Clifton Scannell Emerson Associates

Suir Island Gardens Flood Risk Assessment
Suir Island Gardens

Comhairle Contae Thiobraid Árann
Tipperary County Council

Client: Tipperary County Council

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1 Introduction

Clifton Scannell Emerson Associates (CSEA) has been commissioned by Tipperary County Council (TCC) to conduct a Flood Risk Assessment for the proposed Suir Island Gardens project, situated in Clonmel, County Tipperary. This report provides support for the Statutory Part 8 Planning Application for the proposed upgrading of the Suir Island Gardens, as set out in the Planning and Development Regulations 2001 (as amended).

1.1 Scope of the Report

This Flood Risk Assessment Report has been prepared in accordance with the Office of Public Works (OPW) guidelines publication, "The Planning System and Flood Risk Management, Guidelines for Planning Authorities", published in November 2009. This Guideline was issued by the Minister of the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000.

The scope of this assessment involves the site-specific assessment of the flood risks which may affect the proposed development and secondly, to assess the effect of increasing flood risk to existing infrastructure resulting from the proposed development.

1.2 Site and Proposed Development Description

The proposed Suir Island Gardens development is located on Suir Island adjacent to the southern river reach or Slalom Course of the River Suir. The proposed development consists of an 0.9 hectares area, as indicated in by the Red Line Boundary shown on Figure 1. The development Plan Layout Drawing No. Ti.02-DR-2001 and Sections Drawing No. Ti.02_2400 are provided in **Appendix A**.

The proposed project will comprise of the following:

- Provision of open lawns;
- Landscape planting to include the provision of 40 new native trees along with herb and shrub planting;
- Seating and picnic areas;
- Provision of both hard and soft pathways;
- New entrance gate and associated cladding on adjoining walls;
- Formal and informal children's play areas throughout the site;
- Securing of Suir Island house with decorative grills at ground floor level;
- External feature lighting;
- Ancillary site development works that shall include site drainage for the hard landscaped areas, provision of water supply for the play area and wash down purposes, provision of electrical supply for the external feature lighting, and removal and reconstruction of a short section of boundary wall; and
- All associated site works.

Figure 1: Gardens Site location (Design Rationale Report - Landscape Architecture, Dermot Foley Landscape Architects)

2 Background Information

2.1 Catchment-based Flood Risk Assessment and Management

The Catchment-based Flood Risk Assessment and Management (CFRAM) program has been implemented by the OPW as a competent authority in Ireland for the 2007 EU "*Directive on the assessment and management of flood risks, 2007/60/EC*". Over 29 Flood Risk Management Plans (FRMPs) have been prepared in coordination with the implementation of the Water Framework Directive (WFD). The FRMPs involved undertaking detailed engineering assessments and producing flood protection measures. The assessments addressed the potential impact of the proposed measures on waterbodies, hydro-morphology and quality status. The Suir River CFRAM is highlighted in more detail in **Section 3.1**.

The following reports are available on the OPW Publications website in relation to the Suir CFRAM study:

1. Hydrology Report (Draft Final Report) dated July 2015. Reference: 1891_RP_ Hydrology Report Draft Final_Rev14;
2. Hydraulics Report (Final Report) dated July 2016. Reference: 1891_REP_160711_Hydraulic_Final; and
3. Flood Risk Management Plan River Basin (16) Suir completed in 2018.

2.2 The Planning System and Flood Risk Management Guidelines

The purpose of The Planning System and Flood Risk Management Guidelines for Planning Authorities, published by the OPW in 2009, is to introduce comprehensive mechanisms for the incorporation of flood risk identification and the assessment and management of floods into the planning process. These mechanisms are highlighted in **Section 2.2.2**.

2.2.1 Core Objectives of the Guidelines

The core objectives of the OPW Guidelines are to:

- Avoid unsuitable developments in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional and local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure the requirements of EU and national law in relation to the natural environment and nature conservation area complied with at all stages of flood risk management.

2.2.2 Flood Risk Assessment Concepts

Understanding flood risk is a key step in managing the impacts of flooding. Flood risk is a combination of the likelihood of flooding and the potential consequences arising. The OPW Guidelines recommend a staged approach to flood risk assessments as highlighted in this section.

The staged approach appraisal and assessment is defined as:

- **Stage 1 Flood Risk Identification** – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower-level plan or planning application levels;

- **Stage 2 Initial Flood Risk Assessment** – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and
- **Stage 3 Detailed Flood Risk Assessment** – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

Two important components that must be considered in applying the guidelines in a consistent manner are:

- Likelihood of flooding must be expressed as the percentage probability of a flood of a given magnitude or severity occurring or being exceeded in any given year. For example, a 1% probability indicates the severity of a flood that is expected to be exceeded on average once in 100 years, i.e. it has a 1 in 100 (1%) chance of occurring in any one year.
- Consequences of flooding depend on the hazards associated with the flooding (e.g. depth of water, speed of flow, rate of onset, duration, wave-action effects, water quality), and the vulnerability of people, property and the environment potentially affected by a flood (e.g. the age profile of the population, the type of development, presence and reliability of mitigation measures etc).

A. Source-Pathway-Receptor Model

For carrying out a site-specific Flood Risk Assessment (SSFRA), the OPW Guidelines recommend using the Source-Path-Receptor concept model to identify where the flood originates from, the floodwaters path, and the areas in which assets and people might be affected by such flooding. Figure 2 below displays a schematic representation of S-P-R model.

The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment. All three elements must be examined as part of the flood risk assessment including the vulnerability and exposure of receptors to determine its potential consequences.

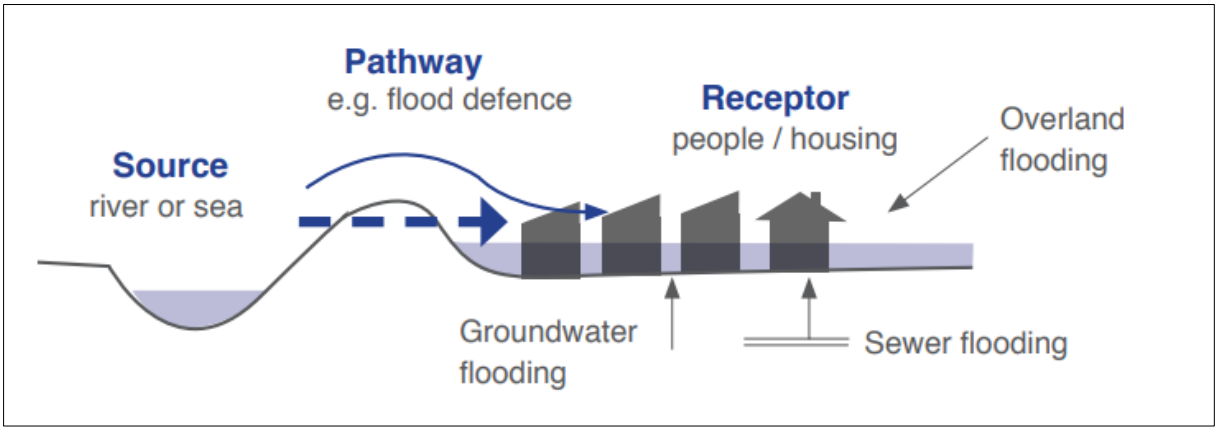


Figure 2: Source-Pathway-Receptor Model

B. Flood Zones

The Flood Zone is the spatial inundation area that falls within a range for the likelihood of flooding. The OPW Guidelines specify three levels of flood zones as shown on Figure 3:

- **Flood Zone A** – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding);
- **Flood Zone B** – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
- **Flood Zone C** – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

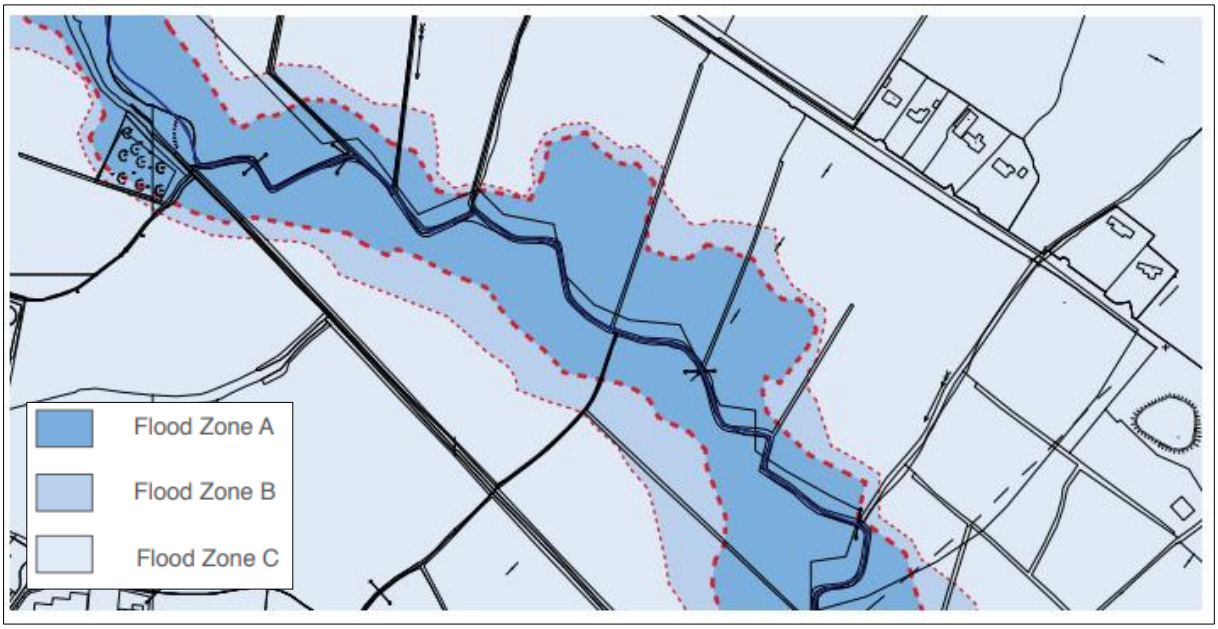


Figure 3: Indicative Flood Zones

C. Climate Change

The OPW states in the "Climate Change Sectoral Adaptation Plan 2015-2019" that climate change will significantly increase the flood risk by different mechanisms including:

- Rise in Sea Level;
- Increase in Rainfall/Runoff;
- Increase in wind speed and hence extreme storm surge events.

The OPW specified two main Climate Change Scenarios for the Pilot CFRAMS Studies, which are:

- Mid-Range Future Scenario *(*MRFS*)*; and
- High-End Future Scenario HEFS.

The Climate Change Scenario parameters are summarised in Table 1.

Table 1: Flood Parameters for the Mid-Range Future and High-End Future Scenarios

Parameter	Mid-Range Future Scenario	High-End Future Scenario
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year[1]	
Urbanisation	No General Allowance – Review on Case-by-Case Basis	
Forestation	- 1/6 Tp^2	- 1/3 Tp^2 + 10% SPR[3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage from afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forests

D. Sequential Approach

A sequential approach to planning is a key tool in ensuring that developments, particularly new developments, are first and foremost directed towards land that is at low risk of flooding. The sequential approach described in Figure 4 and Figure 5 should be applied to all stages of the planning and development management process.

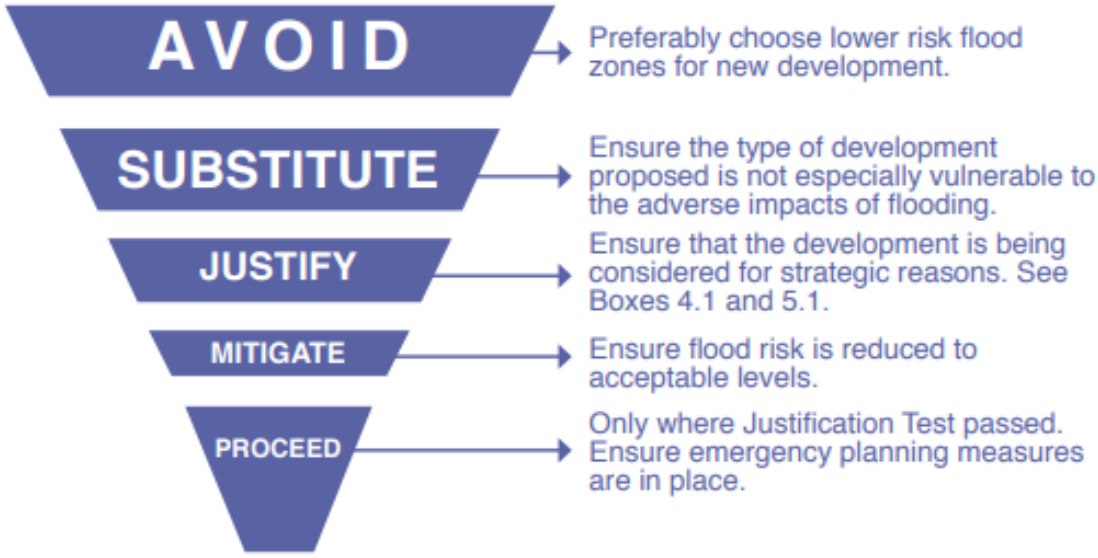


Figure 4: Sequential approach principles in flood risk management

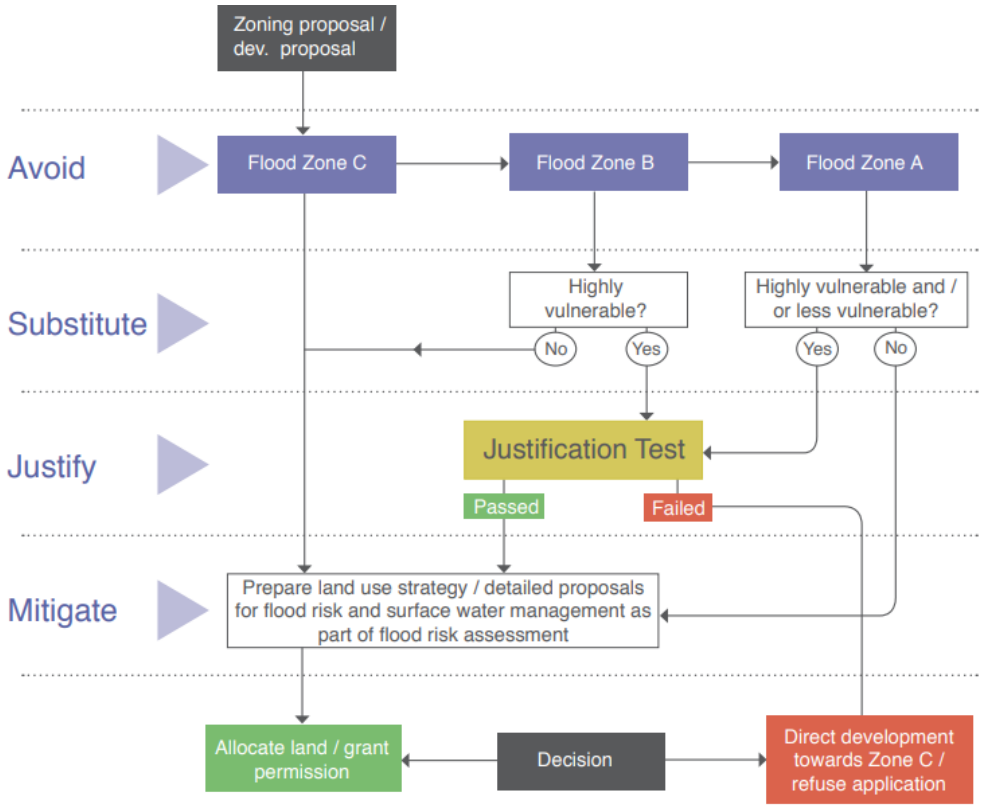


Figure 5: Sequential approach mechanism in the planning process

E. Development Classification

The OPW Guidelines provide three vulnerability categories based on the type of development which are:

- Highly vulnerable: This includes essential infrastructure, such as primary transport and utilities distribution, electricity generating power stations and sub-stations
- Less vulnerable: This category includes land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans;
- Water compatible: Includes water-based flood control and recreational developments and other amenities, open space, outdoor sports and recreation facilities.

Table 2 illustrates those types of developments that would be appropriate to each flood zone and those that would be required to meet a Justification Test in accordance with Section 5 (Box 5.1) of the guidelines, which would be submitted by the proposed development applicant.

Table 2: Matrix of vulnerability versus flood zone

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

3 Stage 1 – Flood Risk Identification

This chapter of the flood risk assessment is undertaken to determine if the proposed development is located within an area susceptible to floods and if so, determine the extent of the risk.

The Suir River's main channel and its tributaries flow primarily through the counties of Tipperary, Kilkenny and Waterford with some small parts of the catchment in Limerick and Cork. The river lies largely within County Tipperary and forms part of its border with County Waterford. The main urban areas are Thurles and Templemore in the northern part of the catchment, Clonmel and Carrick-on-Suir, in the southern part, with the city of Waterford at the head of the estuary.

The Suir River and Clonmel has experienced substantial and devastating floods in the past, as summarised in **Section 3.2**. Significant works have been completed to alleviate flooding around the town of Clonmel as part of the Flood Relief Scheme completed in 2012, which was facilitated by the OPW.

3.1 Suir River CFRAM

The South Eastern Catchment Flood Risk Assessment and Management (CFRAM) study commenced in the South Eastern district in August 2011 and ended in 2016. The proposed development is located in Units of Management (UoM) No. 16 and as per Figure 6 below Clonmel was designated as an Area for Further Assessment (AFA). The detailed assessment was carried out by consultants, Mott MacDonald Ireland, in 2003, during the design of the Clonmel Flood Relief Scheme, which was completed in 2012. The outcomes of the study provided flood protection structures for up to the 1-in-100-year (1% AEP) flood events as shown on Figure 7.

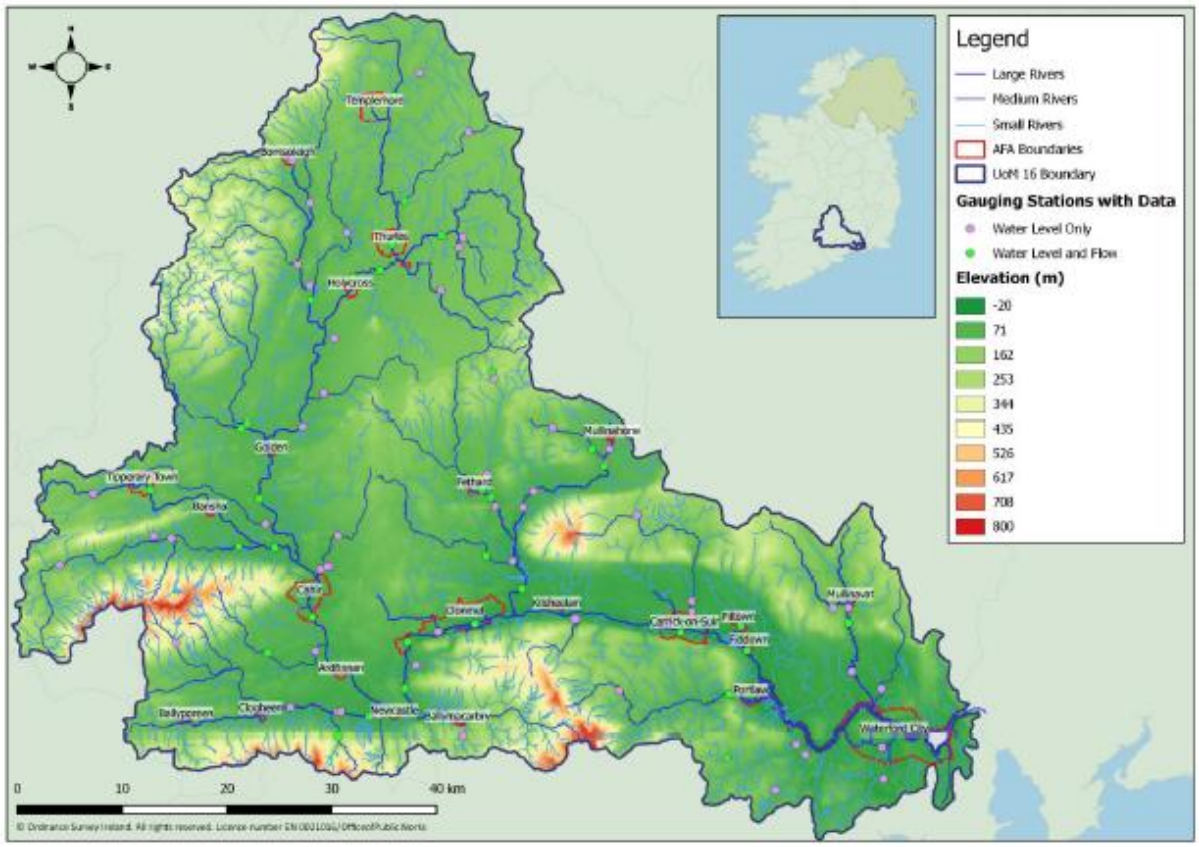


Figure 6: Geographical location of the Suir River Basin

As shown in Figure 7, the proposed Suir Island Gardens is located within Flood Zone A (higher probability than 1% AEP), based on the Suir CFRAM Fluvial Flood Extent Map No. O16CLN_EXFCD_F0_45, included in **Appendix B**. The proposed development is located adjacent to the 1% AEP protected areas. A Flood Warning System is in place for the area of Clonmel, which uses flow data from a network of eight gauges located upstream of the town.

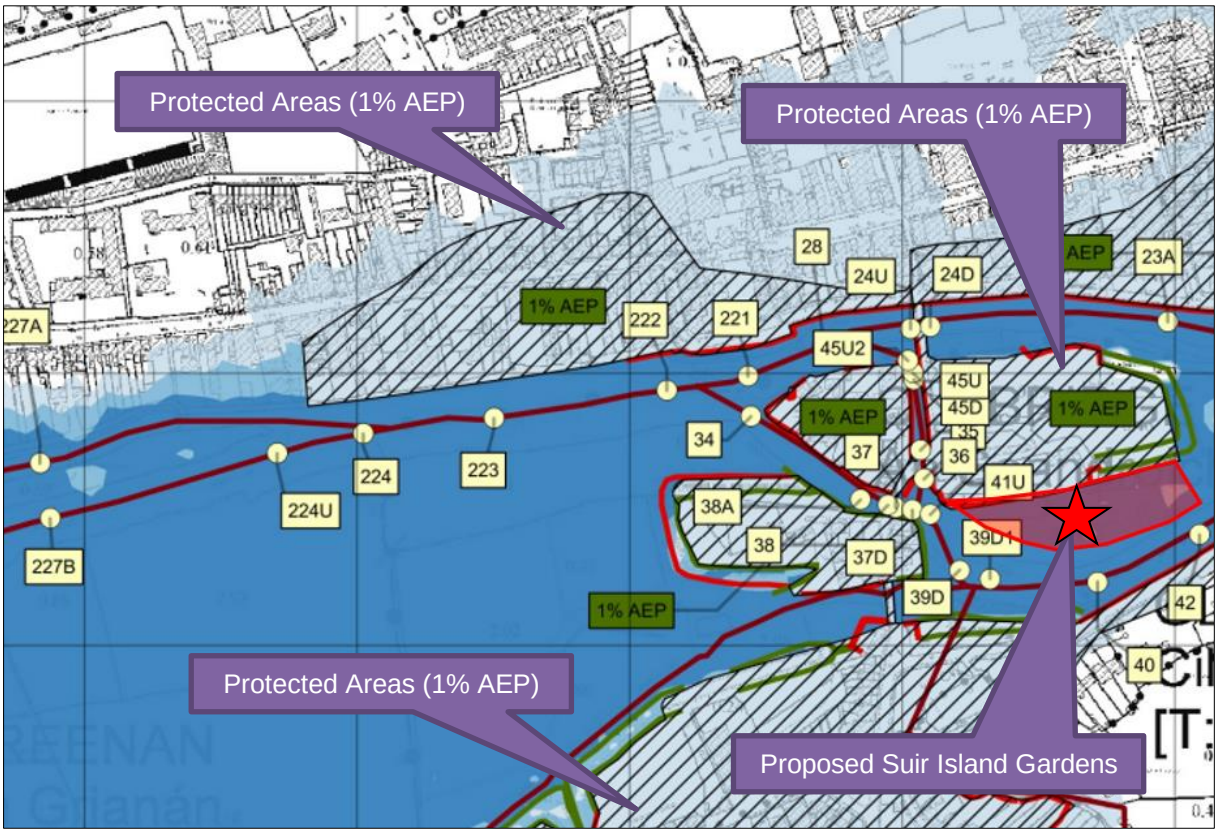


Figure 7: Fluvial Flood Extent Map (Suir CFRAM Study)

3.2 Historical Flood Records

Historical flood records were obtained from the OPW Flood Maps website as shown in Figure 8 below (https://www.floodinfo.ie/map/floodmaps/). It should be noted that these flood events occurred prior to the completion of the Clonmel Flood Relief Scheme works, except for ID-12503, which is situated on a tributary of the Suir River and located upstream of the proposed development.

Historical flood events, as shown in Table 3, was extracted from the Suir River Flood Risk Management Plan, which highlights historical flooding in Clonmel with severity classifications. Floods which occurred in 2012 and 2014 are indicated as “protected” following the completion of the Clonmel Flood Relief Scheme.

Figure 8: Past Flood Events (https://www.floodinfo.ie/map/floodmaps/)

Table 3: Historical Flood Events in Clonmel

Year	1960	1968	1990	1995	1996	2000	2004	2008	2009	2012	2014
Clonmel	X	X	X	X	X	X	X	X	X		

Legend	
AEP	Flood Severity Classification
< 5%	Severe
5-10%	Significant
> 10%	Minor
Protected	Scheme in place

3.3 Clonmel Slalom Course Flood Risk Assessment

The Clonmel Slalom Course Flood Risk Assessment (Report No. 349466AI_001) conducted by Mott MacDonald in March 2016 was reviewed as part of the Flood Risk Identification for the proposed Suir Island Gardens. Figure 9 shows the hydraulic model layout and Table 4 summarises the flood water levels for the 1% AEP flood event at corresponding river sections. The water levels were adjusted from the model Poolbeg datum to Malin Head with a conversion of 2.7m. As indicated on the proposed Suir Island Gardens Drawing Ti.02-DR-2001 included in **Appendix A,** the majority of the site would be inundated by flood water levels for the 1% AEP event as extracted from the Clonmel Slalom Course Flood Risk Assessment.

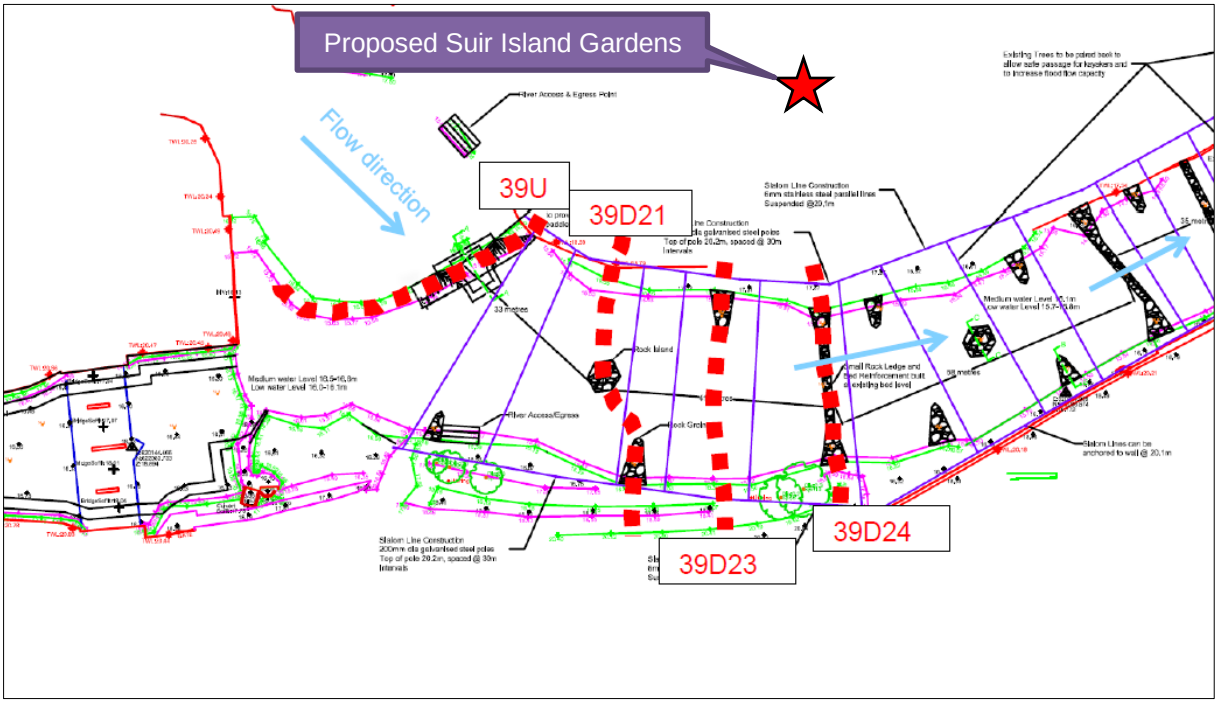


Figure 9: Slalom Course 1D ISIS Model Layout

Table 4: 1% AEP Flood Water Levels in Slalom Course (Mott MacDonald, 2016)

Node	Model Water Level (mOD Poolbeg)		Model Water Level (mOD Malin Head)	
	Pre-development Water Level	Post-development Water Level	Pre-development Water Level	Post-development Water Level
39U	22.721	22.749	20.021	20.049
39D21	-	22.594	-	19.894
39D23	-	22.583	-	19.883
39D24	-	22.583	-	19.883
40*	22.447	22.444	19.747	19.744

***** *Node located further downstream of Slalom Course and not shown within map extents of Figure 9 above.*

3.4 Climate Change Scenarios

The Suir CFRAM Mid-Range Future and High-End Future Scenario mapping is not available for Clonmel on the OPW Flood Maps website (https://www.floodinfo.ie/map/floodmaps/), as this area was designated as an AFA, and further studies were conducted as part of the Clonmel Flood Relief Scheme as stated in **Section 3.1**. As the proposed development is located in Flood Zone A, the proposed development will be significantly inundated in the above scenarios. Refer to the inundation depth maps for various scenarios included in **Appendix B**.

4 Stage 2 – Initial Flood Risk Assessment

4.1 Tidal Flood Risk

As shown in Figure 10 and highlighted in the Suir CFRAM Hydrology Report (Draft Final Report) dated July 2015, the Suir River becomes tidal upstream of Carrick-On-Suir. The proposed Suir Island Gardens Development is not at risk of coastal or tidal flooding.

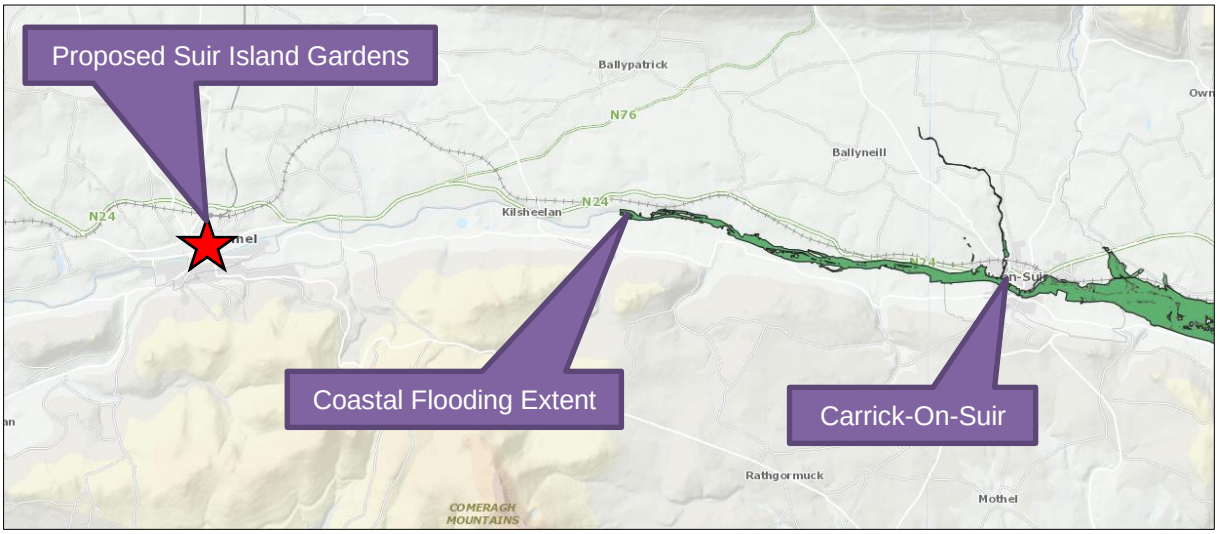


Figure 10: Suir CFRAM Coastal Flood Extents (www.floodinfo.ie/map/floodmaps)

4.2 Fluvial Flood Risk

As discussed in **Section 3**, the proposed Suir Island Gardens is located within Flood Zone A (probability of flooding higher than the 1% AEP event). The Planning System and Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009, states:

"*Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, **amenity open space, outdoor sports and recreation**, would be considered appropriate in this zone."*

As the nature of the development falls under open space amenity or recreational areas, it can be considered appropriate to allow this development to be located within Fluvial Flood Risk Zone A.

4.3 Pluvial Flood Risk

Flood risk from Pluvial sources is considered unlikely. The existing Suir Island surface water drainage system, located in the car park poses no significant flood risk to the proposed Suir Island Gardens. The proposed drainage system for the gardens consists of minor drainage channels and permeable paving to prevent walkways and seating areas from rainwater ponding.

4.4 Groundwater Flood Risk

The OPW Flood Maps website (https://www.floodinfo.ie/map/floodmaps/) and Geological Survey Ireland Spatial Resources website (https://dcenr.maps.arcgis.com/apps/MapSeries) was used to assess the

risk of groundwater flooding for the proposed development. Flood risk arising from groundwater sources is considered to be improbable.

4.5 Increasing Flood Risk Downstream

The proposed works poses an insignificant risk to increasing flood risk downstream of the development. The increase in hardstand would be minimal from walkways and seating areas to be constructed from resin bonded surfacing, seating areas from stone paving, or decorative concrete finishes as shown on Drawing Ti.02-DR-2001 included in **Appendix A**. The proposed finished levels of the gardens development are designed to mirror the existing ground levels to prevent any restrictions or narrowing of the existing floodplain flow area.

5 Conclusion

This section of the Flood Risk Assessment summarises the outcomes of the Stage 1 and Stage 2 assessments carried out for the proposed Suir Island Gardens Development in terms of the Planning System and Flood Risk Management Guidelines for Planning Authorities.

5.1 Sequential Approach

The purpose of the sequential approach to assess flood risks for planning applications, ensures that development, particularly new developments, are first and foremost directed towards land that is at low risk of flooding.

Although the proposed development is located in Zone A (highest risk of flooding), the nature of the development is not highly vulnerable to flooding as stated in the examples of less vulnerable types of developments in the guidelines.

The next step in the sequential approach is to determine if a detailed Justification Test is required. Refer to **Section 5.2** below.

5.2 Justification Test

As per Section 3 of the guidelines, to determine if a detailed Justification Test is required, the development must be classified in terms of its vulnerability to flooding and corresponding Flood Zone, as shown in Table 5 below. For the proposed Suir Island Gardens the appropriate Justification Test is highlighted in green which indicates that the development is appropriate and a detailed justification is not required as part of the Flood Risk Assessment.

Table 5: Matrix of vulnerability versus flood zone to illustrate appropriate development

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	**Appropriate**	Appropriate	Appropriate

5.3 S-P-R Model

A Source-Pathway-Receptor model has been produced to assess the possible sources of floodwater and their likelihood of impact of the pathways by which flood water reaches receptors and also the risk to the receptors that could be affected by potential flooding, as summarised in Table 6.

Table 6: Proposed Development S-P-R Model

Flood Type	Source	Path	Receptor	Likelihood	Impact	Risk
Tidal	Suir Estuary	Suir River	People and infrastructure (the proposed development)	Improbable	Moderate	Very Low
Fluvial	Suir River	Slalom Course	People and infrastructure (the proposed development)	High	High	High
Pluvial	Suir Island Car Park	Existing Surface Water Infrastructure	People and infrastructure (the proposed development)	Improbable	Low	Very Low
Groundwater	Rising groundwater levels around site	Open space	People and infrastructure (the proposed development)	Improbable	Low	Very Low
Other sources	Flooding due to human or mechanical errors	Open space	People and infrastructure (the proposed development)	Unlikely	Low	Very Low

5.4 Conclusion

The site-specific Flood Risk Assessment for the proposed Suir Island Gardens development was carried out in accordance with the Office of Public Works (OPW) guidelines publication, “The Planning System and Flood Risk Management, Guidelines for Planning Authorities”, published in November 2009.

The outcomes of the assessment found the proposed development to be most at risk from Fluvial Flooding occurring in the Suir River. The development is proposed to be located in Flood Zone A (highest risk of flooding), but due to the nature of the project being a water-compatible development, the project can be considered appropriate for this zone.

The proposed development will not increase flood risk upstream or downstream in the River Suir as the development does not involve changing the floodplain topography and the gardens area will not alter the floodplain hydraulic properties i.e. change in hydraulic roughness.

Further justification is not required for the gardens’ development in accordance with the guidelines as summarised in **Section 5.1** and **5.2**.

Appendix A – Proposed Development Drawing

INDICATIVE PROPOSAL BY OTHERS

EXISTING BERM RETAINED

EXISTING SURFACE RETAINED AND MADE GOOD

PROPOSED NEW ENTRANCE GATE (REFER TO DRAWING: ENTRANCE GATE ELEVATION TI.02-DR-2401)

EXISTING NATURAL STONE WALL RETAINED

PROPOSED STONE CLADDING

PROPOSED STONE CLADDING

EXISTING NATURAL STONE WALL RETAINED

EXISTING NATURAL STONE WALL RETAINED

EXISTING HARD STANDING SURFACE

EXISTING NATURAL STONE WALL RETAINED

EXISTING NATURAL STONE WALL RETAINED

EMERGING WET WILLOW HABITAT IN MILLRACE

INDICATIVE PROPOSAL BY OTHERS

WOODLAND PLAY TRAIL

PROPOSED NATURAL STONE WALL

OPEN SPACE

EXISTING LOW RISE WALL RETAINED

EXISTING HARD STANDING SURFACE

PROPOSED BESPOKE SIGN

EXISTING STRUCTURE RETAINED

EXISTING HARD STANDING SURFACE

DESTINATION PLAY

CHIMNEY

SUIR ISLAND HOUSE

DECORATIVE GRILLS IN WINDOW/DOOR OPENINGS ON GROUND LEVEL

CHIMNEY

PROPOSED NATURAL STONE WALL

EXISTING NATURAL STONE WALL RETAINED

EXISTING CONCRETE STEPS AND LANDING RETAINED

OPEN LAWN

EXISTING SUIR ISLAND HOUSE RETAINED

INDICATIVE PROPOSAL BY OTHERS

EXISTING NATURAL STONE WALL RETAINED

EXISTING NATURAL STONE WALL RETAINED

RELOCATION OF EXISTING WALL (EXISTING WALL IN POOR CONDITION)

EXISTING NATURAL STONE WALL RETAINED

RIVER SUIR

KEY PLAN NTS

LEGEND AND SCHEDULE OF MATERIALS

- PLANNING APPLICATION BOUNDARY
- PROPOSED SELECTED DECORATIVE CONCRETE FINISHES
- PROPOSED SELECTED RESIN BONDED SURFACE
- PROPOSED BESPOKE ENGRAVED PAVING
- PROPOSED SEATING ELEMENTS
- EMERGENT WET WILLOW HABITAT
- PROPOSED LAWN
- PROPOSED MIXED LAWN & RANDOM STONE PAVING
- PROPOSED INFORMAL MOWN LAWN PATHWAYS
- PROPOSED GROUNDCOVER/LONG GRASS
- PROPOSED PLAY ELEMENTS
- PROPOSED TREES REFER TO PLANTING SCHEDULE
- EXISTING WALL REMOVED AND RELOCATED

SCHEDULE OF TYPICAL TREE PLANTING

- Existing tree retained
- Multi-stemmed tree
- Single-stemmed tree

Ag	1 no. Ag	*Alnus glutinosa* // Black alder 3 x tr., wrb. 4-5m h., 14-16cm g., feathered.
Sc	5 no. Sc	*Salix caprea* // Goat willow 3 x tr., wrb. 3m h. multistem
Sf	14 no. Sf	*Salix fragilis* // Crack willow 3 x tr., wrb. 3m h. multistem
Qr	4 no. Qr	*Quercus robur* // Common oak 4 x tr., wrb., 4-5m h., 18-20cm g., clear stem min. 2.2m
Bp	5 no. Bp	*Betula pendula* // Silver birch 3 xtr., wrb., 12-14cm g., 3 m h., feathered
Ps	1 no. Ps	*Pinus sylvestris* // Scots pine 3 x tr., wrb., 30-35cm g., 4-5m h., clear stem min 1.8m
Py	3 no. Py	*Prunus yedoensis* // Yoshino Cherry 14-16 cm.g. 4 x tr., wrb., 3.5m h., clear stem min. 1.8m.
Tc	2 no. Tc	*Tillia cordata* 'Greenspire' // Littleleaf Linden 4 x tr., wrb., 4m h.,16-18cm g., clear stem min. 2.2m
Pc	5 no. Pc	*Pyrus calleryana* 'Chanticleer' // Callery pear 3 x tr., wrb., 3m h., 12-14 cm g., feathered

SCHEDULE OF TYPICAL PLANTING

GROUNDCOVER AND HERBACEOUS MIX, TYPICALLY:

Dianella nigra 2 ltr cg.
Dryopteris filix-mas 2 ltr cg.
Convalaria majalis 2 ltr cg.
Geranium spp. 2 ltr cg.
Helleborus foetidus 2 ltr cg.
Luzula sylvatica 2 ltr cg.
Luzula nivea 2 ltr cg.
Echinacea purpurea 2 ltr cg.
Hemerocalis sp. 2 ltr cg.
Hyacinthoides spp. 2 ltr cg.
Narcissus spp. 2 ltr cg.
Pulmonaria officinalis 2 ltr cg.
Verbena bonariensis 2 ltr cg.

HEDGE AND SHRUB PLANTING, TYPICALLY:

Crataegus monogyna, 600-900mm h.
Carpinus betulus, 900-1200mm h.
Buxus sempervirens, 2 ltr. cg.

Planted at 450mm centres in single rows and 600mm centres in double staggered rows.

Abbreviations:

xtr.	number of transplants in nursery
h.	height
s.	spread
wrb.	wire root-balled
cm g.	girth of tree in centimeters measured 1m above ground
2 ltr. cg.	plants supplied in 2 litre volume containers

SCHEDULE OF PROPOSED PLAY EQUIPMENT DESTINATION PLAY

REF.	QUANTITY	DESCRIPTION
P1	1	Water tap/pump
P2	1	Water mill
P3	3	Water dams

NATURAL PLAY TRAIL

REF.	QUANTITY	DESCRIPTION
P4	3	Twin balance beam
P5	2	Balance Stepper
P6	2	Zigzag Stepper
P7	8	Jumping disks
P8	40	Vertical stepping logs
P9	1	Totter beam

NOTES:

- Refer to PUNCH Engineer's document's for water source locations.
- Existing levels on site to be retained.

	REV.	DESCRIPTION	DRAWN BY	CHECKED BY	DATE
28.01.2022	A	Red line modified. Destination play area revised. Southern river access/egress point modified.	lh	df	29.07.2022
18.02.2022	B	Red line modified. Title block revised.			
22.02.2022	C	Existing structures and hard standing areas graphic revised. Title block revised.			
01.03.2022	D	Red line modified. Tree schedule modified. Proposed lighting shown. Title block revised.			
11.03.2022	E	Section lines included. Proposed lighting removed. Schedule and title block revised.			
27.06.2022	F	Legend of materials revised. Additional notes added to drawing. Common names included on tree schedule.			
04.07.2022	G	Schedule revised. Additional notes added to drawing.			
20.07.2022	H	Entrance gate note revised.			
	I	Legend and drawing graphics modified. Additional annotation notes included. Title block updated.	lh	df	

DERMOT FOLEY *LANDSCAPE ARCHITECTS*
MALPAS STREET BLACKPITTS D08 DD56 IRELAND T:+353 1 4545148 WWW.DERMOTFOLEY.COM

CLIENT: TIPPERARY COUNTY COUNCIL

PROJECT: SUIR ISLAND GARDENS

DRAWING: SITE LAYOUT PLAN

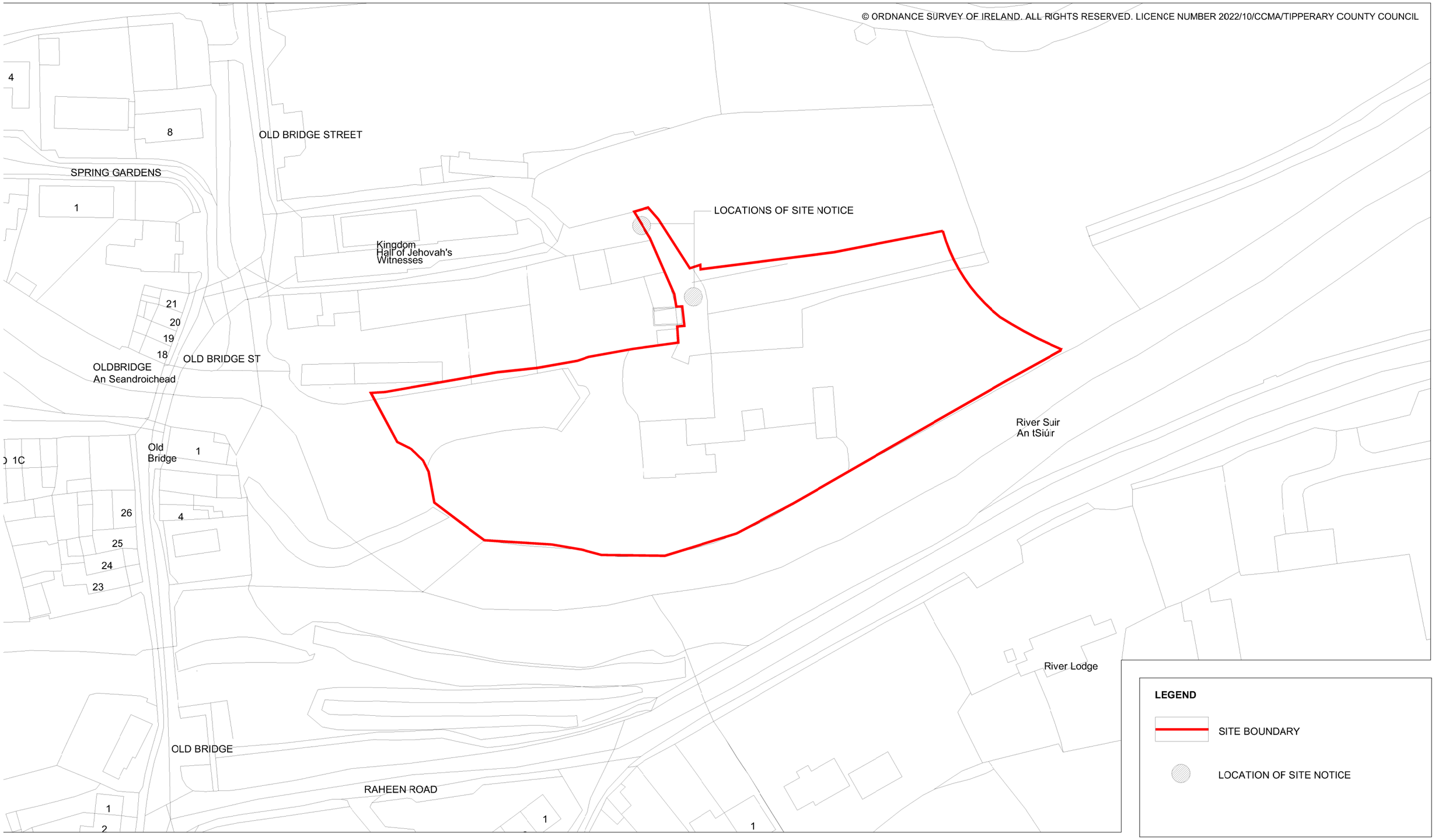
ISSUE STATUS: PLANNING

DRAWING NO.	REVISION
Ti.02-DR-2001	I

PROJECT NO	SCALE	SHEET SIZE	DRAWN BY	CHECKED BY	1st ISSUE
Ti.02	1:250	A1	lh	df	13.01.2022

NORTH

SFK 26:ISSUE-01/DF/06.09.2009



DATE	REV.	DESCRIPTION	DRAWN BY:	CHECKED BY:
22.02.2022	A	Red line modified. Title block revised.	lh	df
29.07.2022	B	Additional site notice added. Title block revised.	lh	tk

NOTES:

OS MAP REFERENCE NUMBERS: 5430-11, 5430-C

DERMOT FOLEY *LANDSCAPE ARCHITECTS*
MALPAS STREET BLACKPITTS D08 DD56 IRELAND T:+353 1 4545148 WWW.DERMOTFOLEY.COM

CLIENT: TIPPERARY COUNTY COUNCIL

PROJECT: SUIR ISLAND GARDENS

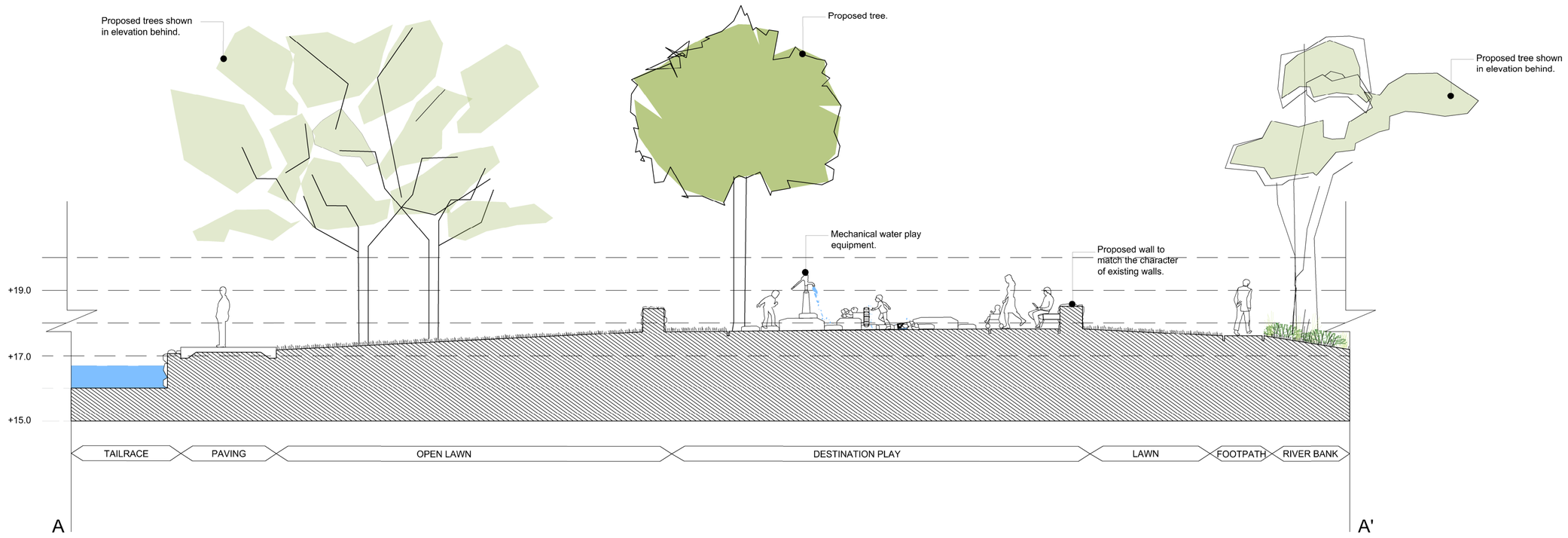
DRAWING: SITE LOCATION PLAN

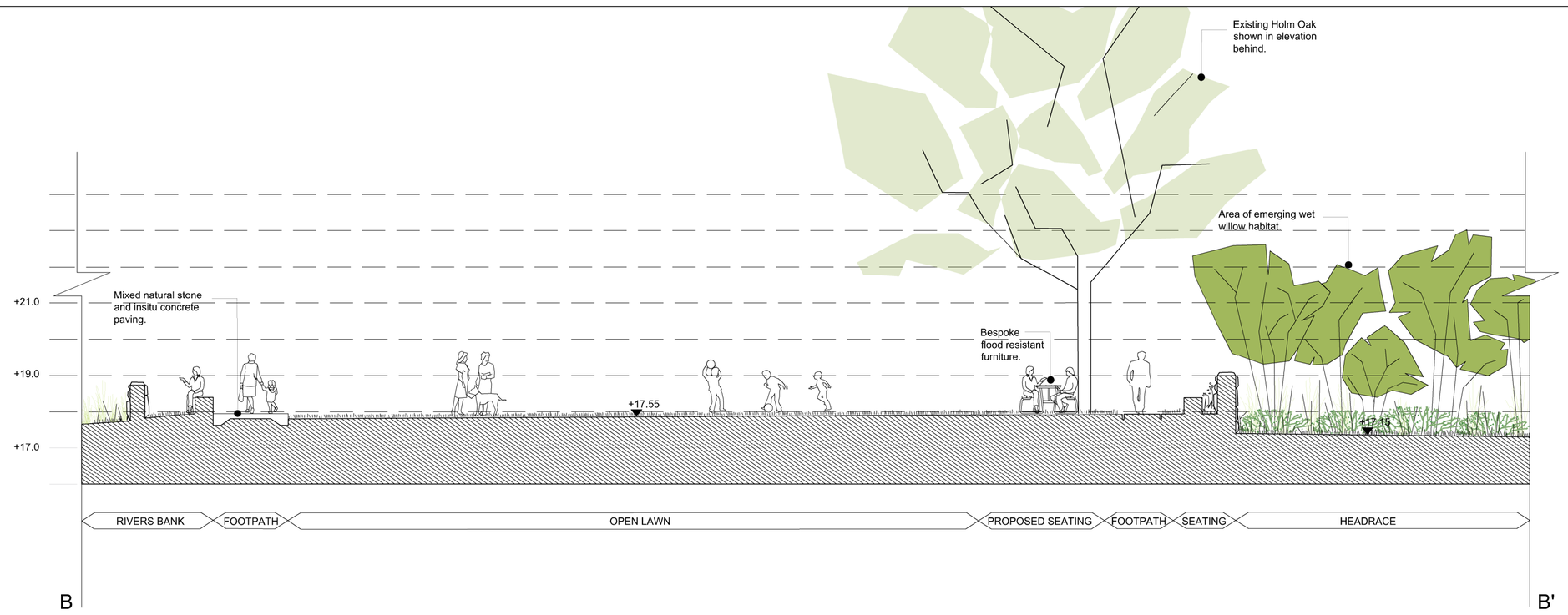
ISSUE STATUS: PLANNING

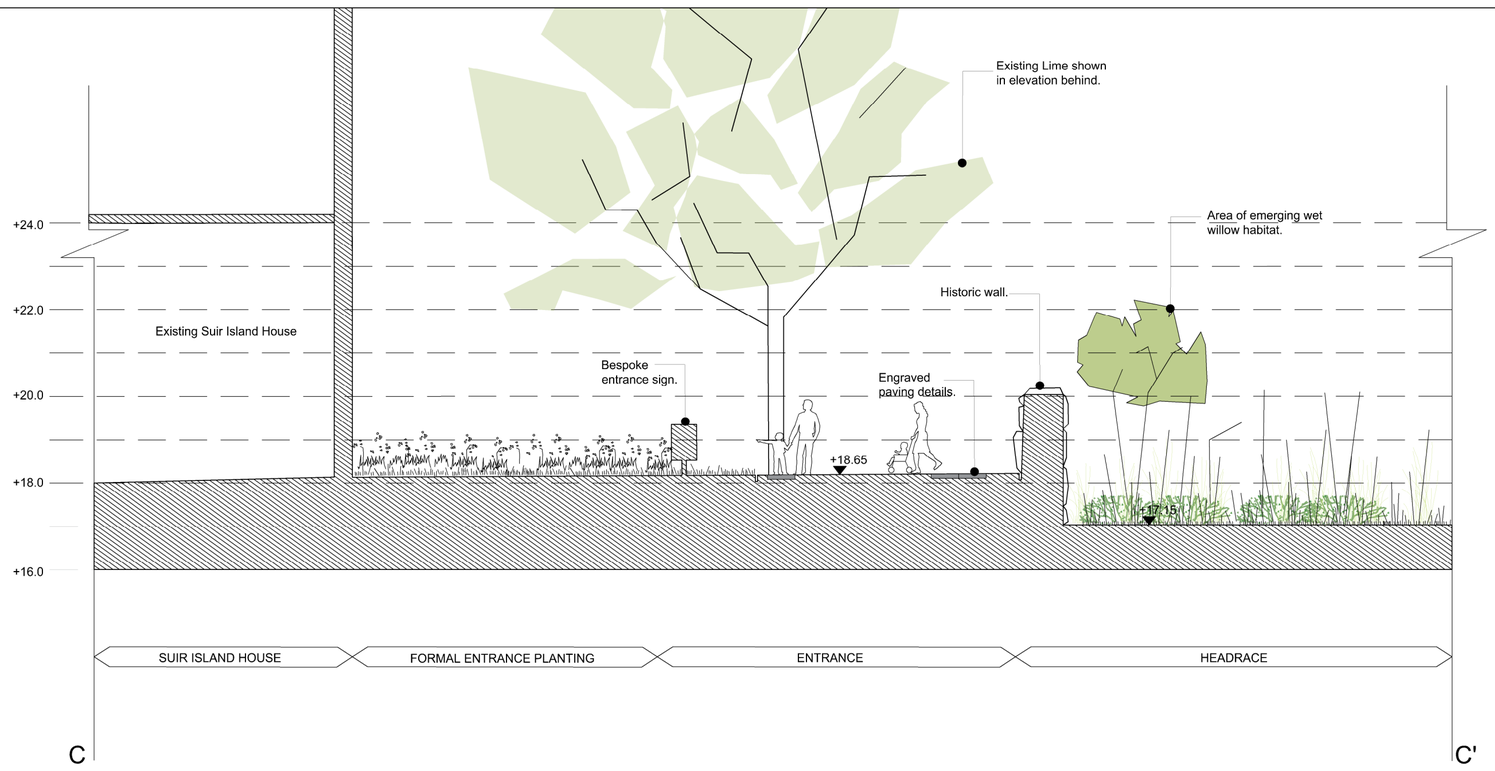
DRAWING NO.	REVISION
Ti.02-DR-2002	B

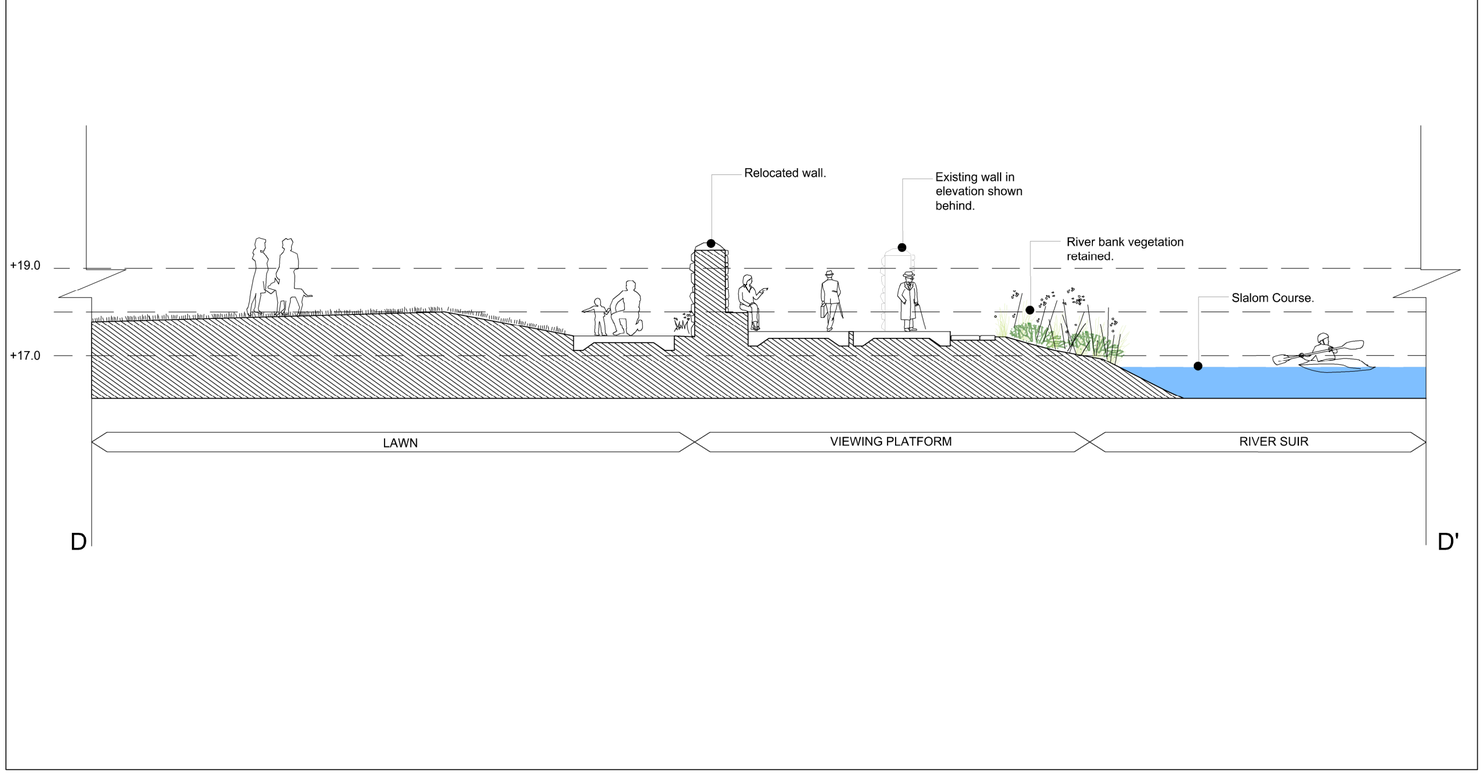
PROJECT NO	SCALE	SHEET SIZE	DRAWN BY	CHECKED BY	1st ISSUE
Ti.02	1:1000	A3	lh	df	28.01.2022

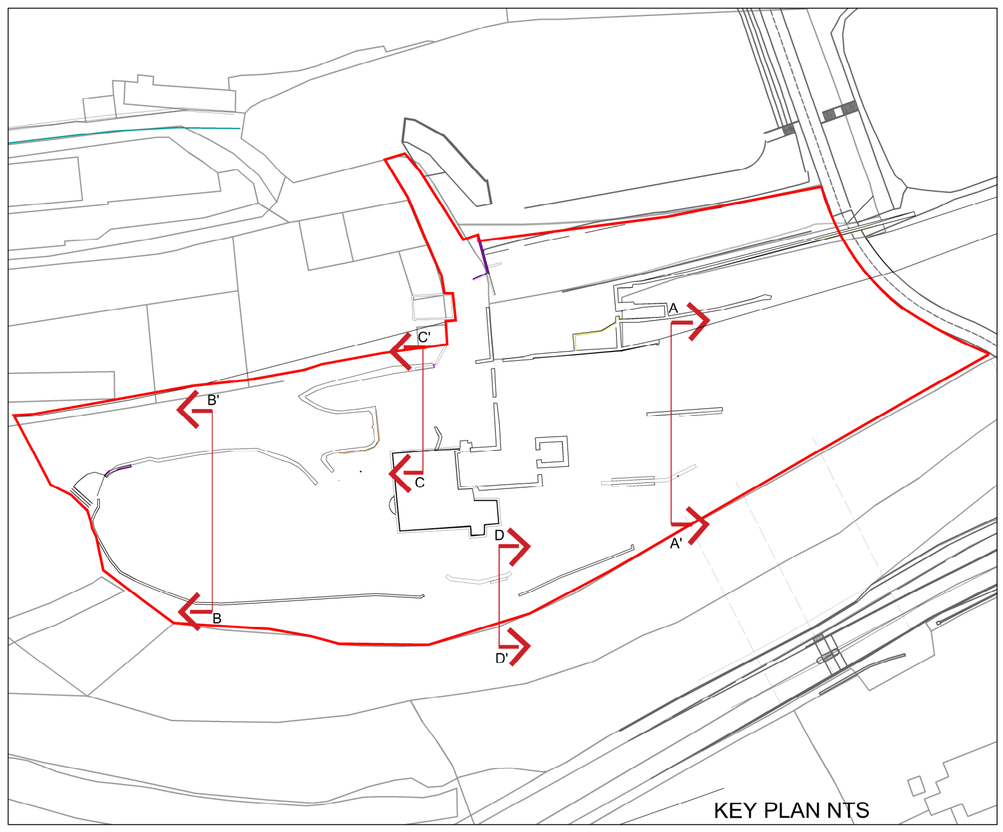
NORTH











NOTES:

DATE	REV.	DESCRIPTION	DRAWN BY:	CHECKED BY:
22.02.2022	A	Red line modified in key. Section's A and D graphics revised. Title block revised.	lh	df
01.03.2022	B	Key plan modified. Title block revised.	lh	df
11.03.2022	C	Section lines modified. Title block revised.	lh	df
13.05.2022	D	Section DD' revised to reflect updated site plan. Title block revised.	lh	df
29.07.2022	E	Section CC' rovised. Title block revised.	lh	tk

DERMOT FOLEY *LANDSCAPE ARCHITECTS*
MALPAS STREET BLACKPITTS D08 DD56 IRELAND T:+353 1 4545148 WWW.DERMOTFOLEY.COM

CLIENT: TIPPERARY COUNTY COUNCIL

PROJECT: SUIR ISLAND GARDENS

DRAWING: LANDSCAPE SECTIONS

ISSUE STATUS: PLANNING

DRAWING NO.	REVISION
Ti.02-DR-2400	D

PROJECT NO	SCALE	SHEET SIZE	DRAWN BY	CHECKED BY	1st ISSUE
Ti.02	1:100	A1	lh	df	28.01.2022

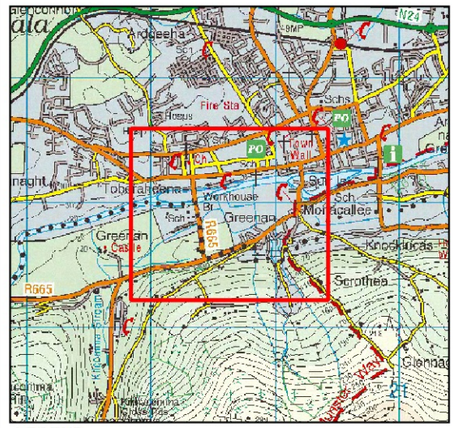
NORTH

Appendix B – Suir CFRAM Fluvial Flood Maps

Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
28	19.596	185.929	20.393	233.159	21.043	-
34	19.596	81.191	20.393	84.439	21.043	-
35	19.445	43.131	20.312	52.577	21.167	-
36	19.193	43.131	19.869	52.577	20.602	-
37	19.187	86.056	19.865	98.403	20.595	-
38	19.439	86.056	20.264	98.403	20.973	-
40	18.993	206.438	19.704	281.13	20.492	-
221	19.596	233.054	20.393	277.073	21.043	-
222	19.599	238.059	20.398	246.228	21.049	-
223	19.605	238.365	20.393	246.403	21.038	-
224	19.634	238.518	20.411	246.626	21.054	-
133	20.01	260.612	20.703	273.672	21.352	-

Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
40	18.993	206.438	19.704	281.13	20.492	-
42	18.842	206.436	19.541	281.123	20.358	-
235	20.045	260.926	20.72	274.244	21.365	-
224U	19.651	238.61	20.422	246.763	21.064	-
227A	19.697	47.996	20.44	49.31	21.075	-
227B	19.688	191.621	20.449	211.669	21.091	-
232A	20.01	48.422	20.703	49.972	21.352	-
232B	20.01	216.846	20.703	229.653	21.352	-
23A	18.522	151.072	19.414	217.63	20.257	-
24D	18.513	151.107	19.399	188.291	20.323	-
24U	19.37	151.107	20.127	188.291	20.698	-
31A	19.727	48.167	20.449	49.572	21.08	-
31B	19.77	216.411	20.524	228.842	21.17	-
33A	19.957	48.167	20.684	49.572	21.342	-
33B	19.871	216.411	20.622	228.842	21.276	-
37D	19.165	86.055	19.847	98.398	20.587	-
38A	19.486	86.057	20.304	98.412	20.996	-
39D	19.115	129.176	19.818	150.485	20.575	-
39D1	19.113	129.174	19.817	150.477	20.574	-
41U	19.165	129.18	19.847	150.511	20.587	-
45D	19.493	43.134	20.23	82.798	20.641	-

Location Plan:



LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- x.x% AEP — Standard of Protection of Flood Defence

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:
SUIR CFRAM STUDY

Map: **CLONMEL SCHEME FLUVIAL FLOOD EXTENT MAP**

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	NMC	Date:	Sep - 2016
Checked by:	MC	Date:	Sep - 2016
Approved by:	GG	Date:	Sep - 2016
Map No.:	O16CLN_EXFCD_F0_45		
Revision: F0			
Map Scale: 1:5,000		Plot Scale: 1:1 @ A3	

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