



CONSULTING ENGINEERS

**Detailed Flood Risk Assessment for
Carrickbeg Active Travel Scheme**

August 2022

Revision Schedule

Report

August 2022
JKB2266

Rev	Date	Details	Prepared by
00	August 2022	Final Report	J Bradshaw CEng MICE Civil Engineer and Flood Risk Specialist
01	September 2022	Final Report	J Bradshaw CEng MICE Civil Engineer and Flood Risk Specialist

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1 Introduction

1.1 Background

JKB Consulting Engineers Ltd “JKB Consulting” was appointed to undertake a Stage 3 Flood Risk Assessment for a proposed active travel development in the Carrickbeg area of Carrick on Suir (southside of the river) with the aim of improving traffic management and vehicular circulation on Abbey Heights, Bridge Street, Corpse Road and the Waterford road. The proposal involves making both Abbey Heights (south from its junction with Bridge St to its junction with Corpse Road) and part of the Waterford road (south-east from its junction with Abbey Heights/ Bridge Street for a distance of 40m to the proposed off-street carpark to the north of Waterford Road) one way. Two new areas of car parking are proposed, one north of the Waterford Road that will provide 24 spaces and one south that will provide 9 spaces. Footpaths are to be provided in the area as well and new pedestrian crossings and improvements to older crossings. A small portion of a boundary wall on the southern side of the Waterford road is to be demolished to facilitate access to the smaller car park. Public lighting is proposed in the car parks. The flood risk assessment is carried out in accordance with the requirements of “The Planning System & Flood Risk Management Guidelines” published by the Department of the Environment, Heritage and Local Government in November 2009.

The proposed scheme is detailed in drawings provided by CST Group Chartered Consulting Engineers and included in Appendix A of this report.

1.2 Qualifications and Experience of Assessor

This flood risk assessment has been carried out by Jonathan Bradshaw, a Chartered Member of the Institution of Civil Engineers. Jonathan has over 15 years’ experience in flood risk and drainage assessments and has prepared flood risk and drainage assessments for numerous large private developments, flood alleviation schemes, as well as several major road projects.

1.3 Information Consulted

This flood risk assessment has been prepared based on the information available from the following sources:

- OPW website www.floodinfo.ie;
- DECLG website www.myplan.ie
- OPW website www.floodmaps.ie
- WCC and Irish Water Records
- Geological Survey of Ireland Maps
- Architectural drawings
- Topographical survey of the proposed site.

2 Site Details

2.1 Site Locations

The proposed development is located in the Carrickbeg area of Carrick on Suir on the southside of the River Suir. The site location is shown in Figure 1.

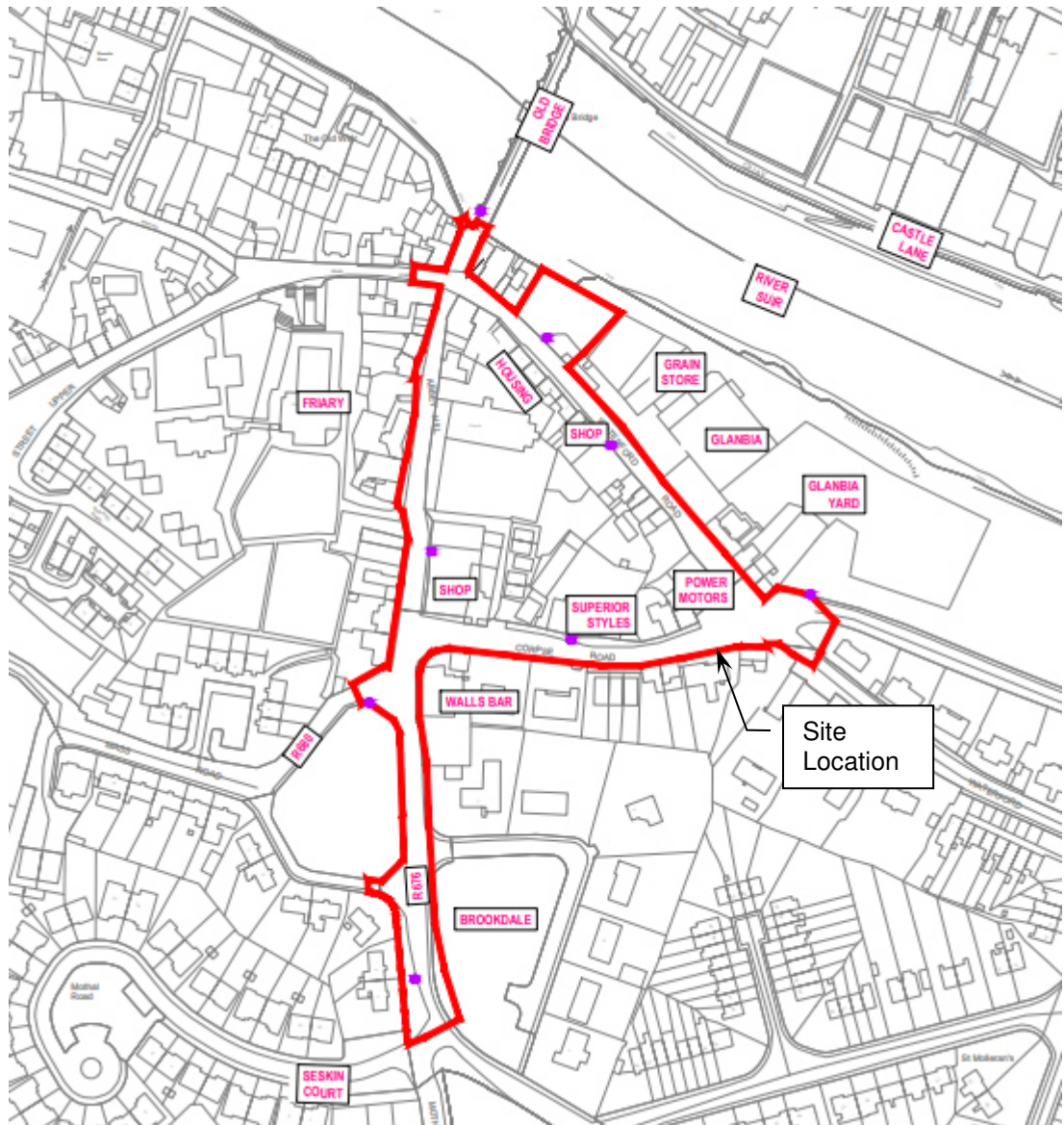


Figure 1: Site Location Plan (Google Maps)

2.2 Proposed Development

The proposed developments aims to improve improving traffic management and vehicular circulation on Abbey Heights, Bridge Street, Corpse Road and the Waterford road. The proposal involves making both Abbey Heights (south from its junction with Bridge St to its junction with Corpse Road) and part of the Waterford road (south-east from its junction with Abbey Heights/ Bridge Street for a distance of 40m to the proposed off-street carpark to the north of Waterford Road) one way.

Two new areas of car parking are proposed, one north of the Waterford Road that will provide 24 spaces and one south that will provide 9 spaces. Footpaths are to be provided in the area as well and new pedestrian crossings and improvements to older crossings. A small portion of a boundary wall on the southern side of the Waterford road is to be demolished to facilitate access to the smaller car park (Northern Car Park). Public lighting is proposed in the car parks. Further details of the proposed development are shown on drawings supplied by CST Group Chartered Consulting Engineers in Appendix A.

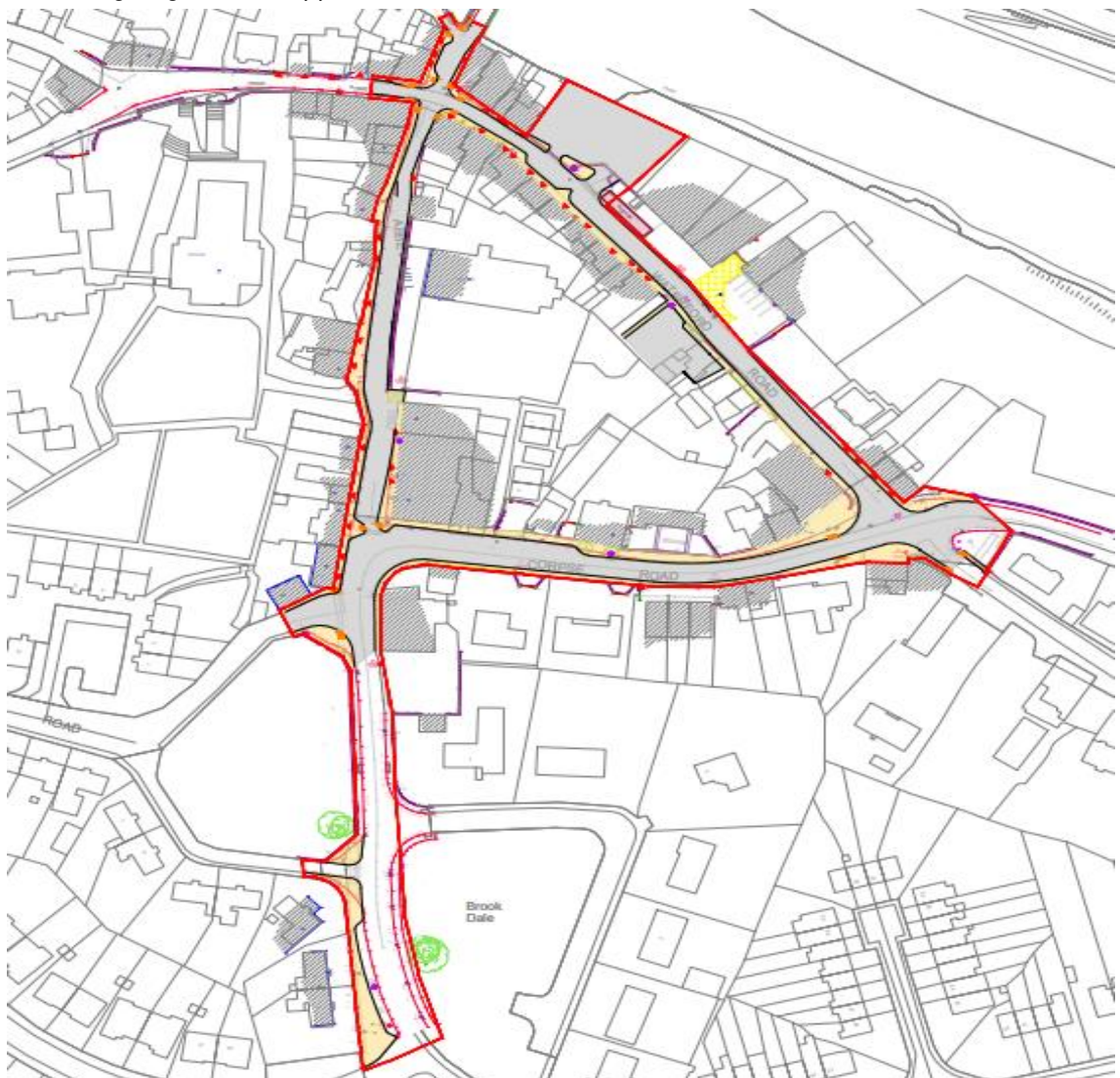


Figure 2: Proposed Development

3 Legislation and guidance

3.1 The Planning System and Flood Risk Management Guidelines

In September 2008, “The Planning System and Flood Risk Management” Guidelines were published by the Department of the Environment, Heritage and Local Government in Draft Format. In November 2009, the adopted version of the document was published.

The Flood Risk Management Guidelines give guidance on flood risk and development. The guidelines recommend a precautionary approach when considering flood risk management in the planning system. The core principle of the guidelines is to adopt a flood risk sequential approach to managing flood risk and to avoid development in areas that are at risk. The sequential approach is based on the identification of flood zones for river and coastal flooding. The guidelines include definitions of Flood Zones A, B and C, as defined below. It should be noted that these do not consider the presence of flood defences, as there remain risks of overtopping and breach of the defences.

- 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).
- 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).

Once a flood zone has been identified, the guidelines set out the different types of development appropriate to each zone. Exceptions to the restriction of development due to potential flood risks are provided for through the use of the Justification Test, where the planning need and the sustainable management of flood risk to an acceptable level must be demonstrated. This recognises that there will be a need for future development in existing towns and urban centres that lie within flood risk zones, and that the avoidance of all future development in these areas would be unsustainable. A three staged approach to undertaking an FRA is recommended:

- Stage 1: Flood Risk Identification – Identification of any issues relating to the site that will require further investigation through a Flood Risk Assessment;
- Stage 2: Initial Flood Risk Assessment – Involves establishment of the sources of flooding, the extent of the flood risk, potential impacts of the development and possible mitigation measure;
- Stage 3: Detailed Flood Risk Assessment – Assess flood risk issues in sufficient detail to provide quantitative appraisal of potential flood risk of the development, impacts of the flooding elsewhere and the effectiveness of any proposed mitigation measures.

This report addresses the requirements for Stage 3.

3.2 Carrick on Suir Town Development Plan 2013

The Carrick on Suir Town Development Plan 2013, has been reviewed as part of this assessment and the following policies are considered pertinent to this Stage 3 FRA:

- Policy INF 21: The Planning Authority will require development proposals within Flood Zone A and Flood Zone B to comply with the recommendations of Section 5.3 of the Strategic Flood Risk Assessment. Applications will also be required to be accompanied by a comprehensive Stage 3 Flood Risk Assessment for proposals in an area at risk of flooding, adjoining same or where cumulative impacts may result in a flood risk elsewhere, in low lying areas and in areas adjacent to streams.

4 Flood Risk Identification

4.1 Existing Hydrological Environment

A site visit carried out on the 1st August 2022. The River Suir runs through the town of Carrick on Suir. Whilst the majority of the site is located inland there is a proposed area for a new car park located on the Waterford Road to the north of the site downstream of Old Bridge. The location of the River Suir in the context to the proposed site is shown in Figure 3 below.

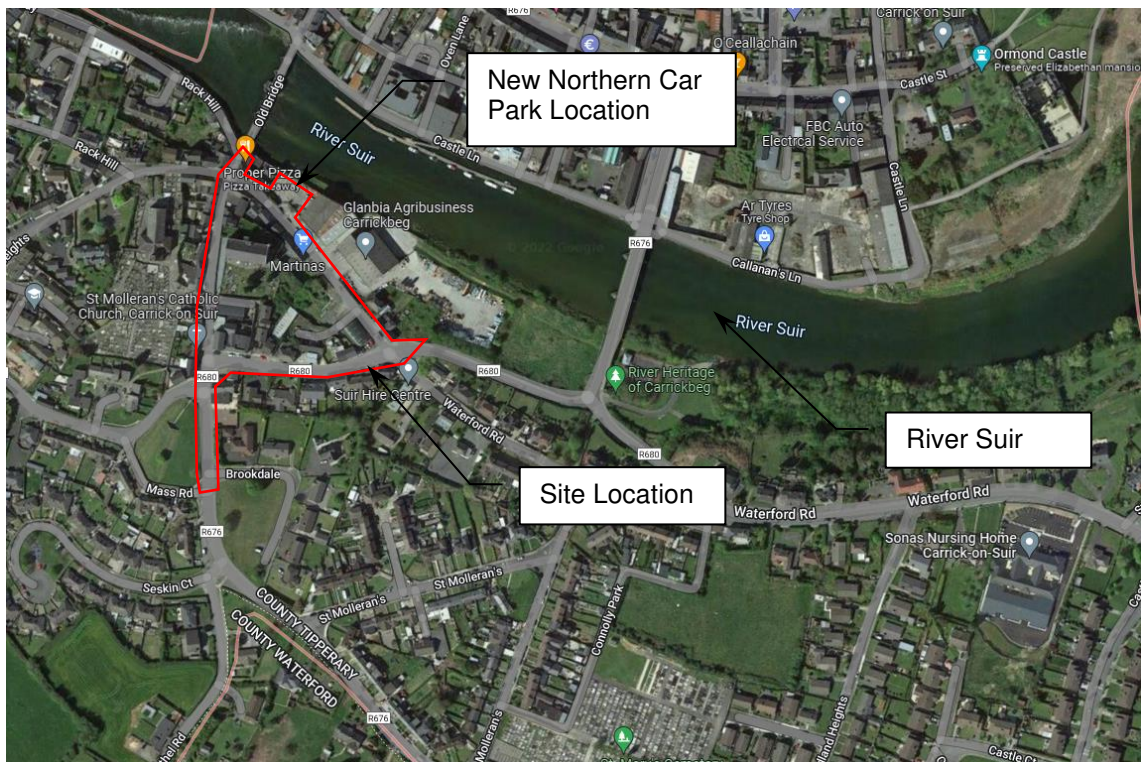


Figure 3: River Suir

4.2 Site Walkover

A site visit was carried out on the 1st August 2022 this did not identify any other watercourses.

4.3 Topographical Survey

A topographical survey of the site was provided by the applicant for the purposes of the flood risk assessment. The topographical survey is shown drawing JKB2266_001 in Appendix A.

4.4 Site Geology

The geology of the site was reviewed using data from the Geological Survey of Ireland. The geology of the site varies, with areas between, Yellow & red sandstone & green mudstone, Sandstone, shale & thin limestone, and Dark muddy limestone, shale. An extract of the Geological Survey of Ireland Map is shown in Figure 4.



Figure 4: Geology of the Surrounding Area (source: Geological Survey of Ireland)

4.5 Historical Flooding

The Office of Public Works (OPW) Flood Hazard Mapping website holds a record of historic flood events. A review of the database indicated a number of historical flooding events close to the site. However, on review of the historical flooding report there does not appear to be any evidence of flooding of the proposed development area. Figure 5, shows the past flood event data, see Appendix B for full report. Please note that this is not a guaranteed record of all flood events.



Figure 5: OPW Past Flood Event Record

4.7 CFRAMS Mapping

The OPW has published detailed flood hazard mapping for the area based on results from the Suir CFRAMS. This includes flood extent and flood depth mapping for a number of return periods for fluvial and coastal flood events. Full CFRAMS fluvial and coastal flood maps for the area are included in Appendix C of this report

Figure 6 below shows an extract from the Suir CFRAMS fluvial flood map for the area surrounding the proposed development site.

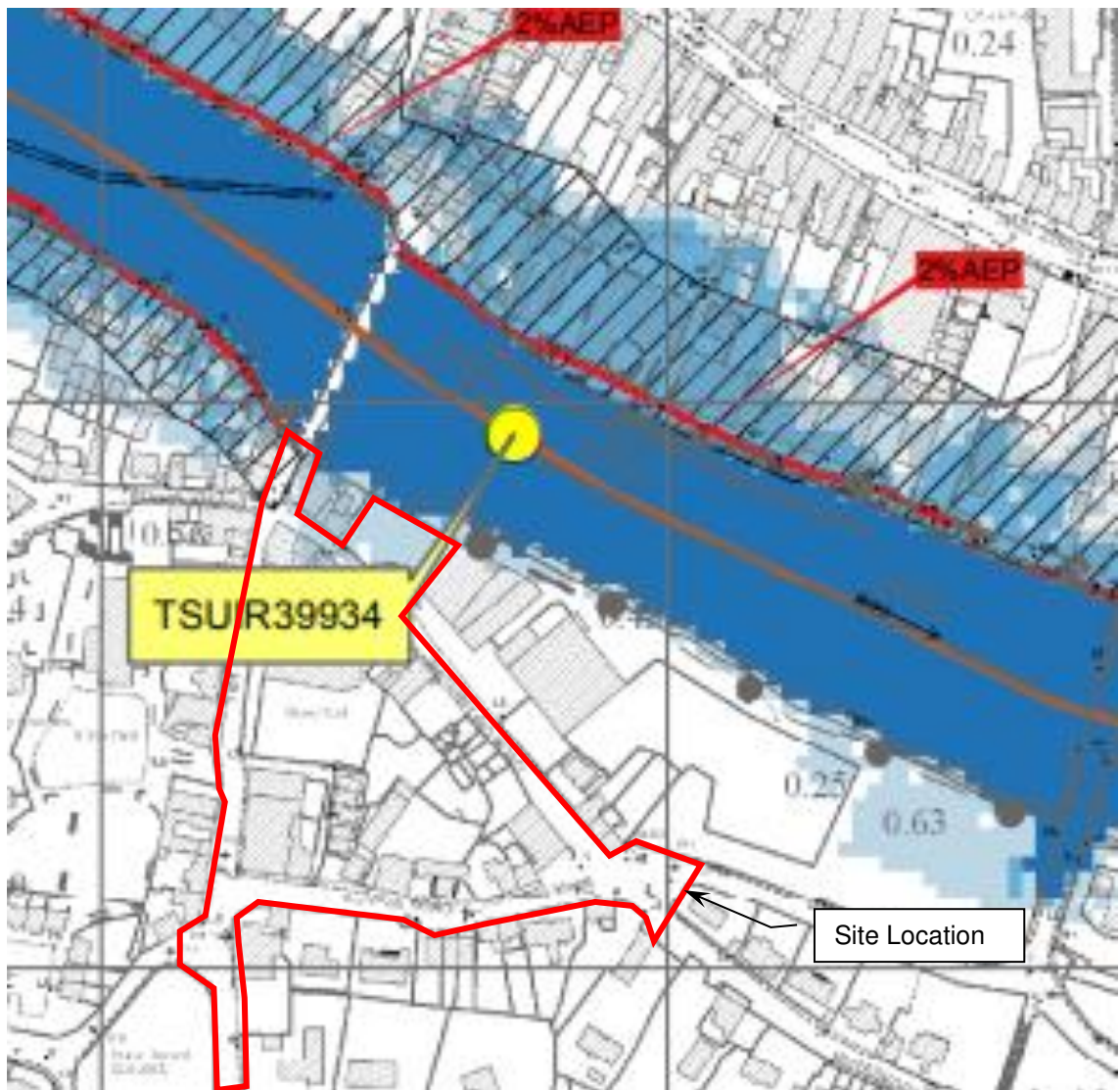


Figure 6: Extract from CFRAM fluvial flood map

As can be seen from the map above, there is a possibility of fluvial flooding on the site during the 10%, 1% or 0.1% AEP events near the proposed car park along the Waterford Road.

Figure 7 below shows an extract from the Suir CFRAMS coastal flood map for the area surrounding the proposed development site.

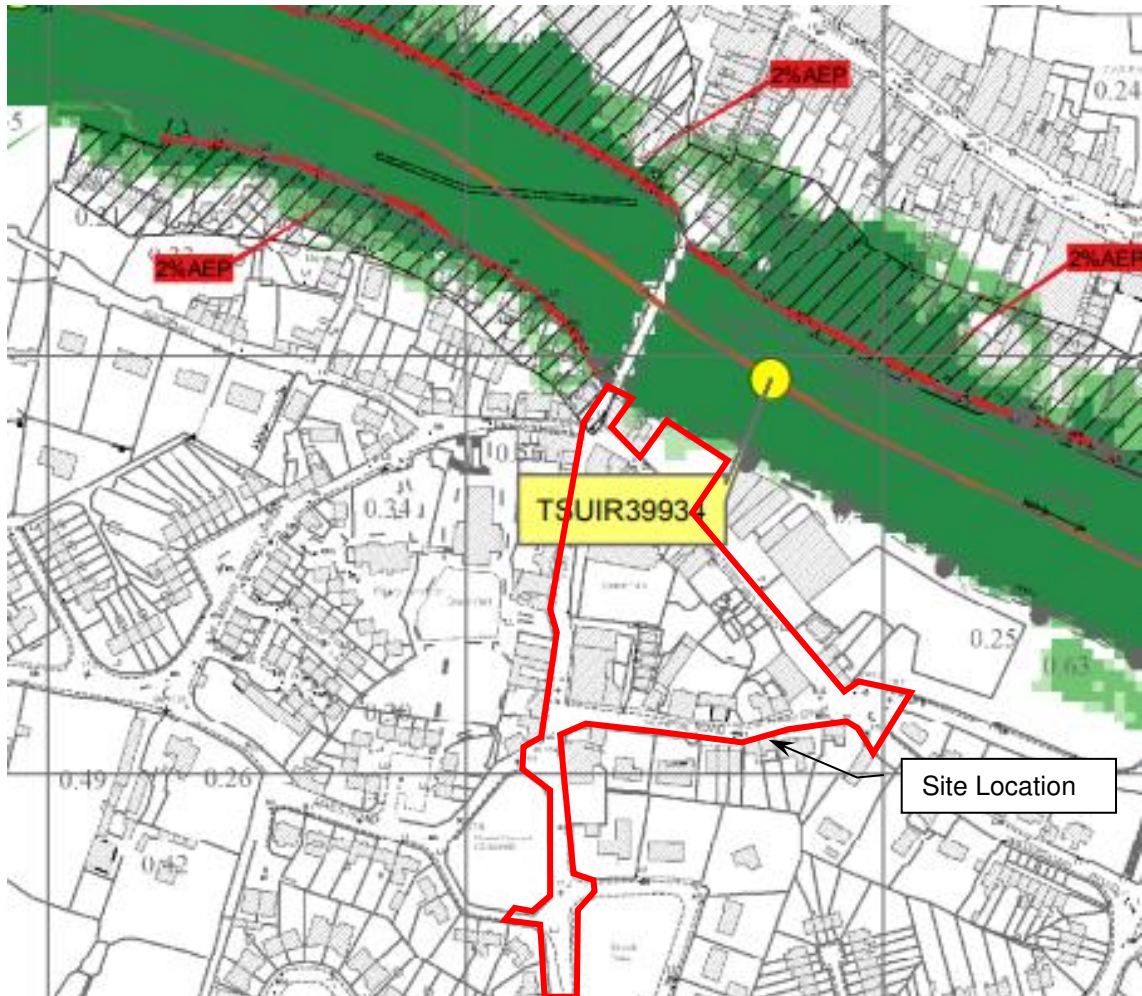


Figure 7: Extract from CFRAM coastal flood map

As can be seen from the map above, there is a possibility of fluvial flooding on the site during the 10%, 0.5% or 0.1% AEP events near the proposed car park along the Waterford Road.

4.8 Modelled Flood Levels and Flood Zones

The site has been assessed in accordance with the “The Planning System and Flood Risk Management” Guidelines. As part of the sequential test, the OPW flood hazard maps have been consulted, as have the Catchment Flood Risk Assessment Maps. The site is located in close proximity to CFRAM modelling node TSUIR39934 on the River Suir. The predicted flood levels for fluvial and coastal flood events are as per Table 1 and 2 below.

Node	10% AEP (mAOD)	1%AEP (mAOD)	0.1%AEP (mAOD)
TSUIR39934	2.82	3.06	3.24

Table 1: CFRAM Fluvial Predicted Flood Levels in Vicinity of Site.

Node	10% AEP (mAOD)	0.5%AEP (mAOD)	0.1%AEP (mAOD)
TSUIR39934	2.9	3.2	3.34

Table 2: CFRAM Coastal Predicted Flood Levels in Vicinity of Site.

JKB Consulting has compared the CFRAMS flood levels outlined within Table 1 and 2 with the recent topographical survey of the site and can confirm that the site is not located within a 0.1%AEP Fluvial flood zone or 0.1%AEP Coastal flood zone. Drawing JKB2266_002 and Drawing JKB2266_003 in Appendix A shows the extent of the 0.1%AEP Fluvial and Coastal Flood Levels against the existing ground levels

JKB Consulting has reviewed all the information above and concluded that the site is located in Flood Zone C.

4.9 Estimate of Flood Zone

The site has been assessed in accordance with the “The Planning System and Flood Risk Management” Guidelines. As part of the sequential test, the OPW flood hazard maps have been consulted, as have the Catchment Flood Risk Assessment Maps.

JKB Consulting has compared the CFRAMS flood levels outlined within Table 1 with the recent topographical survey of the site and can confirm that the flooding is contained within the River Suir at this location. JKB Consulting has reviewed all the information above and concluded that the site is located in Flood Zone C.

5 Flood Risk Assessment

5.1 Sources of Flooding

When carrying out a Flood Risk Assessment, consideration is given to all potential risk and sources of flood water at the site. A summary of the sources is outlined within Table 2.

Source of Flooding	Risk
Fluvial Flooding	Fluvial flooding is the result of a river exceeding its capacity and excess water spilling out onto the adjacent floodplain. From a review of the available information the 0.1%AEP fluvial flood level is 3.34mOD and the existing site levels are above this level. From a review of the available information, it is considered that the site is at low risk of fluvial flooding. The proposed development will all be located in areas designated Flood Zone C.
Coastal Flooding	Coastal Flooding is the result of sea levels which are higher than normal and result in sea water flowing inland during high tides or storm surges. The subject site is located close to an area of coastal flooding. The 0.1%AEP coastal flood level is 3.24mOD and the existing site levels are above this level. From a review of the available information, it is considered that the site is at low risk of coastal flooding. The proposed development will all be located in areas designated Flood Zone C.
Pluvial Flooding	Pluvial Flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high-intensity rainfall. There are no areas within the site which are subject to pluvial flooding based on a review of the PFRA mapping. The surface water from the site will be attenuated to greenfield runoff and managed onsite. The surface water network will be designed for a 1 in 100-year storm with a 20% allowance for climate change.
Groundwater Flooding	Groundwater Flooding occurs when the level of the water stored in the ground rises as a result of prolonged rainfall. The study area is not at risk of groundwater flooding. The development does not include any infrastructure which would be impacted by groundwater flooding.

Table 3: Sources of Flooding

5.2 Site Vulnerability

The proposed development comprises footpaths and car parking and falls into the category of local transport infrastructure, as a result the development is classified as “Less Vulnerable Development.” The Planning System and Flood Risk Management Guidelines gives definitions for the type of developments that can take place in each Flood Zone. Only coastal and fluvial flood zones are considered in determining whether a Justification Test is required.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 4: Matrix of Vulnerability versus Flood Zone to indicate Justification Requirement

As the site has been designated as Flood Zone C, less vulnerable development proposed in Flood Zone C is considered appropriate as per Table 4 above.

5.3 Flood Mitigation Measures

The proposed development is located above the higher 0.1% AEP fluvial flood level, which is 3.34 AOD. The closest area of the development to the fluvial floodplain is a proposed car park located at the northern corner of the site on the Waterford Road. The lowest current ground level within this area is 3.58m AOD, with the proposed minimum level to be 3.67m AOD. This provides 330mm of freeboard above higher 0.1% AEP fluvial flood level. Consideration could be given to the raising the levels further to provide further protection against climate change. However, given that the development is less vulnerable development and the impact on the development on flooding would be minimal the current freeboard is deemed acceptable.

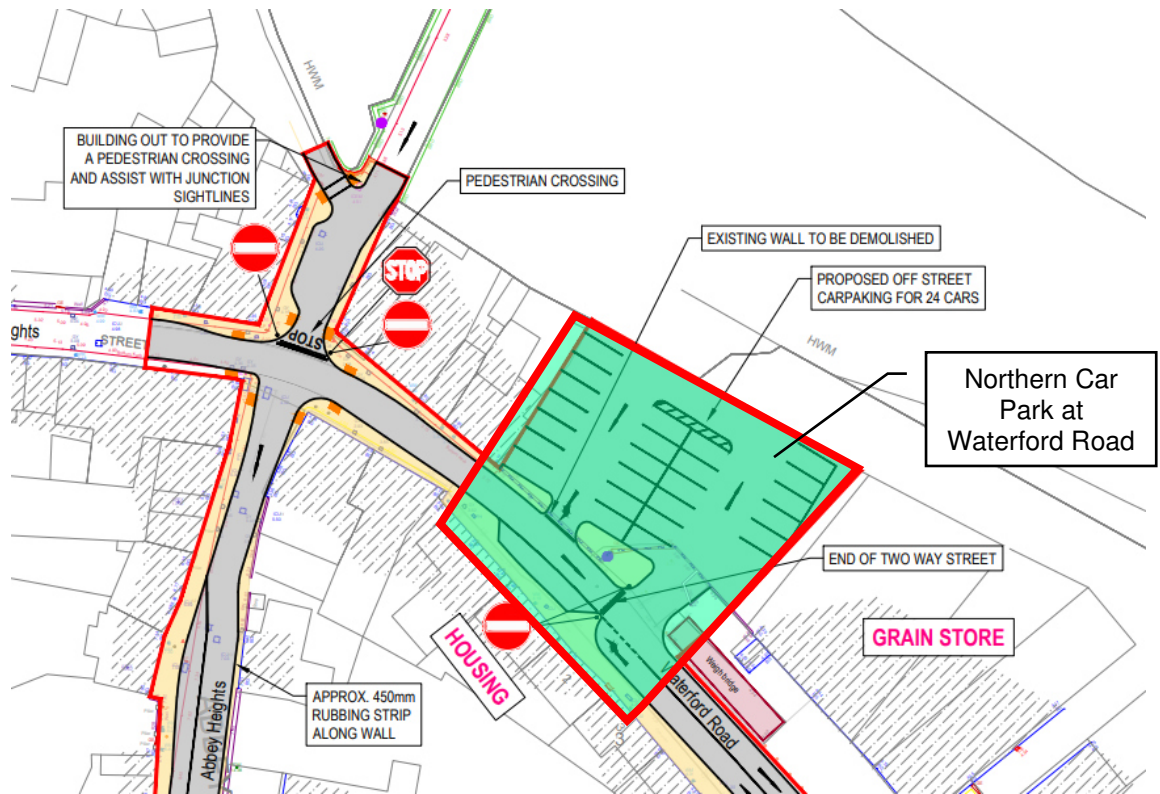


Figure 8: Northern Car Park Location

The proposed development will provide stormwater drainage in accordance with the Carrick on Suir Town Development Plan 2013. With the implementation of the above measures the site will be at low risk of flooding and will not increase the risk of flooding to any adjacent or nearby area.

6 Conclusions

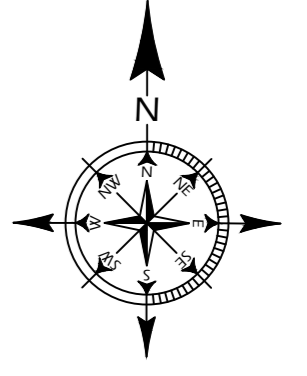
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A review of the flooding and flood risk in the area was carried out as the site is located near the River Suir. Flood Maps produced as part of the CFRAMS were consulted to establish the Flood Zone. The proposed development is found to be located within Flood Zone C for fluvial, pluvial and coastal flooding and in accordance with The Planning System & Flood Risk Management Guidelines the proposed development is deemed appropriate for this flood zone designation.

Appendix A

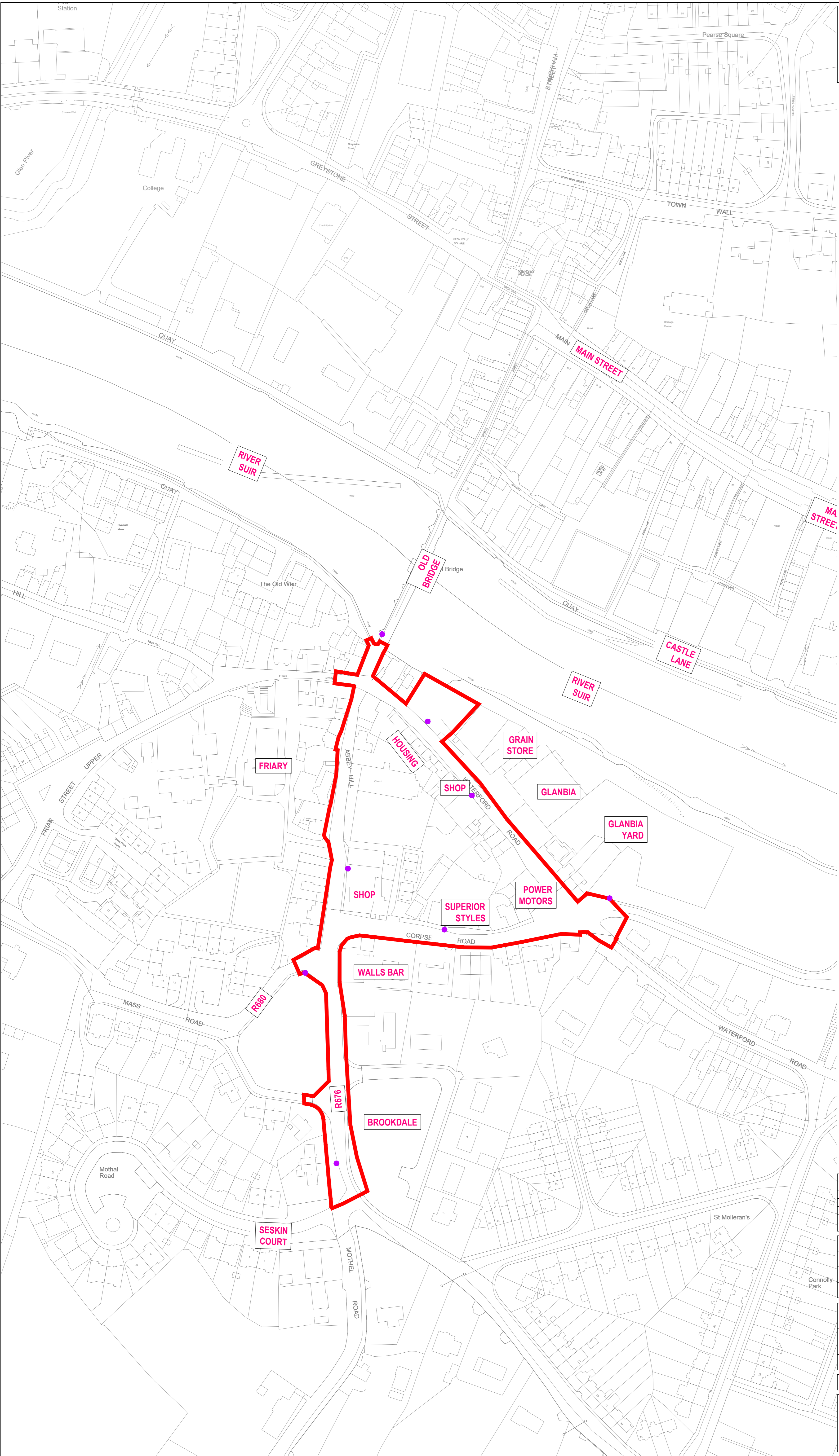
Drawings

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KEY

- RED LINE BOUNDARY
- SITE NOTICE LOCATION

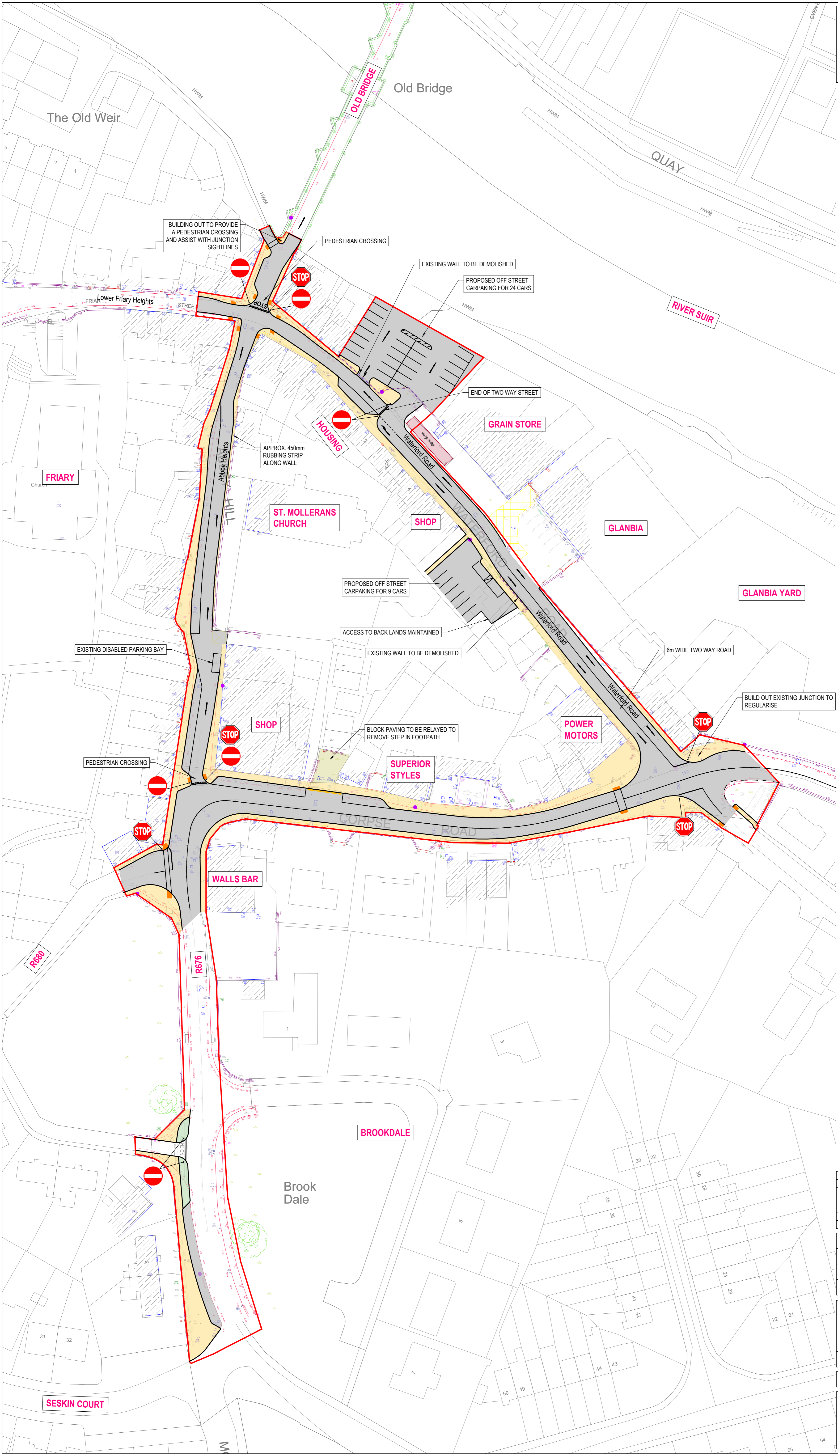
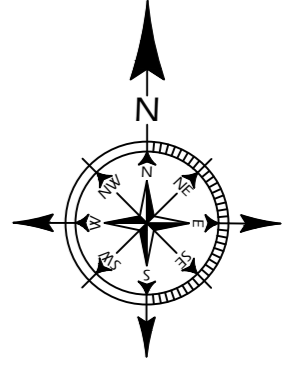


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CLIENT:	TIPPERARY CoCo		
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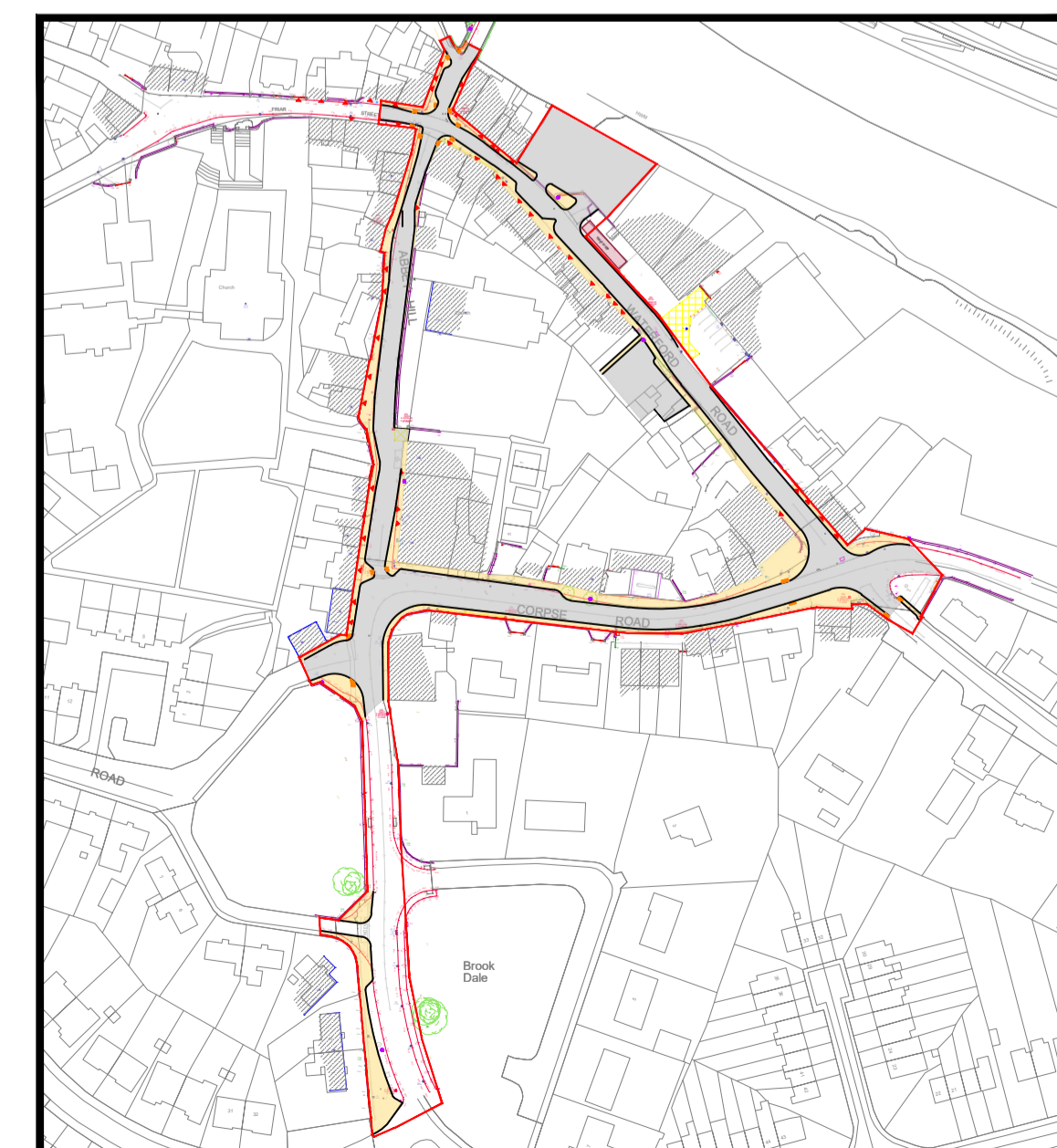
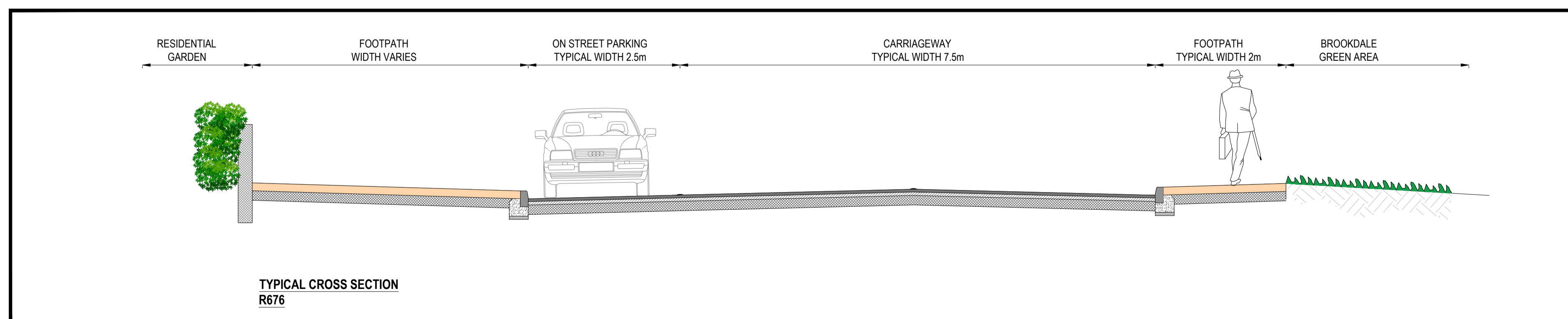
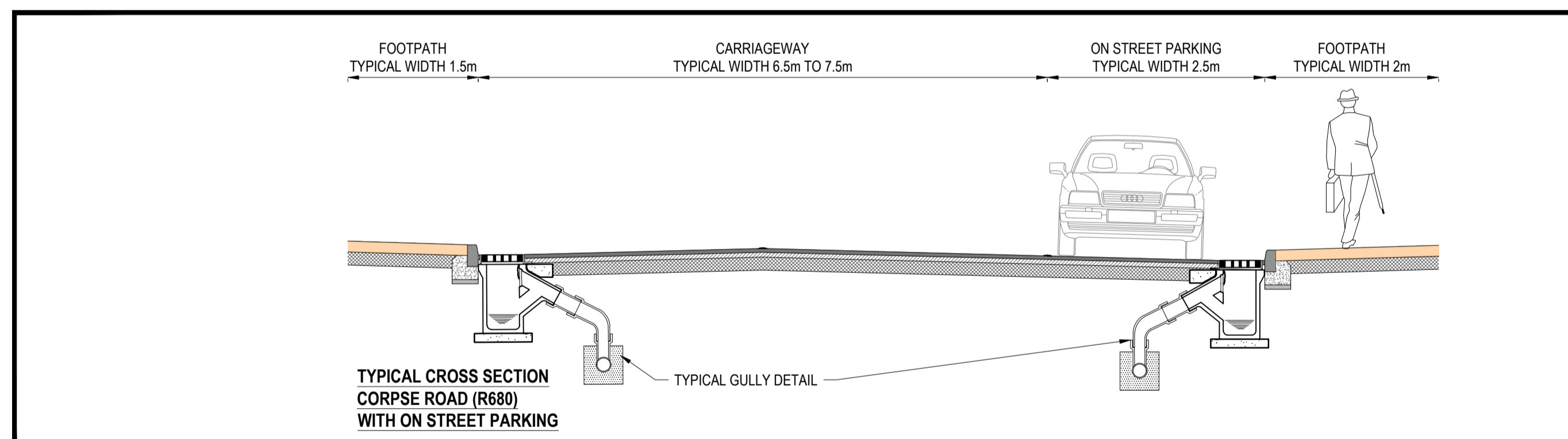
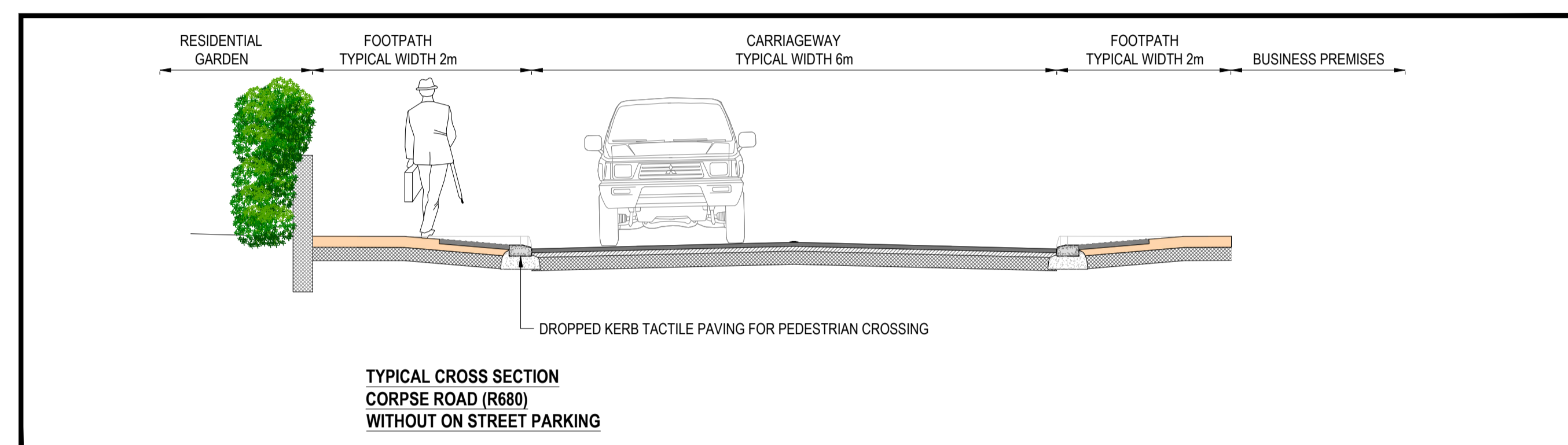
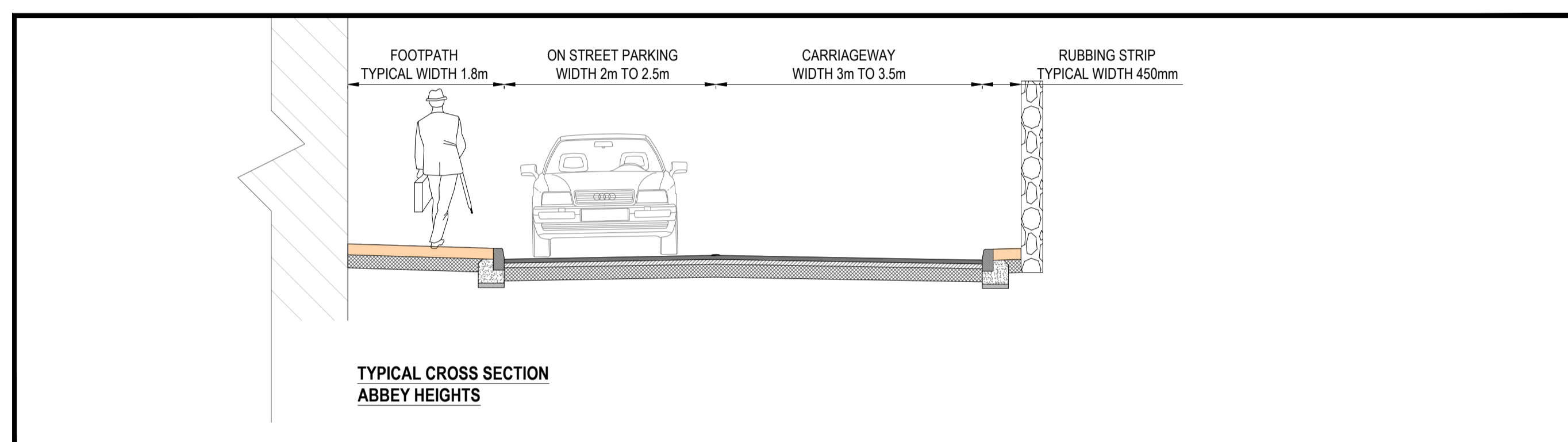
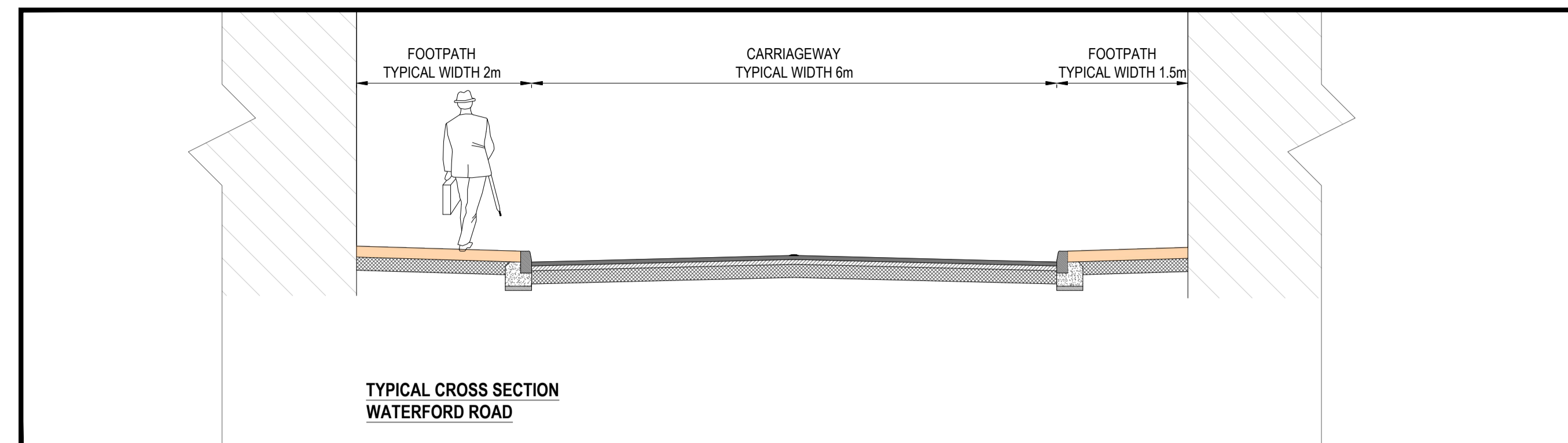
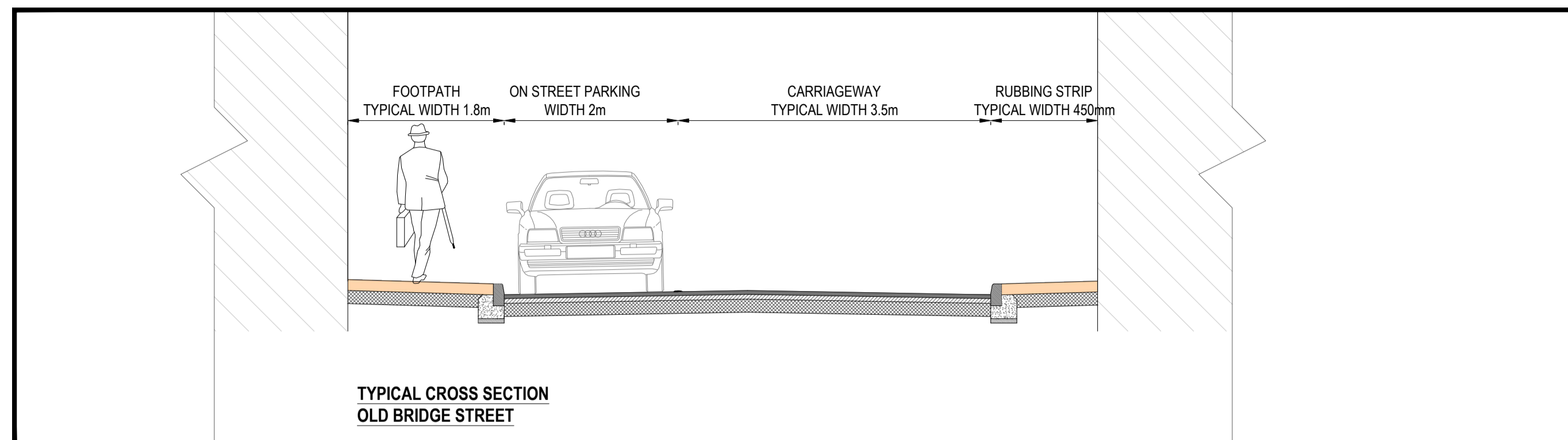


KEY	
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	PROPOSED CONCRETE FOOTPATH
	ROAD/PARKING - BLACKTOP FINISH
	PRIVATE PARKING
	PROPOSED LANDSCAPING
	TACTILE PAVING AT PEDESTRIAN CROSSING LOCATIONS
	PROPOSED KERB
	SITE NOTICE LOCATION

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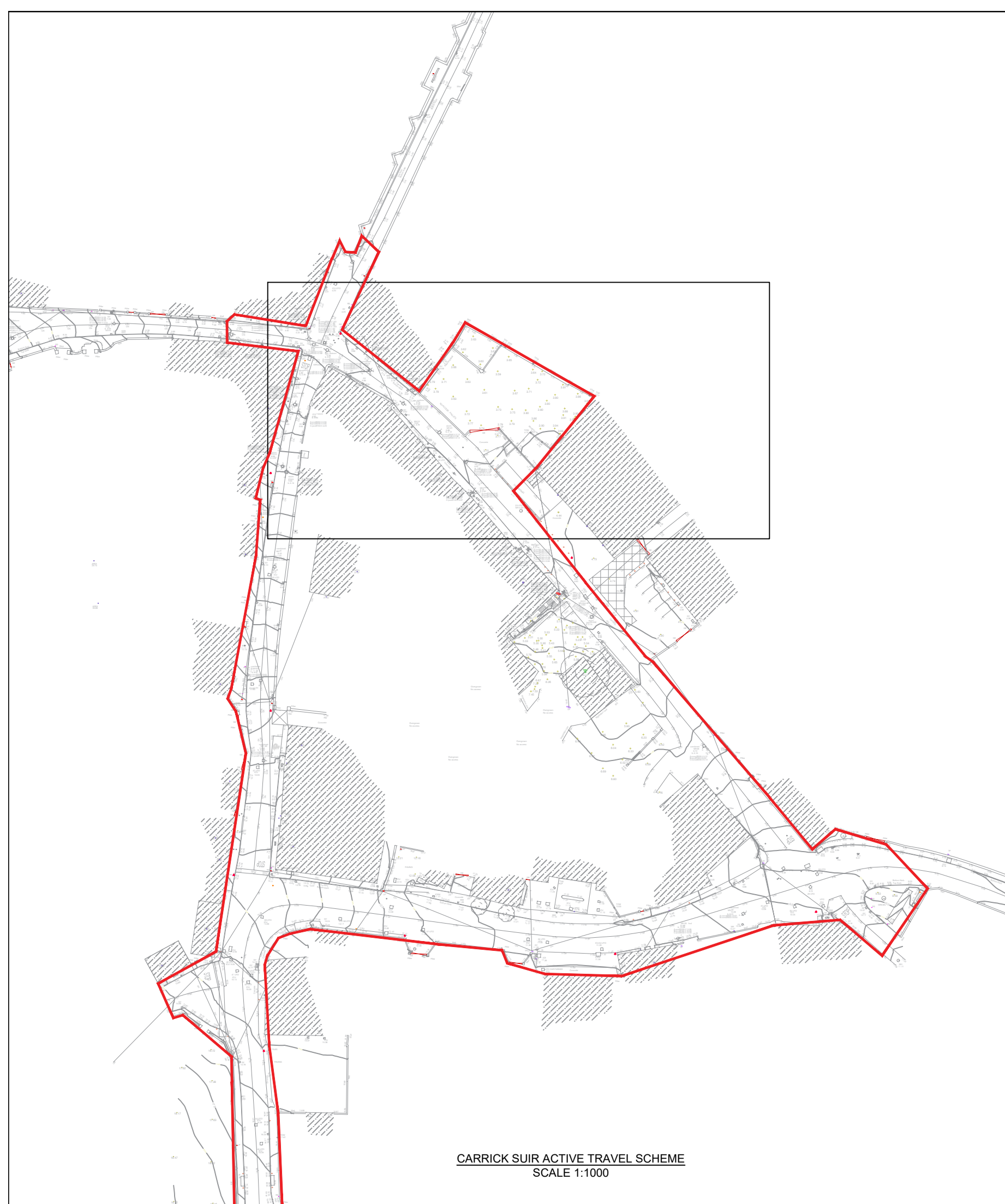
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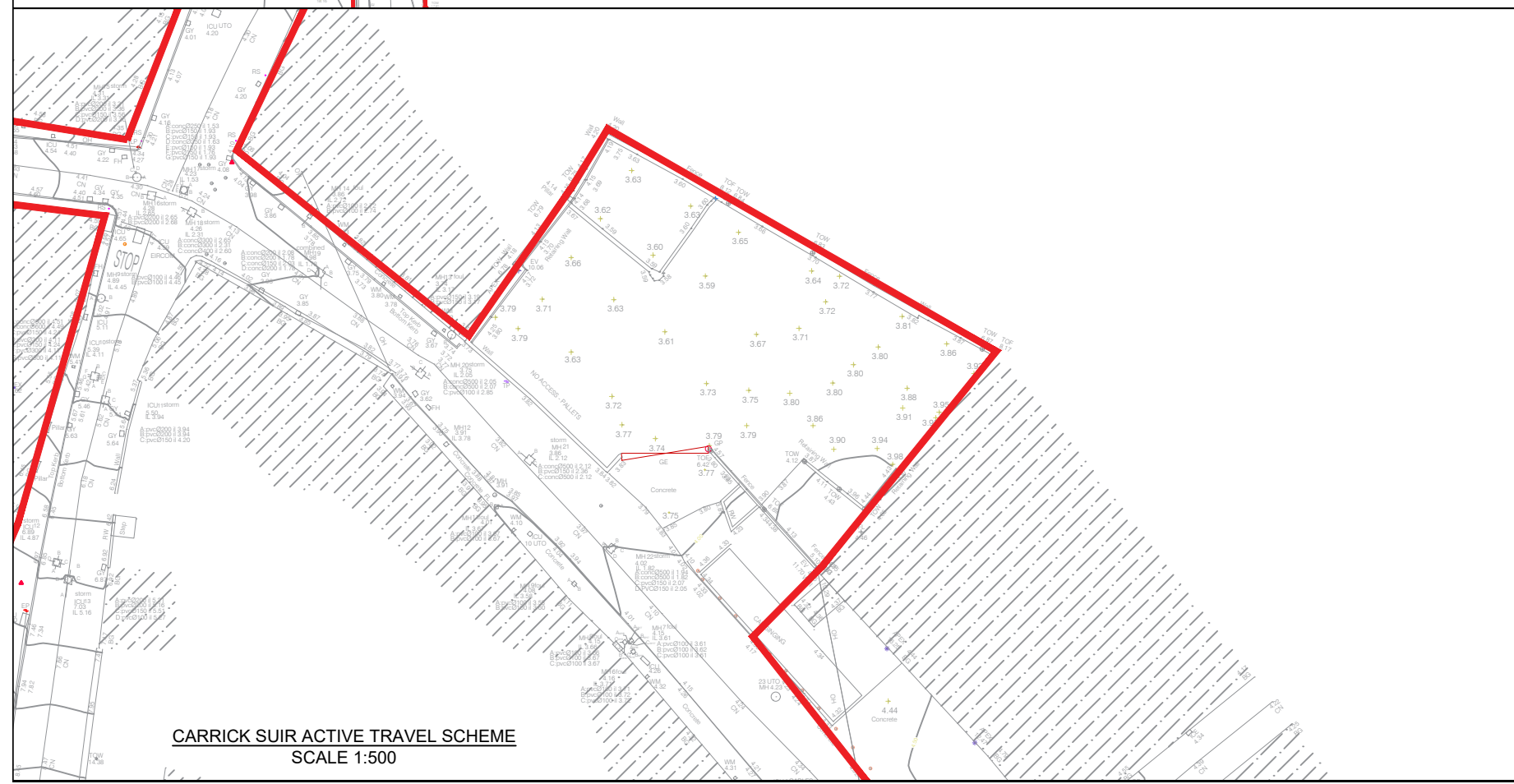


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CARRICK SUIR ACTIVE TRAVEL SCHEME
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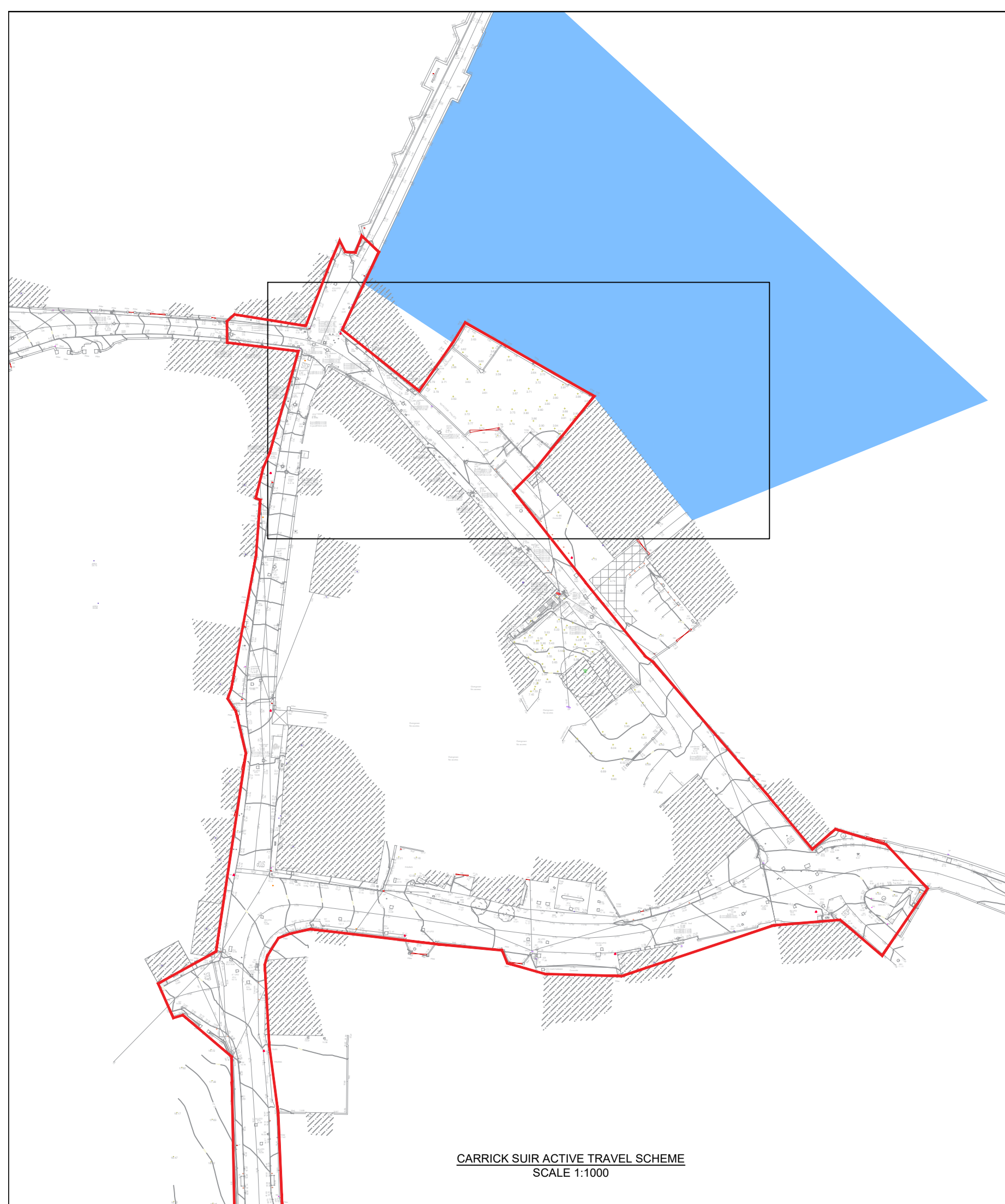


CARRICK SUIR ACTIVE TRAVEL SCHEME
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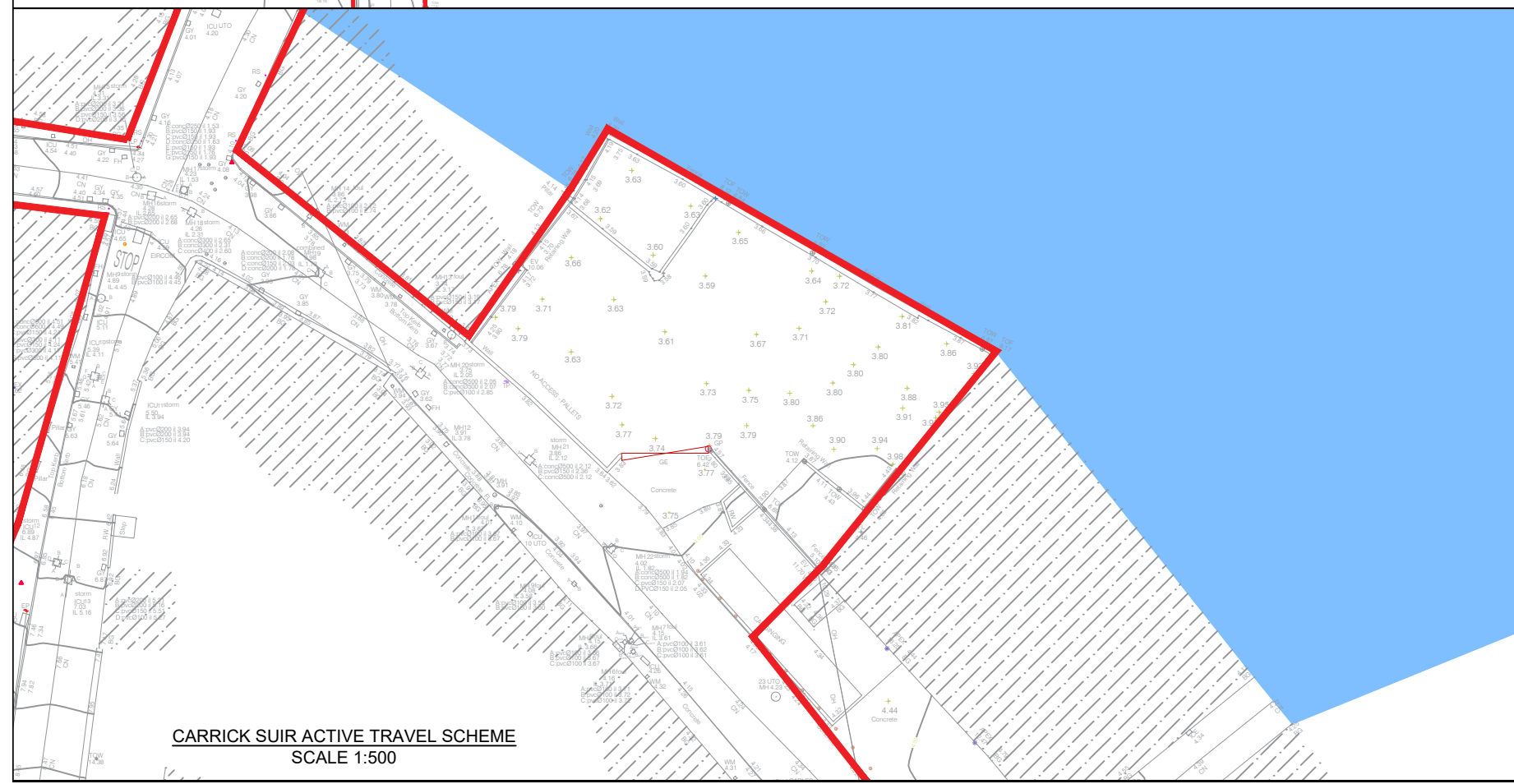
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KEY

0.1% AEP FLUVIAL
FLOOD LEVEL -
3.34m AOD



CARRICK SUIR ACTIVE TRAVEL SCHEME
SCALE 1:1000



CARRICK SUIR ACTIVE TRAVEL SCHEME
SCALE 1:500

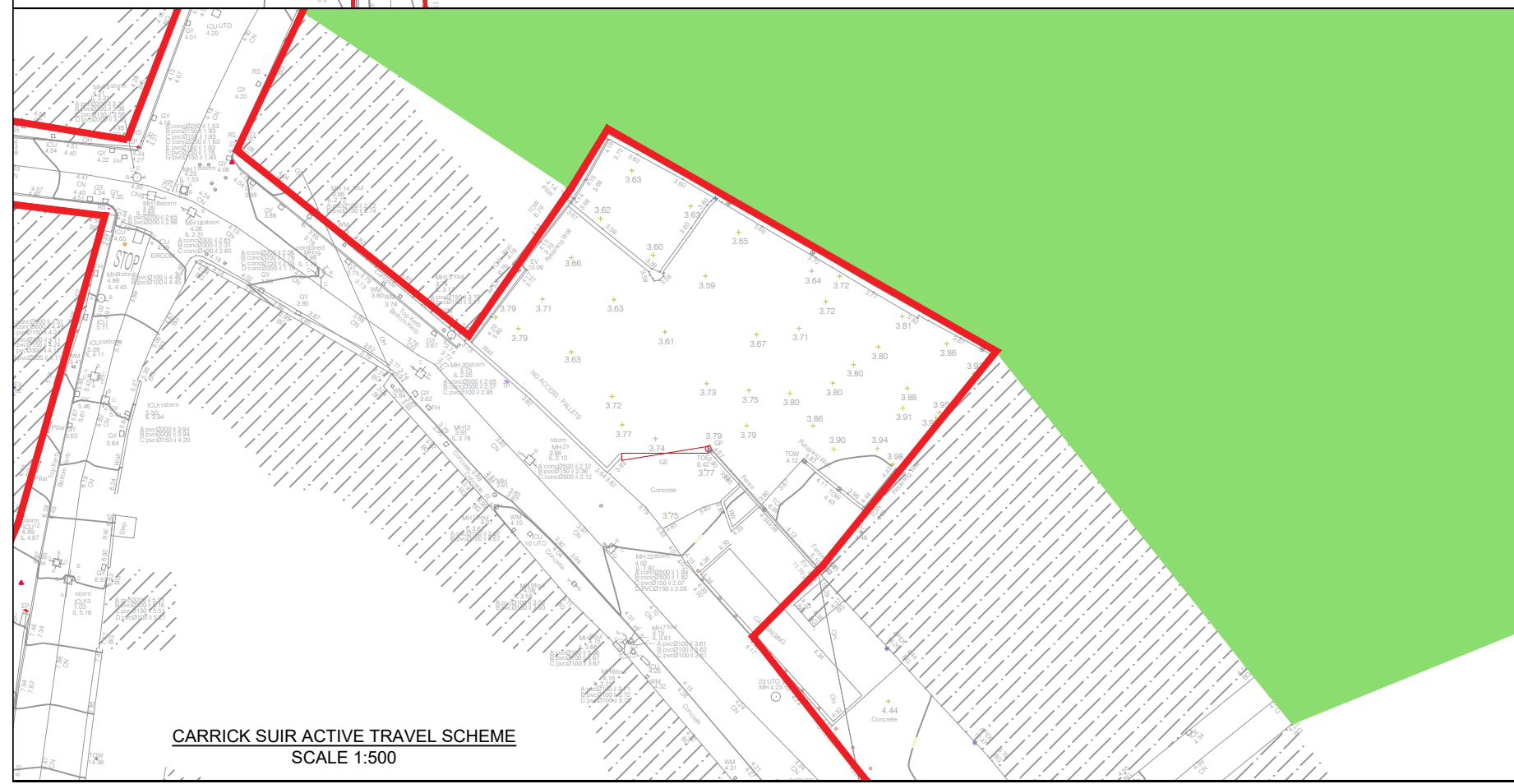
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KEY

0.1% AEP COASTAL
FLOOD LEVEL -
3.24m AOD



CARRICK SUIR ACTIVE TRAVEL SCHEME
SCALE 1:1000



CARRICK SUIR ACTIVE TRAVEL SCHEME
SCALE 1:500

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CST GROUP			
Project Title			
CARRICKBEG ACTIVE TRAVEL SCHEME DETAILED FRA			
Drawing Title			
0.1% AEP COASTAL FLOODPLAIN PRESENT DAY			
Drawn	Approved	Date	
JB	JB	AUG 22	
Project No.			
JKB2266			
Scale @ A3			
AS SHOWN			
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JKB Consulting Engineers Ltd 56 Greengraves Road Dundonald Belfast Co Down BT16 1UZ TEL: 07534 493480 Email: jonathan@jkb-consulting.com Web: www.jkb-consulting.com			
Drawing Number	Rev		
003			

Appendix B

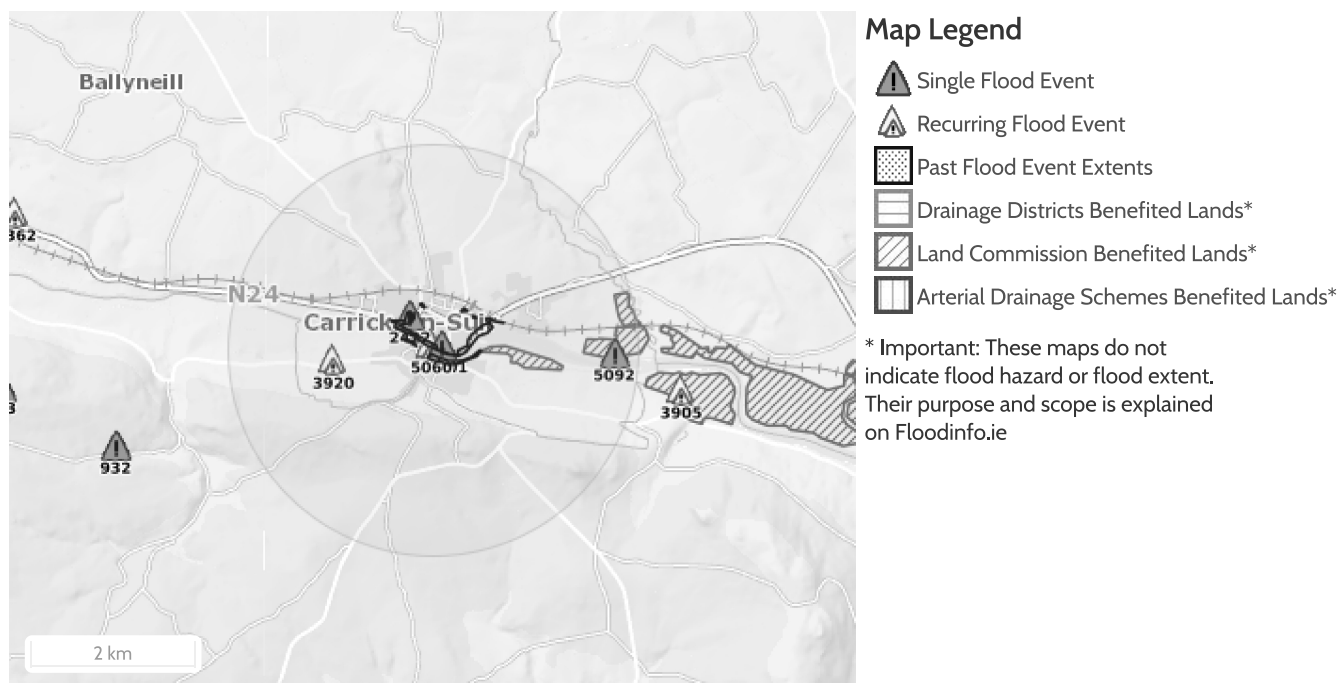
OPW Past Flood Event Local Area Summary Report



Report Produced: 21/8/2022 13:57

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "Website"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.




Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

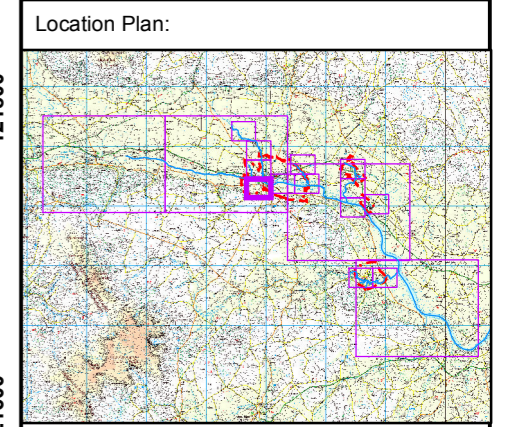
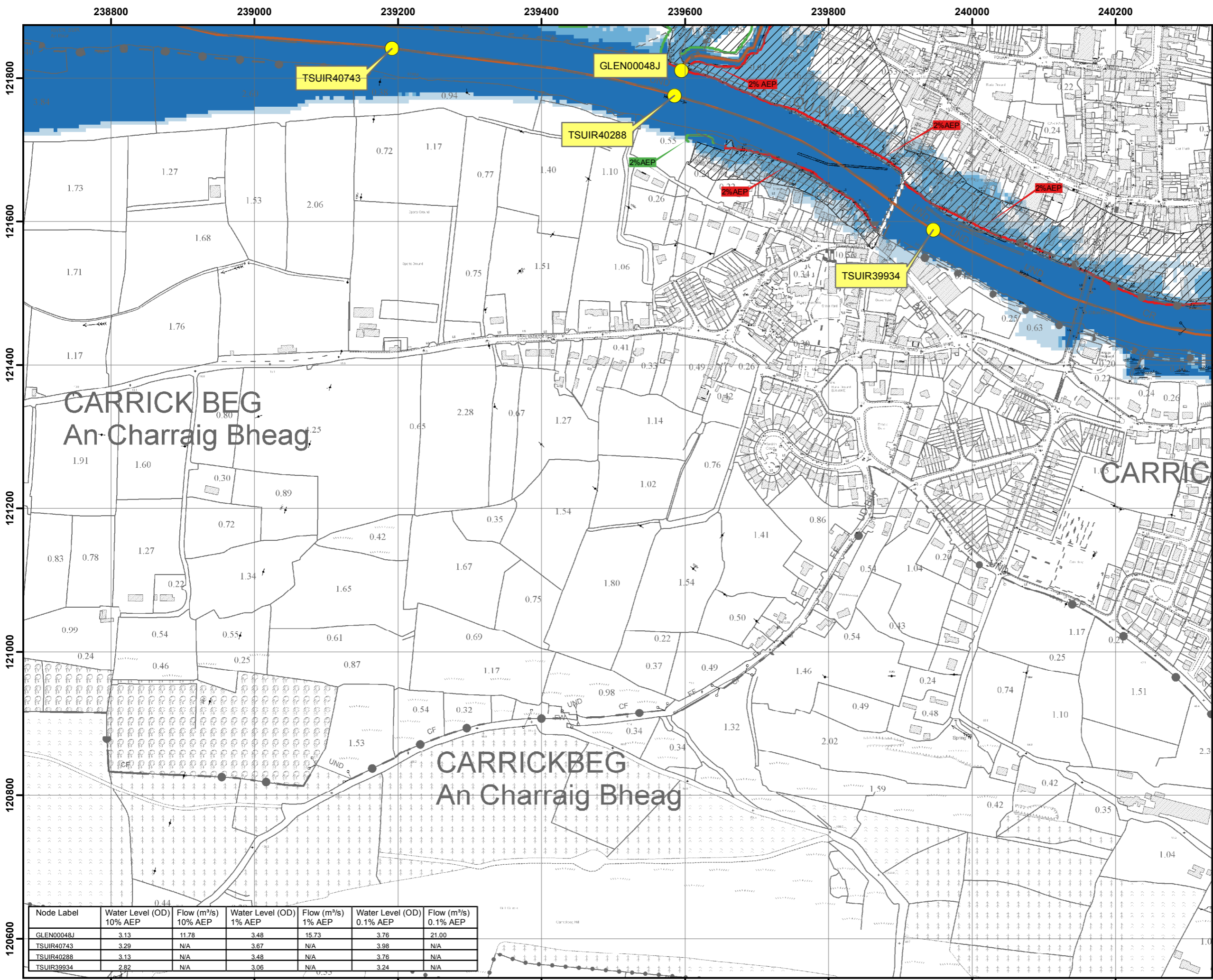
7 Results

Name (Flood_ID)	Start Date	Event Location
1. Suir Carrick On Suir Jan 1996 (ID-1425) Additional Information: Reports (5) . Press Archive (0)	04/01/1996	Area
2. Suir Carrick-on-Suir October 2004 (ID-2422) Additional Information: Reports (1) . Press Archive (0)	26/10/2004	Approximate Point
3. Suir Carrick-on-Suir Nov 2000 (ID-5060) Additional Information: Reports (4) . Press Archive (1)	06/11/2000	Approximate Point
4. Suir at Ballylynch Nov 2000 (ID-5092) Additional Information: Reports (1) . Press Archive (0)	05/11/2000	Approximate Point
5. Carrick-on-Suir Recurring (ID-4361) Additional Information: Reports (7) . Press Archive (73)	n/a	Approximate Point
6. Carrick on Suir Toberagattabrack recurring (ID-3920) Additional Information: Reports (2) . Press Archive (0)	n/a	Approximate Point

Name (Flood_ID)	Start Date	Event Location
7.  Flooding at Carrick on Suir on 30/12/2015 (ID-13501)	30/12/2015	Approximate Point
Additional Information: Reports (0) , Press Archive (0)		

Appendix C

OPW CFRAM Map



Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Defended Area
- Flood Defence - Embankment
- Flood Defence - Wall
- 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- Node ID Node Label

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: **CARRICK-ON-SUIR FLUVIAL FLOOD EXTENT MAP**

Map Type: EXTENT

Source: FLUVIAL

Map Area: HPW

Scenario: CURRENT

Drawn By: F.McCotter Date: 21 September 2016

Checked By: S. Patterson Date: 21 September 2016

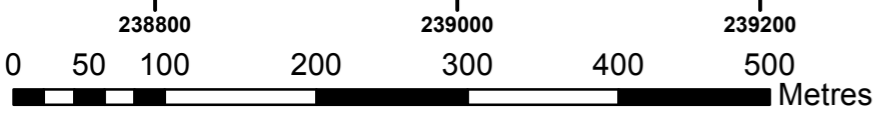
Approved By: G.Gallagher Date: 21 September 2016

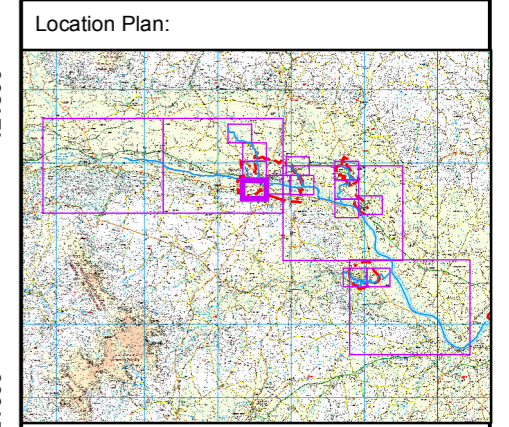
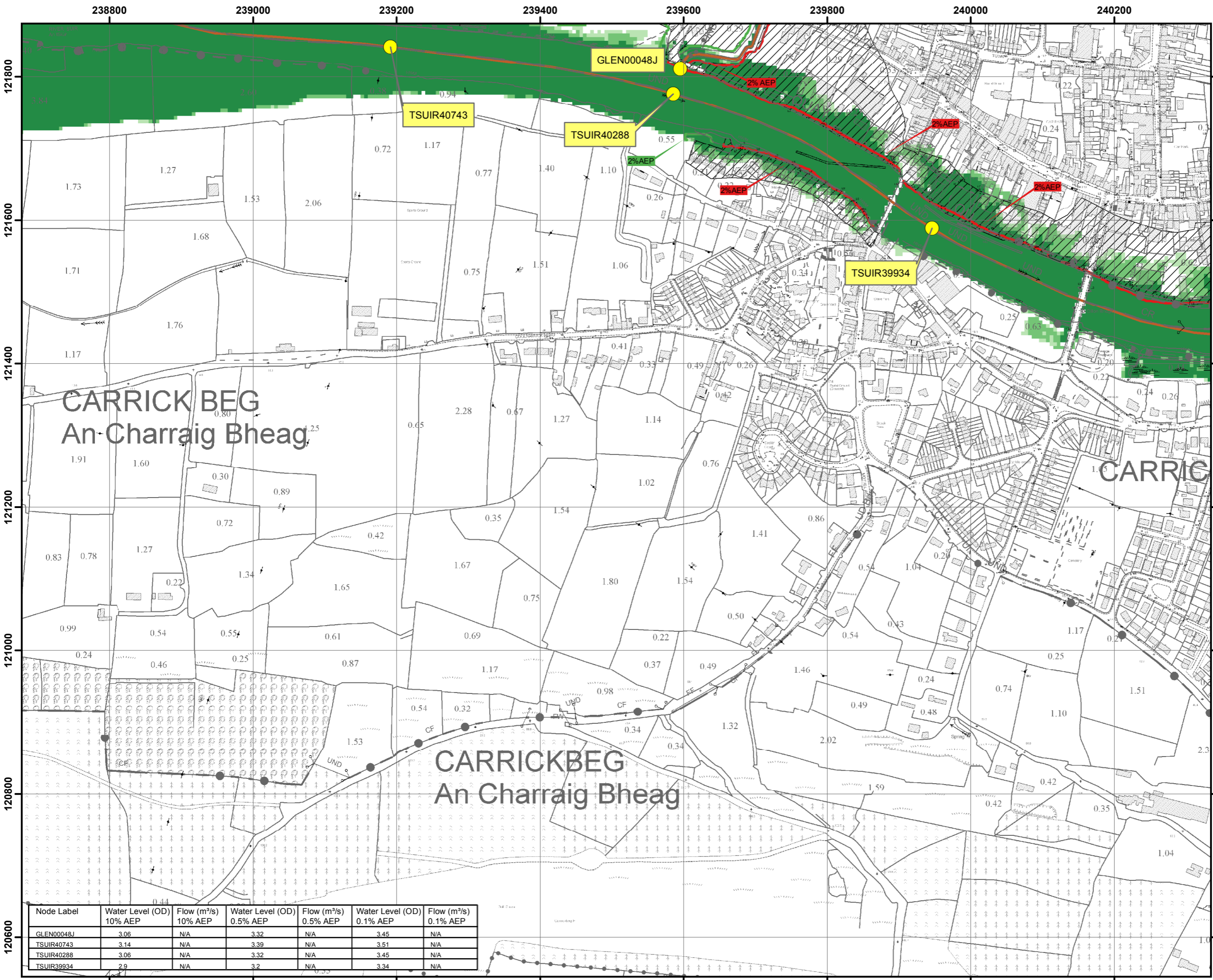
Map No.: O16COS_EXFCD_F0_06 **FINAL**

Sheet: Page 06 of 17 Revision: 0

Map Scale: 1: 5000 Plot Scale: 1:1 @ A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
GLEN00048J	3.13	11.78	3.48	15.73	3.76	21.00
TSUIR40743	3.29	N/A	3.67	N/A	3.98	N/A
TSUIR40288	3.13	N/A	3.48	N/A	3.76	N/A
TSUIR39934	2.82	N/A	3.06	N/A	3.24	N/A





Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Defended Area
- Flood Defence - Embankment
- Flood Defence - Wall
- 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- 1% AEP Standard of Protection of Flood Defence (Walls / Embankments)
- Node ID Node Label

IMPORTANT USER NOTE:
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Project:		SUIR CFRAM STUDY	
Map:		CARRICK-ON-SUIR TIDAL FLOOD EXTENT MAP	
Map Type:		EXTENT	
Source:		TIDAL	
Map Area:		COASTAL	
Scenario:		CURRENT	
Drawn By:	F.McCotter	Date:	21 September 2016
Checked By:	S. Patterson	Date:	21 September 2016
Approved By:	G.Gallagher	Date:	21 September 2016
Map No.:		O16COS_EXCCD_F0_06 FINAL	
Sheet:		Page 06 of 17	
Map Scale:		1: 5000	
Plot Scale:		1:1 @ A3	

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
GLEN00048J	3.06	N/A	3.32	N/A	3.45	N/A
TSUIR40743	3.14	N/A	3.39	N/A	3.51	N/A
TSUIR40288	3.06	N/A	3.32	N/A	3.45	N/A
TSUIR39934	2.9	N/A	3.2	N/A	3.34	N/A

