

# TOBIN

**Kilkenny County Council**

**IDA Belview Infrastructure  
Development  
Co. Kilkenny**

**Culvert Design Report**

**BUILT ON KNOWLEDGE**

Document Control Sheet	
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## 1. INTRODUCTION

This Culvert Design Report was generated for the proposed development at Belview, Co. Kilkenny.

### 1.1 BACKGROUND

The proposed development will provide access to the IDA Ireland land bank at Kilmurry, Belview, Co. Kilkenny (Fig. 1-2) to facilitate IDA development as well as provide active travel modes for the area. The subject site is located in South Kilkenny approximately 3 km east of Waterford and north of IDA Science and Technology Business Park.

The L3412 Road forms the northern boundary of the subject site. To the south of the site are Tirlan Belview, Kilkenny Cheese, and Celtic Anglian Water.

The Rathpatrick Stream flows through the subject site and is the nearest hydraulic feature. These stream flows southward and converges with the River Suir, which is situated approximately 1km south of the site and flows in an easterly direction.

Proposed road upgrade works will require crossing of the Rathpatrick stream and construction of a new culvert.

### 1.2 ASSESSMENT OBJECTIVE

Site Specific hydraulic analysis was undertaken by TOBIN as part of the Planning application for the proposed culvert at Gorteens, County Kilkenny.

This Report consists of application to the Office of Public Works (OPW) in accordance with Section 50 of the 1945 Arterial Drainage Act for construction/alteration works on bridges and culverts. Refer to **Appendix B** for Section 50 Application.

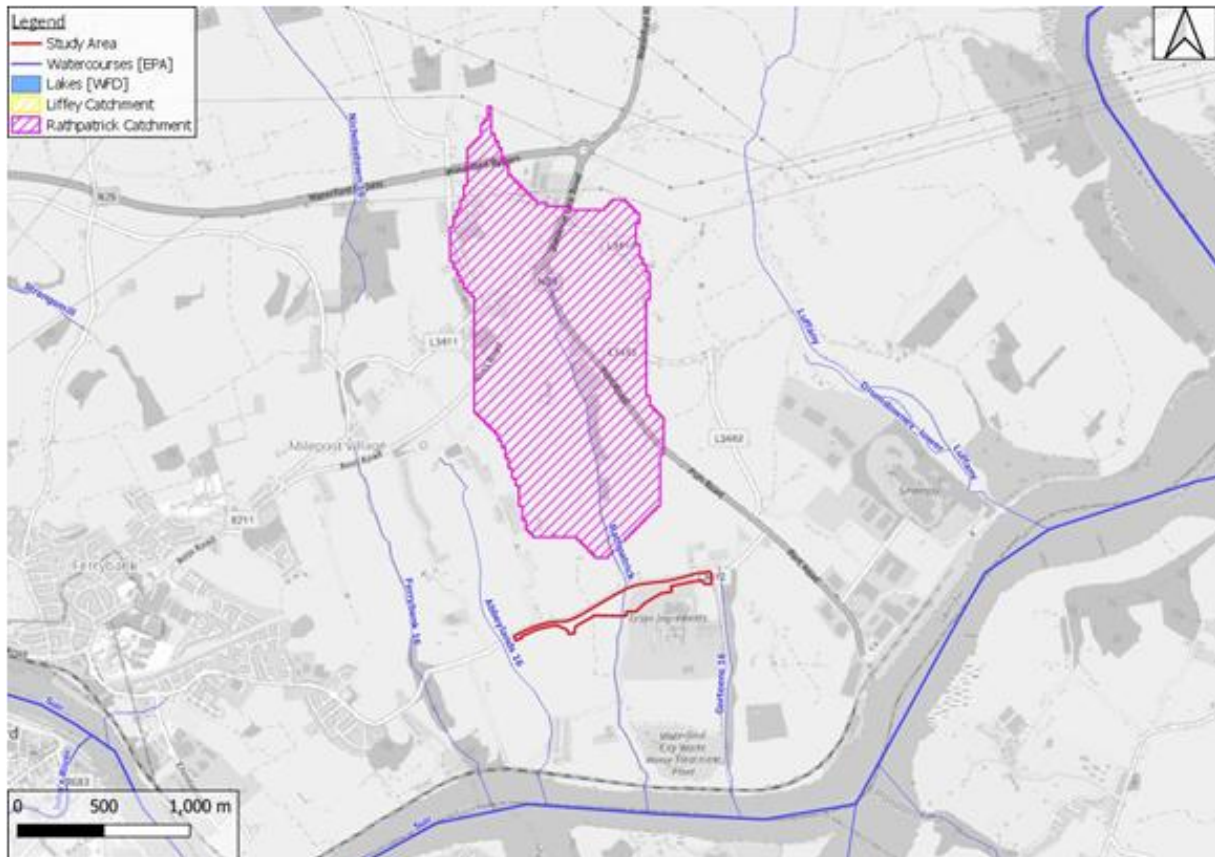


## 2. HYDRAULIC ASSESSMENT

The general hydrology and catchment description for the location identified as a potential site for the construction of a new culvert is outlined in the following sections.

This section provides a summary of the hydraulic assessments undertaken to demonstrate the appropriateness of the proposed works required to facilitate the IDA Master planning Project.

The catchment area of the Rathpatrick Stream was determined by using the FSU node “16\_928\_3”, which was a node located just upstream of the subject site. The derived catchment area is shown in **Figure 2.1**.



**Figure 2.1: Rathpatrick Stream Catchment Area**

The existing culvert is located at 52°16'05.2" N - 7°03'25.2" W, which is 85m upstream of the proposed new box culvert. The culvert is approximately 10m-long and a view of it from road level towards East direction is provided in **Figure 2.2**.



Figure 2:2: A View of The Existing Culvert from Road Level

## 2.1 HYDRAULIC CALCULATIONS

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 IH124 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 40 hours.
- Boundary Condition: A Normal Depth Boundary Condition was applied at the downstream end of the model domain. The model features a steep gradient with a 1:55 slope. The bed level drops significantly from approximately 22mOD at the end of the model to 2mOD near the sea, a distance of about 1.1km.

The Institute of Hydrology Report 124 (IH124), published in 1994, provides a simplified method for estimating the mean annual flood ( $Q_{bar}$ ) in small rural catchments under 25 km<sup>2</sup>. It was developed using data from 71 such catchments and is widely used in the UK for assessing greenfield runoff rates, particularly in planning and development contexts. The method relies on three key parameters: catchment area (AREA), standard annual average rainfall (SAAR), and soil index (SOIL), all of which can be derived from existing hydrological maps. Extreme flows within the catchment were estimated based on the catchment descriptors in Table 1.

Table 1: Catchment Descriptors

Descriptor	Units	Value	Source
Watercourse	-	Rathpatrick Stream	EPA
Catchment Area	km <sup>2</sup>	1.997	FSU/TOBIN
BFISOIL	-	0.663	FSU
SAAR	mm	983.160	FSU/MET
FARL	-	1.000	FSU/TOBIN
DRAIND	km/km <sup>2</sup>	0.866	FSU
S1085	m/km	15.929	FSU/DEM
ARTDRAIN2	-	0.000	FSU
URBEXT	-	0.130	FSU

The hydraulic model was developed using 6 cross sections covering approximately 100m of the Rathpatrick Stream. As a result, the flood levels from the cross sections upstream and downstream of the proposed road were used in the assessment, providing a conservative estimate for flood levels at the culvert location. The model configuration is shown in **Figure 2.3**.



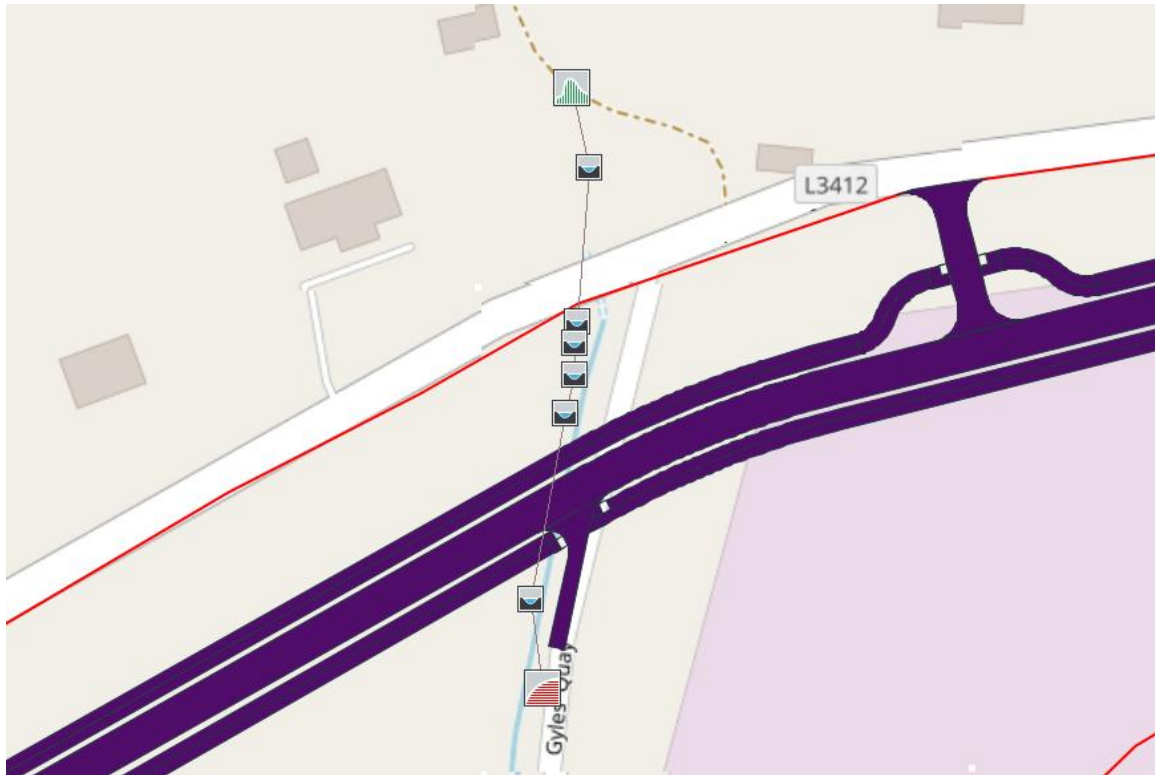


Figure 2:3: Model Configuration

Figure 2.4 below shows the 1 in 100-year (1% AEP) MRFS water level at the cross section which is located approximately upstream of the proposed culvert. The 1 in 100-year (1% AEP) MRFS water level at this section prior to the introduction of the proposed culvert is 22.65mOD. As the proposed culvert will span the entire width of the channel and its invert will be buried under fill to replicate existing channel conditions, it will not alter the channel's hydraulic conditions.

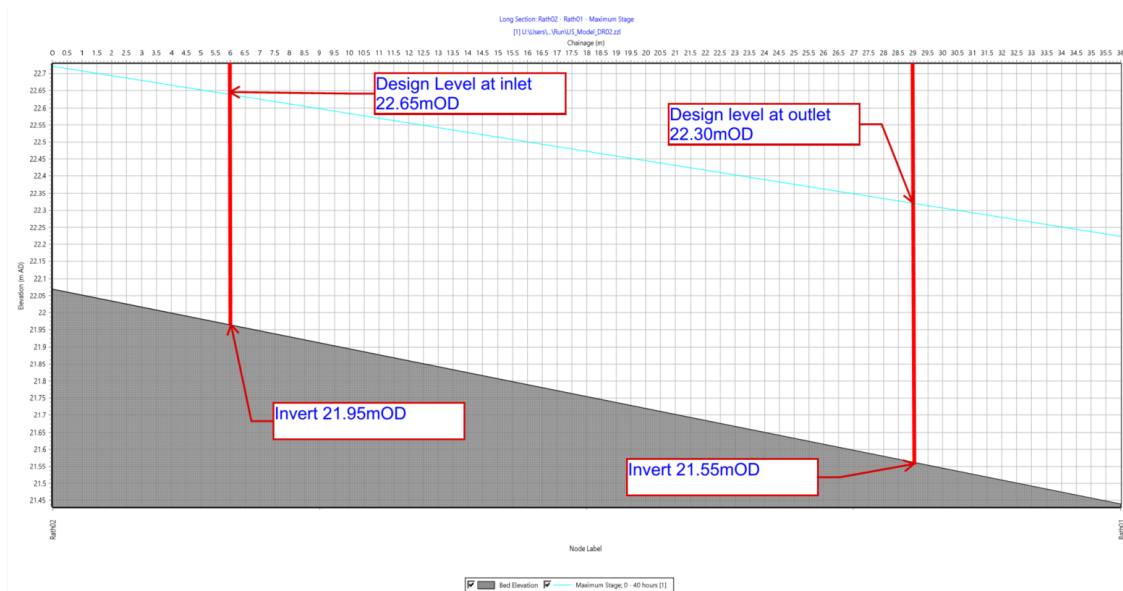


Figure 2:4: 100yr MRFS model results – long section



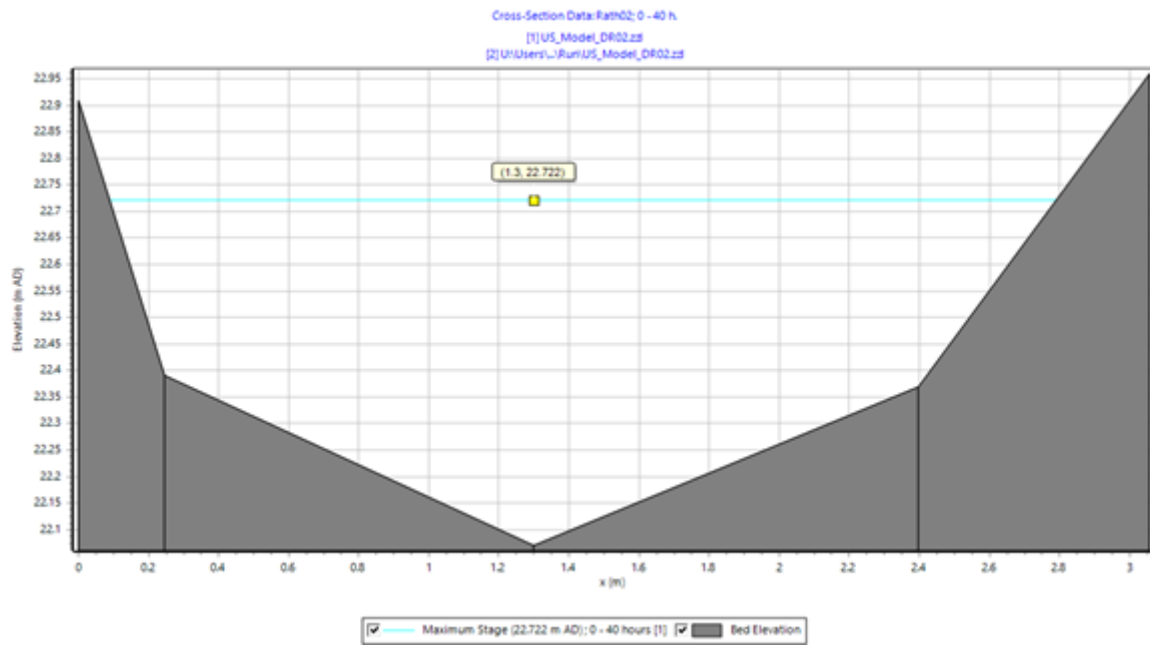


Figure 2:5: 100yr MRFS model results – cross section 6 metres upstream of proposed culvert



### 3. CONCLUSION

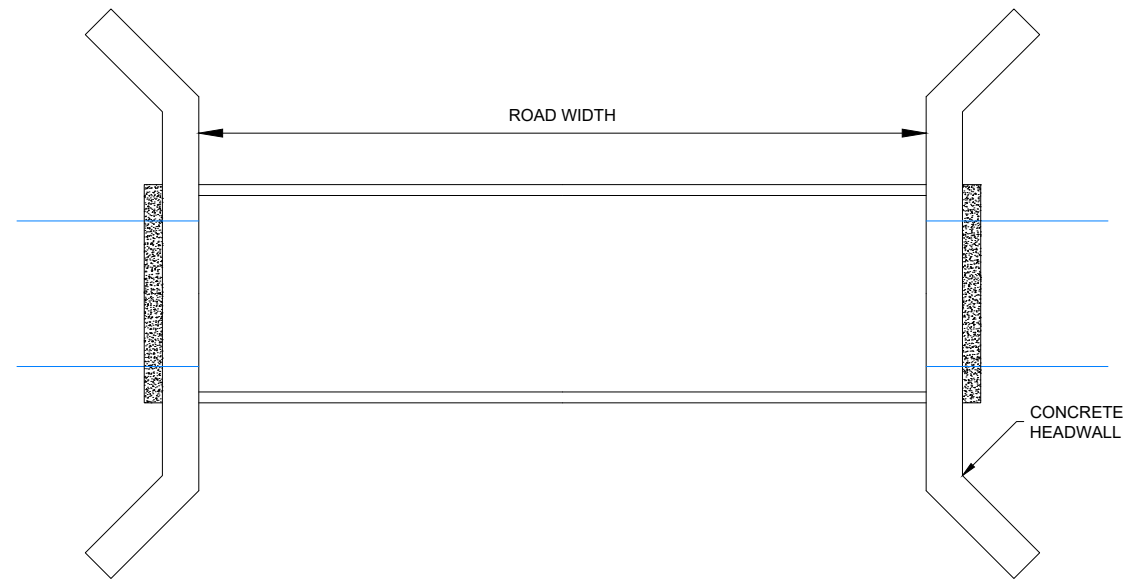
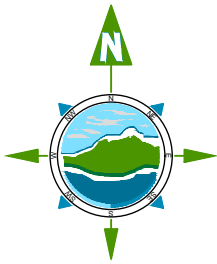
Based on the above hydrological and hydraulic calculations a new 3m wide x 1.5m high culvert at Gorteens, Co. Kilkenny is proposed for the Rathpatrick Stream crossing. The culvert will be 23m in length. The proposed structure will have minimal impact on the geometry of the Rathpatrick Stream, as the culvert will span the entire length of the existing channel width. Drawings of the proposed culvert are included in this report in Appendix A. Section 50 Application form is included in Appendix B.

All construction shall be carried out in line with the Inland Fisheries Ireland 2016 Guidelines, OPW requirements and mitigation measures included in the Natura Impact Statement and Construction Environmental Management Plan.



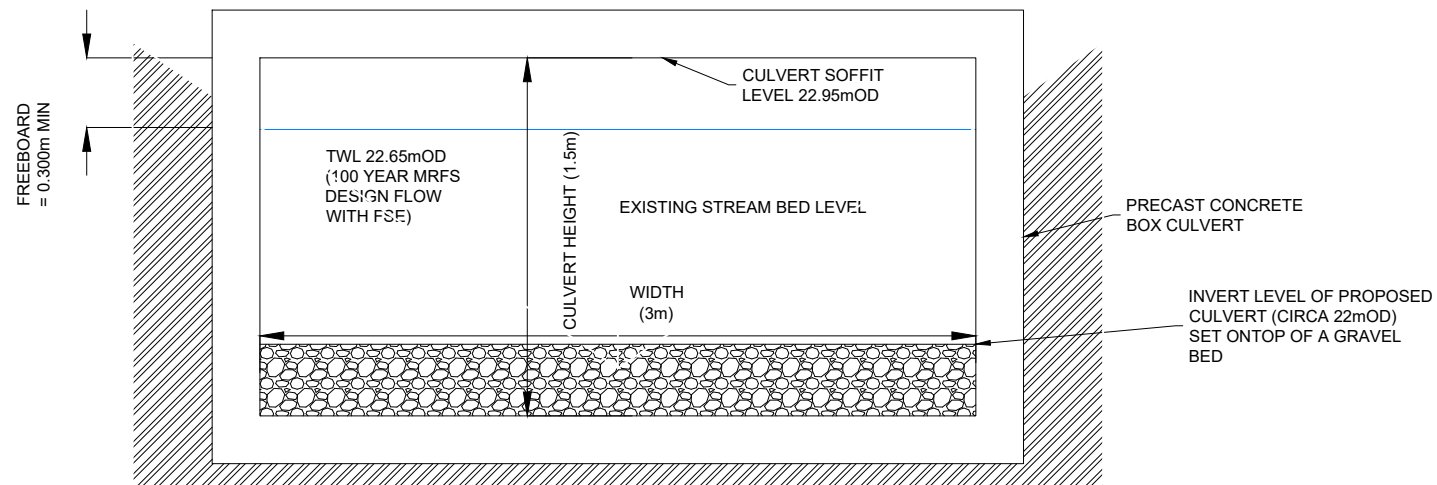
## Appendix A DRAWINGS





**PLAN**

ROAD SURFACE



**ELEVATION**

- NOTES:**
1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
  2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE.
  3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES.
  4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES.
  5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD.

Rev	Date	Description	By	Chkd.
A	25-06-2025	Issue	S.T.	A.T.

Client: **IDA Ireland**

Project: **BELVIEW SECTION 50**

Title: **PROPOSED DETAIL DRAWING OF CONCRETE BOX CULVERT**

Scale @ A1: **NTS**

Prepared by: S.T.      Checked by: A.T.      Date: 26-05-2025

Drawing Status: **PLANNING ISSUE**

**TOBIN**

Tel: +353 (0)91 565 211  
Email: info@tobin.ie  
www.tobin.ie

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Drawing No.: **12001-S50-03**      Revision: **A**

## Appendix B SECTION 50 APPLICATION





**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	<b>Belview Access Road</b>	Structure Ref No.	<b>C01</b>
Applicant (Correspondence will issue to agent)			
Company or Organisation Name:	IDA Ireland		
Postal Address:	Athlone Business & Technology Park, Dublin Road, Athlone, Co. Westmeath		
Contact Person:	Vanessa Kiernan		
Phone:	(090) 647 1500		
E-mail:	vanessa.kiernan@ida.ie		

Agent (Correspondence will issue to agent)			
Company or Organisation Name:	<b>TOBIN</b>		
Postal Address:	<b>Fairgreen House, Fairgreen Road, Galway</b>		
Contact Person:	<b>Shane Taaffe</b>		
Phone:	<b>091-565211</b>	Fax:	
E-mail:	<b>shane.taaffe@tobin.ie</b>		

Location and Parameters of crossing			
Watercourse:	<b>Rathpatrick Stream</b>	Catchment:	<b>Rathpatrick Catchment</b>
Address (Townland – County):	<b>Gorteens, Co. Kilkenny</b>		
Grid Reference	X: <b>664364</b>	Y: <b>613305</b>	<b>ITM</b>
Hydrometric Station(s) utilized (including reference number):	<b>Non applicable</b>		
Area of Contributing Catchment:	<b>2.401 Km<sup>2</sup></b>	Road Reference:	
Design Flood Flow:	<b>1.98 m<sup>3</sup>/s</b>	Annual Exceedance Probability (AEP):	<b>1% MRFS</b>

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:	<b>Shane Taaffe</b>
Company/Organisation:	<b>TOBIN</b>
Signature:	
Date:	<b>26<sup>th</sup> June 2025</b>

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

For OPW use only	Date of Receipt							
OPW Drainage Maintenance Region	East	<input type="checkbox"/>	Southeast	<input type="checkbox"/>	Southwest	<input type="checkbox"/>	West	<input type="checkbox"/>

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	<input type="checkbox"/>

**ADDITIONAL INFORMATION**

Hydrological Analysis				
Methodology Applied			Factors Applied	
Method Used	Tick box if used or state other	Flow *2 (m <sup>3</sup> /sec)	Type of Factor	Value Used
6 – Variable Catchment characteristics	<input type="checkbox"/>		Climate Change	<b>1.2</b>
			Irish Growth Curve	1.96
			100-year Growth Factor	2.20
			Factor for Standard Error	1.65 (IH124)
3 – Variable Catchment Characteristics	<input type="checkbox"/>		Drained Channel	
			Other	
IH 124	<input checked="" type="checkbox"/>	<b>1.98</b>		
Gauged Flow	<input type="checkbox"/>			
Unit Hydrograph	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
Other	<input type="checkbox"/> FEH			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	MRM <input type="checkbox"/>	Tidal	<input type="checkbox"/>
Comments			Comments	
			1.2 factor for climate changes relates to the Mid Range Future Scenario (MRFS).	
			The highest result (IH124) was adopted as the 100 MRFS design flow.	

Hydraulic/Structure Details	
Description of Structure*3	<p>Permission is hereby sought for the construction of a proposed 3m wide x 1.5m high culvert at Gorteens, Co. Kilkenny. The culvert will be 23m in length. The proposed structure has minimal impact on the geometry of the Rathpatrick Stream, as the culvert will span the entire length of the existing channel width. The catchment was delineated based on FSU delineated catchments and topographic data. The riverbed is made up of cobble and small boulders.</p> <p>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 1.65 for the 68% standard error.</p>
Effective Conveyance Area *4	<b>1.16m<sup>2</sup></b>
Upstream Invert Level <b>21.95mOD</b>	Downstream Invert Level <b>21.55mOD</b> F
Upstream Soffit Level <b>22.95mOD</b>	Downstream Soffit Level <b>22.60 mOD</b>
Upstream Design Flood Level <b>22.65mOD</b>	Downstream Design Flood Level <b>22.30mOD</b>

**NOTES:**

- 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.

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

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

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



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