Construction, Replacement or Alteration of Bridges and Culverts
Application for Consent under Section 50 of the Arterial Drainage Act, 1945 & EU (Assessment and Management of Flood Risks) Regulations SI 122 of 2010

Project Name	**Newport Ball Ally Footbridge**	Structure Ref No.	**C01**

Applicant (Correspondence will issue to agent)	
Company or Organisation Name:	Tipperary County Council
Postal Address:	Civic Offices, Nenagh, County Tipperary
Contact Person:	Paul Crowe
Phone:	(0)818 06 5000
E-mail:	Paul.crowe@tipperarycoco.ie

Agent (Correspondence will issue to agent)			
Company or Organisation Name:	**TOBIN**		
Postal Address:	**Fairgreen House, Fairgreen Road, Galway**		
Contact Person:	**Frank O'Connor**		
Phone:	**091-565211**	Fax:	
E-mail:	**frank.oconnor@tobin.ie**		

Location and Parameters of crossing				
Watercourse:	**Small River**		Catchment:	**Small River Catchment**
Address (Townland – County):		**Clonbealy, Co. Tipperary**		
Grid Reference	X:	**572538**	Y:	**662329 ITM**
Hydrometric Station(s) utilized (including reference number):		**Non applicable**		
Area of Contributing Catchment:		**14.346** Km^2	Road Reference:	
Design Flood Flow:	**30.386** m^3/s	Annual Exceedance Probability (AEP):		1% MRFS

Statement of Authenticity	
I hereby certify that the information contained in this application form, along with all appended supporting information, has been checked by me and that all statements are true and accurate.	
Name:	**Frank O'Connor**
Company/Organisation:	**TOBIN**
Signature:	
Date:	**18th June 2025**

Application Check List	☐
COMPLETED APPLICATION FORM	☒
SUPPORTING HYDROLOGICAL AND HYDRAULIC INFORMATION	☒
PHOTOGRAPHS COVERING SITE OF ALL PROPOSED WORKS	☒
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	☒
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	☒
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	☒
DETAILS OF RELEVANT EXISTING STRUCTURES	
COMPLETED STATEMENT OF AUTHENTICITY	☒
PLAN OF CATCHMENT AREA	☒
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	

For OPW use only	*Date of Receipt*							
OPW Drainage Maintenance Region	*East*	☐	*South East*	☐	*South West*	☐	*West*	☐

If the application form is not completed correctly, and in its entirety, the application may be deemed invalid and returned for correction.

Correspondence Number	*OPW Register No:*	
	Consent Issued	☐

ADDITIONAL INFORMATION

Hydrological Analysis

Methodology Applied

Method Used	Tick box if used or state other	Flow *2 (m^3/sec)
6 – Variable Catchment characteristics	☐	
3 – Variable Catchment Characteristics	☐	
IH 124	☐	
Gauged Flow	☐	
Unit Hydrograph	☐	
Other	☐	
Other	☒ FEH	20.928

FSR ☐ FSU ☒ *12.476* MRM ☐

Comments

Factors Applied

Type of Factor	Value Used
Climate Change	**1.2**
Irish Growth Curve	1.96
100-year Growth Factor	2.27
Factor for Standard Error	1.21
Drained Channel	
Other	

Tidal ☐

Comments
1.2 factor for climate changes relates to the MidRange Future Scenario (MRFS).
The highest result (FEH) was adopted as the100 MRFS design flow. Four Flows were assessed the FSU Bo Pivotal Site,One Pivotal Site, 3 Pivotal Sites, and the FEH Small Catchment Equation

Hydraulic/Structure Details

Description of Structure*3

Permission is hereby sought for the construction of a proposed clear span footbridge at the Newport Ball Ally, Co. Tipperary. The proposed structure has minimal impact on the geometry of the Small River, with the foundations either side of the bridge only inset into the channel slightly. The catchment was delineated based on FSU delineated catchments and topographic data.

The area where the new bridge is proposed has slow to moderate flow with a depth of approximately 0.47m when the cross sections were taken. The riverbed is made up of cobble and small boulders. The banks are relatively steep with sides of approximately 2.5m above the bed level.

Supporting hydrological and hydraulic calculations for the subject structure are attached with this Section 50 Application form. Drawings showing the structure's location, catchment and channel geometry are also included. It should be noted that the Flow estimation sheet attached is for the current scenario without standard error and was increased by a factor of 1.2 for the MRFS and 1.21 for the 68% standard error.

Effective Conveyance Area *4	**13.718**m^2		
Upstream Invert Level	**50.32**mOD	Downstream Invert Level F	**50.32**mOD
Upstream Soffit Level	**53.439** mOD	Downstream Soffit Level	**53.439** mOD
Upstream Design Flood Level	**52.981**mOD	Downstream Design Flood Level	**41.133**mOD

NOTES:

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1. In line with OPW policy, section 50 approvals should be sought for bridges and culverts that are necessary for access or deemed acceptable by the planning authority. A copy of the notice of grant of planning permission with all conditions should be enclosed with all applications, that are not exempt development under the Planning and Development Act, 2000, as evidence that these factors have been considered.
2. Flow is the estimated flow from the catchment, without any factors applied.
3. The following details are to be included: the channel bed level, invert and soffit levels of the structure along with the width, length and total conveyance area. Any environmental considerations such as bed depression, baffles, mammal walkways etc. should be described.
4. Effective conveyance area is from channel bed level to design flood level.
5. All levels must be given to Ordnance Datum, Malin Head

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Legend
- Subject Site
- Bridge Location
- Watercourses [EPA]
- Lakes [WFD]

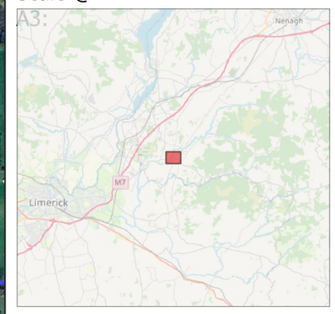
Newport [tipperary]

Smeil [tipperary]

Newport [tipperary]

0 100 200 m

Site Overview:
Scale @ 1:750,000



Client
Tipperary County Council

Project
Newport Ball Ally Footbridge
Co. Tipperary

Title
Site Location

Scale @ A3: As Shown on Map

Prepared by:	Checked:	Date:
FOC	AT	June 2025

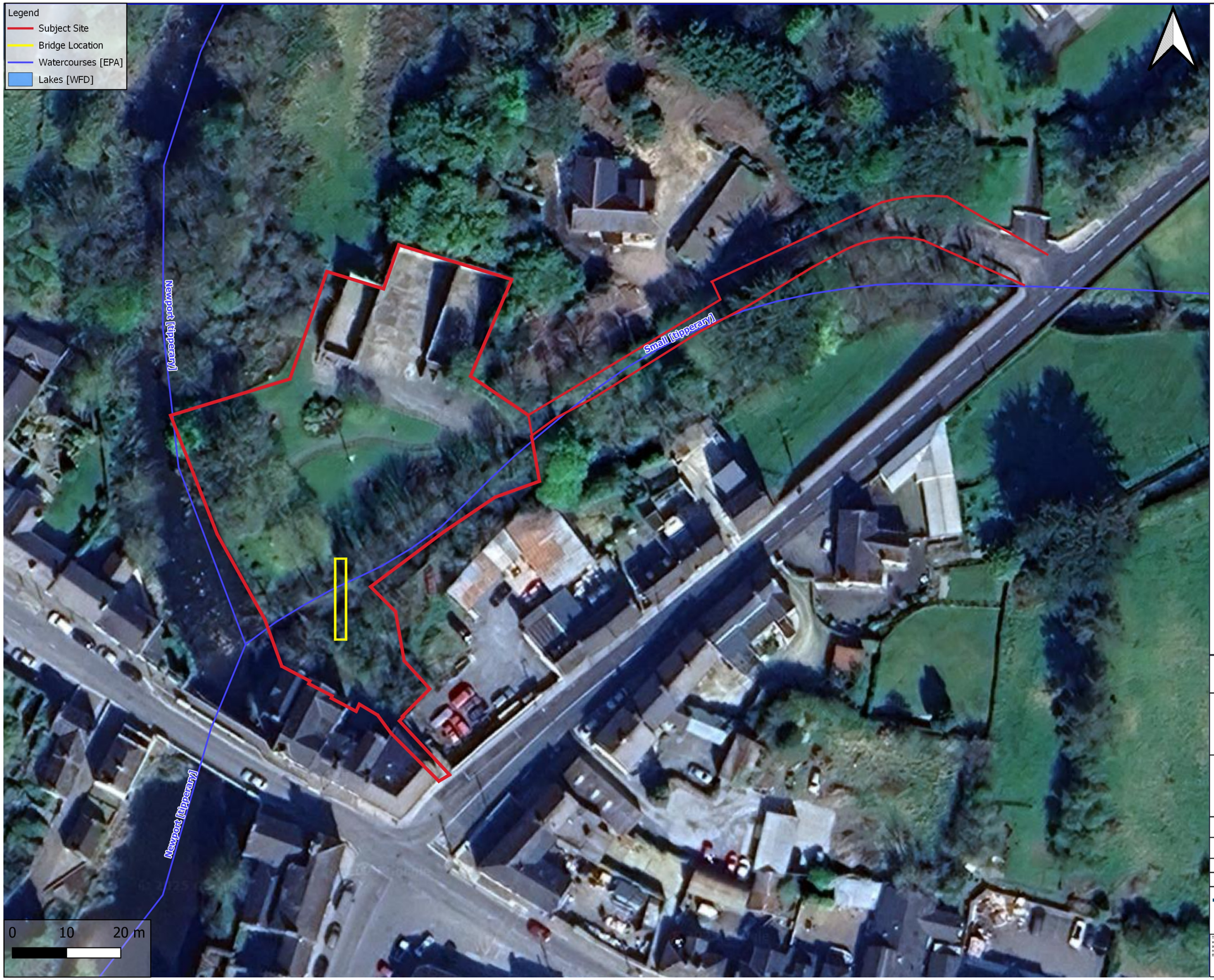
Project Director AT

Drawing Status Draft

TOBIN
TOBIN,
Fairgreen House, Fairgreen Road,
Galway, Ireland.
tel: +353-(0)91-565211
e-mail: galway@tobin.ie
www.tobin.ie

Drawing No. 12165-S50-01

Issue A



Site Overview:
Scale @ 1:750,000

Client
Tipperary County Council

Project
Newport Ball Ally Footbridge
Co. Tipperary

Title
Bridge Location

Scale @ A3: As Shown on Map

Prepared by:	Checked:	Date:
FOC	AT	June 2025

Project Director AT

Drawing Status Draft

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e-mail: galway@tobin.ie
www.tobin.ie

Drawing No. 12165-S50-02

Issue A

Legend
- Subject Site
- Catchment Area
- Watercourses [EPA]
- Lakes [WFD]

Gortshane_middle
Munnia
Drumbaun 25
Coolboreen
Newport [tipperary]
Doonane 25
Boolatin
Fiddane 25
Gortdise
Gortacoula
Kilmacogue
Newross
Small [tipperary]
Castlewaller
Carrowkeale
Tooreenbrien_lower
Tullow 25
Newport 25
Tooreenbrien_upper
Ladkamore 25
Fanit
Annagh [tipperary]
Scragreen
Derrygarean
Knockaneglenagh
Glenn Glenn

0 0.75 1.5 km

Site Overview:
Scale @ 1:750,000

Client
Tipperary County Council

Project
Newport Ball Ally Footbridge
Co. Tipperary

Title
Catchment Area

Scale @ A3: As Shown on Map

Prepared by:	Checked:	Date:
FOC	AT	June 2025

Project Director AT

Drawing Status Draft

TOBIN
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tel: +353-(0)91-565211
e-mail: galway@tobin.ie
www.tobin.ie

Drawing No. 12165-S50-03

Issue A

North

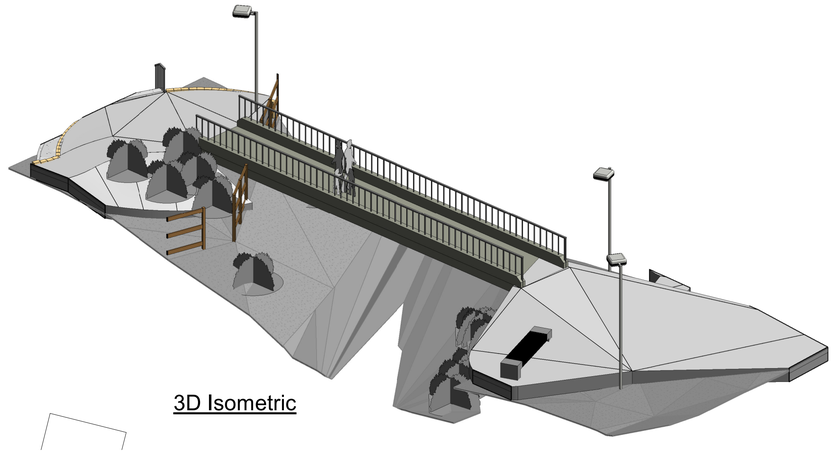
Handball alley Noted on Record of protected structure TRPS 784

Planning Notice 2 of 2

Protected structure. Shoeing stone noted on record of protected structures. TRPS2941

Planning Notice 1 of 2

1 Site Layout
1 : 250



3D Isometric

Rev:	Description:	Date:	By:	To:
1	Levels Updated	18/06/25	ZG	ZG

NOTES:

1. ALL DRAWINGS SHOULD BE READ IN CONJUNCTION WITH ARCHITECTS PLANS AND SPECIFICATION AND ALL RELEVANT DOCUMENTATION RELATED TO THE CURRENT PROJECT.
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3. DO NOT SCALE FROM DRAWINGS.
4. ALL DIMENSIONS IN S.I. UNITS UNO.

PROPOSED WORKS

The proposed works include the installation of new foot bridge, re surfacing of existing path and creation of a seating area with tables.

SITE AREA

Total Ownership Area =	3195 m²
Redline Boundary Area =	3710 m²

DRAWING LEGEND

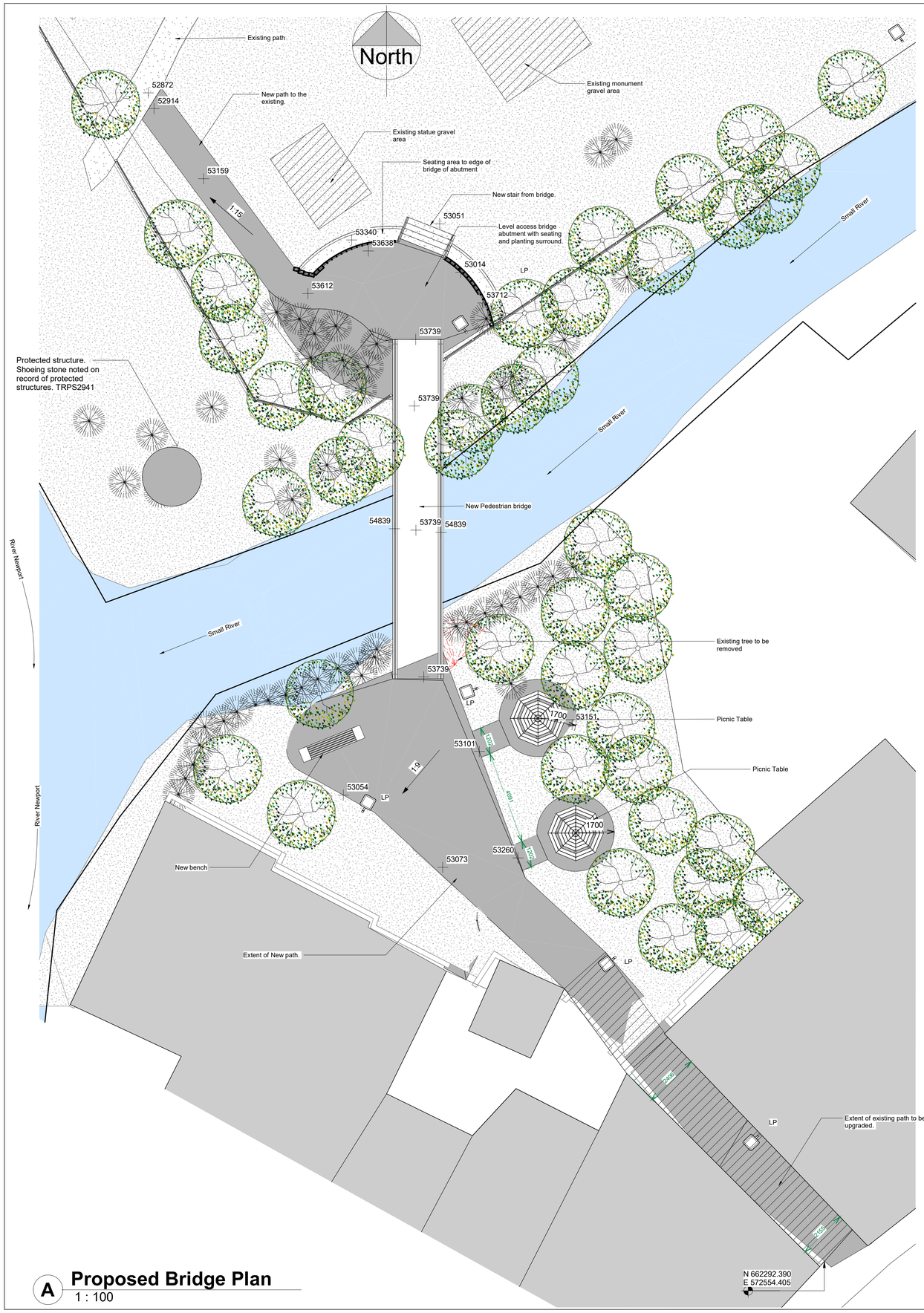
Total Ownership Boundary

Outline of Proposed Works

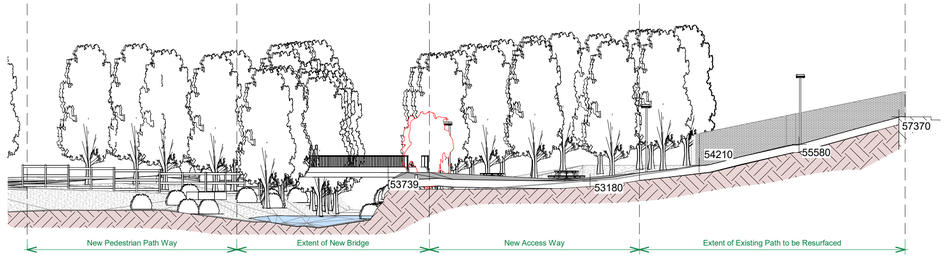
Comhairle Contae Thiobraid Árann
Tipperary County Council

WILL MC GARRY & ASSOCIATES
ENGINEERS
15 MARY STREET CLONMEL
PHONE: 052 6181828 MOBILE: 086 2737455 EMAIL: INFO@WMAA.IE

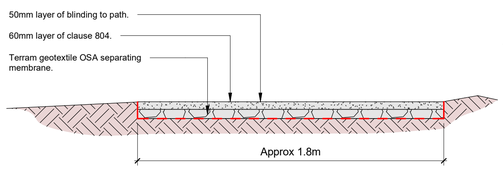
Preliminary	REV: 1
Tipperary County Council	
Newport Path Upgrade and Bridge	
Proposed Site Plan	
Project number:	25.0202
Date:	12/06/25
Drawn by:	ZG
Checked by:	ZG
Scale @ A1:	As indicated
Sheet No:	25.0202- WMA- ZZ- ZZ- DR- A- 1000



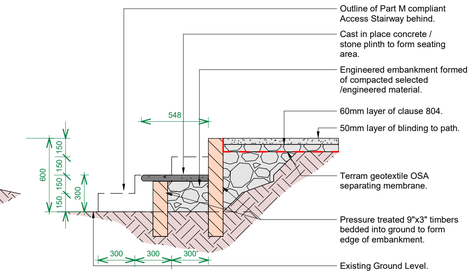
A Proposed Bridge Plan
1 : 100



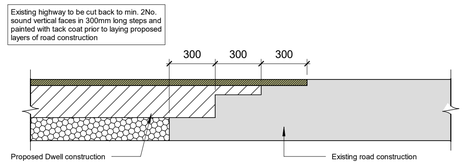
2 Long Section of Path
1 : 200

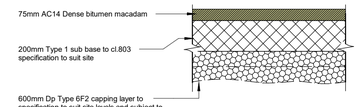


3 Proposed New Path
1 : 20



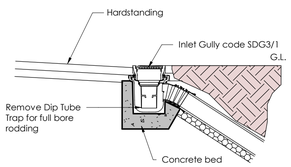
1 Abutment Seating Step
1 : 25



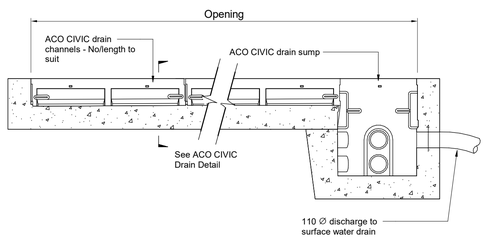


4 New Access Way Tie in Detail
1 : 20

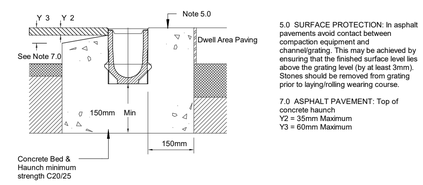
5 New Access Way Build Up
1 : 20



6 Inlet Gully
1 : 20



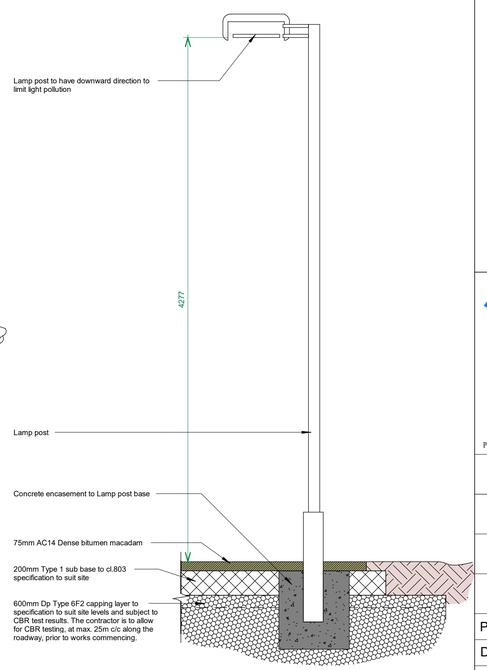
7 Aco Drain Elevation
1 : 20



5.0 SURFACE PROTECTION: In asphalt pavements avoid contact between compaction equipment and channel/grating. This may be achieved by ensuring that the finished surface level lies above the grating level (by at least 3mm). Stones should be removed from grating prior to laying/rolling wearing course.

7.0 ASPHALT PAVEMENT: Top of concrete haunch
Y2 = 35mm Maximum
Y3 = 60mm Maximum

8 Aco Drain Section
1 : 10



9 Lamp Post
1 : 25

Rev:	Description:	Date:	By:	To:
1	Levels Updated	18/06/25	ZG	ZG

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4. ALL DIMENSIONS IN S.I. UNITS UNO.

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Checked by:	ZG
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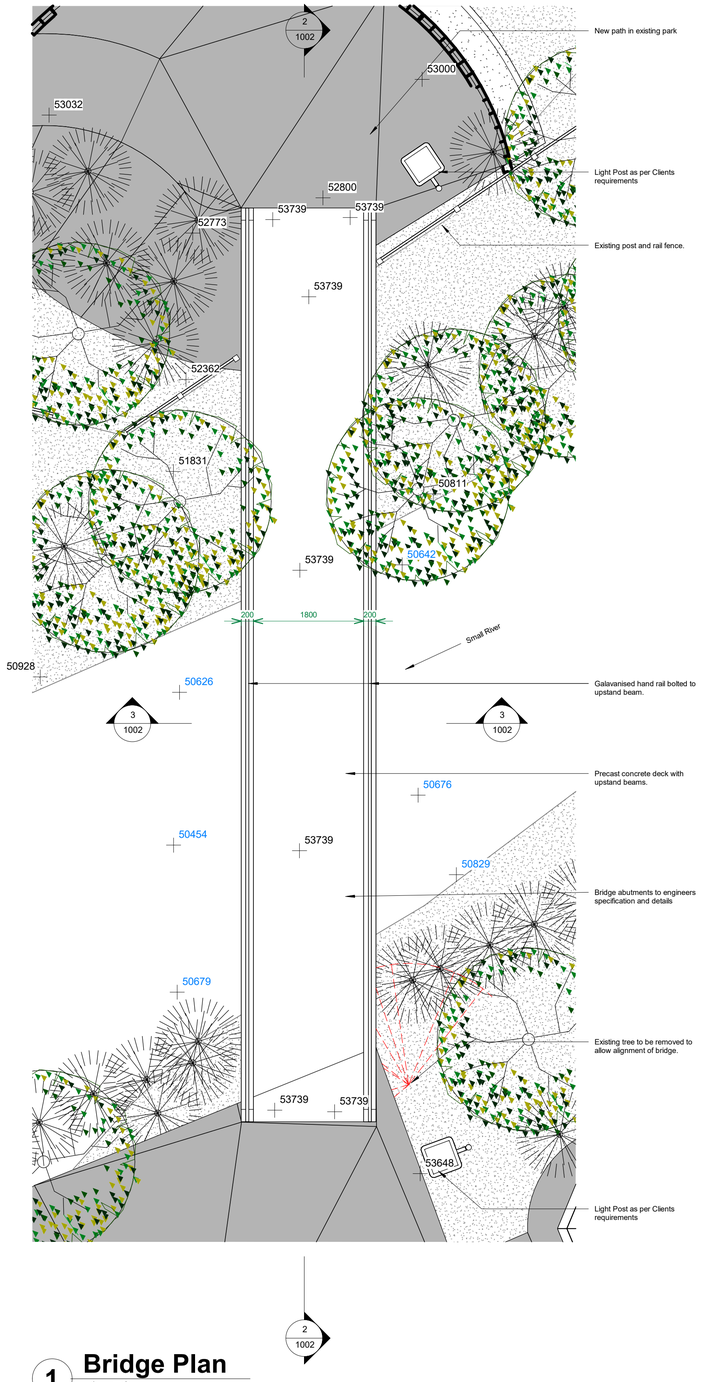
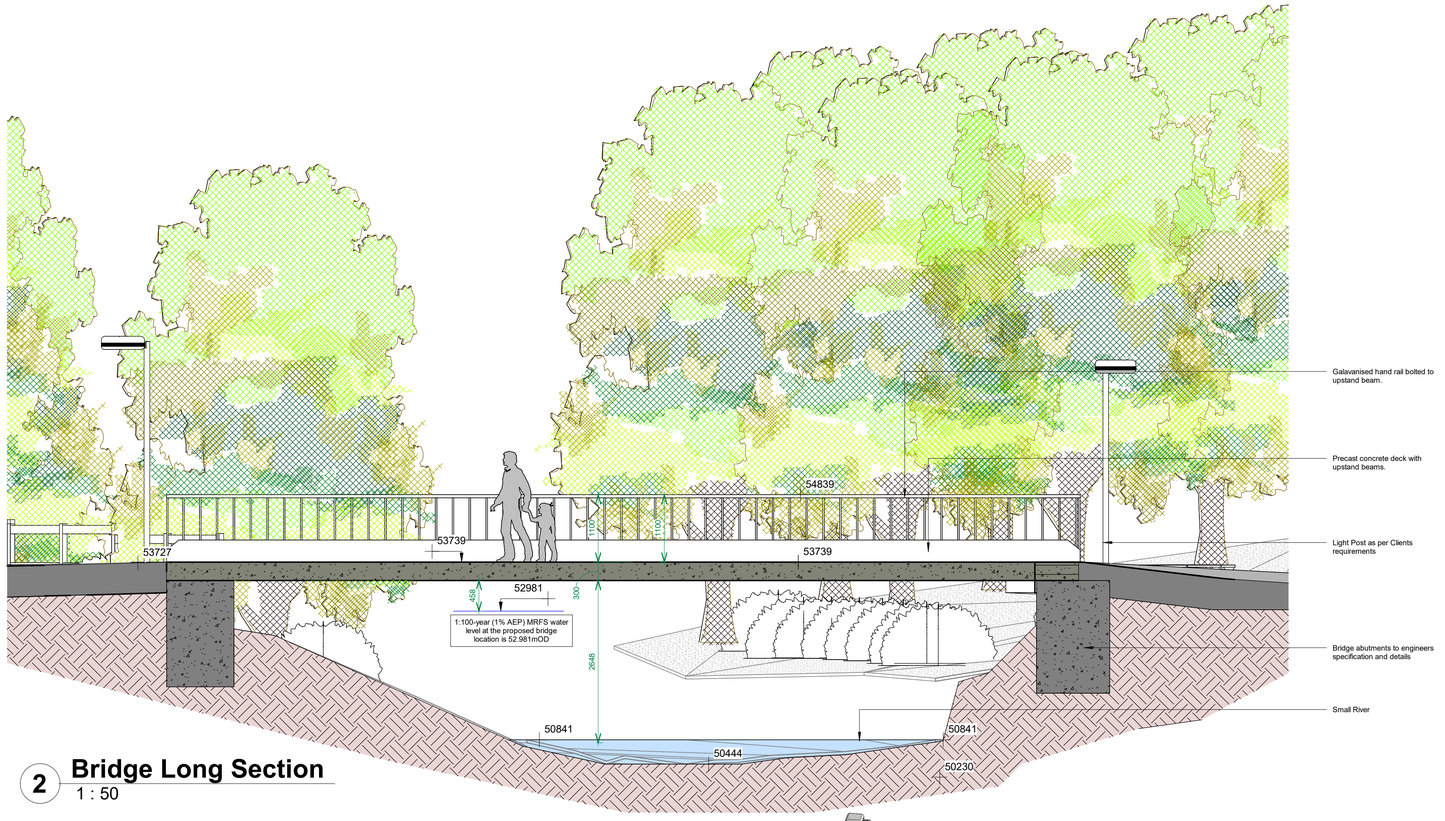
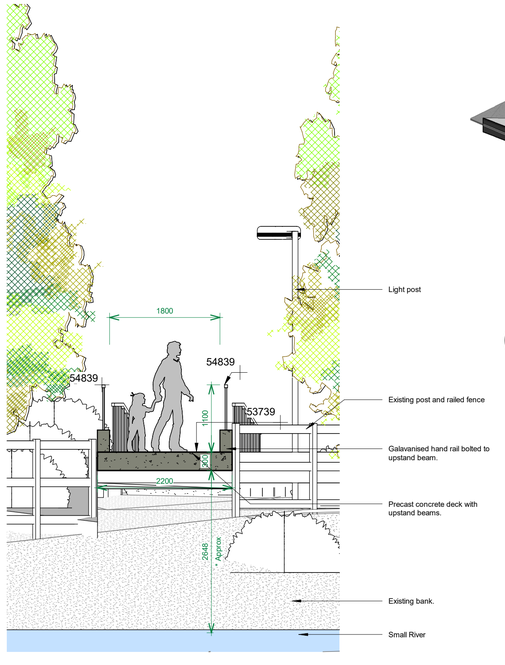


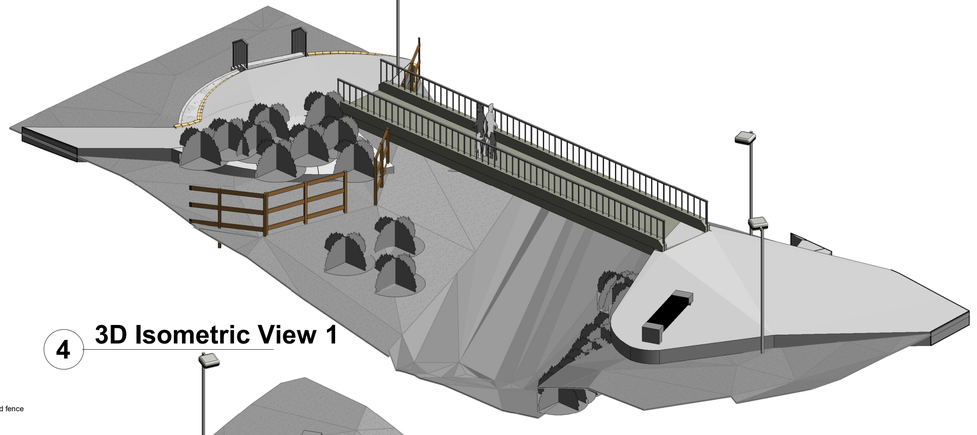
1 Bridge Plan
1 : 50



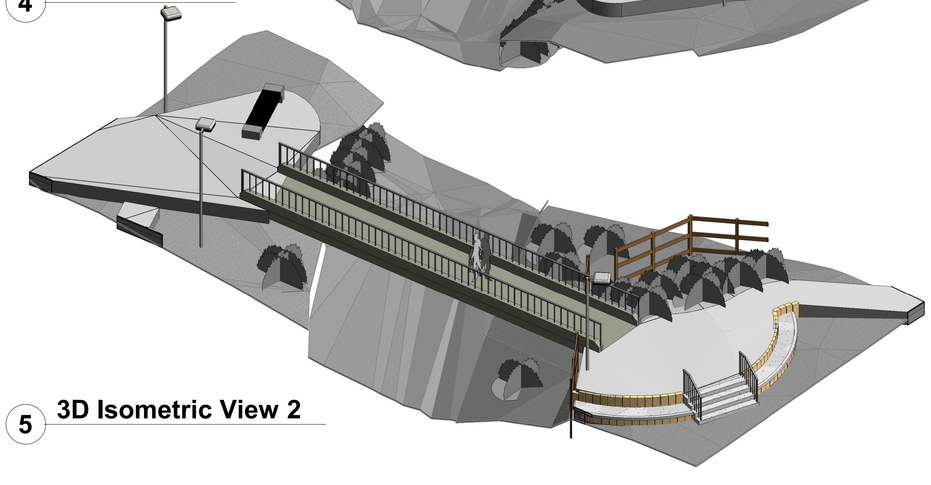
2 Bridge Long Section
1 : 50



3 Bridge Short Section
1 : 50



4 3D Isometric View 1



5 3D Isometric View 2

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Checked by:	ZG
Scale @ A1:	1 : 50
Sheet No:	25.0202- WMA- ZZ- ZZ- DR- A- 1002

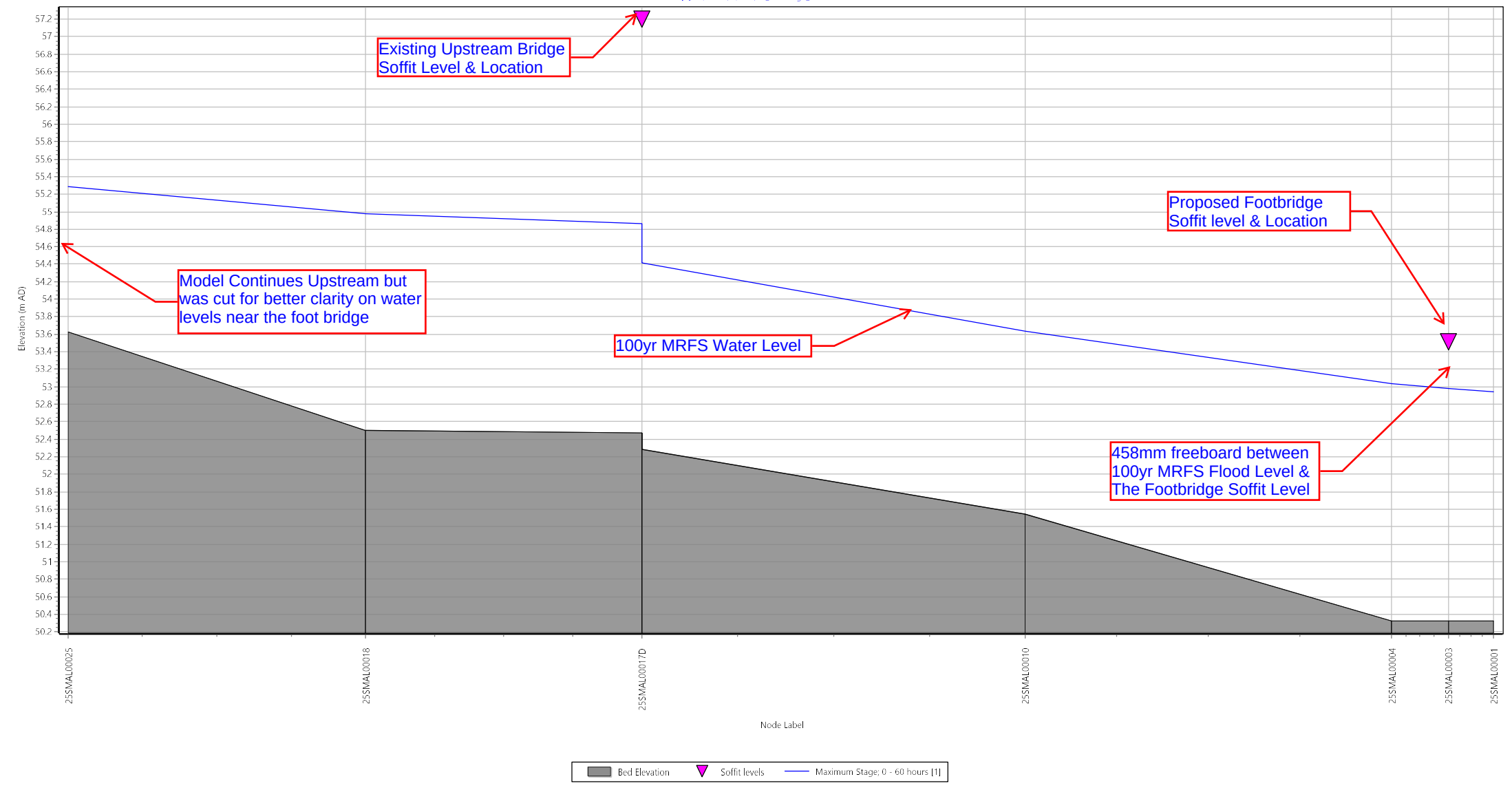

Existing Upstream Bridge Soffit Level & Location
Proposed Footbridge Soffit level & Location
Model Continues Upstream but was cut for better clarity on water levels near the foot bridge
100yr MRFS Water Level
458mm freeboard between 100yr MRFS Flood Level & The Footbridge Soffit Level
Elevation (m AD)
Node Label
25SMAL00025
25SMAL00018
25SMAL00017D
25SMAL00010
25SMAL00004
25SMAL00003
25SMAL00001
Bed Elevation
Soffit levels
Maximum Stage; 0 - 60 hours [1]

Figure 5 – Cross Section just upstream of proposed footbridge – facing downstream

Figure 6 - Cross Section just upstream of proposed footbridge – facing upstream

OPW **FEMI Flood Estimation Report**	**CLIENT:** Tipperary County Council **PROJECT:** Newport Ball Ally Footbridge **DOC. TITLE** Flow Estimation **REFERENCE:** 0 0 0
Checked: FOC **Approved:** AT	**SUBJECT:** CALCULATION OF QMED & PEAK DESIGN FLOWS IN UNGAUGED CATCHMENTS

A Selection of the Subject Site

A1 Ungauged Node ID: 25_2323_5

A2 Ungauged Node Catchment Descriptors:

Physical Catchment Descriptors			
AREA	14.35	Node East	172767
BFIsoils	0.55	Node North	162335
SAAR	1201.08	Centroid East	176200
FARL	1.00	Centroid North	162820
DRAIND	1.38	ALLUV	0.02
S1085	30.09	ARTDRAIN	0.00
ARTDRAIN2	0.00	FOREST	0.49
URBEXT	0.01		

B Module 1: Estimation of the Index Flood (QMED)

B.1. Estimation of QMED without the use of a pivotal site	3.59
B.2. Estimation of QMED by using one pivotal site: 33010	5.47
B.3. Estimation of QMED using three pivotal sites: 33010, 36021, 13001	5.50
B.4. Final chosen QMED estimate: Using the small catchment equation	9.22

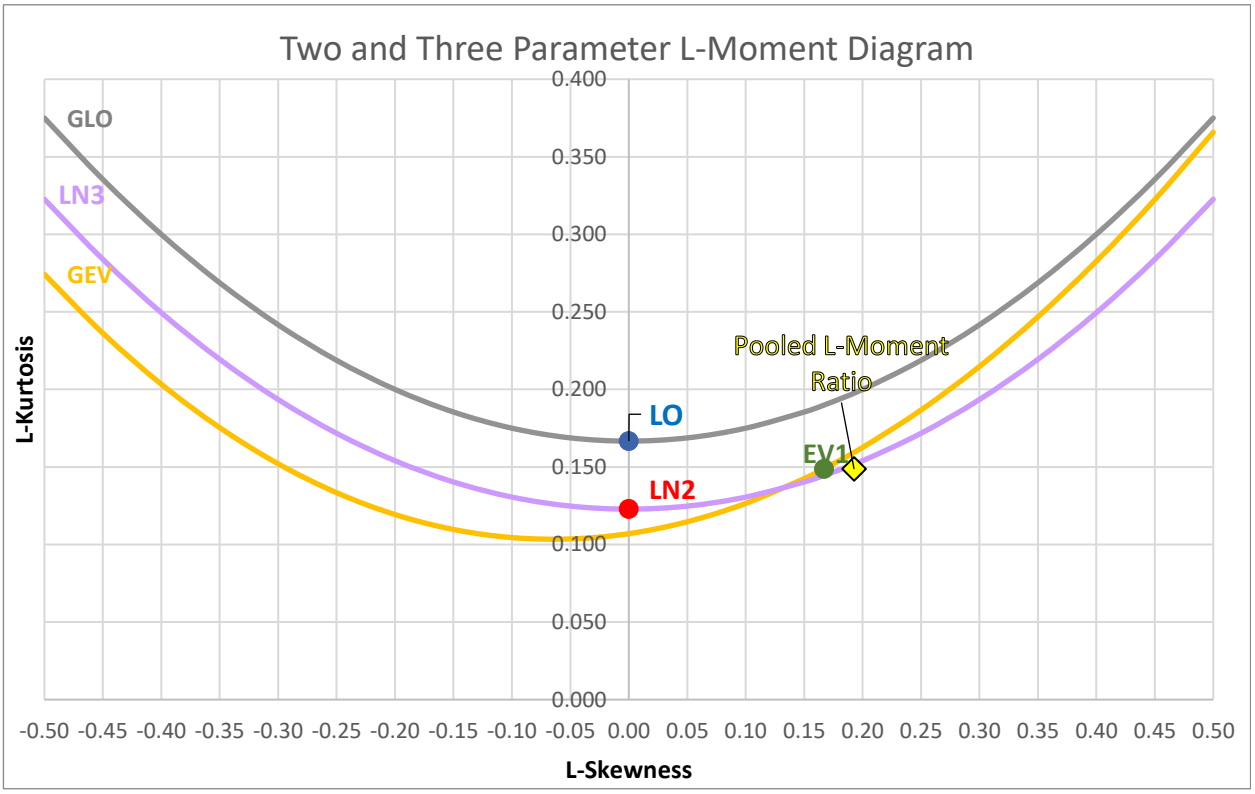
C Module 2: Estimation of the flood growth factors and design flood magnitudes

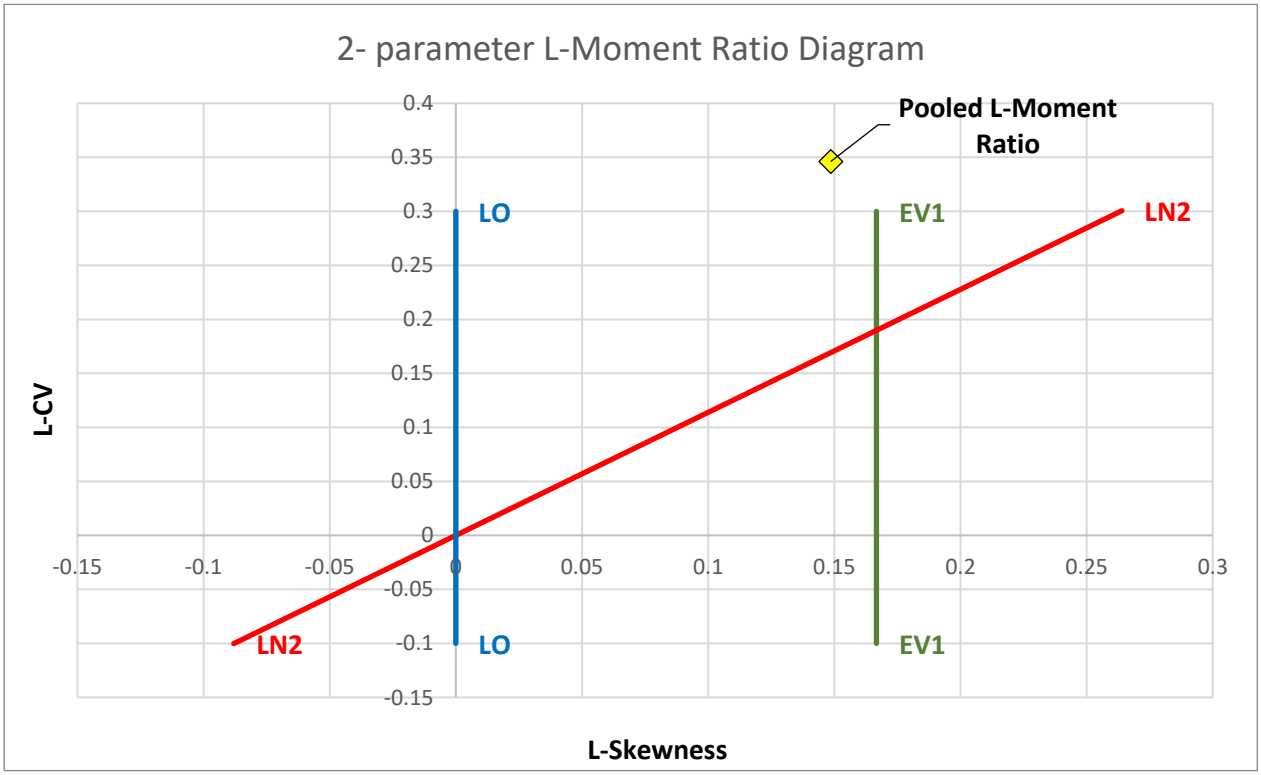
C.1. Selection of Pooling Group for flood frequency analysis

station no.	Location	similarity measure	No. of Yrs of data	t2 L-CV	t3 L-Skewness	t4 L-Kurtosis
30020	BALLYHAUNIS	0.88	34	0.184	0.310	0.263
34024	KILTIMAGH	1.16	44	0.090	0.105	0.133
26010	RIVERSTOWN	1.22	53	0.107	0.186	0.143
30021	CHRISTINA'S BR.	1.24	45	0.140	0.055	0.259
34011	GNEEVE BRIDGE	1.38	48	0.105	0.149	0.145
23001	INCH BR.	1.49	51	0.176	0.106	0.171
25038	TYONE	1.69	33	0.100	-0.007	0.132

C.2. Selection of the best fit flood frequency distribution to the pooled data

L-Moment Ratio Diagrams:





Final Growth Factors and Design Flows:

LN3		
Return Period (T)	**Growth Factors**	**Design Flows**
1.3	**0.577**	**5.321**
2	**1.000**	**9.221**
5	**1.471**	**13.562**
10	**1.712**	**15.783**
20	**1.908**	**17.592**
25	**1.965**	**18.115**
30	**2.009**	**18.525**
35	**2.045**	**18.861**
50	**2.126**	**19.603**
100	**2.270**	**20.928**
200	**2.400**	**22.129**
500	**2.556**	**23.573**
1000	**2.665**	**24.576**

Custom Return Period	1000	2.665	24.576

D Module 3: Generation of Design Hydrograph Shape Parameters

D.1. Generation of Initial Design Hydrograph Shape Parameters

Catchment Wetness Indicator **(CWI)** 124

Baseflow: 0.51 m^3/s

n	Tr (hours)	C (hours)
10.84	13.44	36.31

D.2. Selection of most hydrologically similar catchments

	Station No.	Dij similarity measure	n	Tr	C
1st most similar	16005	0.111	4.505	22.500	11.976
2nd most similar	16007	0.236	6.851	24.498	24.802
3rd most similar	16013	0.337	10.000	4.795	1.716

D.2. Option 1: Adjusted parameters using most hydrologically similar catchment, 16005

n	Tr	C
5.725	12.559	10.739

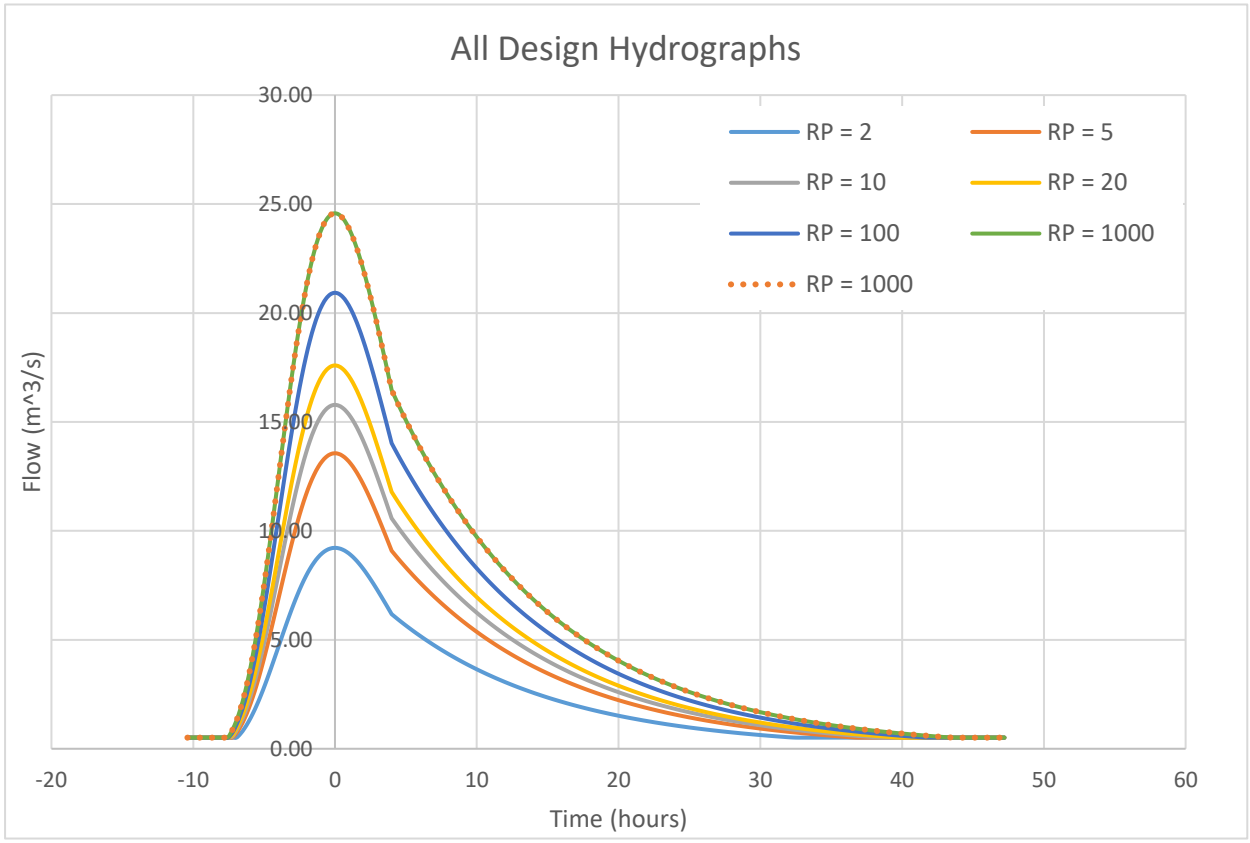
D.2. Option 2: Adjusted Shape parameters using 3 no. Pivotal Sites, 16005, 16007, 16013

n	Tr	C
7.789	10.411	11.394

Chosen parameter selection method:

Adjusted Shape parameters using 3 no. Pivotal Sites, 16005, 16007, 16013

D.3. Final Hydrograph Parameters:	**n**	**Tr**	**C**
	7.789	**10.411**	**11.394**


All Design Hydrographs
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25.00
20.00
15.00
10.00
5.00
0.00
Flow (m^3/s)
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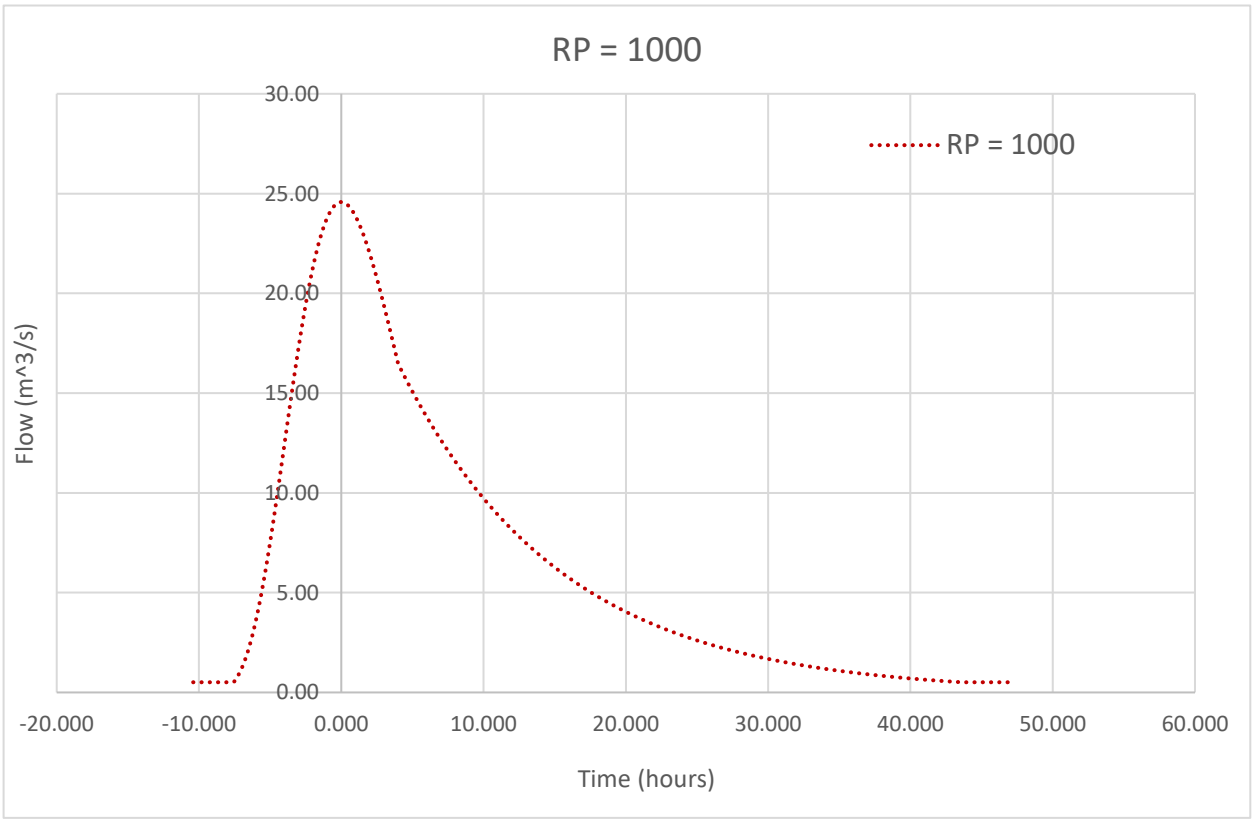
-10
0
10
20
30
40
50
60
Time (hours)
RP = 2
RP = 5
RP = 10
RP = 20
RP = 100
RP = 1000
RP = 1000


RP = 1000
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Flow (m^3/s)
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-10.000
0.000
10.000
20.000
30.000
40.000
50.000
60.000
Time (hours)
RP = 1000

Hydrograph Plot Data:

							Custom RP
Time (Hours)	RP = 2	RP = 5	RP = 10	RP = 20	RP = 100	RP = 1000	RP = 1000
-10.411	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-10.123	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-9.835	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-9.547	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-9.259	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-8.971	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-8.682	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-8.394	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-8.106	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-7.818	0.511	0.511	0.511	0.511	0.511	0.511	0.511
-7.530	0.511	0.511	0.511	0.511	0.511	0.544	0.544
-7.242	0.511	0.511	0.553	0.616	0.733	0.861	0.861
-6.954	0.511	0.711	0.827	0.922	1.096	1.288	1.288
-6.665	0.689	1.014	1.180	1.315	1.565	1.837	1.837
-6.377	0.945	1.390	1.617	1.803	2.144	2.518	2.518
-6.089	1.251	1.839	2.141	2.386	2.838	3.333	3.333
-5.801	1.606	2.363	2.749	3.065	3.646	4.281	4.281
-5.513	2.009	2.955	3.439	3.833	4.559	5.354	5.354
-5.225	2.454	3.610	4.201	4.682	5.570	6.541	6.541
-4.937	2.936	4.318	5.025	5.601	6.663	7.824	7.824
-4.648	3.446	5.069	5.899	6.575	7.821	9.185	9.185
-4.360	3.977	5.850	6.808	7.588	9.027	10.600	10.600
-4.072	4.520	6.648	7.737	8.624	10.259	12.047	12.047
-3.784	5.065	7.450	8.670	9.664	11.496	13.500	13.500
-3.496	5.604	8.242	9.592	10.691	12.718	14.936	14.936
-3.208	6.127	9.012	10.487	11.690	13.906	16.330	16.330
-2.920	6.626	9.746	11.342	12.643	15.039	17.661	17.661
-2.631	7.095	10.435	12.144	13.537	16.103	18.910	18.910
-2.343	7.526	11.070	12.882	14.359	17.081	20.059	20.059
-2.055	7.915	11.641	13.548	15.101	17.963	21.095	21.095
-1.767	8.256	12.144	14.132	15.753	18.739	22.006	22.006
-1.479	8.548	12.573	14.632	16.309	19.401	22.783	22.783
-1.191	8.788	12.925	15.042	16.766	19.945	23.422	23.422
-0.903	8.974	13.200	15.361	17.122	20.368	23.919	23.919
-0.614	9.108	13.396	15.590	17.377	20.672	24.275	24.275
-0.326	9.189	13.516	15.729	17.533	20.856	24.493	24.493
-0.038	9.220	13.562	15.782	17.592	20.927	24.575	24.575
0.250	9.203	13.536	15.753	17.559	20.887	24.529	24.529
0.538	9.140	13.444	15.645	17.439	20.745	24.362	24.362
0.826	9.035	13.289	15.466	17.239	20.507	24.082	24.082
1.114	8.892	13.078	15.220	16.965	20.181	23.699	23.699
1.403	8.714	12.816	14.915	16.625	19.776	23.224	23.224
1.691	8.505	12.509	14.557	16.226	19.302	22.667	22.667
1.979	8.269	12.161	14.153	15.776	18.766	22.038	22.038
2.267	8.010	11.781	13.710	15.282	18.179	21.348	21.348
2.555	7.732	11.372	13.234	14.751	17.548	20.607	20.607
2.843	7.438	10.940	12.732	14.192	16.882	19.825	19.825
3.131	7.133	10.492	12.210	13.609	16.189	19.012	19.012
3.420	6.820	10.030	11.673	13.011	15.478	18.176	18.176
3.708	6.501	9.561	11.127	12.402	14.754	17.326	17.326
3.996	6.179	9.088	10.576	11.789	14.024	16.469	16.469
3.996	6.179	9.088	10.576	11.789	14.024	16.469	16.469

4.428	5.949	8.750	10.183	11.350	13.502	15.856	15.856
4.860	5.728	8.424	9.804	10.928	12.999	15.266	15.266
5.292	5.514	8.111	9.439	10.521	12.515	14.697	14.697
5.725	5.309	7.809	9.087	10.129	12.050	14.150	14.150
6.157	5.111	7.518	8.749	9.752	11.601	13.624	13.624
6.589	4.921	7.238	8.424	9.389	11.169	13.116	13.116
7.021	4.738	6.969	8.110	9.040	10.753	12.628	12.628
7.454	4.562	6.709	7.808	8.703	10.353	12.158	12.158
7.886	4.392	6.460	7.517	8.379	9.968	11.706	11.706
8.318	4.228	6.219	7.238	8.067	9.597	11.270	11.270
8.750	4.071	5.988	6.968	7.767	9.240	10.850	10.850
9.182	3.920	5.765	6.709	7.478	8.896	10.447	10.447
9.615	3.774	5.550	6.459	7.200	8.565	10.058	10.058
10.047	3.633	5.344	6.219	6.932	8.246	9.683	9.683
10.479	3.498	5.145	5.987	6.674	7.939	9.323	9.323
10.911	3.368	4.953	5.764	6.425	7.643	8.976	8.976
11.343	3.242	4.769	5.550	6.186	7.359	8.642	8.642
11.776	3.122	4.591	5.343	5.956	7.085	8.320	8.320
12.208	3.005	4.421	5.144	5.734	6.821	8.010	8.010
12.640	2.894	4.256	4.953	5.521	6.567	7.712	7.712
13.072	2.786	4.098	4.769	5.315	6.323	7.425	7.425
13.505	2.682	3.945	4.591	5.117	6.088	7.149	7.149
13.937	2.582	3.798	4.420	4.927	5.861	6.883	6.883
14.369	2.486	3.657	4.256	4.744	5.643	6.627	6.627
14.801	2.394	3.521	4.097	4.567	5.433	6.380	6.380
15.233	2.305	3.390	3.945	4.397	5.231	6.142	6.142
15.666	2.219	3.263	3.798	4.233	5.036	5.914	5.914
16.098	2.136	3.142	3.657	4.076	4.848	5.694	5.694
16.530	2.057	3.025	3.520	3.924	4.668	5.482	5.482
16.962	1.980	2.912	3.389	3.778	4.494	5.278	5.278
17.394	1.906	2.804	3.263	3.637	4.327	5.081	5.081
17.827	1.835	2.700	3.142	3.502	4.166	4.892	4.892
18.259	1.767	2.599	3.025	3.372	4.011	4.710	4.710
18.691	1.701	2.502	2.912	3.246	3.861	4.535	4.535
19.123	1.638	2.409	2.804	3.125	3.718	4.366	4.366
19.556	1.577	2.320	2.699	3.009	3.579	4.203	4.203
19.988	1.518	2.233	2.599	2.897	3.446	4.047	4.047
20.420	1.462	2.150	2.502	2.789	3.318	3.896	3.896
20.852	1.407	2.070	2.409	2.685	3.194	3.751	3.751
21.284	1.355	1.993	2.319	2.585	3.075	3.612	3.612
21.717	1.305	1.919	2.233	2.489	2.961	3.477	3.477
22.149	1.256	1.847	2.150	2.396	2.851	3.348	3.348
22.581	1.209	1.779	2.070	2.307	2.745	3.223	3.223
23.013	1.164	1.712	1.993	2.221	2.642	3.103	3.103
23.445	1.121	1.649	1.919	2.139	2.544	2.988	2.988
23.878	1.079	1.587	1.847	2.059	2.449	2.876	2.876
24.310	1.039	1.528	1.779	1.982	2.358	2.769	2.769
24.742	1.000	1.471	1.712	1.909	2.270	2.666	2.666
25.174	0.963	1.417	1.649	1.838	2.186	2.567	2.567
25.607	0.927	1.364	1.587	1.769	2.105	2.472	2.472
26.039	0.893	1.313	1.528	1.703	2.026	2.380	2.380
26.471	0.860	1.264	1.471	1.640	1.951	2.291	2.291
26.903	0.828	1.217	1.417	1.579	1.878	2.206	2.206
27.335	0.797	1.172	1.364	1.520	1.808	2.124	2.124
27.768	0.767	1.128	1.313	1.464	1.741	2.045	2.045
28.200	0.739	1.086	1.264	1.409	1.676	1.968	1.968
28.632	0.711	1.046	1.217	1.357	1.614	1.895	1.895
29.064	0.685	1.007	1.172	1.306	1.554	1.825	1.825
29.496	0.659	0.969	1.128	1.258	1.496	1.757	1.757

29.929	0.635	0.933	1.086	1.211	1.440	1.691	1.691
30.361	0.611	0.899	1.046	1.166	1.387	1.628	1.628
30.793	0.588	0.865	1.007	1.122	1.335	1.568	1.568
31.225	0.566	0.833	0.969	1.080	1.285	1.509	1.509
31.658	0.545	0.802	0.933	1.040	1.237	1.453	1.453
32.090	0.525	0.772	0.899	1.002	1.191	1.399	1.399
32.522	0.511	0.743	0.865	0.964	1.147	1.347	1.347
32.954	0.511	0.716	0.833	0.928	1.104	1.297	1.297
33.386	0.511	0.689	0.802	0.894	1.063	1.249	1.249
33.819	0.511	0.663	0.772	0.861	1.024	1.202	1.202
34.251	0.511	0.639	0.743	0.829	0.986	1.157	1.157
34.683	0.511	0.615	0.716	0.798	0.949	1.114	1.114
35.115	0.511	0.592	0.689	0.768	0.914	1.073	1.073
35.547	0.511	0.570	0.663	0.739	0.880	1.033	1.033
35.980	0.511	0.549	0.639	0.712	0.847	0.994	0.994
36.412	0.511	0.528	0.615	0.685	0.815	0.957	0.957
36.844	0.511	0.511	0.592	0.660	0.785	0.922	0.922
37.276	0.511	0.511	0.570	0.635	0.756	0.888	0.888
37.709	0.511	0.511	0.549	0.612	0.728	0.854	0.854
38.141	0.511	0.511	0.528	0.589	0.701	0.823	0.823
38.573	0.511	0.511	0.511	0.567	0.674	0.792	0.792
39.005	0.511	0.511	0.511	0.546	0.649	0.763	0.763
39.437	0.511	0.511	0.511	0.526	0.625	0.734	0.734
39.870	0.511	0.511	0.511	0.511	0.602	0.707	0.707
40.302	0.511	0.511	0.511	0.511	0.580	0.681	0.681
40.734	0.511	0.511	0.511	0.511	0.558	0.655	0.655
41.166	0.511	0.511	0.511	0.511	0.537	0.631	0.631
41.598	0.511	0.511	0.511	0.511	0.517	0.607	0.607
42.031	0.511	0.511	0.511	0.511	0.511	0.585	0.585
42.463	0.511	0.511	0.511	0.511	0.511	0.563	0.563
42.895	0.511	0.511	0.511	0.511	0.511	0.542	0.542
43.327	0.511	0.511	0.511	0.511	0.511	0.522	0.522
43.760	0.511	0.511	0.511	0.511	0.511	0.511	0.511
44.192	0.511	0.511	0.511	0.511	0.511	0.511	0.511
44.624	0.511	0.511	0.511	0.511	0.511	0.511	0.511
45.056	0.511	0.511	0.511	0.511	0.511	0.511	0.511
45.488	0.511	0.511	0.511	0.511	0.511	0.511	0.511
45.921	0.511	0.511	0.511	0.511	0.511	0.511	0.511
46.353	0.511	0.511	0.511	0.511	0.511	0.511	0.511
46.785	0.511	0.511	0.511	0.511	0.511	0.511	0.511
47.217	0.511	0.511	0.511	0.511	0.511	0.511	0.511
47.217	0.511	0.511	0.511	0.511	0.511	0.511	0.511

Hydraulic Calculations

Site Specific hydraulic analysis was undertaken by TOBIN as part of the Section 50 application for the proposed footbridge at the Newport Ball Ally, County Tipperary

A 1D only site-specific hydraulic model of the site area was developed using the latest version (6.2) of Jacob's Flood Modeller software. Flood Modeller is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels. The two primary inputs into the Flood Modeller model are summarised below.

- Inflow Data; 100yr MRFS design flows. These flows were derived from hydrological analysis using the FEH methodology, with a 68% standard error. An unsteady approach was taken using a hydrograph calculated using the OPW FSU Excel sheet and ran for a period of 60 hours.
- Boundary Condition: A Normal Depth Boundary Condition was applied at the downstream end of the model domain. To accurately replicate the normal depth boundary condition the model was ran with the CFRAM flows, which had corresponding flood levels. The downstream boundary condition was then changed until the level in our model matched that in the CFRAM study. This normal depth boundary condition was then used with our new flows to accurately represent the water levels at the proposed bridge location.

The **FEH Statistical Method** was applied in this assessment. Developed as part of the UK's Flood Estimation Handbook (FEH), this approach is widely used for estimating peak flood flows in both gauged and ungauged catchments. It employs regression-based equations derived from extensive hydrological data and catchment descriptors such as area, rainfall, slope, and baseflow characteristics. The method is particularly suited to a wide range of rural and urban catchments and is underpinned by a robust national dataset, making it a standard tool for flood risk assessment and infrastructure design across the UK and Ireland. Extreme flows within the catchment were estimated based on the catchment descriptors in Table 1.

Four different methods for calculating Q_{med} flows were used for a basis of assessment (no pivotal site, 1 pivotal site, 3 pivotal sites, and the small catchment equation (FEH)). The FEH method gave the highest flows, and combined with out 68% standard error gave a conservative flow value for an ungauged area.

Table 1 - Catchment Descriptors

Descriptor	Units	Value	Source
Watercourse	-	Small River	EPA
Catchment Area	km^2	14.346	FSU/TOBIN
BFISOIL	-	0.547	FSU
SAAR	mm	1201.08	FSU/MET
FARL	-	1.000	FSU/TOBIN
DRAIND	km/km^2	1.38	FSU
S1085	m/km	30.0938	FSU/DEM
ARTDRAIN2	-	0	FSU
URBEXT	-	0.0059	FSU

The catchment area of the Small River was determined by using the FSU node "25_2323_5", which was a node located just upstream of the subject site. Upon review of the node and associated mapping, it was evident that relocating the nodeslightly downstream within the subject site would result in only a marginal increasein the catchment area. This increase was considered negligible in the grand schemeof flow estimation. The derived catchment area is shown in Figure 1.

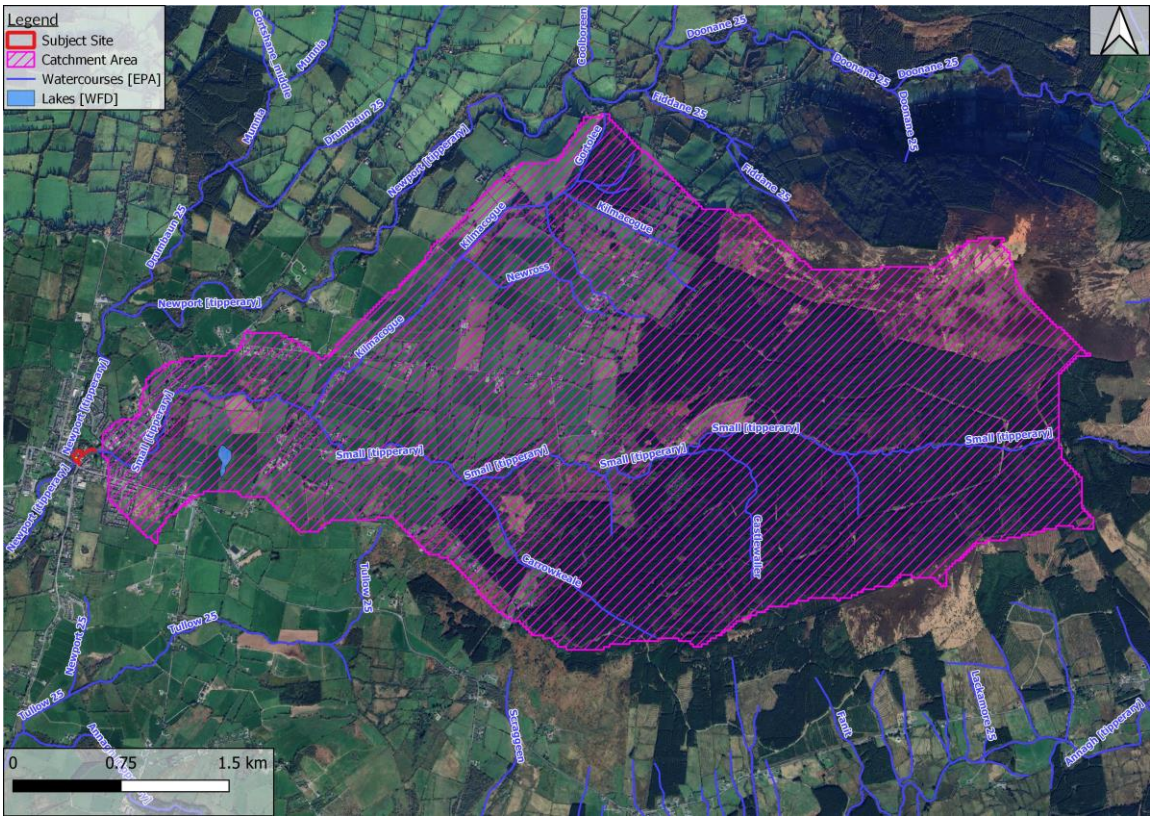

Figure 1 - Unnamed River Catchment Area

The hydraulic model was developed using CFRAM cross sections covering approximately 2.4 km of the Small River. The most downstream cross section is located approximately 13.5 metres upstream of the proposed footbridge. As a result, the flood levels at this cross section were used in the assessment, providing a conservative estimate for flood levels at the footbridge location. The bridge located approximately 140m upstream of the subject site was also included in the model to ensure any restrictions of flows it may cause were accounted for when calculating the flood level. The model configuration is shown in Figure 2.

Figure 2 - Model Configuration

Figure 3 below shows the 1 in 100-year (1% AEP) MRFS water level at the cross section which is located approximately 13.5m upstream of the proposed foot bridge. The 1 in 100-year (1% AEP) MRFS water level at this section prior to the introduction of the proposed footbridge is 52.939mOD.

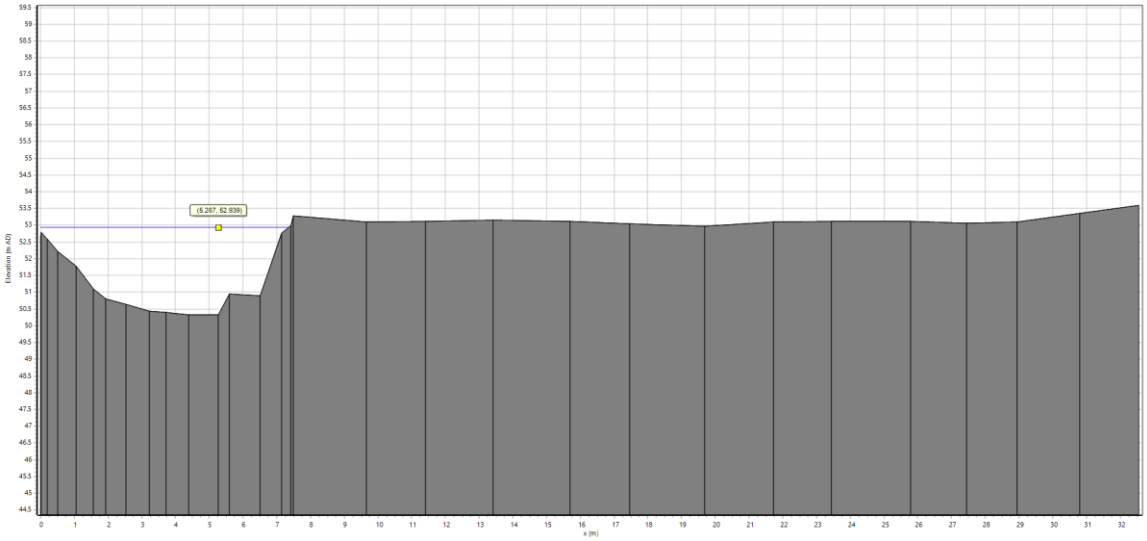

Figure 3: 100yr MRFS model results – without footbridge

In order to fully assess the impact of the footbridge, although it has no piers within the river, it will still reduce the banks slightly and result in a lowered flow area. Therefore,

we added the proposed foot bridge to the model to assess if the water level would increase. The cross section upstream of the proposed footbridge was replicated and moved to downstream locations to accurately locate the footbridge along the channel. With the proposed footbridge in place the 1 in 100-year (1% AEP) MRFS water level increased slightly to 52.981mOD. The proposed soffit level for the footbridge is 53.439mOD, and therefore, there is a freeboard of 458mm between the 100yr MRFS water level and the bridge soffit, which is sufficient for conveyance and flood resilience. The flow velocity drops from 2.203m3/s to 2.154m3/s when the bridge is added to the model. The slight drop in velocity due to the bridge narrowing is minimal and will not significantly impact the overall channel performance.

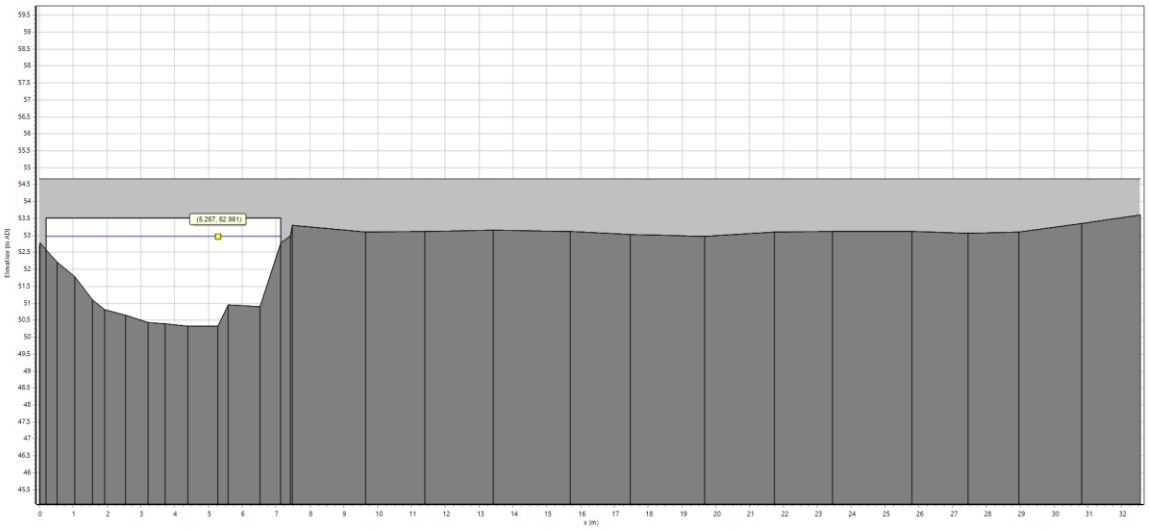

Figure 4: 100yr MRFS model results – with footbridge