis
NCCAF	National Climate Change Adaptation Framework
NFM	Natural Flood Management
NHA	Natural Heritage Area
NI	Northern Ireland
NIAH	National Inventory of Architectural Heritage Natura Impact Statement
NIS	
NMI	National Museum of Ireland
NMS	National Monuments Service
NIG	National Implementation Group
NPWS	National Parks and Wildlife Service
OPW	Office of Public Works
PCD	Public Consultation day

RBD	River Basin District
RBMP	River Basin Management Plan
RPG	Regional Planning Group
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFRA	Strategic Flood Risk Assessment
SI	Statutory Instrument
SMR	Sites and Monuments Records
SPA	Special Protection Area
WFD	Water Framework Directive
WMU	Water Management Unit
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works
ZAP	Zones of Archaeological Potential

1 Introduction

1.1 Purpose of this Report

This Scoping Report forms the first stage in the preparation of the Environmental Impact Assessment Report (EIAR) for the King's Island Flood Relief Scheme (FRS) in Limerick City. (See Figure 1-1) The Scoping Report introduces the proposed development, defines the location and extent of works, identifies the key environmental issues and receptors in the vicinity, the potential impacts of the proposal, and identifies the likely environmental studies that are required to inform the full EIAR.

The information in this report is based on:

- Information gathered during earlier stages of the project including the Constraints and Options stages;
- Existing environmental data bases, reports and mapping; and
- Consultation with stakeholders and the public.

1.2 Project Background

King's Island lies in the heart of Limerick City and is surrounded by the River Shannon and the Abbey River as shown in Figure 1-1. Location Plan. Both rivers are tidal at this location and the island is historically susceptible to both tidal and fluvial flood risk. There is a history of flooding in King's Island, the most recent events recorded in 1999, 2002, 2009, and 2014 (Limerick City Council *et al.*, 2013). Prolonged rainfall, spring tides, and storm surges have been the source of severe flooding (Limerick City Council *et al.*, 2013). King's Island and the surrounding area was badly flooded in early 2014 when there was an extremely high tide that overtopped the embankments around the Island and caused them to fail in one location.

Much of the existing ground on the island is low-lying, particularly in the open spaces in the east of the island. The central spine of the island is generally quite elevated, with levels in the 'Englishtown' area (adjacent to the castle) being well in excess of the 0.5% AEP flood level, which is approximately 4.8mOD. Elevations on the island range from 1.85mOD to 11mOD (E.Russell *et al.*, 2018). Figure 1-2. Existing Situation shows where the existing embankments failed and were breached in the January 2014 flood event. Flood levels in this event were estimated to be approximately 4.55mOD and were high enough to induce significant structural damage to the existing embankments and necessitated the installation of remedial sheet piling. (E.Russell *et al.*, 2018).

Major improvements to the flood defences are required to try to prevent re-occurrences of such flood events. As such, JBA Consulting/ARUP, were commissioned by Limerick City & County Council (LCCC) to provide engineering services for the King's Island Flood Relief Scheme (the Scheme).

The overarching objective of the project is to:

"...to assess, develop and design an appropriate viable, cost-effective and sustainable flood relief scheme which aims to minimise risk to human beings, the existing community, social amenity, environment and landscape character."

The scheme is to be developed primarily to protect the affected areas against fluvial and tidal flooding. In addition, consideration will be given to the potential impact of any flood relief scheme on groundwater and pluvial flood risk. The target standard of protection (SOP) is the 0.5% AEP tidal event.

This scheme will be designed to provide protection to properties in the study area from the 0.5% AEP tidal flood event, with a suitable freeboard allowance provided on both the hard and soft defences. An Options Assessment Report for King's Island is being prepared which provides technical detail of the flood protection options (it will be available at <http://www.kingsislandfrs.ie/>).

1.2.1 Stages of the Scheme

There are five statutory phases of work in the completion of a FRS and the progression to one stage heavily depends on the outcome of the previous stage. The five stages of the project are as follows:

- Stage I - Development of a number of flood defence options and the identification of a Preferred Scheme;
- Stage II – Public Exhibition & Detailed Design;
- Stage III & IV – Tender & Construction; and
- Stage V – Project Close-Out (Handover to Client).

This EIAR Scoping Report is produced as part of **Stage I** of the project. It follows on from work carried out to date. Supporting documents to this report include the following: (available at <http://www.kingsislandfrs.ie/>)

- Constraints Study for Flood Relief Scheme at King's Island, Limerick (December 2015); and
- The King's Island FRS Options Assessment Report (preparation ongoing).

1.3 Study Area

The study area for the proposed development shown in red on Figure 1-1 and includes the watercourses and environs adjacent to and surrounding King's Island. The area of the proposed development is shown by the black dotted line around Kings Island.

1.3.1 Site Location

King's Island is located at the north-east of Limerick City Centre. It is a valuable asset to the city due to its historical importance, its ecological and archaeological significance, and its tourism potential. The island also contains a residential and community area with a large housing estate (St. Mary's Park) to the north and various terraces of houses to the south. The landscape of the island is urban with a low-lying area of wetland edging the north eastern part of the island.

The urban area consists of a combination of residential, administrative, commercial, educational, ecclesiastical, and tourism elements. In terms of the built environment, the north of the island is predominantly residential and due to poor transportation connections, it is somewhat disconnected from the rest of the city. The southern part of the island has a wider range of land uses, retail opportunities, and includes King John's Castle and other historic buildings. King's Island has a community centre in the south-west region, two soccer pitches to the east of the Island and three educational facilities in the south of the island (one mixed primary school and two Gael Scoileanna). City Hall houses all the offices for Limerick City and County Council (LCCC) and other public administrative functions.

1.3.2 Surrounding Environment

King's Island is situated between the River Shannon and the Abbey River putting the island at risk of fluvial and coastal flooding. The River Shannon is the largest river in Ireland, it rises in the Cuilcagh Mountains, at Shannon Pot, in Co. Cavan/Fermanagh and it flows in a southerly direction, discharging in the Shannon Estuary. At the north of King's Island, the Shannon splits into two distinct waterbodies: the Shannon and the Abbey River. The Abbey River is a smaller watercourse that flows along the eastern and southern boundaries of the island before re-joining the Shannon adjacent to Merchant's Quay and the Courthouse.

The surrounding waterbodies and some eastern portions of the island are designated on ecological grounds as a Special Area of Conservation (SAC); as highlighted by the orange hatching. The SAC applicable to King's Island is titled 'Lower River Shannon' (Site Code: 002165) and is of ecological interest as it contains habitats and species listed on Annexes I and II of the E.U. Habitats Directive. Also, of note, is the occurrence of invasive species such as Japanese Knotweed, Giant Hogweed, Himalayan Balsam, Buddleia, Winter Heliotrope on the island.

King's Island has 28 structures listed for protection in the Records and Protected Structures (RPS). In addition, there are 10 structures currently recognised on the National Inventory of Architectural Heritage (NIAH) of Limerick City. There are currently no Architectural Conservation Area (ACA) in place in King's Island, however, the southwestern part of the King's Island has been included in the Area of Special Planning Designation (ASPD).

1.4 Proposed Development

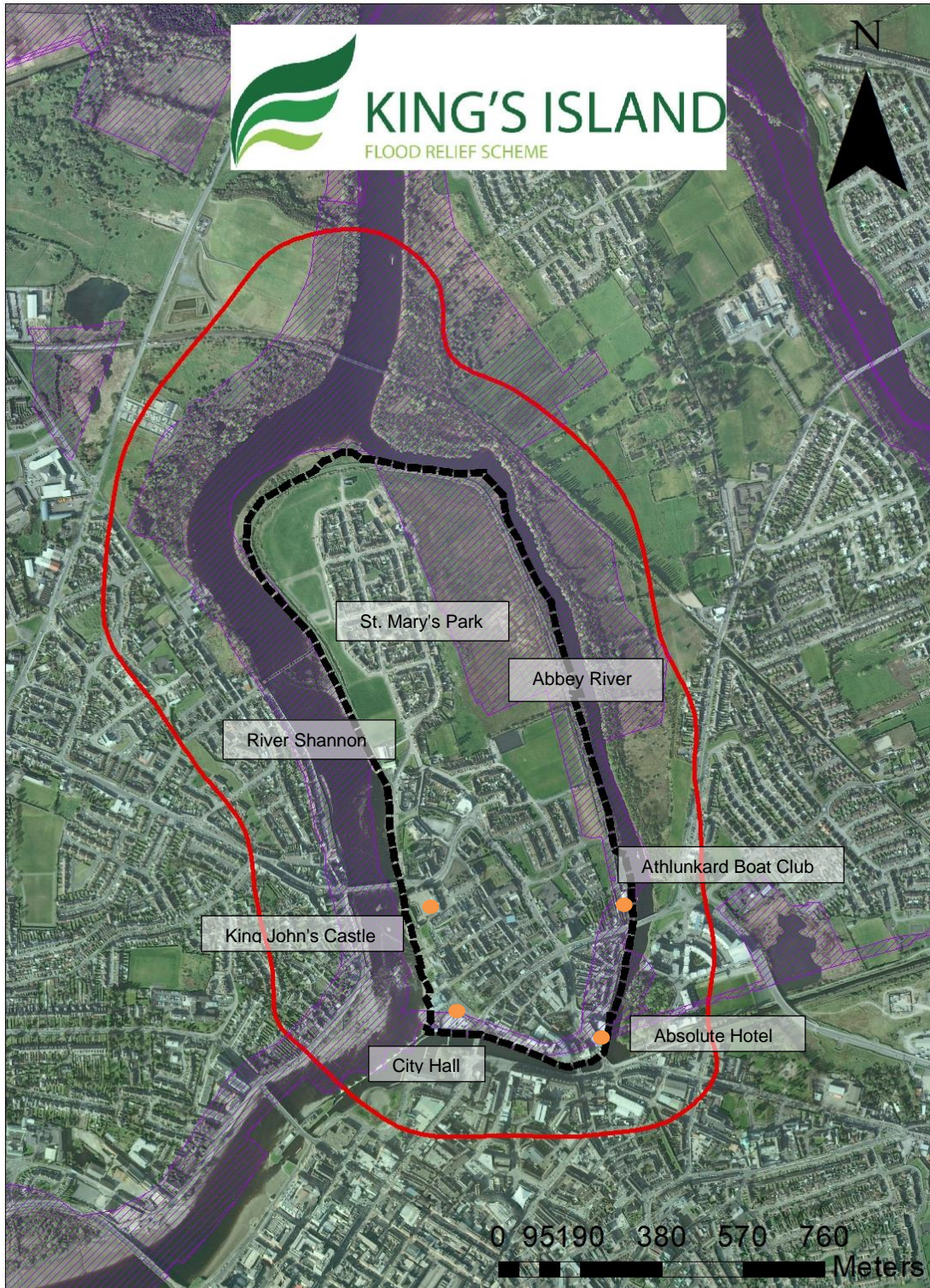
The proposed development is described in the project Options Assessment Report as the Emerging Preferred Option. It is a series of flood defences positioned around King's Island comprising both new and upgraded flood walls (incorporating glass panels in the urban areas) and embankments plus associated townscape improvements.

The proposed development can be described further in terms of flood cells, which are defined on the basis of the extent of the 0.5% AEP flood event across the Kings Island study area. There are two flood cells, Flood Cells A and B as shown on Figure 1-3 Flood Cells and Sub areas.




Flood Cell A - This is the more residential part of the island and currently has a level of flood protection primarily provided by embankments, although walls also contribute to the perimeter protection. One of the key constraints of this area is the Lower River Shannon Special Area of Conservation (SAC) and the proximity of its boundary relative to the proposed flood relief options. It includes the ten sub-areas A1-A10.

Flood Cell B- This is the more commercial part of the study area. Where there is flood protection, it is in the form of quay walls. However, there is no defence provision around the Potato Market and civic buildings on Merchant's Quay. Relating new flood management measures to the existing built environment is the key constraint in the south of the island. It includes four sub-areas B1-B4.

Figure 1-1. Location Plan and Site Context



Legend

-  Proposed Scheme
-  Special Area of Conservation
-  Study Area



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Figure 1-2. Existing Situation

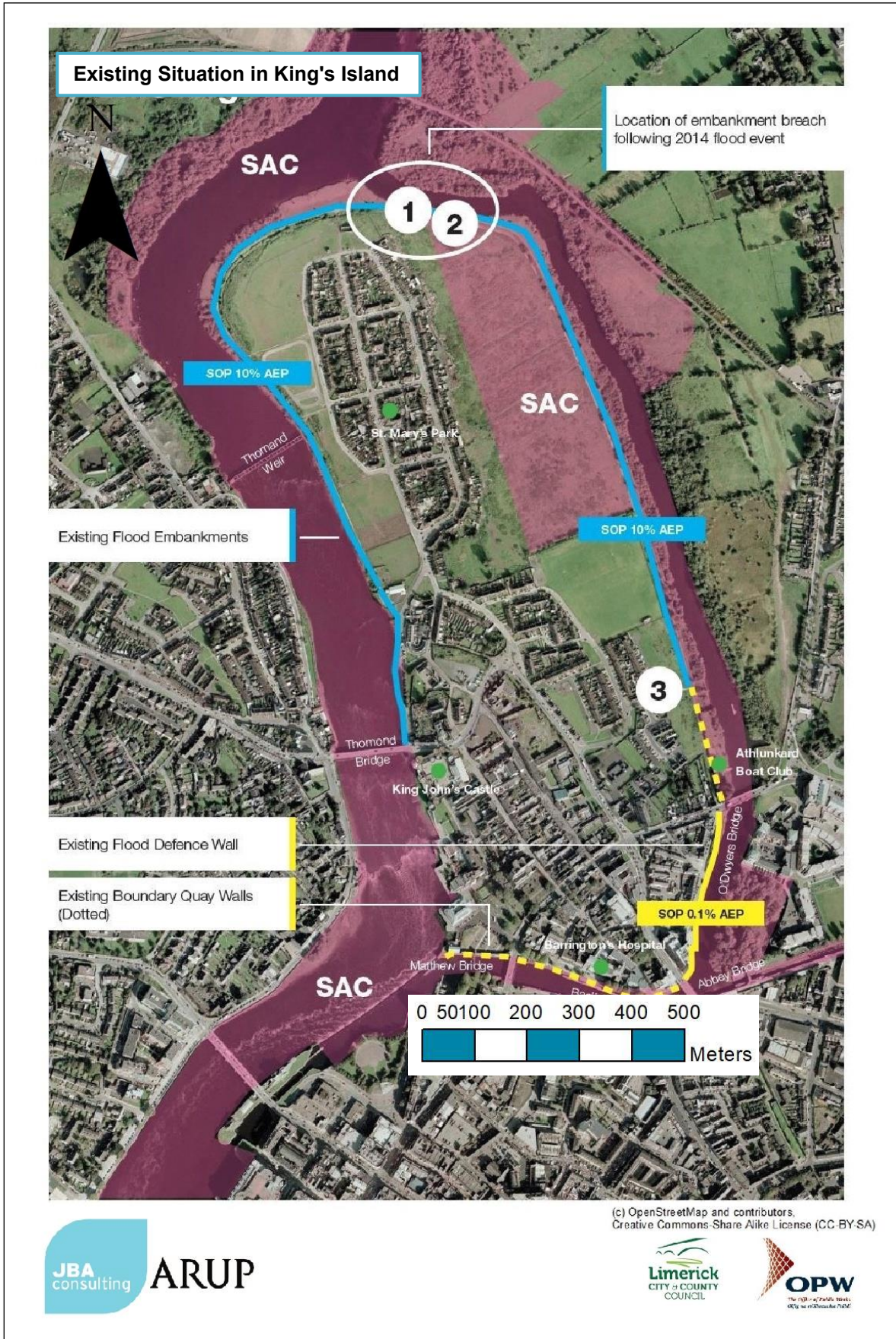
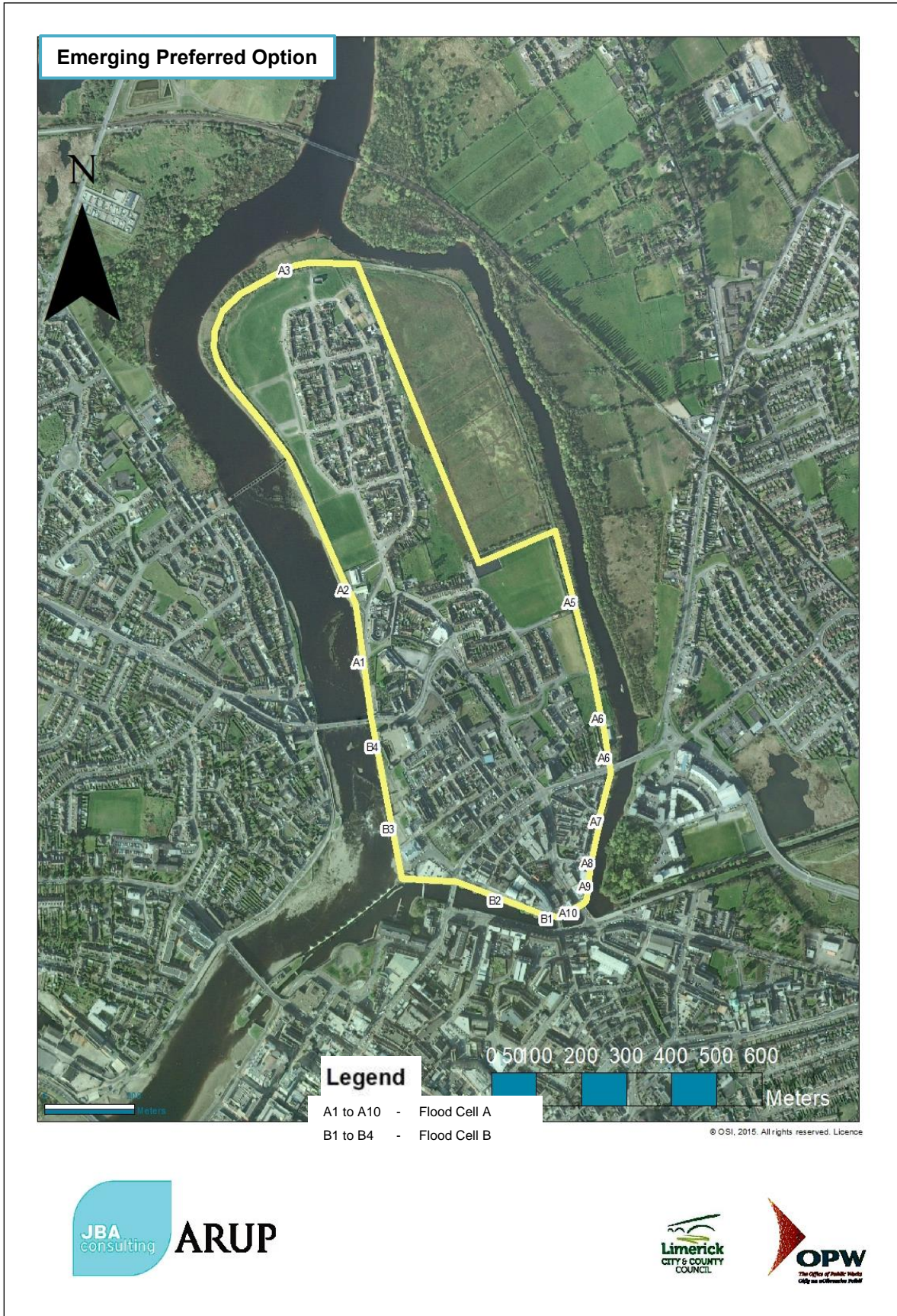


Figure 1-3. Flood Cells and sub areas



2 Regulatory Context and Planning History

2.1 Regulatory Context and Planning History

The Planning Application will be prepared in line with relevant policy and legislation. The remainder of this section outlines the key legislation and policy documents to be considered.

2.1.1 Planning and Development Legislation

Limerick County Council wishes to prepare a Part 10 Planning Application to An Bord Pleanála, under Section 177AE, of the Planning & Development Act, 2000, for the construction of a Flood Management Scheme for Kings Island, Limerick.

The prescribed classes of development and thresholds that trigger a mandatory Environmental Impact Assessment (EIA) are set out in Schedule 5 of the Planning and Development Regulations, 2001, as amended. A review of the classes of development requiring EIA was carried out to determine whether the proposed development falls into any of the development classes contained therein. The most relevant criterion is Class 10 of Part 2 of Schedule 5 which states:

10. Infrastructure projects

(f) (ii) Canalisation and flood relief works, where the immediate contributing sub-catchment of the proposed works (i.e. the difference between the contributing catchments at the upper and lower extent of the works) would exceed 100 hectares or where more than 2 hectares of wetland would be affected or where the length of river channel on which works are proposed would be greater than 2 kilometers. (S.I. No.600/2001- Planning and Development Regulations 2001)

In the case of the proposed Flood Management Scheme for Kings Island, Limerick, the length of river channel on which works are proposed is 3.7km. An EIAR of the proposed scheme is therefore required to be prepared and submitted to support the planning application. The requirements in respect of Environmental Impact Assessment are contained within the Planning Act and these are described in more detail in Chapter 5. Similar legal requirements in respect of Appropriate Assessment are also set out in the Planning Act and these are summarised in Section **Error! Reference source not found.** below. Similarly, a Natura Impact Statement will be submitted in support of the planning application.

2.1.2 Planning Policy Context

Mid-West Area Strategic Plan (MWASP) 2012-2030

The aim of the strategic plan is to facilitate and inform the implementation of the statutory processes, the constituent Planning Authorities of the Mid-West Region (Clare County Council, Limerick City and County Councils and North Tipperary County Council) and the Mid-West Regional Authority have developed a non-statutory, 20-year, integrated land-use and transport strategy for the region. This will provide evidence base which can inform transport and planning policy and infrastructure investment decisions in the Region to 2030. The MWASP was prepared to secure the following overall objective:

- Prioritisation of investment in the region;
- Strengthening the Limerick/Shannon Gateway;
- Create and support a well-defined hierarchy of settlement;
- Deliver the required transport infrastructure to meet the Plan objective; and
- Provide economic review and direction of the region

The plan recognises the corridor of the River Shannon as the most important emerging tourism asset in the region, the three main areas: the Shannon Estuary, Lough Derg, and lower/mid River Shannon. The plan highlights the potential in the corridor from activity-based tourism, including boating, angling, wildlife, watching and walking, all supported by a network of small attractive villages with good local roads and access.

Shannon Catchment Flood Risk Assessment and Management Study (CFRAM)

The Office of Public Works are working in partnership with their consultants, Local Authorities and other stakeholders to deliver the CFRAM Study for the Shannon River Basin District (RBD).

Work on the study started in January 2011. The Shannon RBD includes the entire catchment of the River Shannon and its estuary, covering some 17,800km² and 20% of the island of Ireland. The RBD covers parts of 17 counties: Limerick, Clare, Tipperary, Offaly, Westmeath, Longford, Roscommon, Kerry, Galway, Leitrim, Cavan, Sligo, Mayo, Cork, Laois, Meath, and Fermanagh.

The study will focus on areas known to have experienced flooding in the past and areas that may be subject to flooding in the future either due to development pressures or climate change. The final output from the study will be Catchment Flood Risk Management Plans, which will define the current and future flood risk in the Shannon RBD and set out how this risk can be managed.

The full extent of the Area of Further Assessment defined for Limerick City lies within three Units of Management and includes all of the developed land within the contiguous urban area of Limerick, and all lands zoned for development in or adjacent to Limerick City (including areas that may be outside of the Limerick City Council jurisdictional boundary). For the purpose of this Study, this AFA will be assessed as part of Unit of Management 25-26. Any flood risk management options proposed for this AFA will therefore be documented within the FRMP for Unit of Management 25-26.

Limerick City Council Development Plan (LCDP) 2010-2016 (as Extended)

The Limerick City Development Plan (LCDP), 2010-2016, Flood Risk Map highlights that King's Island is at risk of flooding indicating that it is within Flood Zone A (high probability of flooding). As a result, all proposed developments are required to follow a newly introduced guidance document: 'The Planning System and Flood Risk Management' (2009) developed by the Department of the Environment Community and Local Government and the OPW. These guidelines were included as policy statements in the LCDP.

Limerick City Development Plan: Policy WS8. Flood Protection

"It is the policy of Limerick City Council to continue to work toward reducing flooding within the City and ensure that all new development proposals comply fully with the requirements of 'Planning Systems & Flood Risk Management Guidelines for Planning Authorities' 2009, and any other guidance during the lifetime of the Development Plan".

As part of St. Mary's Park and Kings Island Framework Strategy in the LCDP, planning objective 6, states the need to prepare a flood risk assessment for King's Island and to determine the long-term flood remediation solution for Kings Island.

Limerick Regeneration Framework Implementation Plan (2015)

The Limerick Regeneration Plan was introduced in September 2013 and focuses in the revitalisation of communities within Limerick City over the next 10 years by raising standard of living, opportunity, health and wellbeing for all residents of the regeneration areas. *It is envisaged to be one of the largest capital programmes and largest regeneration programme in the State. The Plan includes €253m investment on physical, €30m on social, and €10m on economic programmes.*

Limerick Regeneration Framework Implementation Plan (2015)- Starting point

"The aim is to recognise, diagnose, and treat the root causes, as well as, symptoms of social and economic exclusion in Limerick regeneration areas- Moyross and St.Mary's Park on the city's northside and Southill and Ballinacurra Weston on the southside, so that future generations don't face the same challenges as current and former residents".

2.1.3 EIA Directive (2014/52/EU)

The 2011 Environmental Impact Assessment Directive (2011/92/EU) was amended by the 2014/52/EU Directive. The Directive provides that Member States should transpose the legislation into National law by the 16th May 2017. Ireland has failed to do so but in the intervening period the Department of Housing, Planning, Community and Local Government issued a circular (PL 1/2017) to Government Departments advising them on applications submitted before and after the 16th May date and the changes/requirements of the new Directive. Notwithstanding the absence of national transposition legislation, the provisions of the new Directive were deemed to apply from 16 May 2017, under the principle of direct effect, and for that reason this EIA aims to comply with the new Directive.

The new Directive adapts a new title for environmental impact assessment as Environmental Impact Assessment Report. For the purposes of this assessment JBA will use the term Environmental Impact Assessment Report (abbrev. EIAR) to describe the final report for this assessment.

The new Directive is designed to “strengthen the quality of the environmental impact assessment procedure” and it notes that environmental issues, including natural resources, sustainability, biodiversity and climate change have become more important in policy making and must, therefore, be at the forefront of the environmental assessment and decision-making processes.

The EIAR will be undertaken in accordance with the requirements of Directive 2014/52/EU on the assessment of the effects of a development on the environment. The EIAR will also be undertaken in accordance with:

- EPA’s Draft Guidance Note on the Preparation of Environmental Impact Statements (2015); and
- EPA’s Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2017).

3 The Consultation Process

3.1 Requirements for Consultation

The EIAR requirements for consultation are defined in the EIA Directive (85/337/EEC) as amended in 2011 Directive 2011/92/EU and 2014 Directive 2014/52/EU under Article 6.

Article 6 (1)

Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities are given an opportunity to express their opinion on the information supplied by the developer and on the request for development consent.

Statutory Authorities referred to in Article 6 (1) will be consulted on the specific characteristics of the project, including its location, technical capacity, and its likely impacts on the environment. Also, in accordance with the requirements of the Aarhus Convention, the public, statutory authorities, and relevant stakeholders will be given the opportunity to participate in the decision-making process, this integration will allow for the sustainable implementation of environmental management.

3.2 Ongoing Communication

Communication with key stakeholders, including residents and businesses was identified as a priority to the overall project. For that reason, various tools such as a project website and social media outlets including Facebook and Twitter, were established to regularly send update on the progress of the project. A full list of communication methods used is provided in Table 3-1.

One of the key requirements of the early stages of the project was the engagement of a Community Liaison Office (CLO) who was appointed for the first 18 months of project. As a local resident and member of various community groups and committees, the CLO was able to provide introductions to key groups and individuals, as well as raising awareness of the project and the various consultation events.

Engagement through public workshops and consultation has been and will continue to be implemented at various stages of the overall project and the EIAR.

Table 3-1: King’s Island FRS Communication and Consultation Approaches

Communication Activity	Purpose
Project website	<p>To promote and provide information to stakeholders about the project.</p> <p>The website will provide regular updates.</p> <p>To provide a source of information that stakeholders and members of the public can download and review.</p> <p>To provide a means of consultation and allow stakeholders to ask questions or submit information</p> <p>http://www.kingsislandfrs.ie/</p>
Direct email	<p>Where stakeholders have supplied their contact details we will notify project updates, invitations to consultation events via email.</p> <p>Names and addresses must be held securely in compliance with the Data Protection Act 1998.</p>
Local authority / community publications such as parish newsletters	<p>Stories in local authority / community group newsletters are likely to reach a wide range of citizens.</p> <p>King’s Island newsletter is published quarterly by St Mary’s Aid and has a wide circulation (hand delivered to all properties)</p>
LCCC website	<p>News headlines, links to project website, publicise consultation events.</p>
Local Media TV, radio, newspapers, magazine or publications	<p>Press releases are prepared in advance of public meetings and distributed to the media. Photo calls and media interviews can also be arranged and have been carried out.</p> <p>Podcasts / webinars can provide an opportunity to reach a wider</p>

Communication Activity	Purpose
	audience.
Paid for Advertising - in a media publication	There are various options for advertising available – such as online, radio, television, outdoor, transport, press and more.
Public Consultation Days / workshops - held at a community venue.	<p>Consultation exhibitions / events offer a more extensive and open form of engagement on a personal basis. They provide opportunities for members of the public to express views on the consultation subject area, ask questions, take on board the information at their leisure, discuss any concerns, provide a view and receive feedback on the issues they raise.</p> <p>The event will be geared to a specific issue, based on consultation stage of the project programme.</p> <p>The consultation events can be held in community facilities – providing an environment conducive to actively seeking views in the relevant communities.</p> <p>These events can combine the presentation of information, visual displays, verbal presentations, computer presentations (eg video loop) and other details whilst giving people the opportunity to provide views and opinions. Members of the design team and environmental team will be available on the day to answer any specific queries that may arise.</p> <p>Events must be held in venues that are accessible for disabled users or users with special needs to maximize possible attendance.</p> <p>One factor which can determine the success of a public event is how well it has been publicised.</p>
Community groups and forums	<p>Community groups provide opportunities to reach a wider community. Meetings can be used as an opportunity to promote a project event.</p> <p>Engagement through SAG will ensure the primary groups are involved / represented in the project.</p>
Community centres	Community centres can act as a focal point for the community and can be used to post information for citizens, e.g. Posters publicising consultation events. Community centres have notice boards, displays, reception areas and information points that can alert people to events.
Council meetings	<p>Council meetings are usually held on a monthly basis with agendas controlled by the clerk to the council. Can provide opportunities to promote the study and website via meetings and newsletters.</p> <p>Key councillors are invited to the SAG so may already provide and outlet to the wide council body.</p>
Social Media	<p>Facebook and Twitter accounts are set up and linked to the project website and other relevant feeds.</p> <p>Social media sites, such as Facebook Groups, may provide opportunities to promote messages and information about the Study.</p>

3.3 Public Consultation Events

To this day there have been three public information days on the King's Island FRS, information from the public consultation events will become available on the website (<http://www.kingsislandfrs.ie/>). A full summary of the feedback received is provided in the relevant Workshop Reports and will be incorporated into the ongoing scheme design where appropriate.

1. The first public information day was held on Wednesday 7th October 2015 in City and County Hall, Merchant's Quay. It was promoted through various means such as publicity through the Stakeholder Advisory Group, meetings with local groups, social media, traditional media, leaflets drops, posters, and word of mouth. Although widely advertised, the attendance was lower than expected with 40 people signing the attendance register. However, the feedback received was useful and clearly identified the major concerns of local residents with regards to the FRS. There was a lot of genuine interest in the works, and particularly in the timeline for construction. However, the feeling from most attendees was that a solution was needed, and whilst a particular option may not be the most

appealing, for example in terms of visual impact, it is more important that flood protection is provided, and completed in a timely manner. Specific issues raised were as follows:

- Proposed flood wall - the majority was in favour of this concept but that the height of the flood defence and general visual impact were concerns and that the proposed wall should if possible include 'cut through walkways' to give the option of cutting a walk short;
 - Access to river edge - consideration of access point to river edge for fishing, recreational activities and visibility of the water course and landscape beyond;
 - St. Mary's Park embankment - the proposed walkway should include cameras and lighting to assist personal safety. Consideration should also be given to incorporate social aspects in the embankments design especially for children and seniors e.g. seats flowers/planting and a garden;
 - Public right of way - retention of public right of way along the westside of Merchant's Quay;
 - Cultural heritage - The archaeological sensitive area along St Marys Wall, Georges Quay, Merchants Quay and Verdant Place should be taken into consideration;
 - Visual appearance of flood walls - where possible existing masonry quay walls should be incorporated into proposed flood defence using limestone where possible to keep the visual impact minimum. Incorporate flood defences into recreational promenade encircling King's Island;
 - Communication - regular community engagement was requested including updates on any new development on the scheme. Residents of nearby Corbally also requested to be included the project communication due to concerns of insurance cover for their residential properties; and
 - Climate Change Impact and Nature Conservation-concerns were expressed regarding the effects of climate change and nature conservation.
2. A second public information day took place on Tuesday 1st March 2016. This was for the Verdant Place Advanced Works which is being progressed through the Part 8 planning process ahead of the main scheme. This event was held in the King's Island Community Centre which is adjacent to the works location. The consultation was promoted through, social media, traditional media, leaflets drops, posters, pavement stands and word of mouth. Thirty-six people attended the event. All those who attended and provided addresses were residents of King's Island. All comments received on the scheme were positive with several attendees expressing their approval of the one-way system, others expressed how happy they were that action was being taken against flooding. Less common comments were one attendee said they hoped the wall would not spoil view out on to the river and another attendee requested that the works be completed before Christmas 2016.
3. A third Public Information Day (PID) took place on Wednesday 20th December 2017 to present the emerging preferred option for the scheme and to seek the views and opinions of attendees before the next stage of the project, which is preparation of the planning application. Given the feedback from the previous events, this PID was staged as a two-venue event, with displays in the City and County Hall during the day and continuing in the Community Centre in the evening. Information about the scheme including, detailed photomontage, a short film showing a 3D fly-over, was made available for review and comment, and members of the Team were present to discuss the proposals and receive feedback. 89 people attended between the two venues, and included residents of King's Island, Corbally and the city centre. The key issues raised were specific to each flood cell sub area (as shown in Figure 1-3) and are listed below:
- A1 Verdant Place (completed element of the scheme) - consideration to be given to raising height of footpath to give a view of Shannon, and provision of an access ladder at Pump Kiosk. Finish of the wall was also commented on;
 - A3 North West Embankment - concern by residents of the pinch point at chainage c.550 where the embankment is getting very close to existing houses on Oliver Plunket Street and the impact this may have in exacerbating anti-social behaviour, and loss of open space.

- A4 St Marys Park / SAC - the route of the proposed embankment (referred to as 'Inner alignment') was generally accepted, provided the outer walkway was also maintained. A minority of residents (those living to the east of Munchin's Street) wanted reconsideration of the outer alignment which follows the riverbank on north eastern part of Kings Island and is within the SAC;
- A5 Star Rovers - Objection to plans for loss of training pitches at Star Rovers. Some residents raised concerns about moving the car park and reopening the closed lane way near to car park, whilst others welcomed this move as it is currently used for dumping;
- A6 - Athlunkard Boat Club - ensure public right of way to backs of houses on Athlunkard Street is maintained;
- A7 Sir Harry's Mall - request for continuation of walkway from the Absolute Hotel to O'Dwyer Bridge, potentially on the outside of the existing wall;
- A8-A10 - No comments
- B1 Georges Quay East - concern at loss of mature trees required for construction of new wall in this location;
- B2 Georges Quay West - concern that proposed stone finish on wet side matched existing;
- B4 King John's Castle - consideration of a continuous walkway on the west side of the castle.

3.4 Formal Scoping Consultation

This Scoping Report will be issued to Statutory Consultees. Sufficient time will be allocated to ensure clarity and consistency of the consultation and ensure that relevant statutory consultees have had the opportunity to participate. All submissions (responses, comments, and recommendations) will be appended to the final version of this document, they will be acknowledged in the EIAR and will inform the final scope of the EIAR.

4 Alternatives and Preferred Option

Directive 2014/52/EU requires the main alternatives to the proposed development to be considered and presented in the EIAR:

"A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects".

4.1 Initial alternatives considered and screening of viable measures

All flood risk management alternatives were considered in the project Options Report against a predetermined set of criteria. These options included Planning Control, Building Regulations, Flood Forecasting and Early Warning Systems, Public Awareness, Land Use Management, Upstream storage, Tidal barrier, Barrier on up and downstream limits of Abbey River, Direct Flood Defences, Diversion Channels or Culverts, Relocation of Property Occupiers, Individual Property Protection (IPP), Pumping, Channel Widening and Bridge/Weir Modifications.

Further to the initial screening, the following flood risk management measures were identified as potentially viable measures for King's Island and were taken forward for further technical assessment. The potentially viable measures were then considered on an area by area basis in the Options Assessment, taking into account the constraints faced on different parts of the island. The potentially viable measures consist of:

- Do nothing;
- Do minimum; and
- Structural Measures:
 - Direct defences including:
 - Reinforced Concrete (RC) Walls;
 - Enhanced and raised quay walls; and
 - Engineered Earth Embankments.
 - Individual Property Protection; and
 - Tidal barrier with upstream fluvial storage.

4.1.1 Do Nothing

The 'Do Nothing' scenario is defined as the option involving no future expenditure on flood defences or maintenance of existing defences/channels. The implication is that the existing risk of flooding persists in the study area and possibly worsens over time, both as the condition of the banks reduces and climate change impacts are felt. This is not a sustainable option, so it was not considered further.

4.1.2 Do Minimum

The "Do Minimum" measure consists predominantly of ongoing maintenance works in order to maintain the existing standard of protection and would generally involve repairing and reinforcing existing walls and embankments now and as repairs are needed in the future. This option does not address the potential for an allowance for climate change and an increased flood levels on Kings Island and also was not considered further.

4.1.3 Structural Measures

4.1.3.1 Direct flood defences

This measure involved the construction of direct defences along the banks of the existing river to contain flood volumes and flows within the river channel and may take the form of embankments, reinforced concrete walls or sheet-piling.

The final choice of method, i.e. embankments or reinforced concrete / sheet piled walls, will be determined by further detailed site investigation. It is not appropriate to use the full Multi-criteria Analysis (MCA) processes to choose between construction techniques within the various areas.

It is important that a realistic type of measure is included in the EIAR of the preferred option and for discussion with stakeholders. In these situations, the lower environmental impact measure may be more expensive. In order to provide an informed debate, a simplified MCA was undertaken on the two main construction techniques.

In general, it was considered that embankments would be more suited to the northern part of the island, where space allows; embankments are already part of the landscape and a more natural finish is required. In the southern, urban part of the island space is limited and there are already lengths of both formal and informal flood defence walls, so the likelihood is that these will be maintained and added to. Within each area based discussion, the most appropriate form of direct defence was proposed as the direct defence measure, and the reason for this choice explained in the Options Report.

4.1.3.2 Individual property protection (IPP)

This measure involved protection of properties on an individual basis. This typically consists of demountable barriers, which are effective to approximately 0.6m flood depth. Above this depth, the water pressure on the walls of typical domestic properties may cause structural damage. IPP would also include measures to seal or otherwise secure windows and vents and may involve tanking buildings above and below ground to resist ingress of water.

IPP measures were not considered feasible as standalone measure due to the large number of properties at risk and the large predicted flood depths. However, there are some flood cells where smaller numbers of properties are at risk and IPP could be used in conjunction with existing or new structural measures.

Demountable barriers have the disadvantage of requiring a timely flood warning to ensure they are erected prior to the flood occurring. There is a warning system in use in Limerick, which allows for deployment of barriers along Clancy's Strand and O'Callaghan Strand. Risks associated with their use include failure to respond quickly enough or inconvenience caused by deployment without a flood occurring. However, they have the advantage of being relatively cheaper than lengths of flood wall and can be used to target specific 'at risk' buildings. They also provide a more discrete finish in areas of high visual or historical amenity value, or where views are to be protected.

It is important that a continuous and passive response to flood management is provided where possible. Because of the risks associated with the timely erection of the barrier, any measure involving IPP which places a significant number of people or properties behind demountable defences was screened out as being non-technically viable. In localised situations, and where alternatives are either non-viable or non-cost beneficial, the use of IPP was considered.

4.1.3.3 Tidal barrier and upstream storage

A tidal barrier to protect King's Island from tidal flooding would involve providing a tidal barrier downstream of Limerick City. It was found that the optimum location for the tidal barrier would be close to Coonagh West, just downstream of the tunnel. This location would have the added benefit of providing protection from tidal flooding to the whole of Limerick city, when installed in conjunction with fluvial storage upstream.

In this location, the barrier would have an approximate length of 435m, from bank-top to bank-top. In summary it was found that even with the tidal barrier in place, and defending against the peak 0.5% AEP tide level, the maximum water level upstream in Limerick City would remain very similar for every configuration that was tested. This is due to insufficient capacity upstream of the tidal barrier and significant fluvial flows during the period of barrier closure. The maximum reduction realised in a given configuration was approximately 100mm. Significant defences would still be required at King's Island and the scale of works required as part of a tidal barrier could not be justified for such a small reduction in flood defence level. In addition, the works that would be required to span the estuary and provide the required upstream storage would be significant and would pose numerous environmental challenges.

There is already considerable upstream storage provided through the ESB run Ardnacrusha Power Station and Parteen Weir, with extensive tracts of floodplain submerged during extreme floods. Provision of sufficient additional storage that does not impact on existing development is not possible.

4.2 Emerging Preferred Option

The project Options Report considered a range of solutions which would manage the flood risk and achieve the objectives set by the study options. On the basis of the information provided in the Options Report, the emerging preferred option is A1-B1, Inner alignment in Area A4 and Direct Defences for Area B3.

Table 4-1: Potential Flood Relief Options

Flood Cell	Option	Description
A	1	Inner alignment at A4
	2	Outer alignment at A4
B	1	Direct defences at B3
	2	Road raising and IPP at B3

Such an option represents the combination which meets the council's brief for passive flood defences and will ensure the most sustainable, long-term use of the area around Merchant's Quay. It also provides advantages through Multi Criteria Analysis (MCA), including significant benefits in avoiding works within the SAC boundary at the north of the island.

The areas and measures comprising the preferred scheme are summarised in Table 4-2 and described in the text below.

Table 4-2. Summary of preferred scheme option

Area	Preferred Measures
A1 - Thomond Bridge to Verdant Place	Advanced works completed
A2 - Verdant Place Steps and Crèche	Direct defences
A3 - North West Embankment	Direct defences
A4 - St Mary's Park / SAC	Direct defences - Inner alignment
A5 - Star Rovers to Athlunkard Boat Club	Direct defences
A6 - Athlunkard Boat Club	Direct defences and IPP
A7 - Sir Harry's Mall	Direct defences - cantilevered boardwalk including glass panels
A8 - Absolute Hotel Boardwalk	Regrade ramps
A9 - South of Absolute Hotel Boardwalk	Direct defences (including in-stream works during construction)
A10 - Abbey Bridge to Baals Bridge	Direct defences
B1 - George's Quay East	Direct defences - raise existing wall incorporating glass panels
B2 - George's Quay West	Direct defences incorporating glass panels
B3 - Potato Market and Civic Buildings	Direct defences - glass flood barrier (including in-stream works during construction)
B4 - King John's Castle	Do nothing

4.2.1 Area A1 - Thomond Bridge to Verdant Place (as constructed)

Limerick City and County Council advanced flood relief scheme works for Verdant Place, and construction of this length of wall was completed in August 2017. There is a length of existing wall immediately north of the bridge which provided a structural robust, and high enough level of protection. The new wall and incorporated access steps tie into the existing wall and run northwards for approximately 200m towards the crèche.

It is also proposed to remove the temporary railing immediately north of Thomond Bridge which, whilst outside of the flood defence area, was provided as part of the Verdant Place contract to provide safe guarding height. In the permanent scenario, a new architecturally designed capping and railing is proposed for c.40m north of Thomond Bridge and as illustrated in Figure 4-1.

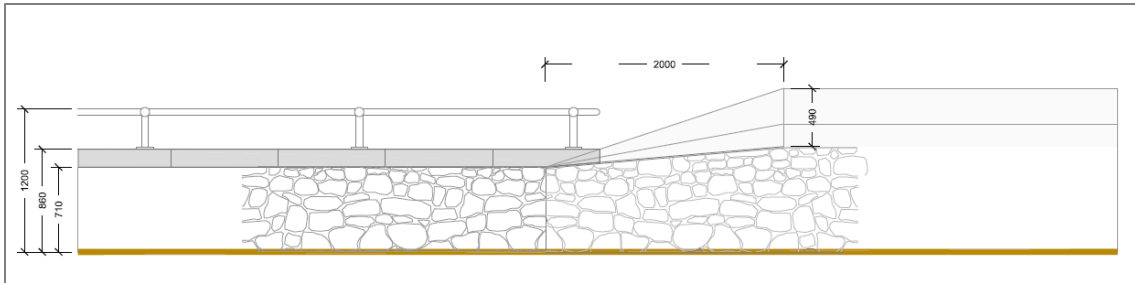


Figure 4-1: Replacement capping and railing at Verdant Place

4.2.2 Area A2 - Verdant Place steps and crèche

Due to space constraints between the river channel and the crèche, the preferred option is limited to a flood defence wall for this length. The wall will run for approximately 70m and will tie into the newly constructed wall and steps at Verdant Place to the south, and the embankment to the north, thus closing the flood cell. The temporary concrete barrier will be replaced with a permanent wall.

To allow views of the river to be retained, it is proposed that the footpath behind the wall be regraded and will result in a wall height of approximately 1.1 - 1.2m above proposed ground level, when standing on the path, i.e. at a safe guarding height.

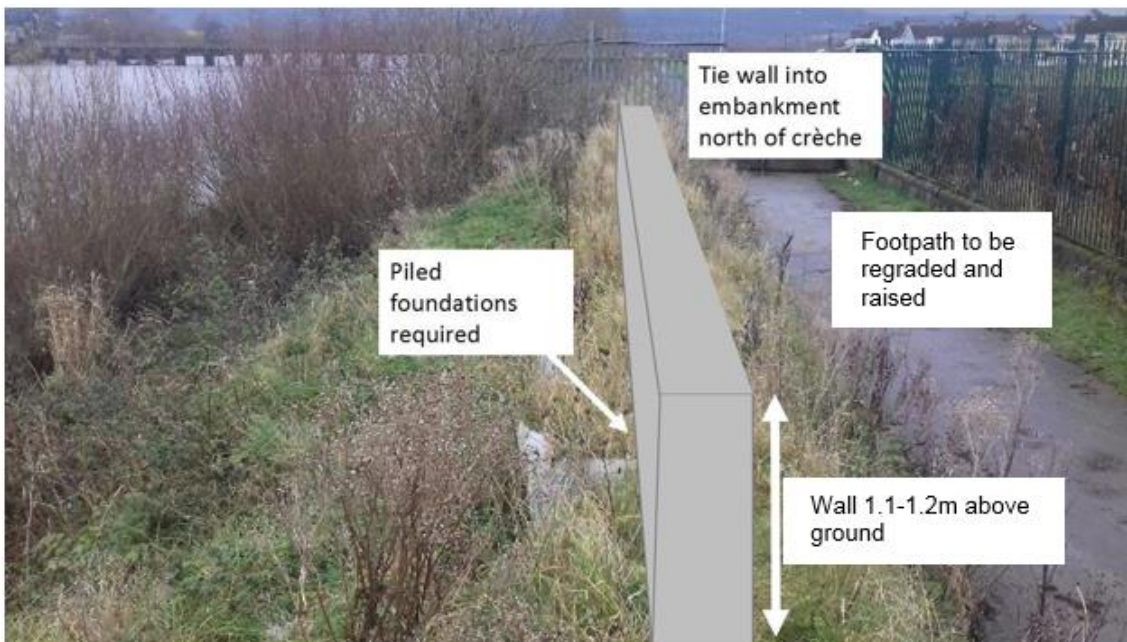


Figure 4-2: Proposed wall behind crèche

4.2.3 Area A3 - North West Embankment and Area A4 - St. Mary's Park / SAC

As this area is currently surrounded by an embankment, direct defence provision by embankment is the proposed form of defence.

An engineered embankment will be located approximately 4.5m inland from the line of sandbags on top of the existing embankment. At the southern end (near the crèche) the cycleway/walkway on this embankment will be ramped to tie in with the proposed regrading of the existing access path to the west of the crèche.

The embankment will be integrated into the existing environment by adopting a considered design approach to the line and slope of the toe of the dryside slope. The width of the embankment will vary, with the toe meandering across the open space between the river and internal estate roads, creating a more sinuous appearance. This approach is planned for all lengths of embankment,

including at Abbeyview. The exception will be at Star Rover's, where the embankment will be kept tight to allow maximum space for existing pitches.

The existing sheet piles to the north of Kings Island will be cut down to a level which is just above ground level. The public footpath which runs outside the sheet piles will be repaired and granular fill will be placed on the river side of the footpath in order to protect the walkway from future erosion and/or scouring effects

A number of pedestrian access routes are also proposed to link the embankment level walkway to Oliver Plunket Street and St, Munchin's Street, providing seven formal access points in total; three from Oliver Plunket Street, two at the north of the island either side of the handball alley and two from St. Munchin's Street as shown in Figure 4-3.



Figure 4-3 - Conceptual design showing softening of embankment slope and pedestrian access

A new open drain will be created along the inner toe of the north-west corner of the embankment and will be used to facilitate the reinstatement of the opposite leaved pond weed that exists in the existing open drain. A new outfall fitted with a non-return valve arrangement will connect the new open drain to the Shannon River. The existing, but unmaintained drain opposite St. Columcille Street will be closed off. The Japanese Knotweed bund will be maintained in a contiguous embankment to allow for management of the problem on-site.

4.2.4 Area A5 - Star Rovers to Athlunkard Boat Club

The preferred form of defence is to continue the line of direct defences from Area A4 to this section of the island through an embankment running alongside the north and eastern boundary of Star Rovers and Athlunkard Villa FC. In order to avoid encroachment onto the SAC the embankment will be replaced with a wall and cantilevered walkway for a 300m stretch along the northern side of the pitches. The cantilevered walkway will continue as a width of 4m and as outlined in 4-4. Along the eastern side of the football pitches the construction of the embankment will be carried out within a constrained corridor in-between the Sports Ground and the river edge.



Figure 4-4 - Embankment and wall alignment at Star Rovers FC and Athlunkard Villa FC

4.2.5 Area A6 - Athlunkard Boat Club

Due to space constraints, it is proposed to construct a combination of wall, embankment and regraded ground profiles, all of which will tie in with the Area A5 embankment and run behind the Boat Club to link into the higher ground at O'Dwyer Bridge. The positioning and alignment of the access ramp will tie in to the existing concrete path fronting the boat house.

4.2.6 Area A7 - Sir Harry's Mall

4.2.6.1 Sir Harry's Mall North

The preferred form of defence along Sir Harry's Mall is to raise the existing stone wall locally. It is also proposed to raise the existing footpath and widen to 2m, where it runs alongside the wall to the north of the Absolute Hotel, to maintain views to the river for pedestrians.

The construction of the wall will be carried out within a constrained corridor in-between the Sir Harry's Mall and the river edge.

4.2.6.2 Sir Harry's Mall South

In lieu of a raised walkway with constrained access points at either end, an alternate detail would be a raised walkway with access steps to/from Sir Harry's Mall along its length with possible intermediate seating areas, refer Figure 4-2.

This would reduce the width of the road along Sir Harry's Mall immediately north of the Absolute Hotel but can be accommodated given the current one-way traffic system.

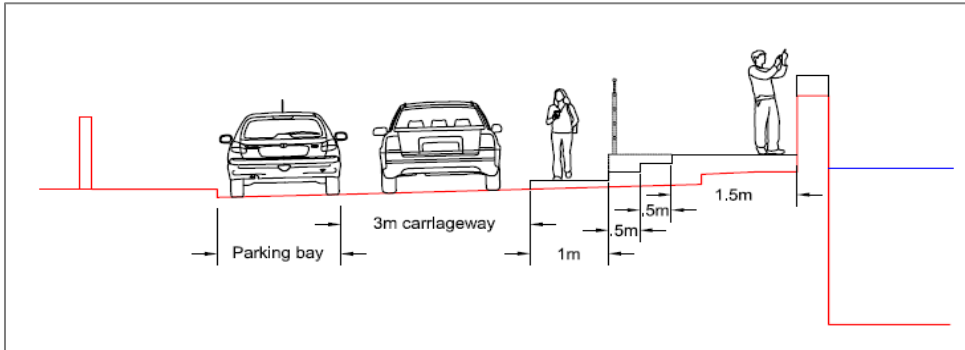


Figure 4-2: Typical section through the road, steps and wall at Sir Harry's Mall

4.2.7 Area A8 - Absolute Hotel Boardwalk

No additional flood defences are required for this area.

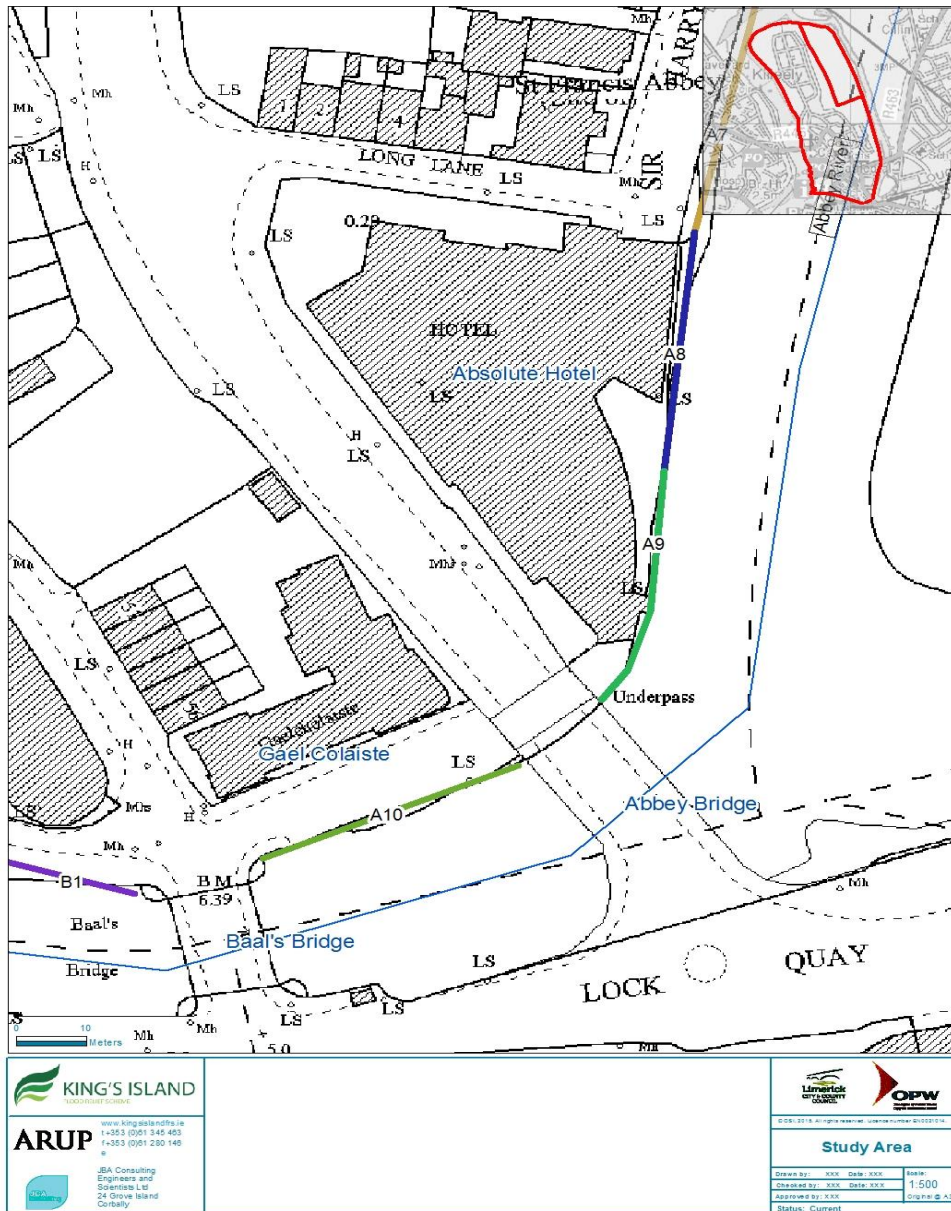


Figure 4-6: Plan of Areas A7-B1 around Absolute Hotel

4.2.8 Area A9 - South of Absolute Hotel Boardwalk to Abbey Bridge

At this location the existing wall is below the design flood defence level, and the condition of the parapet is only fair, with condition of the quay wall unknown, the proposed flood defence option will be to replace the full length of the existing parapet wall with a reinforced concrete wall in this area. Cleaning and repointing of the existing masonry river wall will also be carried out.

Due to the limited space available behind the river wall (approx. 2m between the existing wall and the hotel building at the nearest point), it is proposed to support the new RC wall on piled foundations through the existing wall (see Figure 4-7). The maximum wall height in this area will be 1.4m above ground level.

As working space and access along the hotel waterfront will be limited, in-channel working in this area will be required in the form of a jack-up rig with working platform to work along the face of the existing wall.

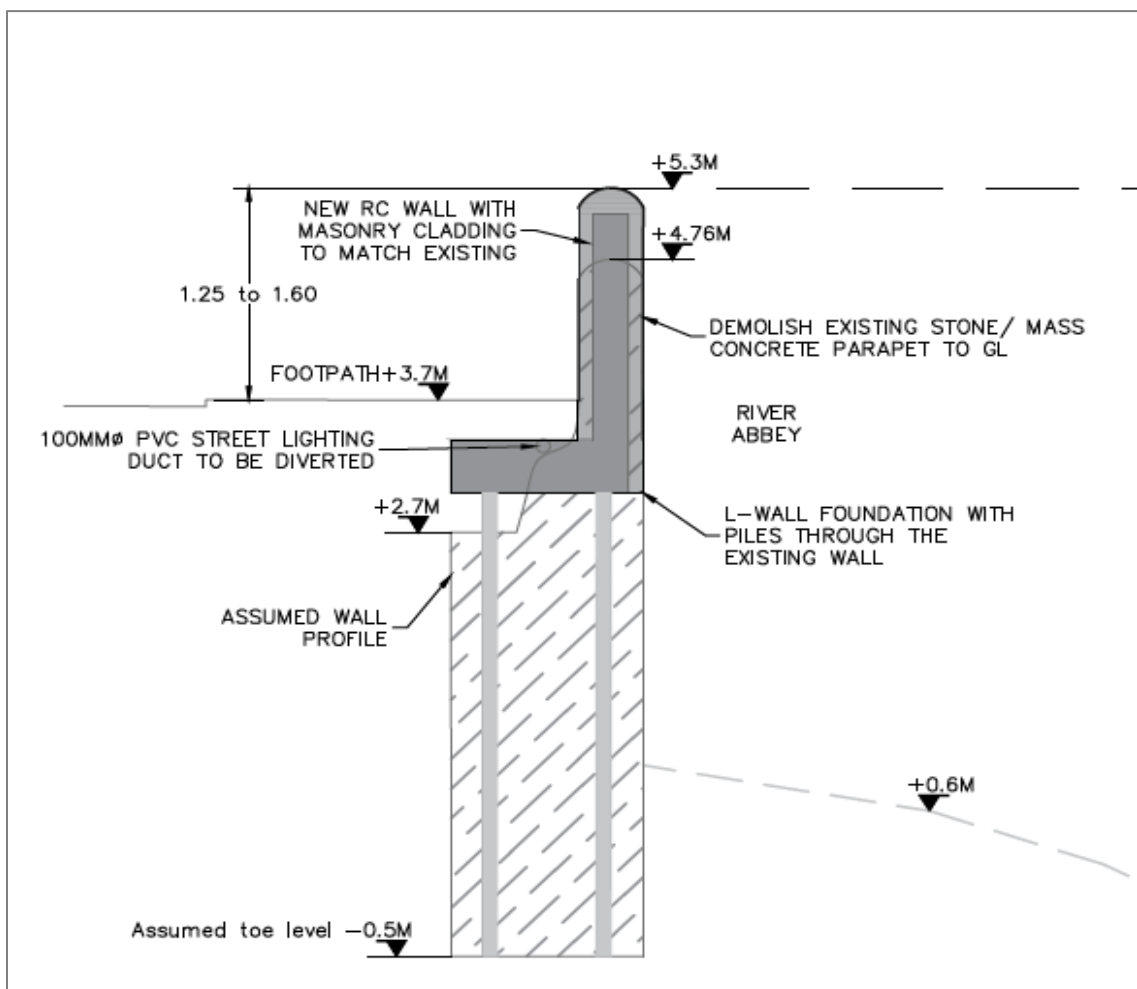


Figure 4-7 - Typical section through piled concrete wall

4.2.9 Area A10 - Abbey Bridge to Baal's Bridge

The proposed flood defence in this area is to replace the entire length of existing masonry parapet with a new reinforced concrete wall to a maximum height of 1.6m above ground level, which will give the design flood standard of protection. This new parapet will be a maximum of 0.6m higher than the existing wall level. The new wall be supported by a mass concrete foundation. Cleaning and repointing of the existing masonry river wall will also be carried out. The construction of the wall, in this area will have to be carried out within a constrained corridor in-between the Gael Coláiste and the river edge.

4.2.10 Area B1 - George's Quay East

In Area B1, the existing wall meets the required flood defence level. However it is proposed to raise the existing parapet by between 400 and 500mm along this 24 linear metre stretch to ensure a safe guarding height is provided (see Figure 4-8). This will be achieved by removing the existing rounded coping stone, building up the wall with stone to match the existing and replacing the coping stone. Cleaning and repointing of the existing masonry river wall will also be carried out.

4.2.11 Area B2 - George's Quay West

Although a proportion of the wall is above the design flood level of 5.1mOD, the full length of this parapet wall is of insufficient strength to withstand the design flood load. It is therefore proposed to replace the full length with a new reinforced concrete wall built on mass concrete foundations behind the existing wall. Providing a safe guarding height of between 1.1m and 1.2m above ground level means the top of the wall will be up to 250mm higher than the existing wall. Cleaning and repointing of the existing masonry river wall will also be carried out. In order to maintain, and as far as possible, improve connectivity with the river, it is proposed to include sections of glass panels with stone clad parapet walls. The location of the glass panels will take into account the symmetry of surrounding buildings and viewpoints along the waterfront (see Figure 4-8).



Figure 4-8 - Proposed George's Quay Direct Defences

4.2.12 Area B3 - Potato Market and Civic Buildings

4.2.12.1 Access Ramp adjacent to the Courthouse

It is proposed that the cantilevered boardwalk and raised access ramp will form the direct defence in this location as shown in Figure 4-9. Around the boat club a self-closing flood barrier is proposed with a secondary manual flood barrier located to the rear.

4.2.12.2 Public Walkway around Courthouse

Around the courthouse the proposed flood defences are a mixture of upgrading existing walls and proposed glass panels. These will be located in an arrangement to maximise pedestrian circulation around the courthouse and along the river edge.

It is proposed to install a glass flood barrier along the alignment of the existing quay wall edge. The existing railings will be relocated close to the courthouse as shown in Figure 4-9 and the existing cantilevered walkway will be removed.

As working space and access around the Courthouse will be limited, in-channel working in this area will be required in the form of a jack-up rig with working platform to work along the face of the existing quay wall.



Figure 4-9 - Proposed Direct Defences and public walkway around Court House

4.2.13 Area B4 - King John's Castle

The proposed flood defence option for this area is to 'do nothing' as the Catchment Flood Risk Assessment and Management (CFRAMS) flood extent does not show ingress of flood waters in this Area.

5 Scoping of EIAR

5.1 Introduction to Environmental Factors

In accordance with Annex IV(4) of Directive 2014/52/EU the environmental factors to be addressed in the EIAR are:

- Population and Human Health;
- Material Assets;
- Roads and Traffic;
- Water;
- Archaeology and Cultural Heritage;
- Biodiversity;
- Landscape and Visual Amenity;
- Geology, hydrogeology and Soil;
- Air and Noise;
- Climate Change;
- Interaction between the above elements; and
- Cumulative effects of this project in combination with other existing and proposed projects
- Schedule of environmental commitments
- Summary of Residual Impacts.

The following Sections outline the receiving environment and the sensitive environmental receptors for the study area. Each environmental factor will be addressed identifying the following:

- Receiving Environment and Sensitive Receptors;
- Potential Impacts;
- Assessment Methodology; and
- Summary.

5.2 Population and Human Health

5.2.1 Receiving Environment and Sensitive Receptors

Kings Island is in the heart of Limerick and contains residential, administrative, ecclesiastical, educational, retail, business, and tourism elements. The Island also contains some cultural heritage features such as remains of Limerick City Walls and various 12th and 13th century buildings including King John's Castle and St. Mary's Cathedral. The southern portion of King's Island is regarded as the historic core of Limerick City and consequently has strong tourism potential; however, the northern portion of the Island is St. Mary's Park residential estate, an area of deprivation, in terms of health, education, employment, and housing conditions and standards.

The road connections from the Island to the rest of Limerick City are located on the southern half of the Island; there are four main access routes, one from Thomond, one from Corbally, and two from the City Centre. There is limited access to St. Mary's Park with only one main entrance from Island Road Roundabout onto St. Ita's Street, disconnecting it from the rest of the island (Limerick City Council *et al.*, 2013).

King's Island is in an area with a lot of potential tourism with significant architectural and cultural heritage. It contains the remains of the Limerick City Walls and various buildings from the 12th and 13th century including King John's Castle, Thomond Bridge, and St. Mary's Cathedral. In addition to the cultural heritage, King's Island offers a pathway along the riverside, which goes around the whole Island surrounded by treelines and wetlands. The Special Areas of Conservation (SAC) within the Island may attract nature enthusiasts (bird watchers), as well as, runners and cyclists. The Island has three rowing clubs namely the Shannon Rowing Club, St. Michael's Rowing Club and Athlunkard Boat Club. St. Mary Park located in the northern section of King's Island was selected as a target area in the Limerick City Regeneration Plan, the largest regeneration

programme in the state which includes significant investment on physical (€253m), social (€30m), and economic (€10m) programmes for selected areas in Limerick City.

5.2.2 Potential Impacts

If the proposed Scheme does not proceed, King's Island will continue to experience extreme flooding affecting property, land use and access to roads and recreational land for tourists, office workers and the local residential population. During the construction stage of the proposed scheme potential negative impacts and disturbance to the community are likely to occur from construction, increases in ambient noise and dust levels, traffic, road closures and diversions. In particular the walkway around the northern end of the scheme will be disrupted from construction of the proposed embankment plus footpaths along Sir Harry's Mall, Georges Quay and along the river edge in proximity to Limerick Circuit Court and the City/County Council offices. However, the operational phase will be general positive as it will provide protection from flood, provide confidence for economic activity, employment, settlement patterns, social patterns and human health. However, there is the potential for negative effects on human health in terms of light overspill for residents on the eastern side of St Mary's Park due to the introduction of lighting on the raised flood embankment to the rear of their properties. A light spill study will be required to assess the potential impact of this aspect.

5.2.3 Assessment Methodology

A desktop study will be carried out to establish the baseline associated with economic activity, employment opportunities, settlement and social patterns. Noise and dust generation during construction will be assessed in air and noise chapter, positive impacts and improved quality of life due to the scheme will be discussed in the EIAR.

5.2.4 Summary

This section has assessed that there are likely to be potential impacts on population and human health during both the construction and operational phases of the scheme, therefore these aspects will be considered further in the EIAR.

5.3 Material Assets

5.3.1 Receiving Environment and Sensitive Receptors

As part of the Constraint Study, utility plans were reviewed and confirmed the presence of water supply, sewers, high voltage underground cable routes and overhead electricity lines, as well as, low pressure and high-pressure gas pipes in various locations around the island. In particular the underground gas network along Verdant Place and Sir Harry's Mall is in close proximity to the location of the proposed flood walls.

Additionally, the out-of-date sewer system in King's Island also poses a constraint in the project development because even if flood prevention infrastructure were introduced, the combined sewer system may not have the capacity to withstand an extreme flooding event, therefore the risk of discharge into the Shannon or Abbey River and flooded houses remains. There are various outfalls throughout the Island discharging into both the Shannon and Abbey Rivers.

5.3.2 Potential Impacts

An assessment of the disruption to utilities from the proposed development will be undertaken in the next stage of the project i.e. conceptual design to understand where any utility diversions or upgrades are required. Potential impacts may result from during the construction stage from any diversions or upgrades as may be required resulting in short-term effects on Roads, Footpaths and Traffic.

5.3.3 Assessment Methodology

The assessment of material assets will include a desk-based exercise, to identify properties, utilities and resources that may be affected by the proposed scheme. This may be followed by test trenching on site with the utility companies to accurately locate services in proximity to proposed construction excavation sites.

5.3.4 Summary

This section has assessed that there are likely to be potential impacts on material assets only during the construction phase, therefore these aspects will be considered further in the Construction chapter of the EIAR.

5.4 Roads and Traffic

5.4.1 Receiving Environment and Sensitive Receptors

King's Island is connected to the rest of the city by four main access routes, all located in the south portion of the island. The Island Road and Castle Street compose part on the N7 route through the city centre. This road is heavily transited and isolated from the north of the Island.

Thomond Bridge connects King's Island to the northwest side of Limerick City. Bridge Street joins the southernmost part of the Island into the heart of Limerick City Centre, past the Hunt Museum and onto O'Connell Street. Mary Street and Island Street attaches the southeast portion of the Island to routes towards the Milk Market, Johnsgate, and Pennywell. Additionally, Bridge Street to the east of the Island turns into Route 465 towards Grove Island and Corbally. R465 is heavily trafficked in the morning and afternoon from people travelling towards and out of the City Centre.

St. Mary's Park has limited access from the rest of Limerick City, the main entrance is through the Island Road Roundabout and three other smaller access routes that all join into a large cul-de-sac. Most of the traffic in King's Island is from people entering and leaving Limerick City Centre using King's Island as a transitory route to get to the city centre.

Limerick City as a Gateway Town is well served with many connections to regional and national routes. Recently developed motorways include: Nenagh-Limerick Motorway, the M18 Ennis Road to Shannon; national primary roads such as the N7 (Dublin Road), N24, N20, N21.

5.4.2 Potential Impacts

The proposed development is not predicted to increase road traffic during the operational stage.

Any development which includes a percentage increase of 5% traffic or less in an urban area is considered not to have an impact. The annual average daily traffic (AADT) of the principal routes in the study area was considered in the Constraints Study and suggests that a 5% increase in traffic would be as a result of approximately 820 passenger car units per day. This equates to 341 HGV's per day (based on a passenger car units conversion factor of 2.4). It is envisaged that the proposed King's Island Flood Defence works will not involve construction traffic which will breach the above threshold.

No roads will be closed permanently as a result of the proposed development. However, during construction diversions will be required in the St Marys Place. The significance of the effect of the disruption of road, traffic and public transport has not been studied at this stage and will be carried out in the next stage of the project.

5.4.3 Assessment Methodology

The assessment of roads and traffic will include a desk-based exercise, to identify roads, footpath, cycleways and public transport routes that may be affected during the construction phase of proposed scheme.

5.4.4 Summary

This section has assessed that there are likely to be potential impacts on roads and traffic only during the construction phase, therefore these aspects will need to be considered further in the Construction chapter of the EIAR.

5.5 Water Quality

An initial scoping assessment of the potential impacts of the proposed Scheme on water was undertaken.

5.5.1 Receiving Environment

5.5.1.1 Surface Watercourse

The study area is located within the Shannon River Basin District and surrounded by the Limerick Docks Transitional Waterbody. Limerick Docks forms part the Shannon Estuary, which extends from the Atlantic Ocean up to Limerick and has a length of 97 kilometres. The Shannon Estuary is divided into various transition waterbodies: Lower Shannon Estuary, Fergus Estuary, Upper Shannon Estuary and Limerick Docks. The Limerick Dock waterbody is classified as part of a Special Area of Conservation (SAC) and a Special Protection Area (SPA) due to the diverse and valuable flora and fauna present.

The principal surface water bodies within the study area are:

- The Shannon River; and
- The Abbey River.

Both the Shannon and Abbey River are within the Limerick Docks transitional waterbody that extends across 3.03 km².

Limerick Docks is classified as a Transitional Water Body (Water Body Code IE_SH_060_0900) of the Shannon Estuary and it is within the Shannon International River Basin District (SIRBD). The Water Framework Directive (WFD) status of Limerick Dock is Moderate and described as unpolluted/slightly polluted (Fanning *et al.*, 2017). The current objective for Limerick Docks is to restore water quality to 'good status' by 2021 however monitoring deduced that it is 'at risk' of not achieving the objective (EPA GeoPortal, 2017).

5.5.1.2 Lakes

Lough Derg is located approximately 22km upstream of and to the northeast of King's Island and Limerick Dock transitional waterbody. The study area inclusive of Limerick Docks is hydraulically separated from the Lough Derg by the Ardnacrusha Power Station. Therefore, it is not considered. The Limerick Dock waterbody is classified as part of a Special Area of Conservation (SAC) and a Special Protection Area (SPA) due to the diverse and valuable flora and fauna present. in the study.

There are no coastal waters present in the study area.

5.5.1.3 Groundwater

There are two groundwater bodies within the study area that are relevant to this assessment: Limerick City North (IE_SH_G_139) and Limerick City East (IE_SH_G_138). They belong to the hydrometric area of the Shannon Estuary. According to the EPA Water Quality Assessment (2010-2015), Limerick City East groundwater body received a WFD status of poor, while Limerick City North groundwater body was given a WFD status of good. Both waterbodies were identified as being 'at risk' of not achieving the WFD objective by 2021 (Fanning *et al.*, 2017). Limerick City North and East GWBs are used for drinking water. The key environmental receptors are the groundwater drinking supplies, people using this for potable water and the ecological habitats on site.

Limited groundwater levels were available for the site at the time of the report, however, a strong connection between the between the river and groundwater level was indicated from groundwater logger data in RC01A at Verdant Place (Fink and Orr, 2016). In addition, the groundwater level data and King's Island River Stage data show that the river and subsoils are hydraulically connected (Fink and Orr, 2016) [Refer to Chapter 5.9.2. Hydrogeology].

5.5.2 Potential Impacts

At this stage it is envisaged that there will be two areas of instream works on the Shannon and Abbey Rivers:

(1) At the south east corner of the Absolute Hotel, instream work on the Abbey River is proposed. This is necessary for construction of a section of reinforced concrete wall to replace the existing parapet wall which is below the design flood defence level. Instream works will comprise the construction of a temporary, enclosed working platform on stilts adjacent to the wall to allow part of the construction works to occur from the river side.

(2) At the south west of the Courthouse, instream work on the Shannon River is proposed. This is necessary for construction of a section of board walk around the Courthouse and would include

sealing of existing joints, tanking of walls, removal of vents on walls adjacent to the river prior to the construction of the boardwalk and glass panels. Instream works will comprise the construction of a temporary, enclosed working platform on stilts to allow part of the construction works to occur from the river side.

As the location of the proposed flood defences are on the water edge of both the Shannon and Abbey River, potential impacts could occur during the construction phase from an unprecedented accident such as but not limited to:

- Contaminated runoff from the site or accidental spillage and fugitive emissions resulting in deterioration of water quality of surface waters; and
- Pollution seepage through the gravel layer into ground water underneath, due to fissured bedrock. The aim is to not interfere with groundwater connections or contaminate the groundwater body during the construction of flood defence mechanisms (flood defence wall, embankment etc).

5.5.3 Assessment Methodology

A review will be undertaken of construction method statements to understand if the construction activities have the potential to pollute surface water and due to the gravel layers present, this could pollute ground water.

The impacts on water will be assessed using the source - pathway - receptor model. A Conceptual Site Model will be prepared for the site to assess the likelihood of an impact on groundwater during construction from the site investigations and boreholes and from the presence of any hazardous materials and during operation of the scheme. The interaction between water/groundwater and water dependant habitats and species will be explored.

The assessment methodology and significance criteria will be developed, and an assessment of the magnitude, duration and sensitivities of the receptors will be determined.

Where significant impacts are identified, recommended mitigation measures to reduce/remedy the impacts will be described. Mitigation measures during the construction of the scheme and operation of the scheme will be provided in the EIAR. A monitoring programme to assess the effectiveness of the mitigation measures will be developed during the project. The residual impacts and cumulative impacts with other developments will be assessed.

Consultation will be undertaken with the NPWS and IFI.

5.5.4 Summary

This section has assessed that there are likely to be potential impacts on surface watercourse and groundwater during the construction phase which would also be present during operational stages, therefore these aspects will need to be considered further in the EIAR.

5.6 Archaeology and Cultural Heritage

For the purposes of this section of the EIAR, the definition of “cultural heritage” is taken broadly from the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage, 1972, which considers the following to be “cultural heritage”:

- Monuments: architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings and combinations of features, which are of outstanding universal value from the point of view of history, art or science;
- Groups of Buildings: groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view of history, art or science; and
- Sites: works of man or the combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.

5.6.1 Receiving Environment

King's Island in Limerick City is strategically located in a national context, positioned near a fording point and guarding the northern approaches to the River Shannon. Given its context, it is likely

that the island was settled from earliest times. Limerick City was besieged by Oliver Cromwell in 1651 and twice by the Williamites in the 1690s (Moore and Quinn, 2015). The Jacobite force finally capitulated to William of Orange on 3 October 1691, the terms were reputedly signed on the Treaty Stone, an irregular block of limestone which once served as a mounting block for horses now displayed on Clancy Strand (Moore and Quinn, 2015).

There are two National Monuments in State Care within the subject area - King John's Castle and Fanning's Castle. There is one site within King's Island that is subject to a Preservation Order.

There are 96 sites listed in the RMP for Kings Island. These range from monumental above ground sites like King John's Castle, Fanning's Tower House and St. Mary's Cathedral to Medieval structures and excavated human remains recovered from a variety of locations.

Notable in the context of the proposed project is the frequency of monuments found around the water's edge, particularly the town defences, mills, weirs, quays, a battery and Thomond and Balls bridge. Not listed on the standard inventories but of Cultural Heritage value are the stone retaining embankments along both the Shannon and Abbey River. These cut stone walls date to the late eighteenth –mid nineteenth century

There are no designated Architectural Conservation Areas within Kings Island.

The Limerick City Development Plan 2010-2016 (as extended): Volume 3 Record of Protected Structures lists 44 Structures within the study area. The National Inventory of Architectural Heritage (NIAH) Survey for Kings Island lists 31 sites within the subject area. Note there is a substantial degree of overlap with the Record of Protected Structures.

5.6.2 Potential Impacts

Due to the presence of cultural heritage aspects within the study area and in particular the frequency of monuments found around the water's edge which are in proximity to the proposed flood defence measures, potential impacts may result during the construction and operational stages.

5.6.3 Assessment Methodology

A desktop study will be undertaken of all the available cultural heritage inventories and cartographic sources that are considered to fully inform predicted impacts and appropriate mitigation measures for the proposed Scheme. This chapter of the EIAR will present an overview of all the known archaeological, architectural, cultural and historical constraints within the study area.

Depending upon the final design and location of the flood fence measures, the archaeological assessment will focus on these areas. Unrecorded archaeological sites have potential to be impacted upon by the flood relief works such as walls or embankments. For any works that will be located close to water, the study team will review underwater archaeological records for the area. For underwater archaeology, consultation will be carried out with the Underwater Archaeological Unit and Development Applications Unit of the DAHG. Mitigation measures, such as the requirement for an on-site archaeologist will be listed. Specific mitigation measures for the planned works in specific areas will be documented and agreed with the Department.

All notification, consents and licencing requirements under the National Monuments Acts will be adhered to.

5.6.4 Summary

This section has assessed that there are likely to be potential impacts on cultural heritage aspects particularly along the water edge during the construction and operational phase, therefore these aspects will be considered further in the EIAR.

5.7 Biodiversity

An initial scoping assessment of the potential impacts of the proposed Scheme on biodiversity was undertaken.

5.7.1 Receiving Environment

Baseline data has been and will be gathered, from a comprehensive desk-based assessment and fieldwork surveys conducted by JBA.

A portion of King's Island is designated as the Lower River Shannon Special Area of Conservation (SAC) and is situated upstream of the River Shannon and River Fergus Special Protection Area (SPA). These sites are protected under the EU Habitats Directive and are of international importance for their wetland, intertidal and estuarine habitats as well as wader and wildfowl populations. Two habitats that are listed as Features of Interest of the Lower River Shannon SAC, have been identified as being present on King's Island during ecological walkover surveys and in close proximity to the footprint of the Scheme. An area of *Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)*, one of the priority habitats within the SAC, occurs along the north easterly edge of King's Island. An area of the Annex I habitat *Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]* of the sub-type Opposite-leaved pondweed (*Groenlandia densa*), occurs to the west of the site, within the drainage ditch at the rear of the existing embankment. Protected habitats and species may be impacted through surface water, groundwater and land or air pathways. Potential impacts to Natura 2000 sites will be considered in detail in a Natura Impact Statement (NIS) that will accompany the EIAR. The remaining main habitats at King's Island include wetlands, an urban residential area and accompanying amenity areas.

5.7.1.1 Lower River Shannon SAC

The Lower River Shannon SAC encompasses the drained river valley which forms the River Shannon Estuary, the broader River Fergus Estuary and a number of smaller estuaries. The site contains many annexed habitats including the most extensive area of estuarine habitats in Ireland. Annexed species are also recorded as present, including all three Irish species of lamprey and Atlantic salmon (*Salmo salar*). The site is internationally important for wintering waterfowl and includes several species of flora listed in the Irish Red Data Book including the endangered species Triangular Club-rush (*Scirpus triqueter*) and Opposite-leaved pondweed (*Groenlandia densa*) (NPWS 2013). Triangular Club-rush has been recorded to the north west of the island and Opposite-leaved pondweed is present in the Limerick Canal, at O'Dwyers Bridge and on the Abbey River (NPWS, 2015). Ecological surveys have also identified *Groenlandia densa* as present on King's Island in the drainage ditch at the rear of the existing embankment on the west of the island. Both species are protected under the Flora Protection Order 2015.

5.7.1.2 River Shannon and River Fergus SPA

The River Shannon and River Fergus SPA includes part of the aforementioned Lower River Shannon SAC. Within the inner Shannon Estuary, it extends as far as Limerick Docks at Limerick City, south of the area of works. The River Shannon and River Fergus Estuary SPA is the most important coastal wetland site in the country, regularly supporting in excess of 50,000 wintering waterfowl. This includes nationally and internationally important populations of waterfowl, some of which are known to be breeding on this site (NPWS 2015).

5.7.1.3 Habitats

An ecological walkover survey of the area (Joint Nature Conservation Committee (JNCC) Phase I Survey) was conducted to record the habitats and flora present as part of the constraints report. The study was chiefly concerned with recording habitats suitable for protected and/or notable habitats and species. The requirement for further relevant surveys was noted where necessary. The following habitats were identified during the ecological walkover survey;

Riparian Woodland (WN5)

This habitat category includes wet woodlands of river margins (gallery woodland) and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement, which usually occurs in the lower reaches of rivers. This habitat category includes the Annex I habitat Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae)* (91E0) (Fossitt, 2000).

Riparian woodland fringes the edge of King's Island. This habitat extends northwards along the eastern margin, from O'Dwyers Bridge to the north-western edge. This riparian woodland is dominated by stands of willows (*Salix sp.*) with occasional Alder trees (*Alnus glutinosa*). The understory contains taxa such as Reed Canary-grass (*Phalaris arundinacea*), Nettle (*Urtica dioica*), Meadowsweet (*Filipendula ulmaria*), Club rush (*Schoenoplectus sp.*), Bindweed (*Calystegia sepium*), Bramble (*Rubus fruticosus agg.*) and Willowherbs (*Epilobium sp.*). Himalayan Balsam (*Impatiens glandulifera*), which is an introduced and invasive species, is abundant throughout the riparian woodland habitat.

Tall Herb Swamps (FS2)

Tall-herb swamps are stands of herbaceous vegetation that occur in wet areas where the water table is above the ground surface for most of the year, or where water levels fluctuate regularly as in the case of tidal sections of rivers (Fossitt, 2000). The tall herb swamp lies within the SAC designation on the eastern side of King's Island. Access to this area was limited, which was viewed from the footpath at a higher elevation to the tall herb swamp. Taxa which dominated this area were Reed sweet grass (*Glyceria maxima*), Yellow Iris (*Iris pseudacorus*), Water-plantain (*Alisma plantago-aquatica*), Water Horsetail (*Equisetum fluviatile*), Branched Bur-reed (*Sparganium erectum*), Bulrush (*Typha latifolia*) and Water Mint (*Mentha aquatica*). The understorey of wetland plants in this habitat could not be assessed due to access restrictions.

Wet grassland (GS4)

Wet grassland habitat occurs on wet or waterlogged mineral or organic soils that are poorly-drained or, in some cases, subjected to seasonal or periodic flooding. On sloping ground, wet grassland is mainly confined to clay-rich gleys and loams, or organic soils that are wet but not waterlogged (Fossitt, 2000). The wet grassland habitat is mainly located to the north of the island. A narrow strip of wet grassland habitat exists along the western edge of the island, which is bordered by a treeline. This wet grassland habitat was dominated by grasses such as Yorkshire-fog (*Holcus lanatus*) and Creeping Bent (*Agrostis stolonifera*). Rushes (*Juncus sp.*), Horsetails (*Equisetum spp.*), Yellow Iris (*Iris pseudacorus*) and Reed sweet grass (*Glyceria maxima*) were abundant in patches within the wet grassland habitat. Broadleaved herbs such as Creeping Buttercup (*Ranunculus repens*), Spearwort (*Ranunculus flammula*), Marsh Thistle (*Cirsium palustre*), Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Ribwort Plantain (*Plantago lanceolata*), Dock (*Rumex sp.*), Figwort (*Scrophularia sp.*) and Clover (*Trifolium sp.*) and Willowherbs (*Epilobium sp.*). Himalayan Balsam (*Impatiens glandulifera*) is abundant in the wet grassland habitats to the east of the island.

Treelines (WL2)

The treelines within the island consist of Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Horse Chestnut (*Aesculus hippocastanum*), Elder (*Sambucus nigra*), willows (*Salix sp.*) and limes (*Tilia spp.*).

Tidal Rivers (CW2) and Estuaries (MW4)

The River Shannon and River Abbey are tidal rivers that surround King's Island. The Shannon Estuary is located downstream of King's Island.

Amenity Grassland (GA2)

Amenity grassland is situated around the areas of residential housing on King's Island. These areas include greens to the west of the island and playing pitches to the east.

Dry meadows and grassy verges (GS2)

A thin strip of GS2 exists either side of the footpath on the eastern side of King's Island. This grassy verge is slight wet in nature given its location on King's Island. This is dominated by Nettle (*Urtica dioica*), Common Knapweed (*Centaurea nigra*), Willowherbs (*Epilobium sp.*), Bramble (*Rubus fruticosus agg.*), clovers (*Trifolium spp.*) and ragworts (*Senecio spp.*). The only grass that was discernible was Cock's-foot (*Dactylis glomerata*).

Recolonising bare ground (ED3) and Spoil and bare ground (ED2)

At the time of the ecological survey areas of bare and recolonising ground existed between the residential housing and SAC boundary. Construction works were taking place within this area.

Drainage ditches (FW4)

A drainage ditch runs along the inside of the embankment on King's Island. This drainage ditch does not seem to be connected to the River Shannon or River Abbey and appears to be for land drainage purposes. Vegetation within and on the banks of the drainage ditch included Reed sweet grass (*Glyceria maxima*), Yellow Iris (*Iris pseudacorus*), Water Horsetail (*Equisetum fluviatile*) and Bulrush (*Typha latifolia*).

Buildings and artificial surfaces (BL3)

This category is dominated by residential housing on King's Island. A tarmac footpath runs around the perimeter of the Island, inside the embankment, and steel pile sheeting has been erected on the north of the Island to stabilise the embankment.

Non-native Invasive species

The non-native invasive species Himalayan Balsam (*Impatiens glandulifera*), Japanese knotweed (*Fallopia japonica*), Winter heliotrope (*Petasites fragrans*) and Giant Hogweed (*Heracleum mantegazzianum*) were recorded at various locations on King's Island. Himalayan balsam is abundant along the edges of the island within the riparian woodland and wet grassland habitats. Numerous stands of Japanese knotweed are located along the boundary line of the SAC and adjoining housing estate. The location of Giant Hogweed was contained to the outer fringe of the island, among the riparian woodland and wet grassland areas. Giant Hogweed was in die back at the time of surveys and therefore some Giant Hogweed plants may not have been recorded. Winter heliotrope was observed during surveys in January at two separate locations. An area to the east of the site, between the boat club boundary wall and the alluvial woodland, contains a significant amount of Winter heliotrope and a small patch is located between the drainage ditches on the west of the site.

5.7.1.4 Invasive Species Management Plan

Particular note has been taken of invasive species, due to their prolific presence on King's Island and their potential to impact the Natura 2000 sites present. Treatment of invasive species already identified has already begun following the preparation of an Invasive Species Management plan, under contract from Limerick City and County Council. Biosecurity measures are required on site and the following documents were and should be referenced:

- Invasive species management for infrastructure managers and the construction industry
- CIRIA C679 (CIRIA 2008);
- Guidelines on The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010);
- Biosecurity and management of invasive non-native species for construction sites and Controlled Activities (SEPA);
- Net Regulations (Construction and Building Industries INNS guidance in Northern Ireland and Scotland); and
- Invasive Species Ireland - Management Toolkit.

The aim of the management plan is to treat, and eradicate where possible, the invasive species recorded on site prior to commencement of the proposed scheme. However, on-going maintenance works (by the invasive species contractor) will continue for the duration of the scheme. Removal of invasive species may cause other opportunist invasive species to thrive and this must be monitored during further surveys. Should further invasive species be identified, the current management plan will be adjusted accordingly.

5.7.2 Potential Impact

A portion of the study area is designated as the Lower River Shannon SAC and is situated upstream of the River Shannon and River Fergus Special Protection Area. Due to the presence of these designated sites and qualifying interests within King's Island and two areas of instream works on the Shannon and Abbey Rivers at the Absolute Hotel and around the Courthouse, potential impacts on biodiversity could occur. Additionally, there is the potential for negative effects on birds in the River Shannon and River Fergus SPA due to the introduction of lighting on the raised flood embankment around St Marys Park. A light spill study will be required to assess the potential impact of this aspect.

5.7.3 Assessment Methodology

5.7.3.1 Ecological surveys

The need to conduct the following surveys has been identified:

- Wintering bird surveys;
- Invasive species;

- Fisheries;
- Botanical - Terrestrial;
- Aquatic vegetation;
- Bats;
- Otter; and
- Other protected mammals

Should these surveys reveal the presence of further, previously un-recorded protected species, the need to conduct additional surveys may arise and shall be carried out. Ecological surveys will be conducted in general accordance with the methods outlined in the following documents:

- Heritage Council (2010). Best Practice Guidance for Habitat Survey and Mapping. [Pre-Publication Version];
- Phase 1 Habitat Survey methodology (Joint Nature Conservation Committee (JNCC), 1990, revised 2003);
- Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes (NRA, 2009);
- Bat Conservation Trust (BCT) Bat Surveys for Professional Ecologists - Good Practice Guidelines (3rd ed.) (Collins, 2016);
- Countryside Bird Survey and the Riparian Bird Survey methods (BWI, 2010);
- National Rivers Authority (1993). Otters and River Habitat Management. Conservation Technical Handbook Number 3. Ward D, Holmes N and José P (1994);
- Best Practice Guidance - Badger Surveys. Inverness Badger Survey 2003. Commissioned Report No. 096. Delahay RJ, Brown JA, Mallinson PJ, Spyvee PD, Handoll D, Rogers LM and Cheeseman C L (2000); and
- Low tide waterbird surveys: survey methods and guidance notes. Irish Wildlife Manuals, No. 80. National Parks and Wildlife Service (Lewis and Tierney, 2014).

5.7.4 Impact Assessment

Impact assessment upon sensitive and protected ecological receptors should follow guidelines contained in the documents Guidelines for Ecological Impact Assessment in the United Kingdom 2nd Edition (CIEEM, 2016), Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (EPA 2003), and also with reference to Guidelines for Assessment of Ecological Impacts of National Roads Schemes (NRA, 2009). A post construction ecological assessment and surveys during the operation of the scheme will be detailed in the EIAR.

5.7.5 Summary

This section has assessed that there are likely to be potential impacts on biodiversity aspects during the construction and operation phase, therefore these aspects will be considered further in the EIAR.

5.8 Landscape and Visual

5.8.1 Receiving Environment

5.8.1.1 Landscape Character

The study area has two distinct areas of landscape character:

- The northern part of the site has a residential area (St Mary's Park) located in the centre and has a continuous green open space including a raised walkway which separates the developed land from the river edge, the River Shannon is to the west and the Abbey River is to the east. The green space on the eastern side of this zone includes a portion of the Lower River Shannon SAC and includes areas of significant vegetation; and
- The southern part of the site is a mixed development in terms of land use and is built upon right up to the water's edge with no open space buffer zone. However, within this area there are pedestrian routes along the water edge incorporating sitting areas, mature trees and formal access points to the river for recreation.

5.8.1.2 Visual Amenity

In terms of visual amenity residents of St Mary's Park and occupiers of the buildings on the water's edge of the mixed-use development enjoy views out to the river, along the river bank and across open spaces within King's Island.

In the south of the Island visibility there are valued views exist of landmarks from locations such as Clancy's Strand on the west bank of the River Shannon across from King John's Castle, or Sarsfield Bridge and Honan's Quay south-west of the island.

5.8.2 Potential Impacts

During the construction phase the landscape character and visual amenity could be affected by the presence of cranes, construction compounds, and lighting, site offices and hoarding. The recreational amenity of the open space areas will also be affected during the construction of the raised embankment in the northern part of the scheme and the excavation works including removal of existing mature trees for the flood defence walls in the southern part.

In the operation stage of the proposed development potential impacts due to visual obstruction and intrusion from the flood defences could occur particularly for those residents in St Mary's Park and occupiers of the mixed-use development the river edge in the south of the Island.

5.8.3 Assessment Methodology

The landscape and visual impact assessment will examine the potential effects of the proposed development on views from residential properties and tourist routes, in terms of visual intrusion and visual obstruction and the impact on landscape character areas from the permanent physical changes to the site brought about by the development.

The Landscape and Visual Impact Assessment in the EIAR will involve consideration of aerial photography, emerging design drawings, relevant various publications and reports, together with visits to the site and environs of the proposed development.

Photomontages will be prepared, and liaison with the Conservation Officer in Limerick City Council will take place to agree on the location of glass panels, finishes to walls and access to embankments etc.

5.8.4 Summary

The impacts associated with the proposed Scheme could potentially be significant on landscape and visual amenity, both in the construction and operational phase. These aspects will need to be considered further in the EIAR.

5.9 Geology and Soil

5.9.1 Receiving Environment

Information from historic site investigations, Teagasc soils maps and GSI bedrock geology maps were compiled to provide information on the geology and soils for the site and extended constraints area. Several geological cross sections have been produced for the site and automatic data loggers have been installed in the groundwater wells around the site.

The geology of King's Island is composed of made ground and alluvial deposits (silt, clay, sand and gravel) overlying limestone. The clay and silt overlying the gravels is consistent across the site.

The thickness and composition of the made ground is variable. Contaminated soils are likely to be present to the east of St. Marys Park because it was the location of an unregulated landfill site. The illegally dumped material has been removed.

The depth of limestone is at approximately 10mbgl in the north of the site and approximately 4mbgl in the south of the site. The GSI groundwater vulnerability mapping notes an area of extreme vulnerability along the western walkway in the north west of the site indicating that rock may be present at or near the surface in this area, however the ground investigation indicated that this is not correct, and that rock is up to 8mbgl in this area.

5.9.2 Hydrogeology

A review of the Geological Survey of Ireland's data base (www.spatial.dcenr.gov.ie/) identified that there is a range of groundwater vulnerable areas within King's Island. Most of the island has a vulnerability level of moderate, however it has pockets of high vulnerability and extreme vulnerability (Rock at or near surface). According to the GSI characterisation, both groundwater bodies are unconfined with the rivers and streams in hydraulic continuity with the aquifer.

The direction of groundwater flow in the subsoils at the site are from the north to the south. The rivers and the groundwater at the site is hydraulically connected.

Groundwater flow in the bedrock is confined beneath the clay and is highest in the centre of the site. Groundwater movement in the Special Area of Conservation indicate that water in the limestone is artesian or at ground indicating that the clay is acting as a confining unit. The SAC is receiving recharge from rainfall recharge.

Limited groundwater levels are available for the site at this stage, however, the limited information available confirms that close to the river there is a strong correlation between river and groundwater level (Buckley,C.,2016). Automatic data loggers were installed in groundwater locations around the site. These data loggers record groundwater levels at set intervals and have been moved around the site on a monthly basis to establish the relationship between surface water and groundwater in the various lithologies (Buckley,C.,2016 ;Fink and Orr, 2016).

Groundwater flow in the subsoils (in particular the gravels and cobbles) at Kings Island is from north to south, in the same direction as the flow of the river. Gravel underlies the upper clay subsoils which is approximately 2 – 15m thick. The overlying clay prevents the gravel from receiving recharge. The gravels, whilst in hydraulic connectivity with the river, are hydraulically separate and disconnected with the SAC. The SAC is fed by incident rainfall only and not from groundwater or surface water sources (Fink and Orr, 2016).

5.9.3 Potential Impacts

It is likely that potential impact on the geological aspects will arise from construction activities including excavation and disposal of earthworks and/or accidental spillage. Additional soil will be imported into the site for the construction of the raised embankment walkway around the north of the island, this has potential to impact on geology and soils for the site.

5.9.4 Assessment Methodology

A number of walkover surveys, and the installation of trial pits, boreholes and piezometers as part of site investigations will furnish relevant information on hydrology, and hydrogeology at the site.

The methodology for assessment of the impacts on the soil and geology will be undertaken in accordance with recommendations in Geology in Environmental Impact Assessment Report - A Guide from the Institute of Geologists of Ireland (2002). The Directive requires EIA practitioners to consider the sustainable use of soil and land.

A Conceptual Site Model for the site will be developed based on the site investigations undertaken, the information on groundwater levels in the boreholes and the proposed flood management scheme. The impacts of the scheme on geology, groundwater and hydrogeology and water dependant habitats and species will be assessed and any significant impacts will be mitigated.

The interaction between geology/ soils and hydrology/ hydrogeology on water dependant ecology will be discussed in the chapter of the EIAR dealing with interactions of the foregoing.

5.9.5 Summary

This section has assessed that there are likely to be potential impacts on geology and soils during the construction phase, therefore these aspects will be considered further in the EIAR.

5.10 Air and Noise

An initial scoping assessment of the potential impacts of the proposed scheme on air and noise was undertaken.

5.10.1 Receiving Environment

Air Quality

The Environmental Protection Agency (EPA) manages the national ambient air quality network under the Clean Air for Europe (CAFÉ) Directive (2008/50/EC), EU member states must designate zones for the purpose of managing air quality. Ireland has defined four zones under the Air Quality Standard Regulations (S.I No. 180 of 2011). The zones were amended on January 1, 2013 to account for changes in population demographics and to align with coal restricted areas in the 2012 Regulations (S.I. No. 326 of 2012). Limerick City has been defined into Zone C along with other cities and large towns. This area is also a coal restricted area. The EPA has published various studies assessing the air quality in Ireland and Limerick City over the years (Limerick City Ambient Air Monitoring Report, 2000; Air Quality in Ireland Report. 2015), displaying that air quality in Ireland continues to be below the EU threshold. EPA monitoring stations produce Air Quality Index for Health (AQIH) values which are calculated every hour in the various monitoring stations around Ireland There are two monitoring stations in Limerick located in Park Road (monitoring finished) and Shannon Estuary (current monitoring site with real time data). Both monitoring facilities defined the AQIH in Zone C-Limerick as 2-Good [index calculated at 16:21, Thursday March 22, 2018] (EPA, 2018).

The AQIH readings are based on five air pollutants which can harm human health: Ozone gas, nitrogen dioxide gas, sulphur dioxide gas, PM_{2.5} particles and PM₁₀ particles. AQIH values determine if the air quality is good, fair, poor, or very poor.

Noise Environment

In July 2013, Limerick City and County Councils jointly produced a Noise Action Plan in accordance with the Environmental Noise Regulations (S.I. No. 140 of 2006). The noise levels indicated are predictions attributed only to a specific source of noise i.e. road traffic. Road traffic noise is the biggest source of noise on the island. There are no other major noise sources located on the island.

The key environmental receptors for noise and dust levels are the residential dwellings, schools, work places around the island.

5.10.2 Potential Impacts

Air Quality

Potential impacts on air quality will result from the increase in construction traffic and potential increased levels of dust

Noise Environment

Potential noise impacts will result from the increase in construction traffic and construction related activities on site. The sensitive receptors for noise are principally residential properties within 300m of the proposed works.

5.10.3 Assessment Methodology

Air Quality

Dust levels will be compared to the EPA dust deposition guidelines, measures to reduce dust levels generated during construction will be detailed in the EIAR.

The assessment of the impact will primarily be by reference to the Air Quality Standards (SI 180 of 2011). The principal pollutants covered by the legislation are:

- Sulphur dioxide;
- Nitrogen dioxide and other nitrogen oxides;
- Particulate matter – 10 µm and 2.5 µm in size (PM10 & PM2.5);
- Lead;
- Carbon monoxide and benzene;
- Ozone; and

Noise Environment

A noise assessment will be carried out to predict noise levels. The assessment of the likely impact will involve an assessment of construction related activities only as the scheme will not generate noise during operational period.

The assessment of the impact of the different activities will be in accordance with recognised industry standards, to estimate the propagation of the noise into the surrounding areas and the impact at local receptors. The resulting noise levels will be compared to the NRA guidelines for construction noise. Mitigation measures will be proposed as required.

5.10.4 Summary

This section has assessed that there are likely to be potential impacts on air and noise during the construction phase, therefore these aspects will need to be considered further in the Construction chapter of the EIAR.

5.11 Climate Change

An initial scoping assessment of the potential impacts of the proposed scheme on climate change was undertaken.

Climate change is a growing global challenge and it must be addressed in a national, regional and global scale. The 2015 Paris Agreements sets the international agenda for addressing this challenge. At a national level, the National Policy Positions (Department of Environment, Climate, and Local Government, 2014) and the Climate Action and Low Carbon Development Act, 2015 provide the policy framework for actions. In combination with the EU-level emissions targets for 2020 and 2030, these specify the short-term actions and longer-term strategy to advance mitigation and adaptation actions. In order to respond to the challenges posed by climate change two options are recommended by the Environmental Protection Agency, *An Assessment: Ireland's Environment* (2016):

- Mitigation of emissions of GHGs that are driving climate change; and
- Adaptation to reduce vulnerability to the adverse impact of climate change.

Ireland's emission should follow a trajectory where an attempt is made to reduce emissions of Greenhouse Gases (GHG) to near or below zero (refer to National Policy Statement, DECL¹, 2014). Mitigation and adaptation actions are framed and informed by UN, EU, and national policy. These include the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, the UN Paris Agreement, the EU Climate and Energy Package, the National Climate Change Adaptation Framework (2012), the National Policy Position on Climate Change and the Climate Action and Low Carbon Development Act 2015, the National Mitigation Plan (2017), and National Adaptation Framework (2018).

5.11.1 Receiving Environment

Ireland's rapid economic growth has resulted in an increase in energy consumption and therefore greenhouse gas emissions through the upsurge in building throughout the country and increase in car ownership. Energy consumption makes up over one third of the country's carbon dioxide emissions, while the transport sector has sustained the most significant and sustained growth, mainly due to road transport. In an effort to comply with commitments under the Paris Agreement, as well as to meet EU targets. Ireland's commitment to its agreement and treaties are reflected in the *National Policy Position on Climate Action and Low Carbon Development (2014)* and the Climate Action and Low Carbon Development Act, 2015 (No. 46 of 2015), the National Mitigation Plan (2017), and National Adaptation Framework (2018).

The *National Mitigation Plan (2017)* is a strategic approach to address the climate challenge in Ireland and globally in order to transition into a low-carbon and climate resilient nation. The *National Policy Position (2014)* set out a commitment to decarbonisation of the economy by 2050 and the 2015 legislation provides a statutory framework for it. Ireland's first National Mitigation Plan is a step towards decarbonisation and should influence policy development and plan in future. In addition, the *National Adaptation Framework (planning for a Climate Resilient Ireland) (2018)*, was introduced to set out a strategy for the application of climate change adaptation measures in different sectors and by local authorities. In doing so, their aim is to reduce the vulnerability of the State to the potential impacts of climate change. The framework also hopes to assist local authorities and key sectors in assessing the risk and vulnerabilities of climate change, implement

¹ The Climate Change functions in the former Department of Environment, Community, and Local Government were transferred in July 2016 to the new government department, the Department of Communications, Climate Action, and Environment.

resilience actions, and ensure consideration to climate adaptation is streamlined into policy making (Department of Communications, Climate Action, and Environment, 2018).

The effects of climate change are projected to further impact on food production systems, water resources, coastal infrastructure, critical services and urban centres, resulting in increased displacement of people, societal stress and loss of land and other assets (Environmental Protection Agency, 2016). Climate change could potentially impact various sectors in Ireland such as agriculture, the marine environment, biodiversity, coastal/riparian zones, critical infrastructure, water management, and human health and well-being. Impacts on these sectors may result from changes in air and soil temperatures, changes in rainfall patterns and extreme events, shift in climate and temperatures (Environmental Protection Agency, 2016).

5.11.2 Potential Impacts

Potential impacts in relations to climate can consist of:

- The contribution by the project to climate change; and
- The vulnerability of the project to climate change effects.

The receiving environment thus consists of the general environment in respect of the climate change impacts, such as greenhouse gas (GHG) emissions, and the surrounding environment in respect of vulnerability issues, such as flooding.

5.11.3 Assessment Methodology

The assessment of the climate change impacts will be by reference to recognised tools, such as the EPA Carbon Calculator. The impact of the more intensive rainfall events likely to arise in the catchment because of climate change over the design life of the scheme, will be assessed relative to IPPC and Irish guidance.

The scheme design takes into account the possible impacts of climate change, and in particular sea level rise. An assessment of the adaptability of the alternative measures has been carried out. Where new walls and embankments are being constructed, they are being built to allow the defence to be raised in the future.

5.11.4 Summary

Due to the nature of the propose Scheme, Climate Change will be considered further in the EIAR.

5.12 Interaction between environmental aspects

Potential impacts that may arise as a result of relationships between sensitive receptors within and outside of the site will be addressed in the EIAR and NIS, particularly those on ecological receptors due to the proximity of the SAC to the proposed works. Guidance for the assessment of indirect and cumulative impacts, as well as impact interactions will be taken from the European Commission document: Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (Walker and Johnston 1999) and Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland (CIEEM 2016 and 2006).

5.13 Cumulative impacts

The cumulative impacts of the proposed development together with other existing and proposed projects, will be addressed in the EIAR. The proposed projects that will be considered are generally those that are 'committed development', i.e. have received planning permission but have not yet been built, and for which there is information in the public domain at a sufficient level of detail to allow their potential cumulative impacts to be assessed in the EIAR (and NIS)

5.14 Schedule of Environmental Commitments

The Schedule of Environmental Commitments will be compiled in the EIAR to summarise all mitigation proposed for construction.

6 Conclusion

Table 6-1 summarises the findings of the initial scoping exercise. It was decided that there could be potential impact (negative or positive) with respect to all aspects of the environment and the EIAR will assess all aspects of the environment at relevant phases. As has been described, the following disciplines will be further assessed in the EIAR.

Table 6-1. Summary of the scoping assessment findings

Environmental Topic	Construction Phase	Operational Phase
Population and Human Health	x	x
Material Assets	x	
Road and Traffic	x	
Water	x	x
Cultural Heritage	x	x
Biodiversity	x	x
Landscape and Visual	x	x
Geology and Soil	x	x
Air and Noise	x	
Climate Change	x	x
Interaction between environmental aspects	x	x
Cumulative impacts	x	x

This Scoping Report is intended to outline key issues to be addressed in the preparation of the EIAR and NIS for the FRS and the preferred options. Consultation with the public, statutory organisations, and non-statutory organisations is being undertaken, based on this document, to ensure input from all interested parties from the earliest stages of the EIAR and NIS preparation.

Comments are invited on the EIAR Scoping Report by Friday 1st February 2019. All comments received will be recorded and acknowledged in the final Scoping Document, and if appropriate changes will be made to our understanding of the environmental baseline, planning and policy and objectives.

The completed EIAR and NIS will be submitted to An Bord Pleanála as part of the formal planning application process.

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Appendices

A Response to consultation on Scoping Document

(to be included when responses received)

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