

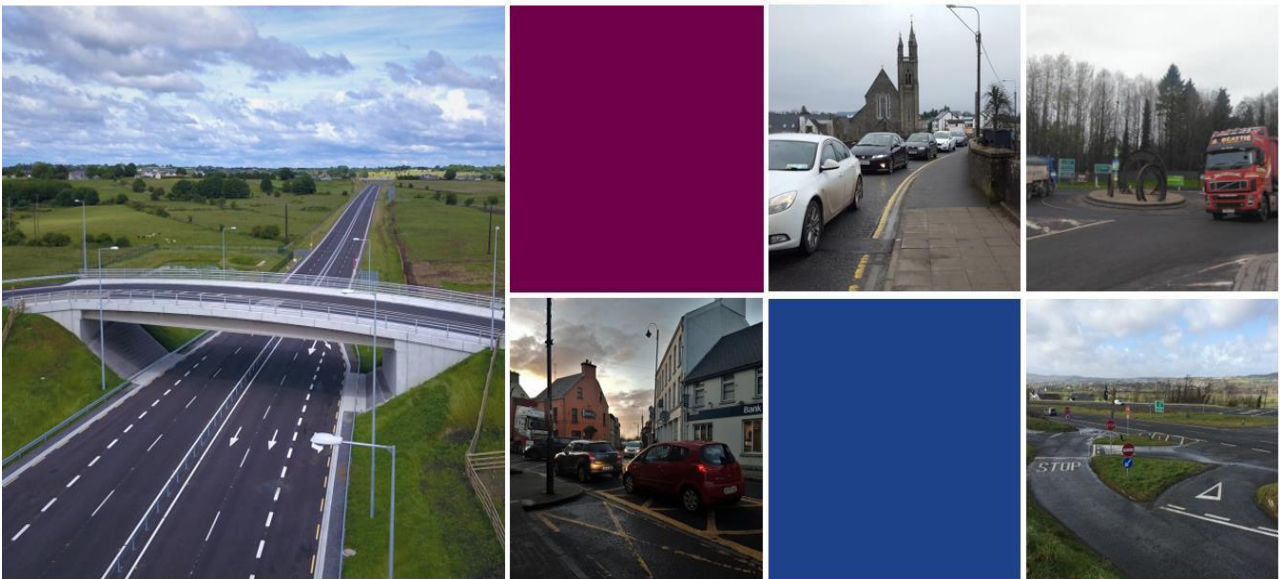
# Appendix C11.02

## Section 2 Flood Risk Assessment

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# Section 2 Flood Risk Assessment Report

### TEN-T Priority Route Improvement Project, Donegal



Section 2 Flood Risk Assessment Report

March 2026



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### TEN-T Priority Route Improvement Project, Donegal



Section 2 Flood Risk Assessment Report

March 2026



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# 1 INTRODUCTION

In January 2017, Donegal County Council appointed the joint venture RPS/Barry Transportation as design consultants for the Trans-European Network - Transportation (TEN-T) Priority Route Improvement Project (PRIP), Donegal; hereafter referred to as the proposed development in this report.

The TEN-T PRIP, involves the targeted and appropriate intervention on three sections of the Ten-T/National Road network in Donegal. The intervention includes online improvement and upgrade, bypass of three urban centres, route realignment and complete, independent and integrated active travel network.

The project is divided into three sections as illustrated in Figure 1-1:

- **Section 1 – N15/N13 Ballybofey / Stranorlar Urban Region**  
*Full active travel, modal hubs, urban bypass*
- **Section 2 – N56/N13 Letterkenny to Manorcunningham**  
*Full active travel, online/upgrade, route realignment, urban bypass (Letterkenny), modal hub*
- **Section 3 – N14 Manorcunningham to Lifford/Strabane/A5 Link**  
*Full active travel, route realignment, urban bypass (Lifford) and cross border connection (Lifford/Strabane), modal hubs.*

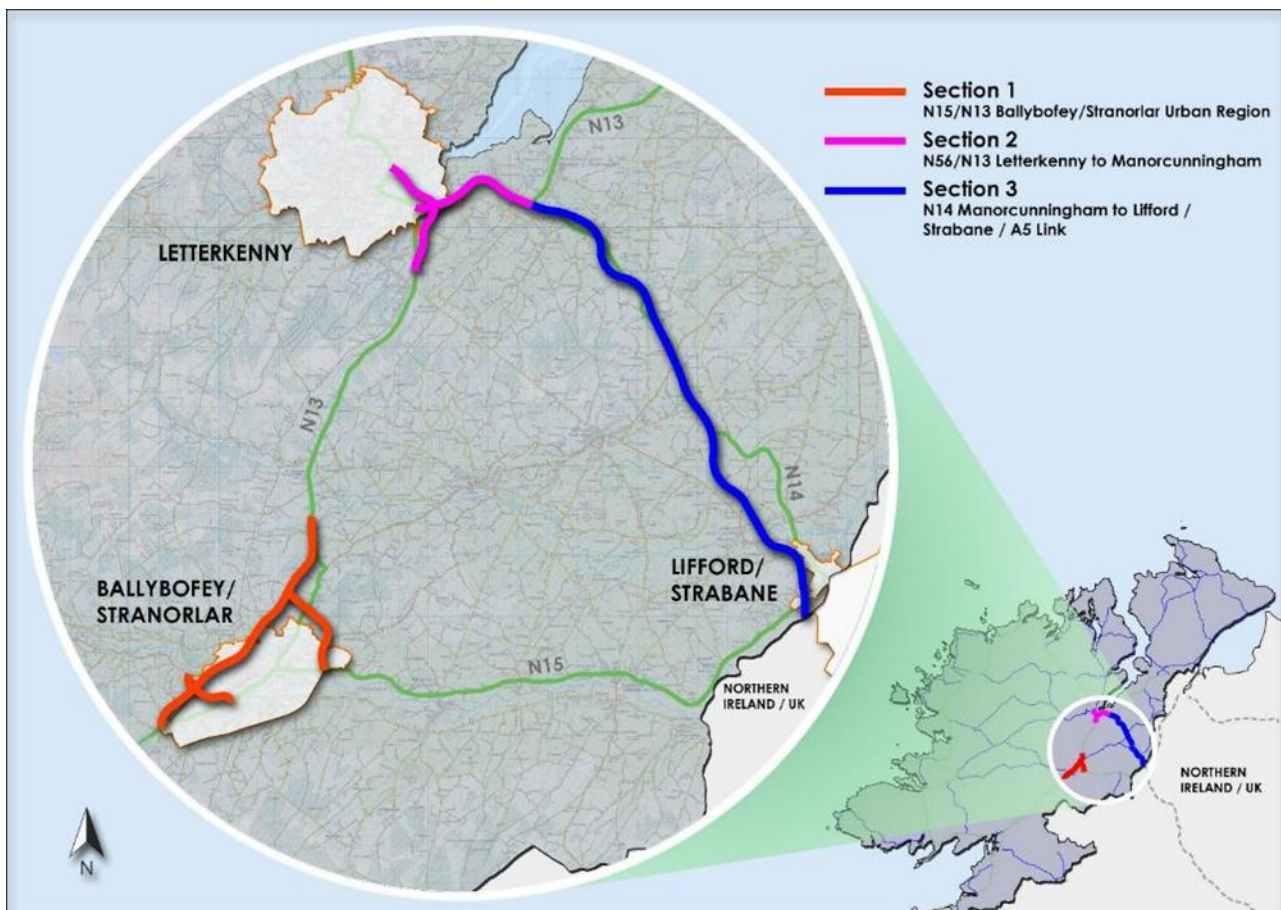


Figure 1-1 Ten-T Priority route improvement project, Donegal

The three sections of the proposed development are being considered as three components of one project. This Flood Risk Assessment report considers Section 2 only.

The study area lies within the Lough Swilly Catchment and forms part of the National Hydrometric Area – 39. The main surface water features include the River Swilly, River Pluck (Leslie Hill Stream) and their tributaries, as well as the Swilly Estuary.

This FRA has been undertaken in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (Dept. of the Environment, Heritage and Local Government and The Office of Public Works, Nov 2009).

Chapter 2 of this report outlines the flood risk management policies and guidelines used for this assessment. Chapter 3 presents a description of the road project and its relevant drainage features. Chapter 4 presents the flood risk assessment that includes flood risk identification and preliminary flood risk assessment for screening purposes, followed by a detailed Flood Risk Assessment of the identified risks and mitigation.

## 2 FLOOD RISK MANAGEMENT POLICY

### 2.1 EU Floods Directive

The European Floods Directive 2007/60/EC on the assessment and management of flood risk aims to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. This directive applies to both inland waters and coastal waters across the whole territory of the European Union.

The directive requires all member states to undertake a national preliminary flood risk assessment in order to identify areas where significant flood risk exists or might be considered likely to occur and to prepare flood hazard and flood risk maps for such areas by December 2013. The Directive requires the preparation of catchment-based Flood Risk Management Plans (FRMPs) by 2015, which will set out flood risk management objectives, actions and measures. These Flood Risk Management Plans are to include measures to reduce the probability of flooding and its potential consequences. Implementation of the EU Floods Directive is required to be coordinated with the requirements of the EU Water Framework Directive and current River Basin Management Plans.

### 2.2 National Flood Policy Review

#### 2.2.1 Background

Historically management of flooding was implemented by drainage commissioners and focused on the protection and improvement of land for agricultural purposes and this is reflected in the various Drainage Acts passed (1842, 1867, 1925, 1928, and 1945).

The Brown Commission (Report of the Drainage Commission 1938-1940) which examined flooding and improvement of land through drainage resulted in the development of the Arterial Drainage Act, 1945. The Brown Commission recommended the establishment of a single national drainage authority with a remit to embark on a national drainage programme. The Office of Public Works (OPW) became the Statutory Authority responsible for implementing arterial drainage schemes nationally.

The emphasis of the 1945 act was improvement of agricultural land and following the act a priority list of river basins was set out and a programme of drainage works commenced and continued up until the early 1990's. This drainage act was amended in 1995 to allow the OPW to implement localised flood relief schemes for relieving flooding in urban areas. This amendment recognised that urban flooding had become a significant problem and signalled a departure away from arterial drainage of lands with no new arterial drainage schemes being implemented.

The various drainage districts and arterial drainage schemes, local flood relief schemes carried out under the drainage act continue to be maintained today by the OPW and Local Authorities.

#### 2.2.2 Report of the Flood Policy Review Group

In 2003 a review of the National Flood Policy was carried out by a review group of relevant stakeholders. The review focuses on fluvial (river) and tidal flooding and concentrates on the roles of the state agencies in these areas. The scope of the review included the following:

- Causes, extent and impacts of the flooding problem
- Current roles and responsibilities of the main state bodies
- International best practice
- Future flood policy
- Proposals for future organisational structures and responsibilities
- Resource requirements and strategic programme.

The review group prepared a report by December 2003 that was approved by government and published in September 2004. The adopted policy has many specific recommendations, including:

- Minimise the national level of exposure to flood damages through identification and management and future flood risks in an integrated, proactive and river basin based approach.
- The OPW is to be the lead agency in delivering this policy.
- All future expenditure in the area of flood relief will need to satisfy strict prioritisation criteria.
- A two-pronged approach to flood management is to be pursued with a greater level of importance attributed to non-structural flood relief measures supported where necessary by traditional structural flood relief measures.
- River basin flood management plans to be developed along with comprehensive Flood Hazard Maps and all information made available to the Dept. of the Environment, Heritage and Local Government now known as Housing, Planning and Local Government to inform future planning and development processes.
- Programmes of necessary hydrological research were identified and included the update of the Flood Studies Report and river basin (hydrological) modelling, analysis of potential impact of climate change on flood frequency and severity and Meteorological forecasting.

## 2.3 National CFRAM Studies

The OPW is the lead agency for flood risk management and part of its responsibility is the coordination and implementation of Government Policy on the management of flood risk in Ireland. The SI No. 122 on the European Communities (Assessment and Management of Flood Risks) 2010 identifies the Commissioners of Public Works as the competent authority with overall responsibility for the implementation of the Floods Directive (2007/60/EC).

In order to comply with the Floods Directive (2007) and the National Flood Policy Review Group (2004) a national Catchment Flood Risk Assessment and Management (CFRAM) programme commenced in 2011 and flood risk and hazard mapping was completed in 2015; in addition, the catchment management plans and the Strategic Environmental Assessment (SEA) process was completed in 2016. This followed preparatory studies involving the Preliminary Flood Risk Assessment mapping and AFA (areas for further assessment) identification and followed a number of Pilot Catchment studies including the Lee Catchment FRAMS (commenced 2006), the River Dodder FRAMS (commenced 2007) and the Fingal East Meath FRAMS (commenced 2008) to refine the approach and methodologies to be adopted. The areas deemed to be at significant risk are identified as AFAs and more detailed assessment on the extent and degree of flooding was undertaken in the CFRAM studies and involved detailed survey hydrological and hydraulic modelling, flood mapping, flood risk management plans and supporting Strategic Environmental Assessments.

## 2.4 Planning Guidelines Concerning Flood Risk Management

### 2.4.1 Background

In November 2009, the OPW and DoEHLG jointly published the Planning System and Flood Risk Management - Guidelines for Planning Authorities which are aimed at ensuring a more consistent, rigorous and systematic approach to fully incorporate flood risk assessment and management into the planning system.

The core objectives set out in these guidelines are to:

- Avoid inappropriate development in areas of flood risk.
- Avoid new developments that may increase flood risk elsewhere.
- Ensure effective management of residual risks for developments permitted in floodplains.

- Avoid unnecessary restriction of national, regional or local economic growth.
- Improve the understanding of flood risk among the relevant stakeholders.
- Ensure that the requirements of EU and National law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

The key principles to be adopted by regional and local authorities, developers and their agents are to:

- Avoid the risk, where possible.
- Substitute with less vulnerable uses, where avoidance is not possible.
- Justify that the need for the development is a strategic need, where avoidance and substitution are not possible.
- Mitigate and manage the risk.

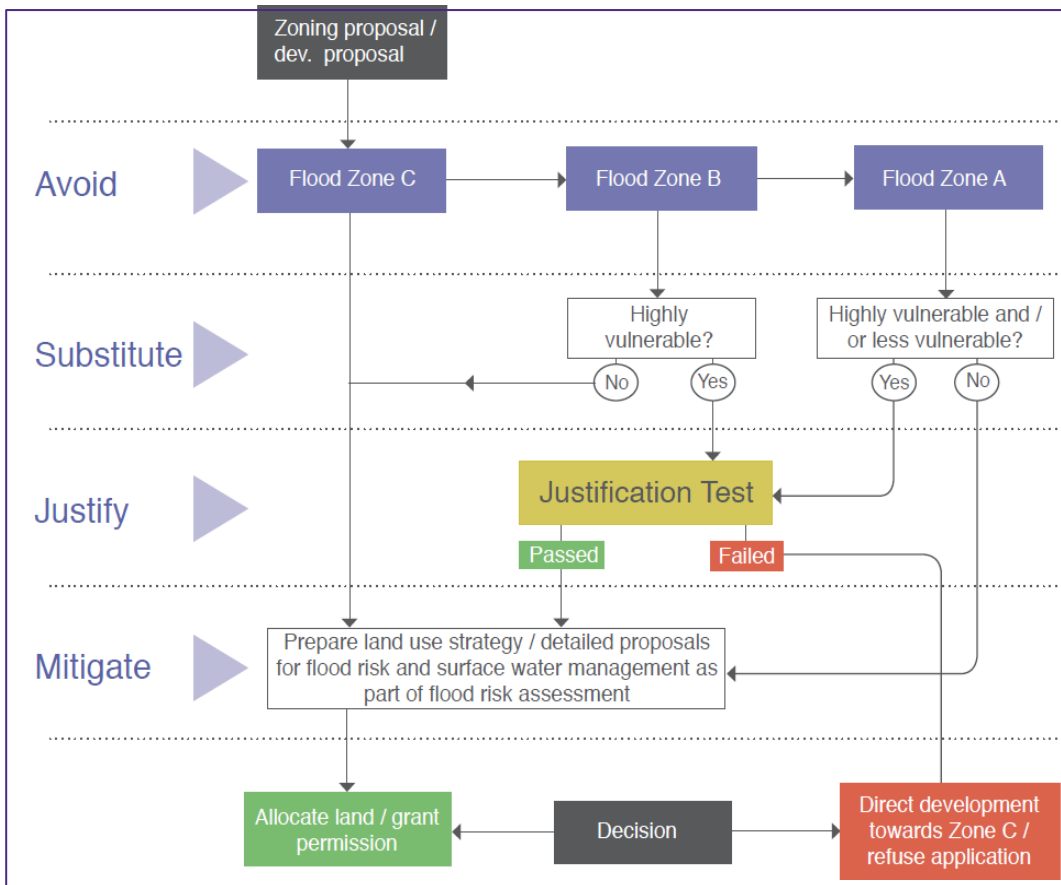
**Decision Making Process**

Management of flood hazard and potential risks in the planning system is based on:

1. Sequential Approach.
2. Justification Test.

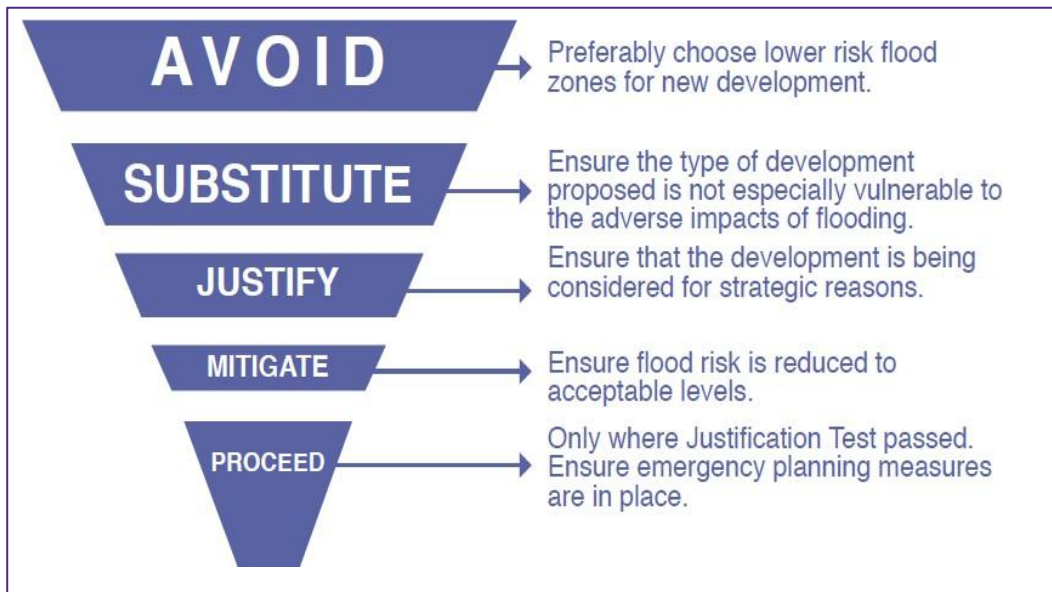
**2.4.2 Sequential Approach**

The aim of the sequential approach is to guide new development away from areas at risk from flooding into areas at low risk of flooding. The approach makes use of flood risk zones and classifications of vulnerability of property to flooding but ignores the presence of flood protection structures. The sequential approach should be applied to all stages of the planning process, particularly at the plan making stage.



**Figure 2-1 Sequential approach mechanism in the planning process (Fig. 3.2 from The Planning System and Flood Risk Management Guidelines)**

The sequential approach is based on the principles shown in Figure 2-2.



**Figure 2-2 Sequential approach principles in flood risk management (Fig. 3.1 from The Planning System and Flood Risk Management Guidelines)**

### 2.4.3 Flood Risk Zones

Definitions of flood risk zones in the planning guidelines are based on probability of occurrence with three flood risk zones (High, Moderate and Low) defined. These flood zones are as follows:

- **Zone A High Probability:** Highest risk of flooding: More than 1% probability of river flooding and more than 0.5% probability of tidal flooding. Development should be avoided and/or only considered through application of a justification test. Most types of development would be considered inappropriate in this zone. Development in this zone should be avoided and/or only considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the justification test has been applied.
- **Zone B Moderate Probability:** Between 1 and 0.1% probability of river flooding or between 0.5 and 0.1% probability of coast flooding. Development should only be considered in this zone if adequate land or sites are not available in Zone C or if development in this zone would pass the Justification Test. Highly vulnerable development would generally be considered inappropriate in this zone, unless the requirements of the Justification Test can be met. Less vulnerable development and water-compatible development might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone C and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to and from the development can or will adequately be managed.
- **Zone C Low Probability:** Less than 0.1% probability of river or coastal flooding. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainable development considerations.

These flood zones are determined on the basis of the probability of river and coastal flooding only and should be prepared by suitably qualified experts with hydrological experience. The derivation of these zones is broadly in line with those in common usage internationally. They are based on the current assessment of the 1% and the 0.1% fluvial events and the 0.5% and 0.1% tidal events, without the inclusion of climate change factors.

The provision of flood protection measures in appropriate locations, such as in or adjacent to town centres, can significantly reduce flood risk. However, the presence of flood protection structures should be ignored

when determining the flood risk zones.

This is because areas protected by flood defences still carry a residual risk of flooding from overtopping or breach of the defences and the fact that there may be no guarantee that the defences will be maintained in perpetuity. The likelihood and extent of this residual risk needs to be considered, together with the potential impact on proposed uses, at both development plan and development management stages, as well as in emergency planning. In particular, the finished floor levels within protected zones will need to take account of both urban design considerations and the residual risk remaining.

## 2.4.4 Development Type Vulnerability Classification

In determining the suitability of the Development within the various flood zones the vulnerability class of the development is taken into consideration. Three categories of vulnerability are considered as described in **Error! Reference source not found.** and Table 2-2 below:

**Table 2-1 Classification of Vulnerability of Different Types of Development**

Vulnerability Class	Land uses and types of development which include*:
Highly Vulnerable development (including essential infrastructure)	<ul style="list-style-type: none"> <li>• Garda, ambulance and fire stations and command centres required to be operational during flooding.</li> <li>• Hospitals.</li> <li>• Emergency access and egress points.</li> <li>• Schools.</li> <li>• Dwelling houses, student halls of residence and hostels</li> <li>• Residential institutions such as residential care homes, children's homes and social services homes.</li> <li>• Caravans and mobile home parks.</li> <li>• Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility</li> <li>• Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.</li> </ul>
Less Vulnerable development	<ul style="list-style-type: none"> <li>• Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions;</li> <li>• Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans.</li> <li>• Land and buildings used for agriculture and forestry.</li> <li>• Waste treatment (except landfill and hazardous waste).</li> <li>• Mineral working and processing.</li> <li>• Local transport infrastructure.</li> </ul>
Water-compatible development	<ul style="list-style-type: none"> <li>• Flood control infrastructure;</li> <li>• Docks, marinas and wharves;</li> <li>• Navigation facilities;</li> <li>• Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location;</li> <li>• Water-based recreation and tourism (excluding sleeping accommodation).</li> <li>• Lifeguard and coastguard stations;</li> <li>• Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and</li> <li>• Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).</li> </ul>

\* Uses not listed here should be considered on their own merits

**Table 2-2 Requirement for Justification Test based on Vulnerability Group and Flood Zone Category**

Vulnerability Class	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

### 2.4.5 Justification Test

Further sequentially based decision making should be applied when undertaking the Justification Test for development that needs to be in flood risk areas for reasons of proper planning and sustainable development:

1. within zone or site, development should be directed to areas of lower flood probability.
2. where impact of the development on adjacent lands is considered unacceptable the justification of the proposal or zone should be reviewed.
3. where the impacts are acceptable or manageable, appropriate mitigation measures within the site and if necessary, elsewhere should be considered.

A justification test is required where a planning authority is considering the future development of areas at a high or moderate risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out above within the flood zones. In such cases the planning authority must be satisfied that it can clearly demonstrate on a solid evidence base that the zoning or designation for development will satisfy the justification test outline in Box 4.1 of the guidelines as presented below in Figure 2-3.

### Box 4.1: Justification Test for development plans

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan<sup>1</sup>, a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

- 1 The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
- 2 The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
  - (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement<sup>2</sup>;
  - (ii) Comprises significant previously developed and/or under-utilised lands;
  - (iii) Is within or adjoining the core<sup>3</sup> of an established or designated urban settlement;
  - (iv) Will be essential in achieving compact and sustainable urban growth; and
  - (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
- 3 A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment.

Figure 2-3 Justification Test for Development Plans

## 2.4.6 Flood Risk Assessment

A staged approach to flood risk assessment that covers both the likelihood of flooding, and the potential consequences is recommended in carrying out a Flood Risk Assessment (FRA). The stages of appraisal and assessment are:

- Stage 1 Flood Risk Identification
- Stage 2 Initial Flood Risk Assessment
- Stage 3 Detailed Flood Risk Assessment

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 local area plans (LAPs) 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.

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.

All stages may not be needed in the FRA in order to inform the decision making process and often a Stage 2 assessment is sufficient at the strategic level to inform the decision making process. This will depend on the level of risk, the level of conflict with the proposed development and the scale of mitigation measure being proposed. For the purposes of applying the sequential approach, once a flood risk has been identified it can be avoided. Where development is planned in flood risk areas, a detailed assessment may be carried out within the FRA, so that the potential for development of the lands and their environmental impact can be assessed.

The FRA of the Ten-T Priority Route Improvement Project will:

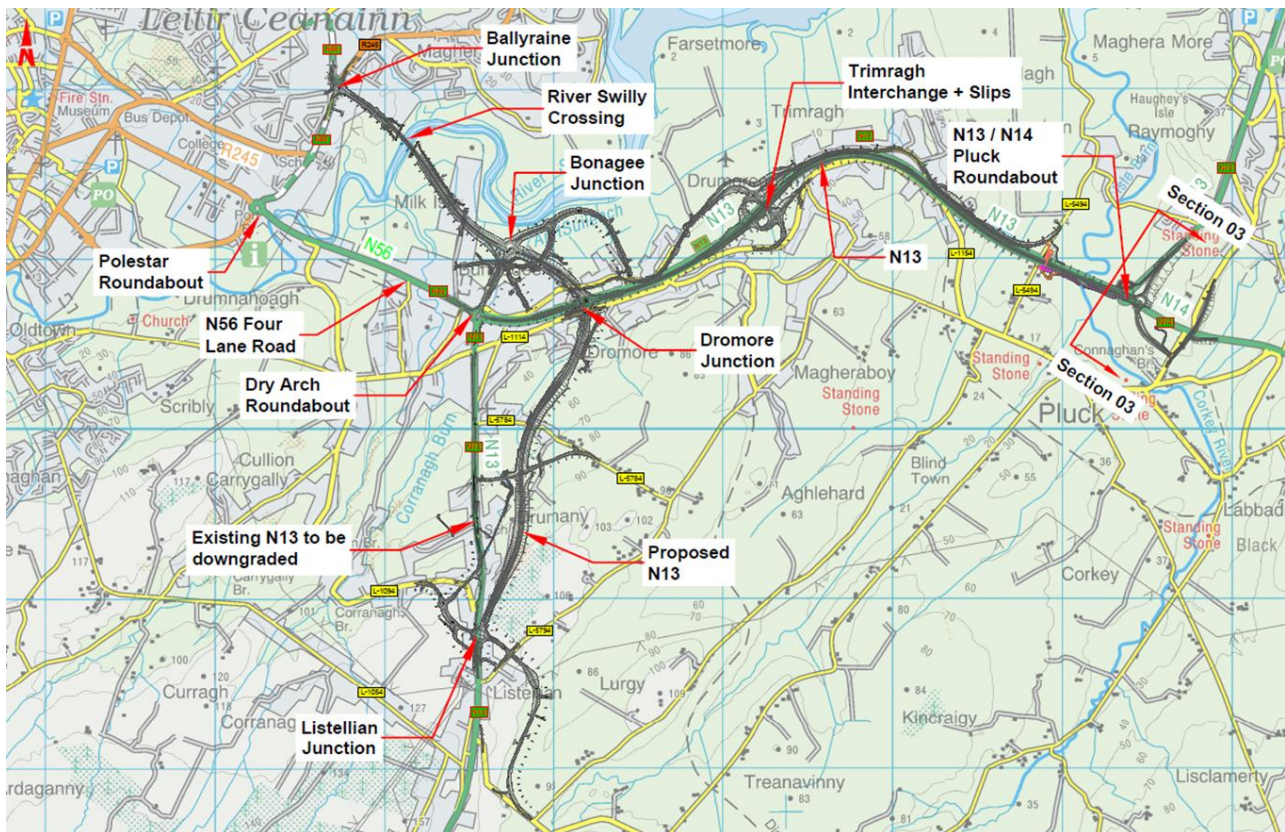
- Identify the broad nature of flood risk (type and source) within the study area;
- Provide an improved understanding of flood risk issues along the route of the proposed road development; and
- Provide a more detailed assessment and management strategy for the transport infrastructure within the identified flood risk areas.

### 3 THE PROPOSED DEVELOPMENT

This Section provides a brief description of the proposed works for Section 2 including the drainage/cross-drainage works proposed under this proposed road route.

Section 2 route corridor is approximately 9 km long and runs to the south and east of Letterkenny (See **Figure 3-1**). It comprises several sections, with the following local road interfaces:

- Tie-in to existing N13 at Listellian (proposed online junction).
- Tie-in to existing N13/N56 at Bonagee (existing Dry Arch roundabout to be improved).
- Tie-in to existing N56/R245 at Ballyraire (existing roundabout to be improved).
- Tie-in to the existing N13 dual carriageway at Dromore (proposed online junction).
- Tie-in to the existing N13/N14 in proximity to Pluck roundabout at Raymoghly (Section 3 interface).



**Figure 3-1 Section 2 Proposed Road Development**

The proposed road can be summarised under the following elements:

#### Roads:

- Mainline Section 1.1 which is 0.5 km of Type 1 Single Carriageway cross section between the existing N15 southern tie in and Dooish Junction (EIAR Drawing 4.1, sheet 1 of 8).
- Mainline Section 1.2 which is 8.6 km of Type 2 Divided Road bypassing Ballybofey/ Stranorlar between Dooish Junction and Meenavoy Junction (EIAR Drawing 4.1, sheets 1, 2, 4, 5, 6 and 7 of 8).
- Mainline Section 1.3 which is 0.6 km of Type 1 Single Carriageway cross section between Mainline

Section 1.2 (Meenavoy Junction) and the existing N13 to the north of the Proposed Development (EIAR Drawing 4.1, sheet 7 of 8).

- Ballybofey Link Road (north and south sections) which is 2.1 km Type 2 Single Carriageway connecting Mainline Section 1.2 to the local road network at Ballybofey (EIAR Drawing 4.1, sheets 2 and 3 of 8).
- N15 Primary Road Connector which is 3.1 km of Type 3 Divided Road connecting Mainline Section 1.2 to the existing N15 Lifford Road (Teevickmoy Junction to Treanamullin Junction) (EIAR Drawing 4.1, sheets 6 and 8 of 8).
- Provision of approximately 10.6 km of additional Type 1, Type 2 and Type 3 Single Carriageway roads not already mentioned above (includes new and realigned).

#### **Junctions:**

- Three compact grade-separated junctions, one each at Cappry (EIAR Drawing 4.1, sheet 2 of 8), Teevickmoy, and Tircallan/ Dunwiley (both shown on EIAR Drawing 4.1, sheet 6 of 8), including structures, link roads and roundabouts.
- Three at-grade roundabout type junctions at tie-in transition points at Dooish (EIAR Drawing 4.1, sheet 1 of 8), Meenavoy (EIAR Drawing 4.1, sheet 7 of 8), and Treanamullin (EIAR Drawing 4.1, sheet 8 of 8).

#### **Structures:**

- 360 m long, seven span bridge (ref: N15R024) over the River Finn and flood plain at Ballybofey/ Stranorlar (clear span over the river channel).
- Two river/stream bridges.
- Seven overbridges.
- Five underbridges.
- Three underpasses (including active travel / mammal underpass).
- Culverts, gantries and environmental barriers.

#### **Active Travel:**

- Provision of active travel infrastructure. This includes connections to existing infrastructure and three new Park and Share / Cycle facilities, one each near Dooish, Cappry, and Meenavoy as illustrated in Volume D: Book of Drawings (EIAR Drawings 4.1 and 4.50).

#### **Other Works:**

- Access roads.
- Provision of attenuation ponds, flood compensation measures, watercourse diversions and associated drainage infrastructure.
- Provision of existing utility diversions and new utility infrastructure.
- Provision of landscape planting, signage, lighting, safety barrier, and other works ancillary to the construction and operation of the Proposed Development.

### 3.1 River Bridge Crossing

There are two bridge structures proposed along the mainline carriageway of Section 2, namely, River Swilly Crossing and a footbridge over Isle Burn (Leslie Hill Stream). Table 3-1 presents locations and bridge types and their span/lengths details. Hydraulic designs of these bridge openings have been carried out through developing a HEC-RAS hydraulic model for the relevant watercourses. Further details of the hydrologic and hydraulic modelling results are provided in Appendix C11.02. The locations of these bridge crossings are illustrated in Figure 3-2.

**Table 3-1 Section 2 Proposed Bridge Schedule**

Bridge Reference	Chainage	Referenced Mainline / Side Road	Location X	Location Y	Structure Type	Approx. Length (m)
River Swilly Bridge	CH0+520	Mainline	619,068.739	911,693.472	Three Span Bridge	234 (65m +104 m+65 m)
Isle Burn Footbridge	CH3+400	Mainline	623,059.943	910,836.499	Single Span Bridge	40

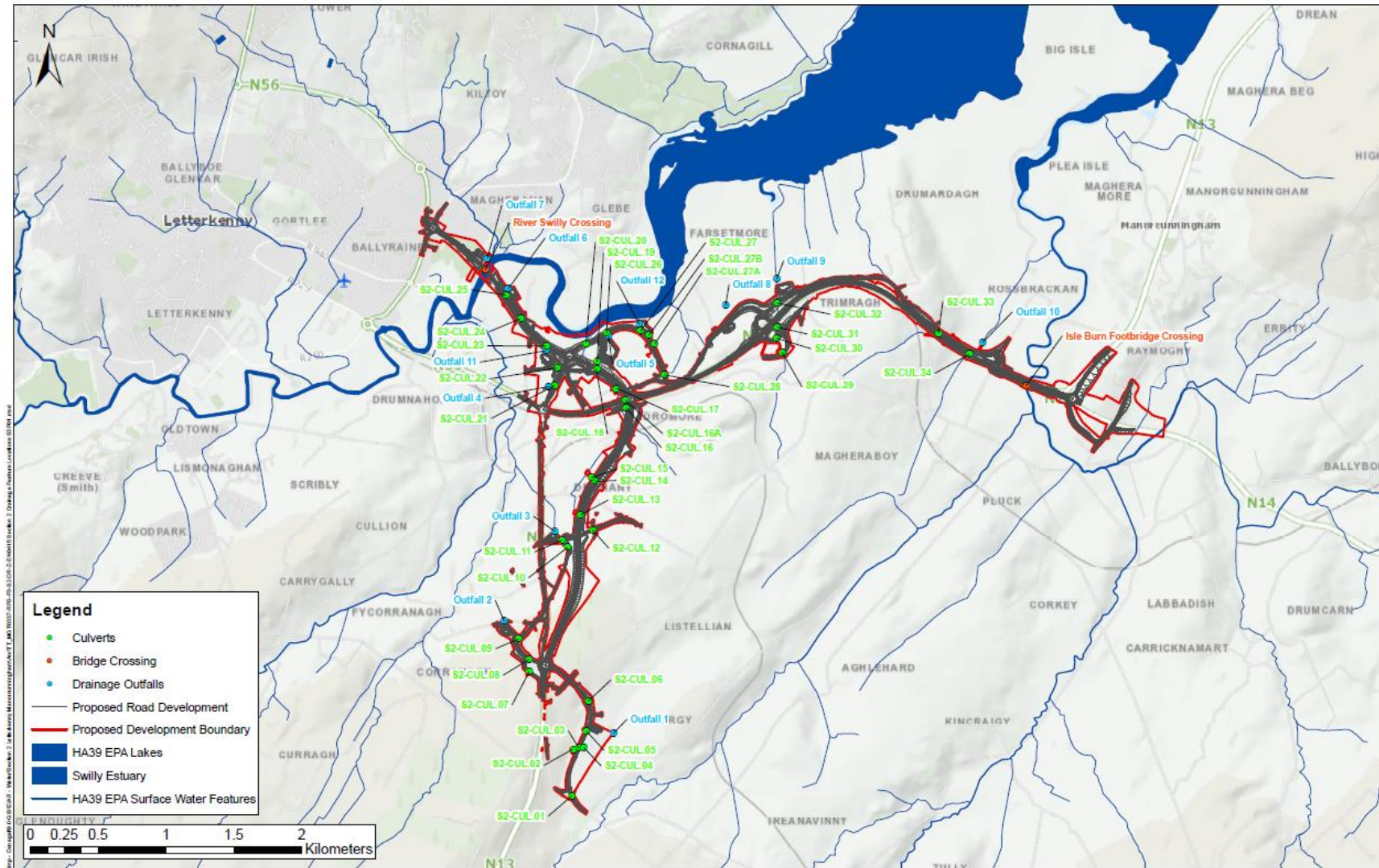


Figure 3-2 Locations of Bridges / Culvert Crossing and Drainage Outfalls

### 3.2 Other Culvert Crossings along the Proposed Road

There are 37 culverts proposed along the mainline/connector/link road carriageways. Table 3-2 lists these culverts along with their required size and lengths. Figure 3-2 illustrates the location of these culverts. Drawing no. TT\_MGT0337-RPS-P3-S2-DR-C-DR1001 included in the Design Report show their layout plans. Typical cross-section details are shown on TT\_MGT0337-RPS-P3-S2-DR-C-DR1004. Culverts or pipes with a clear span greater than 2.0 m are classified as structures in accordance with the DN-STR-03001 (BD 2).

All culverts were sized based on the calculations set out in the updated CIRIA Culvert, Screen and Outfall Manual (2019), CIRIA Report No. C786.

**Table 3-2 Section 2 Proposed Culvert Schedule**

Culvert Reference	Chainage	Referenced Mainline / Side Road	Location X	Location Y	Culvert Diameter (m) / Width (m) x Height (m)	Approx. Length (m)
S2-CUL.01	0+166	L-1064 Connector	619703.6	907809.6	1.2Ø	26.3
S2-CUL.02	0+515	L-1064 Connector (Farm Access)	619719.5	908155.4	1.2Ø	8.0
S2-CUL.03	0+540	L-1064 Connector	619762.1	908164.3	1.2Ø	40.8
S2-CUL.04	0+558	L-1064 Connector (Farm Access)	619795.9	908169.9	1.2Ø	8.3
S2-CUL.05	0+677	L-1064 Connector	619816.4	908290.7	1.2Ø	20.1
S2-CUL.06	0+904	L-1064 Connector	619831.2	908512.8	1.2Ø	55.4
S2-CUL.07	0+235	L-1094 Connector	619394.2	908731.2	1.2Ø	20.4
S2-CUL.08	0+129	L-1094 Connector	619392.5	908819.9	1.2Ø	20.2
S2-CUL.09	0+024	LX-2004	619314.1	908971.1	1.2Ø	32.7
S2-CUL.10	0+190	L-5784 Connector	619676.7	909646.2	1.2Ø	10.1
S2-CUL.11	0+160	L-5784 Connector	619636.6	909698.2	1.2Ø	21.2
S2-CUL.12	0+400	L-5784 Connector	619863.3	909773.3	1.2Ø	28.1
S2-CUL.13	1+411	Mainline 2.2	619770.4	909885.8	1.5Ø	45.7
S2-CUL.14	1+680	Mainline 2.2	619878.1	910133	1.2Ø	45.9
S2-CUL.15	1+687	Mainline 2.2 (Farm Access)	619851.1	910159.7	1.2Ø	10.0
S2-CUL.16	0+130	L-1114 Connector	620046.6	910650	1.25 x 1.75	52.6

Culvert Reference	Chainage	Referenced Mainline / Side Road	Location X	Location Y	Culvert Diameter (m) / Width (m) x Height (m)	Approx. Length (m)
<b>S2-CUL.16A</b>	0+625	Mainline 2.3	620101.0	910731.3	1.75 x 1.75	59.1
<b>S2-CUL.17</b>	n/a	AR 2.31	620033.1	910812.2	2.5 x 2.0	9.0
<b>S2-CUL.18</b>	1+630	Mainline 2.5	619895.2	910961.2	2.9 x 2.1	83.1
<b>S2-CUL.19</b>	0+550	LX-2011	619894.2	911013.5	2.9 x 2.5	34.5
<b>S2-CUL.20</b>	0+150	LX-2010	619821.5	911146.7	2.9 x 3.3	65.0
<b>S2-CUL.21</b>	0+200	Bonagee Link	619581.6	910840.2	2.0 x 3.2	48.4
<b>S2-CUL.22</b>	0+238	LX-2011	619599	910969.5	2.5 x 3.4	25.4
<b>S2-CUL.23</b>	1+218	Mainline 2.6	619522.8	911135.7	3.3 x 3.5	71.0
<b>S2-CUL.24</b>	0+942	Mainline 2.6	619339.1	911329.9	1.25 x 1.35	67.7
<b>S2-CUL.25</b>	0+750	Mainline 2.6	619221.5	911499.2	2.0 x 2.5	95.2
<b>S2-CUL.26</b>	0+056	LX-2005	619964.5	911226.6	1.5 x 2.6	41.0
<b>S2-CUL.27</b>	0+325	LX-2005	620215.2	911241.3	1.2Ø	31.3
<b>S2-CUL.27A</b>	0+458	LX-2005 (Farm Access)	620312.4	911142.9	1.2Ø	13.5
<b>S2-CUL.27B</b>	0+390	LX-2005 (Farm Access)	620276.8	911209.2	1.2Ø	20.4
<b>S2-CUL.28</b>	0+695	LX-2005	620390.3	910918.6	1.5Ø	35.5
<b>S2-CUL.29</b>	0+151	L-1154 Connector WB	621262.8	911076.1	3.5 x 2.0	26.6
<b>S2-CUL.30</b>	0+120	Trimragh WB Link	621216.6	911187.9	3.5 x 2.0	37.9
<b>S2-CUL.31</b>	0+048	Trimragh Link	621223.0	911270.0	3.5 x 2.0	66.9
<b>S2-CUL.32</b>	0+128	L-5494 Connector	621221.6	911446.9	3.5 x 4.0	79.2
<b>S2-CUL.33</b>	2+635	Mainline 2.4	622410.8	911220.6	1.2Ø	89.4
<b>S2-CUL.34</b>	2+928	Mainline 2.4	622640.7	911068.34	1.8Ø	75.7

### 3.3 Proposed Road Drainage Features

**Error! Reference source not found.** below provides details of the road network associated with each outfall for Section 2. Drawing TT\_MGT0337-RPS-P3-S2-DR-C-DR0001 (included in Section 6 of Design Report) provides the location of these drains. For the mainline carriageway a total of 2 no. drainage networks have been proposed, while for the side roads 10no. separate drainage network have been proposed. Road runoff from the drainage network will initially be discharged into 12no. attenuation ponds and then into the existing natural watercourses via 12no. outfalls. Figure 3-2 illustrates the locations of all outfalls.

**Table 3-3 Carriageway Drainage Network Details**

Drainage Network Ref.	Mainline / Side Road (No.)	Chainage	Outfall
<b>S2-ML-DN-01</b>	Mainline 2.1 + 2.2	0+000 to 2.364	Outfall 05
	Listellian Junction	-	
	L-5784 Connector	0+300 to 0+784	
	L-58141 Connector	0+000 to 0+458	
	L-11141 Connector	0+135 to 0+274	
	Dromore Junction	-	

Drainage Network Ref.	Mainline / Side Road (No.)	Chainage	Outfall
	Mainline 2.4	0+000 to 0+220	
	Mainline 2.5	0+205 to 0+564	
	L-1064 Connector	1+200 to 1+326	
	L-11141 Connector	0+000 to 0+250	
<b>S2-ML-DN-02</b>	Mainline 2.4	0+700 to 1+415	Outfall 09
	Trimragh Junction	-	
	L-1154 Connector EB	0+000 to 0+305	
	L-5494 Connector	0+000 to 1+030	
	Trimragh WB Link	0+000 to 0+340	
<b>S2-SR-DN-01</b>	L-1064 Connector	0+139 to 1+200	Outfall 01
	AR 2.34		
	Listellian Junction		
	AR 2.34		
<b>S2-SR-DN-02</b>	L-1094 Connector	0+045 to 0+458	Outfall 02
	L-1094 / LX-2004 Junction	-	
	AR 2.28	0+040 to 0+353	
	LX-2004	0+000 to 0+110	
<b>S2-SR-DN-03</b>	LX-2004	0+110 to 0+400	Outfall 03
	L-5784 Connector	0+078 to 0+300	
<b>S2-SR-DN-04</b>	LX-2009	0+028 to 0+304	Outfall 11
	LX-2011	0+178 to 0+740	
<b>S2-SR-DN-05</b>	Bonagee Link	0+114 to 0+430	Outfall 04
<b>S2-SR-DN-06</b>	Mainline 2.6	0+440 to 1+330	Outfall 06
<b>S2-SR-DN-07</b>	Mainline 2.6	0+160 to 0+440	Outfall 07
<b>S2-SR-DN-08</b>	LX-2010	0+000 to 0+749	Outfall 12
	Dromore Junction	-	
	LX-2010	0+000 to 0+274	
	Bonagee Junction	-	
	Mainline 2.5	0+000 to 0+205	
	L-11141 Connector	0+250 to 0+350	
<b>S2-SR-DN-09</b>	L-11141 Connector	0+350 to 1+225	Outfall 08
<b>S2-SR-DN-10</b>	L-5494 Connector	1+030 to 2+093	Outfall 10

### 3.4 Stream Diversions

At a number of locations, the existing natural flow paths are proposed to be altered slightly in order to suitably align the proposed culvert crossings with the road alignment. These diversion works have been designed such that there will be no changes in the existing hydrological or morphological regimes of the relevant watercourses. Layout plans of the stream diversion works are provided in the Section 2 drawings in Volume D of the EIAR.

## 4 FLOOD RISK ASSESSMENT

### 4.1 General

Flood risks to the proposed road scheme have been investigated by reviewing all available historical flood information and any flood maps prepared for the study area under any previous flood studies (source: [www.floodinfo.ie](http://www.floodinfo.ie)). Further to this, a detailed flood risk assessment was also carried out through a detailed hydrological assessment and hydraulic modelling of the relevant watercourses.

The FRA has been undertaken in accordance with The Planning System and Flood Risk Management – Guidelines for Planning Authorities (Dept. of the Environment, Heritage and Local Government and The Office of Public Works, Nov 2009).

The following sources of records have been collected and reviewed to identify any existing flood risk to the proposed development site area and its vicinity:

- 6" & 25" OSi historical maps for the Sligo Area,
- Historic flood maps and reports from ([www.floodmaps.ie](http://www.floodmaps.ie)),
- OPW and EPA Hydrometric Data (<http://www.opw.ie/hydro/index.asp?mpg=main.asp>; <http://hydronet.epa.ie/hydronet.html>),
- The National Preliminary Flood Risk Assessment (PFRA) – Overview Report & Indicative Flood Maps (OPW, March 2012, [www.cfram.ie](http://www.cfram.ie)),
- North-Western Neag Bann CFRAM Studies Reports ([www.floodinfo.ie](http://www.floodinfo.ie)),
- Strategic Flood Risk Assessment, Donegal County Development Plan 2024 – 2030, August 2023.
- Groundwater Flood Maps, Geological Survey of Ireland ([www.gsi.ie](http://www.gsi.ie))
- Met Eireann rainfall records ([www.meteireann.ie](http://www.meteireann.ie)),
- Irish Coastal Protection Strategy Study Report– North West Coast (OPW, November 2013)
- Irish Coastal Wave and Water Level Modelling Study (OPW, 2018)

### 4.2 Existing Hydrological Environment

The proposed route for Section 2 lies within the Lough Swilly Catchment and form part of the National Hydrometric Area – 39. The main surface water features include the River Swilly, River Pluck (Leslie Hill Stream) and their tributaries, as well as the Swilly Estuary.

The River Swilly is the major river of the greater Lough Swilly catchment (HA 39) and receives flows from a number of tributaries including the Sprack, Corravaddy Burns and the Knocknamona watercourse. The Swilly River catchment is fairly mixed in land coverage with forested land, pasture, peat bog and urban area due to Letterkenny. The modelled tributaries which enter the Swilly emanate from the hills surrounding Letterkenny to the north and south. Some of these tributaries pick up a significant amount of urban drainage along the way to their discharge points into the Swilly. The River Swilly Sub Catchment (Swilly\_SC\_010) is a medium sized catchment with an area of 97 km<sup>2</sup> upstream of the proposed bridge crossing at Letterkenny.

The Isle Burn stream catchment is located within hydrometric area 39 – Lough Swilly. The stream conveys flows from approximately 54.57km<sup>2</sup> of upstream land areas at the proposed footbridge location. The catchment is predominantly underlain by a mixture of poorly drained and deep well-drained metamorphic tills with a BFI value of 0.5141.

Figure 4-1 shows the River Swilly catchment extents along with their tributaries.

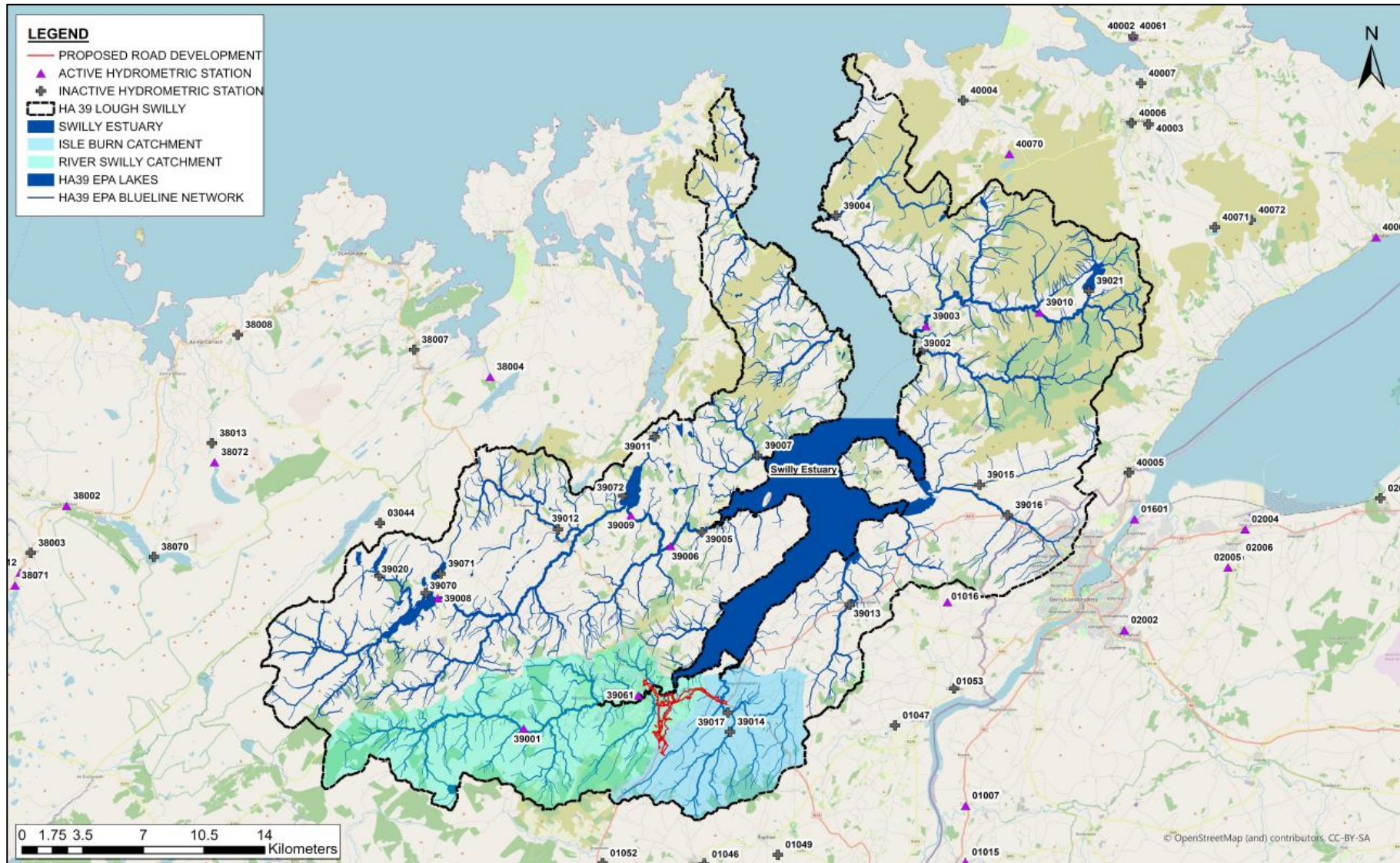


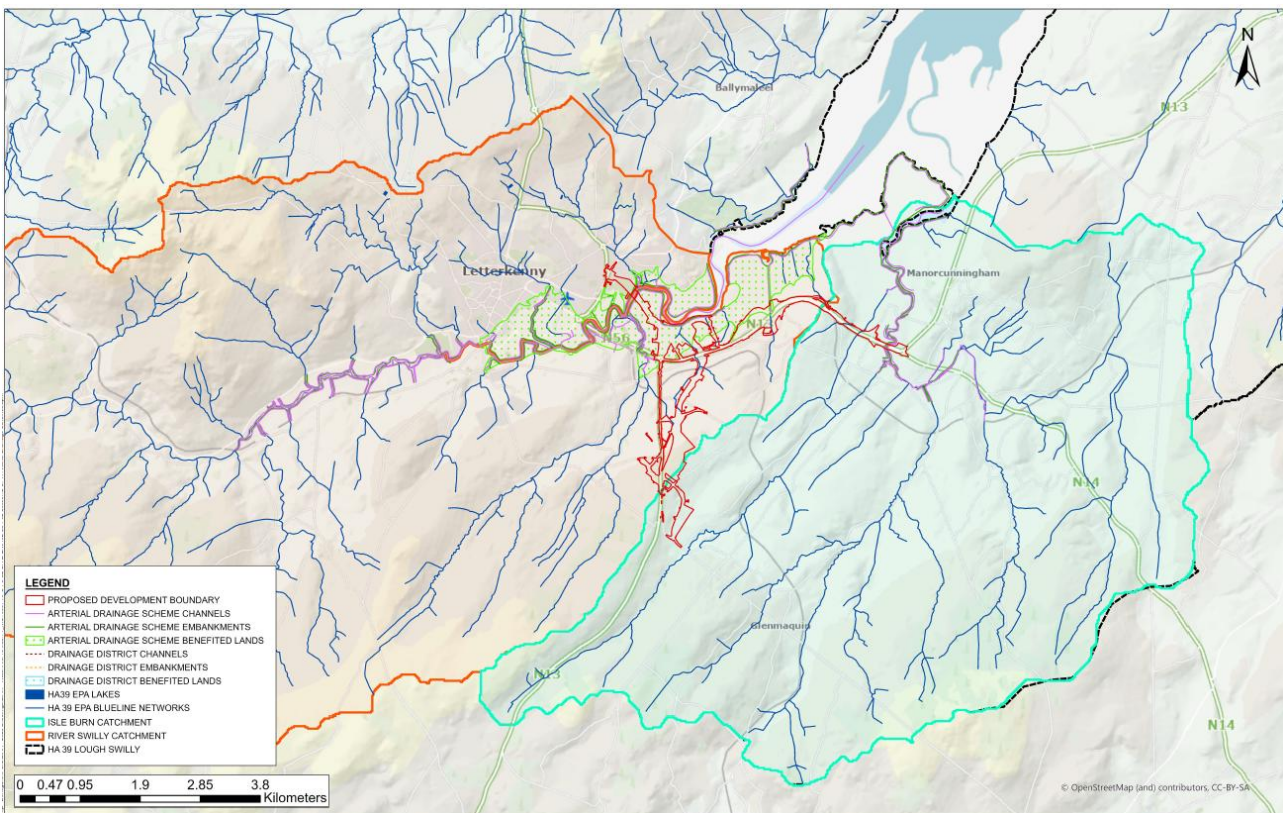
Figure 4-1 River Swilly and Isle Burn Catchment extents

Table 4-1 presents the physical catchment descriptors/characteristics (PCD) for the River Swilly and Isle Burn at the proposed bridge crossings. (ref. OPW, FSU, 2009).

**Table 4-1 Section 2 FSU Catchment Characteristics of the River Swilly and Isle Burn River**

Physical Catchment Descriptors	River Swilly	Isle Burn
Area (km <sup>2</sup> ):	96.761	54.567
Standard Average Annual Rainfall (SAAR) (mm):	1568.43	1110.34
Flood Attenuation from Reservoirs and Lakes (FARL):	1	1
Baseflow Index of Soils (BFISOIL):	0.3188	0.5141
Drainage Density (DRAINDD) km per km <sup>2</sup> :	2.081	1.58
Channel Flood Slope S1085 (m/km):	8.1566	11.487
Arterial Drainage Factor (ARTDRAIN2):	0.0606	0.0212
URBEXT (Urban Extent):	0.0422	0.0012

There are a significant number of existing streams and rivers that the proposed development traverses along the Section 2 route. The OPW Arterial drainage mapping was also consulted and there is evidence that the River Swilly and surrounding lands benefit from arterial drainage (see Figure 4-2).



**Figure 4-2 Section 2 Arterial Drainage System**

## 4.3 Stage 1 – Identification of Sources of Flooding

The Stage 1 FRA identified the existing information pertinent to flood risk along the proposed road route. The information used to inform this assessment includes historical mapping and indicative sources relating to previous predictive flood studies and risk assessments.

### 4.3.1 Flood History

#### OPW Flood Hazard Mapping

The Flood Hazard Mapping Website ([www.floodmaps.ie](http://www.floodmaps.ie)) is a record of historic flood events maintained by the OPW. The data available was reviewed in order to obtain information on recorded flood events within the study area. There are three instances of historical flooding recorded upstream of the Shell Bridge on the Corravaddy Burn and a further two instances of previous flooding recorded upstream on the River Swilly. These are summarized in **Table 4-2** and are illustrated in **Figure 4-3**.

It is apparent from the recorded flood history that the River Swilly and Corravaddy Burn has frequently flooded its banks in the past. However, there are no recorded instances of flooding at the proposed crossings of River Swilly and Isle Burn River. **FloodInfo.ie** can be interrogated for further flood reports and press articles. There is also a detailed assessment of historical flood events included in the North Western - Neagh Bann CFRAM Study UoM 01 Hydraulics Report (RPS, 2017) as part of the hydraulic model calibration and verification.

**Table 4-2 Summary of Historical Flood Events provided by Floodinfo.ie**

Flood ID	Location	Date(s) of Report(s)	Recorded date of occurrence	Frequency	Description
4036	Milk Isle/Bonagee	11/01/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides. The road is liable to flood, and properties are affected. The Halting site is also prone to flooding. Area affected is from the Port roundabout to the Dry Arch roundabout
552	Navenny Bridge, Ballybofey	01/12/1999 21/12/1999	November 1999 05/07/1999 11/09/1999 24/09/1999	Annual	Flooding of back drain at Bonagee – has occurred on numerous occasions. Flooding on main Derry-Letterkenny Road at Bonagee roundabout and on the minor road at Bonagee. Believed to be caused by insufficient storage in drain network when high tides occur during periods of high rainfall.
4478	Letterkenny Area (notably houses adjacent to Clanree Hotel)	October 2002	N/A	N/A	Letterkenny Localised Flood Study, JB Barry & Partners. Mentions possibility that flooding is due to construction of Holiday Inn (Clanree) hotel.
4477	UNIFI Factory	October 2002	N/A	N/A	Letterkenny Localised Flood Study, JB Barry & Partners. Refers to flooding at Lisnenan Road. Undersized culvert and trash screen blocking causes flooding.
4038	Bunbeg	11/01/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides.
4037	Drumnaoagh	11/01/2006 26/11/2006	N/A	Annual	Low lying land floods every year through a combination of heavy rain and high tides. Port Bridge area on N14 due to tidal influence – infrequent.
4039	Neil T Blaney Road	11/01/2006 26/11/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides. Areas either side of the Neil T. Blaney road are flooded

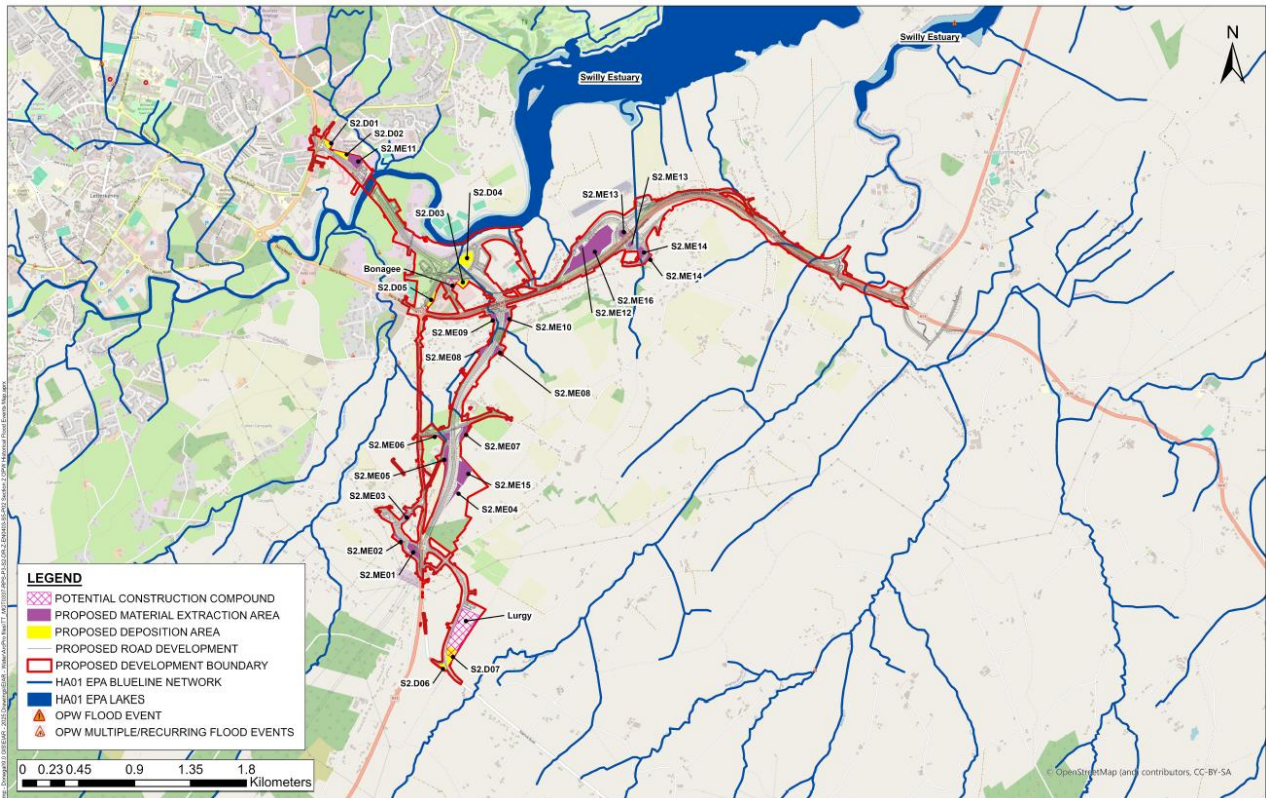


Figure 4-3 OPW Historical Flood Points (Section 2)

### OSI Historical Mapping

The OSI 6 inch Cassini and 25 inch historical maps do not illustrate any evidence of flooding in the past in the vicinity of the proposed road. It appears that the ‘Ordinary Tide’ historically flowed as far as Milk Isle. The map illustrates a relatively intricate network of open drains that outfall to the River Swilly and Corravaddy Burn. Some of these drains still exist while some have been combined and redirected to other locations (Figure 4-4). The 25 inch map shows evidence of flood defence berms along the riverbank and lands “liable to floods”. The map also shows the location of the highest point to which ordinary tides flow. This would indicate that water levels in the river may be tidally affected and should be considered in any hydraulic design.

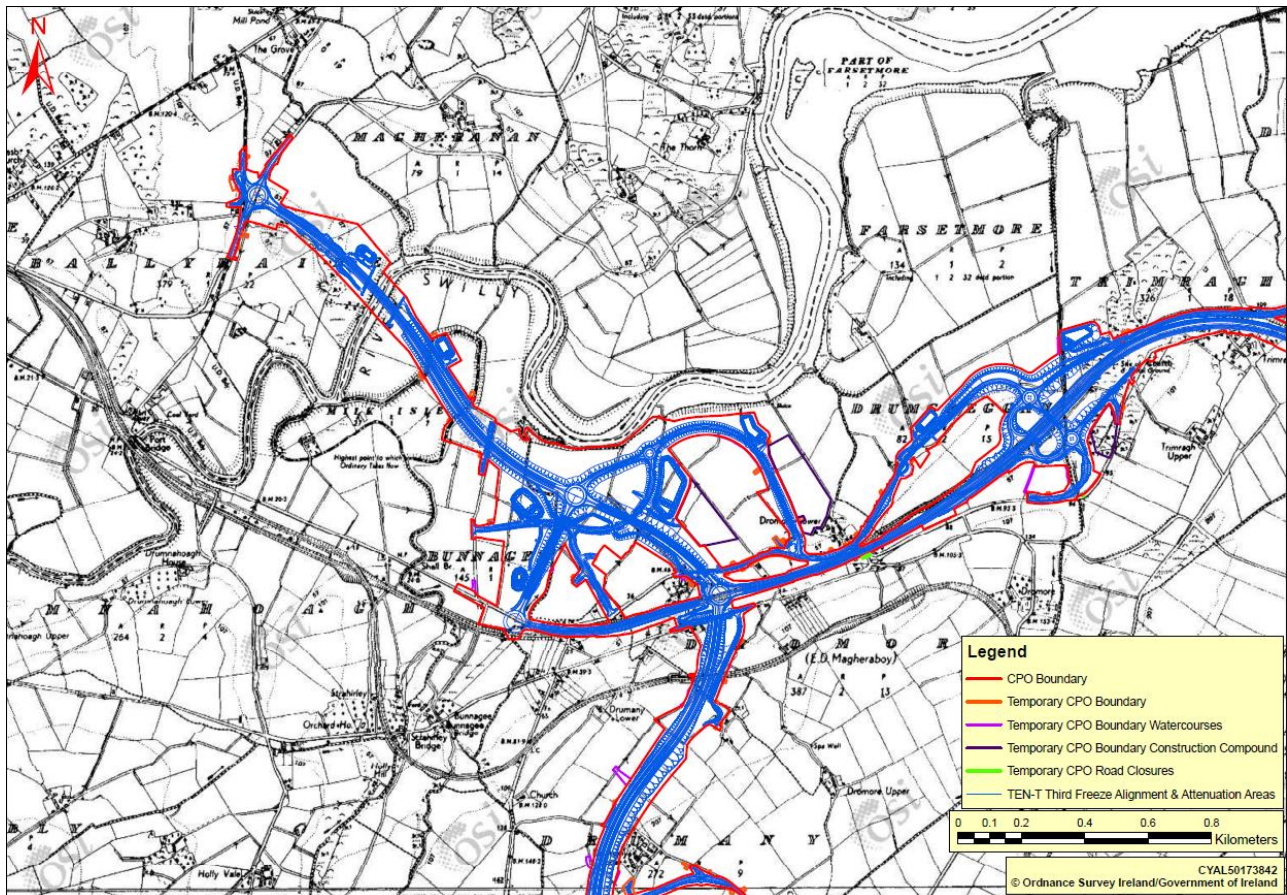


Figure 4-4 River Swilly Crossing - OSI 6inch Cassini historical mapping with proposed route overlaid

### Historical Groundwater Flooding

There was no historical groundwater flooding identified along the proposed Section 2 road route.

### 4.3.2 Predictive Flooding

#### OPW CFRAM Study and National Indicative Fluvial Mapping (NIFM):

Letterkenny has been identified as an Area for Further Assessment (AFA) in the OPW Preliminary Flood Risk Assessment (PFRA) in 2012. Under the Northwest -Neagh Bann CFRAM study (OPW, 2016) flood levels in all high priority watercourses (River Swilly and its tributaries), located within this AFA were estimated through a detailed hydrological and hydraulic modelling. Also, under the OPW National Indicative Fluvial Mapping (NIFM) Project (2020), predictive flood extent maps were produced for all watercourses with catchment area greater than 5km<sup>2</sup>, and for which flood maps were not produced under the National CFRAM Programme. For example, the Isle Burn River channel at the proposed Section 2 road crossing was not modelled under the CFRAM study, however, predictive flood extent maps were prepared for this watercourse under the NIFM study.

The above studies showed that the proposed Section 2 crosses/encroaches the 1% AEP & 0.1%AEP flood extents at a number of locations as listed in Table 4-3. Figure 4-5 illustrates these flood extents for the current climatic condition.

**Table 4-3 Section 2 Road Route- Predictive flood risks (CFRAM & NIFM Studies)**

<b>EPA Name</b>	<b>Watercourse Segment Code</b>	<b>Crossing/ Encroachment</b>	<b>Flood risk details</b>
<b>Drumany</b>	39_1545	Crossing & Encroachment	Proposed N13 road adjacent to Dromore junction (between Ch.1+900 and 2+100) encroaches into the CFRAM study estimated 1% AEP flood extent.
<b>Dromore Upper</b>	39_1544	Crossing & Encroachment	Some roads associated with the Bonagee and Dromore junctions are located within the 1% AEP flood extents of the River Swilly and the Dromore Upper Stream (CFRAM).
<b>Bonagee &amp; Unknown</b>	39_12 and 39_2934	Crossing & Encroachment	Some roads associated with the Bonagee junction are located within the 1% AEP flood extents of the River Swilly and the Bonagee stream (CFRAM).
<b>Dromore 39</b>	39_2954	Crossing & Encroachment	The LX-2,300 Tie-in road, east of Bonagee junction encroaches the Dromore and River Swilly 1%AEP flood extents (CFRAM).
<b>Dromore Upper &amp; Unknown</b>	39_1021 & 39_225	Crossing	These river segments in the vicinity of the proposed development were not identified as liable to flooding under the CFRAM study. However, the 39_225 segment is shown to be liable to flooding under the 0.1%AEP flood event.
<b>Drumreggan</b>	39_1268	Encroachment	The proposed link road west of the Trimragh Interchange encroaches to the low-lying floodplain of this Drumreggan stream channel (between Ch. 0+450 and Ch. 0+710). However, this was identified at flood risk in the CFRAM study.
<b>Maghera_More / Trimragh</b>	39_413/39_576 /39_412	Crossing & Encroachment	The proposed N13 road (between Ch. 2+850 & Ch. 3+000) encroaches on the 1% AEP flood extents of the Maghera More and Trimragh streams.
<b>Leslie Hill (Stream)</b>	39_741	Crossing & Encroachment	The proposed N13 road (between Ch.3+350 & Ch. 3+450) encroaches on the 1% AEP flood extents of this stream.
<b>Farsetmore</b>	39_2476	Crossing & Encroachment	The proposed link road north of the Trimragh Interchange encroaches to the low-lying floodplain of the River Swilly and Farsetmore stream 1%AEP flood extents (CFRAM Study).
<b>Swilly 39 &amp; Corravaddy (Burn)</b>	39_2718/ 39_2724	Crossing & Encroachment	Much of the proposed Bonagee Junction and the Swilly River Bridge approach road are located within the 1%AEP floodplains of River Swilly and Carravaddy River.

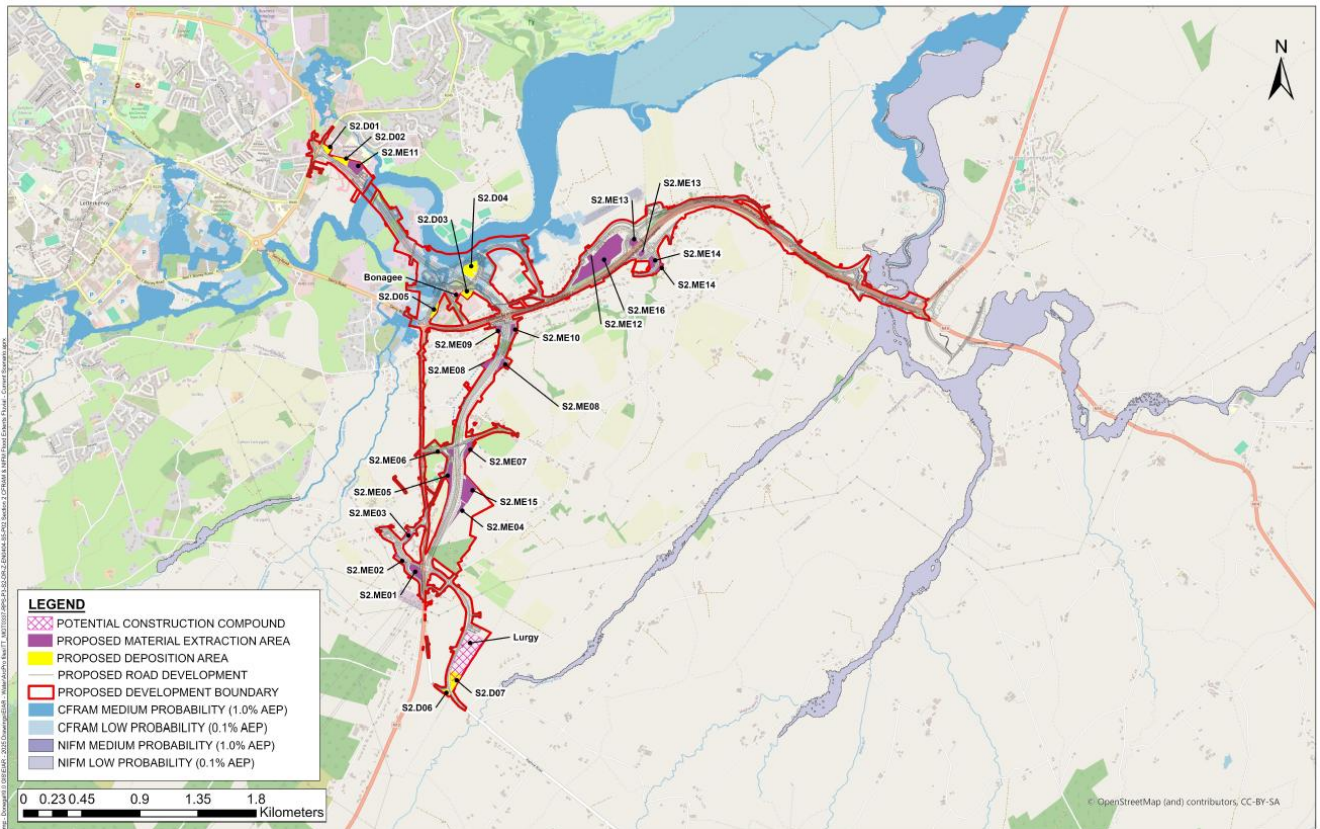


Figure 4-5 CFRAM and NIFM Flood Extent Map (Fluvial – Current Scenario)

### National Coastal Flood Hazard Maps

The River Swilly Estuary is tidally impacted and was modelled under the Irish Coastal Protection Strategy Study (ICPSS, OPW, 2013). This model was updated in 2018 under the Irish Coastal Wave and Water Level Modelling Study (ICWWS, OPW, 2018). Figure 4-6 illustrates the 0.5% AEP and 0.1%AEP tidal flood extents (current scenario) for River Swilly Estuary. It can be seen from this flood map both the River Swilly and Isle Burn floodplains and much of the Bonagee junction are liable to flooding from the 0.5%AEP tidal event.

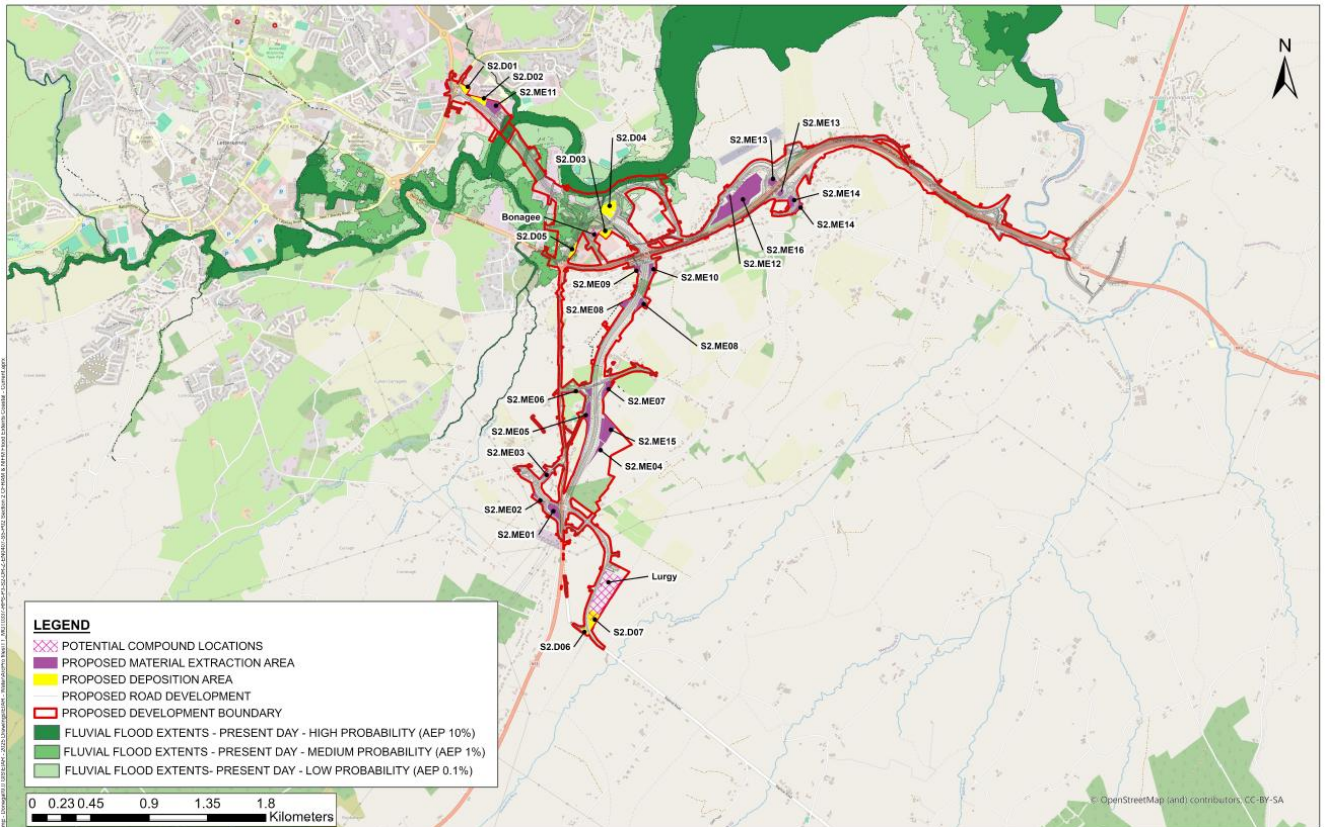


Figure 4-6 National Coastal Flood Hazard Maps

**Strategic Flood Risk Assessment (SFRA), Letterkenny Local Area Plan 2022**

An SFRA for the Letterkenny Local Area Plan 2022 was prepared in accordance with the requirements of The Planning System and Flood Risk Assessment Guidelines for Planning Authorities (2009) Circular PL02/2014 (August 2014). The SFRA provides an assessment of all types of flood risk within the Letterkenny area and provides assistance to Donegal County Council (DCC) to make informed strategic land-use planning decisions and formulate flood risk policies. A Stage 1 Flood Risk Identification was undertaken to identify any flooding or surface water management issues related to Letterkenny that may warrant further investigation. As part of this stage the best available data at the time of preparation was acquired from the OPW North Western CFRAM Study. The North Western CFRAM has generated flood zone mapping which has been deemed suitable as a Stage 2 Initial Flood Risk Assessment. The SFRA examines the Flood Zones A, B and C identified in the North Western/Neagh Bann CFRAMs study with respect to the management of flood risk for development in respect of the Letterkenny land use zoning map.

Further to this, Donegal County Council in conjunction with OPW are currently implementing the Letterkenny Flood Relief Scheme. Donegal County Council has commenced a pilot data collection phase for the Letterkenny Flood Relief Scheme, ahead of appointing a consultant to progress the project.

Figure 4-7 illustrates the flood zones in Section 2 as extracted from the Strategic Flood Risk Assessment (SFRA), –Letterkenny Local Area Plan (2022):

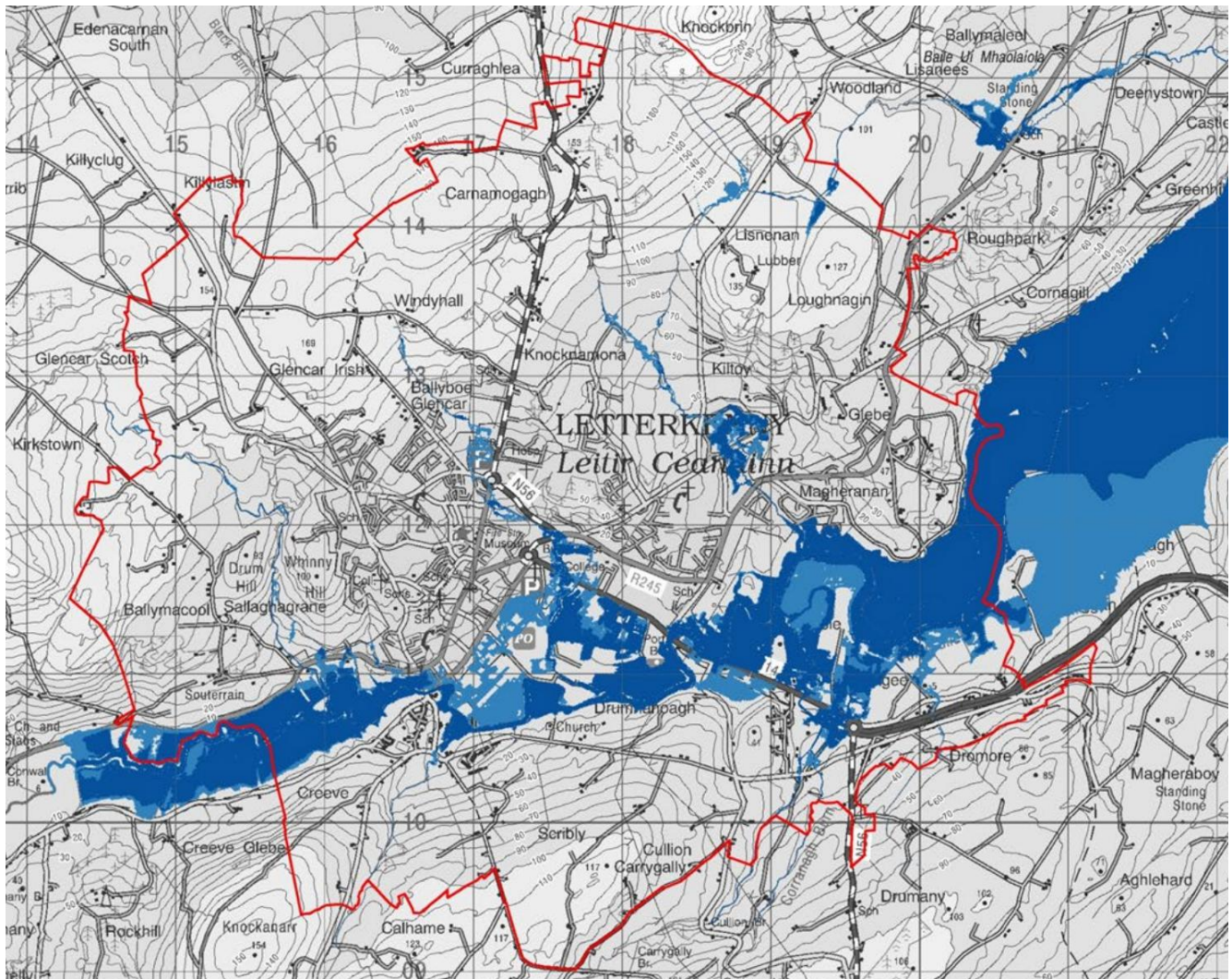


Figure 4-7 Section 2 Flood Zone Map (Letterkenny Local Area Plan SFRA, 2022)

## 4.4 Stage 2 - Initial Flood Risk Assessment

This Stage 2 assessment investigated in more detail the flood risk implications for the proposed road development from available sources. It was carried out to confirm sources of flooding that could affect the development, and to appraise the adequacy of existing information and to scope the extent of the risk of flooding.

The North-Western /Neagh Banna CFRAM studies have generated flood zone mapping which have been deemed suitable as a Stage 2 Initial Flood Risk Assessment. This flood risk information enabled the application of 'The Guidelines' sequential approach, and where necessary the Justification Test, to appraise locations where the proposed road traversed the flood zones.

By the nature of transport infrastructure the crossing of watercourses (rivers and floodplains) are often unavoidable as the purpose is to link lands that are likely to be separated by a number of watercourses. A sequential approach has been adopted in respect to a route selection process for the project which takes into account many environmental factors which include flood risk and hydrology in order to select the most suitable route.

Flood extents maps for the River Swilly and most of its tributaries were prepared under the North-Western Neagh Bann CFRAM studies and ICWW studies through a detailed hydrological and hydraulic modelling of

the associated watercourses and estuaries. The proposed road embankments will encroach these flood prone areas at the relevant bridge crossings.

The above mentioned CFRAM study and ICWW Study prepared flood maps can be used reliably in assessing the initial flood risk for the proposed road section where it exists. However, any impacts of the proposed road scheme on the existing flooding regime cannot be assessed without doing a further detailed flood study.

In the above contexts a Stage 3 -Detailed Flood Risk Assessment has been carried out in order identify any risks to the proposed road development and also to assess any impacts of the proposed development on any existing flooding risk to any lands and properties.

## 4.5 Stage 3 - Detailed Flood Risk Assessment

The extents of the CFRAM and ICWW studies flood mapping in the vicinity of the proposed route shows that there are locations where the proposed road route impacts on the flood events modelled as part of these studies. Where considered necessary, more detailed flood studies have been carried out as part of the Flood Risk Assessment for Section 2. Table 4-4 below shows these locations.

**Table 4-4 Section 2 Road Route - Predictive Flood Risks**

Chainage	River	Flood Source	Description of Flood Risk
Mainline: Ch. 385 to 630	Fluvial & Coastal	River Swilly	Much of the proposed Bonagee Junction and the Swilly River Bridge approach road are located within the 1%AEP floodplains of River Swilly and Carravaddy River. The ICWW Study prepared coastal flood maps also show that much of the approach road and Bonagee junction are also liable to 0.5% AEP tidal flooding. A detailed flood risk assessment has been carried out to size the bridge and determine the impact on the flood plain.
Mainline Ch.	Fluvial	Isle Burn (Leslie Hill (Stream))	The proposed N13 road (between Ch.3+350 & Ch. 3+450) encroaches on the 1% AEP flood extents of this stream. A detailed flood risk assessment has been carried out to size the proposed foot over bridge and determine the impact on the floodplain if any.

### 4.5.1 River Swilly Bridge Crossing

The proposed River Swilly crossing is located at CH385-630 on the main N56/N13 realignment arm where it spans from the townland of Ballyraine to Bonagee. It is a 234 m long 3-span bridge with the largest span 104 m long spanning clearly over the main channel. From CH630 the proposed alignment consists of fill embankment through the Swilly floodplain as it approaches the proposed roundabout junction with the existing N13. Within the floodplain area there are also several proposed local access arms and a roundabout that links with the existing N13 at the Dry Arch Roundabout to provide access to the local business parks and other public amenities.

The River Swilly channel bed level varies from -2.04mOD at the upstream face of the proposed crossing to -2.32mOD at the downstream face. The left channel bank raises to an area of pasture with a ground level rising from 2.40mOD to 4.35mOD. The right channel bank has an existing ground level of approximately 2.60mOD for a length of 8m before rising to a flood defence embankment with level of 4.25mOD. The right overbank (floodplain) consists of agricultural pastures with some business developments dotted throughout.

There are also several drains within the floodplain that outfall to the River Swilly and Corravaddy Burn at several locations. These drains are included in the OPW Arterial Drainage Scheme as well as the flood defence embankments. The river at the proposed crossing structure location is meandering as would be expected with a transitional/estuarial water body and has a main channel width of approximately 50m.

It is apparent from the North – Western Neagh Bann CFRAM Study that the low-lying floodplains of River Swilly at the proposed bridge crossing are predicted to be liable to flooding from 1% AEP & 0.1%AEP fluvial flood events (Figure 4-8). The ICWW Study prepared coastal flood maps also show that much of the approach road and Bonagee junction are also liable to 0.5% AEP tidal flooding (Figure 4-9).

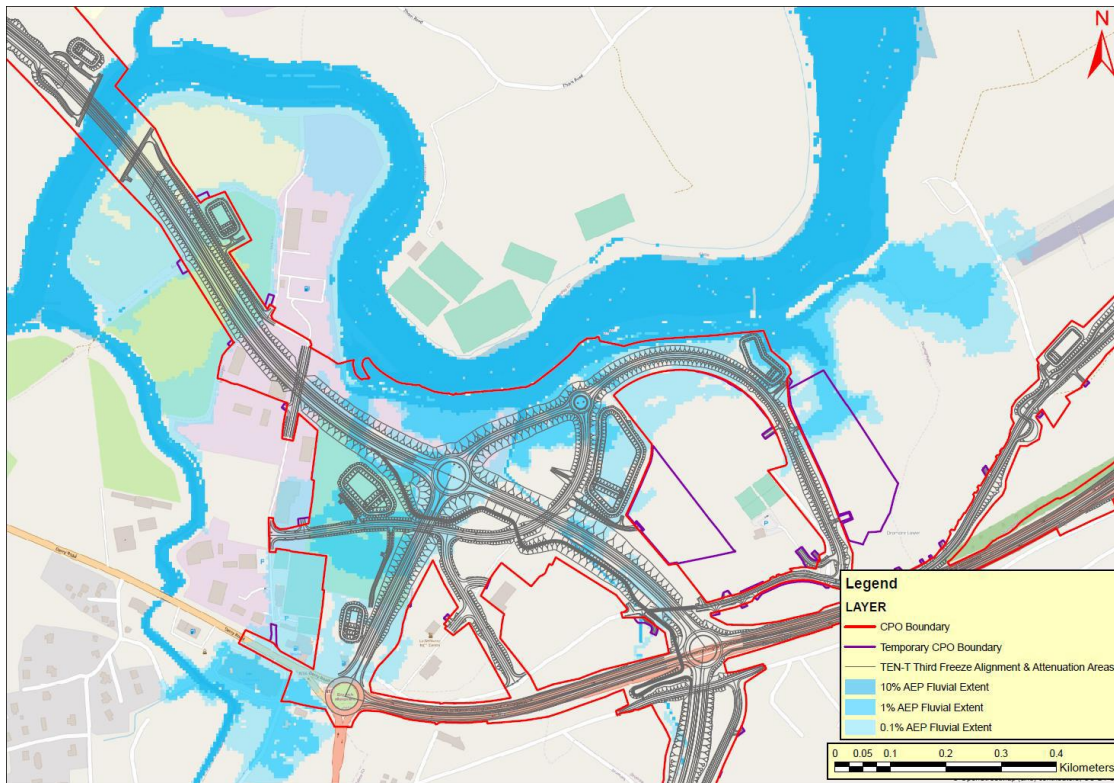


Figure 4-8 River Swilly Crossing - CFRAM current fluvial flood extents with proposed route alignment

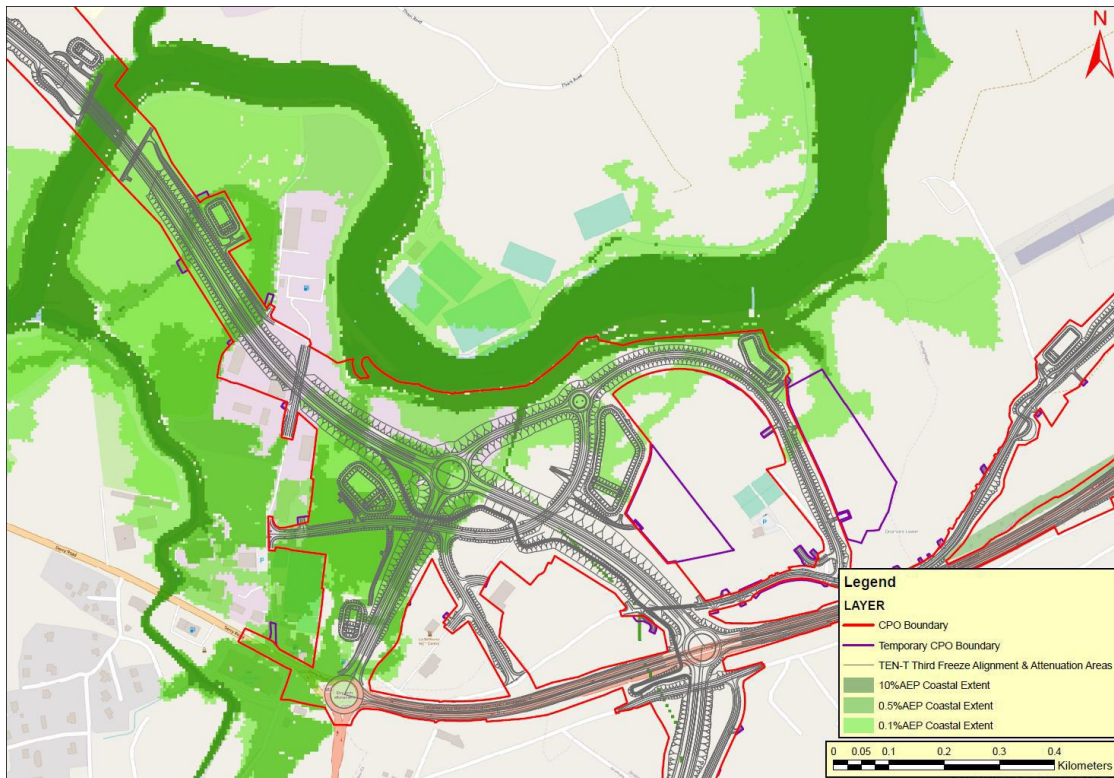


Figure 4-9 River Swilly Crossing – ICWWS predicted tidal flood extents with the proposed route alignment

A detailed flood study was carried out in order to determine any flood risks to the proposed River Swilly bridge crossing and associated approach road and also to assess any impacts of the proposed works on the existing flooding regime in the vicinity. The flood study report is included in Appendix A. A summary of this flood study is provided below:

- An unsteady 1D/2D model was built using HEC-RAS software to model the impacts of the earthworks' volumes on flooding in the study area. The topographical data used to build the existing scenario model geometry included:
  - OPW CFRAM Cross-Sections for the River Swilly (Survey January 2013)
  - OPW LiDAR 2m Digital Terrain Model (DTM) (Flight date 23 June 2008)
  - As-built surveys of bridges/culverts

**Figure 4-10** shows the extent of the River Swilly model reach.

- The hydrological inputs to the model consisted of both fluvial and tidal inputs. Fluvial inputs were developed through use of FSU methodologies for design flow estimates and FSSR16 for hydrographs shapes for Corravaddy and Knocknamona and 'hydrograph borrowing' for River Swilly Hydrograph. The tidal inputs were developed through combination of ICWSS extreme water level outputs, predicted perigean spring tides from January 2014 and an observed design storm surge from January 2014. The hydrological inputs were kept consistent across all scenarios.
- The flood extents output by the model showed an increase in inundated flood areas from the existing to proposed scenarios (see Figure 4-11 and Figure 4-12). Flood compensation areas were proposed to increase flood volume storage locally (see Figure 4-13). The flood compensation areas have been reduced to 1.0mOD (between 500mm and 1600mm deeper than existing ground level) and together they provide approximately 28,000m<sup>3</sup> of storage. The model outputs indicate that the flood compensation areas effectively mitigate the impacts of the proposed route alignment on flood impact locally (see Figure 4-14).
- The model outputs showed a very minimal net headloss through the bridge crossing and the available freeboard over the design flood level is in the order of 4.073m.
- A Section 50 Application for this River Swilly bridge crossing was submitted to OPW.

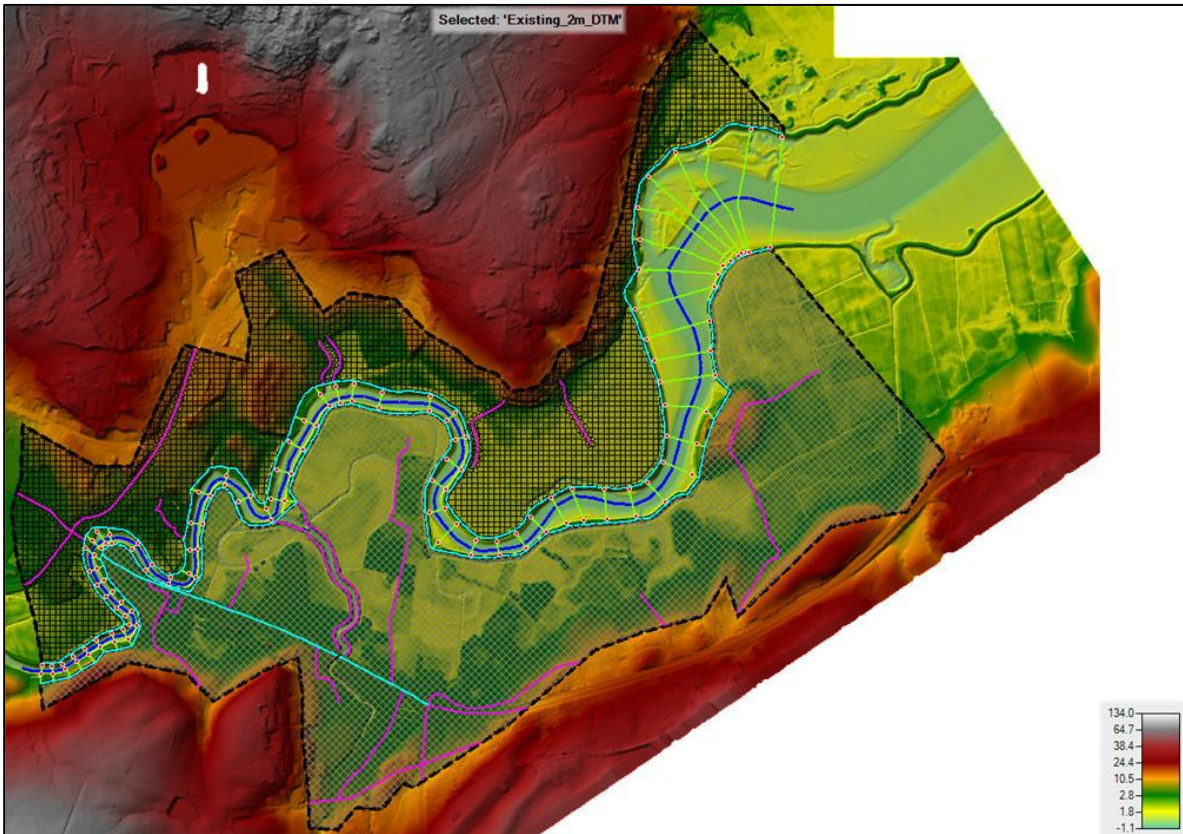


Figure 4-10 HEC-RAS model extent

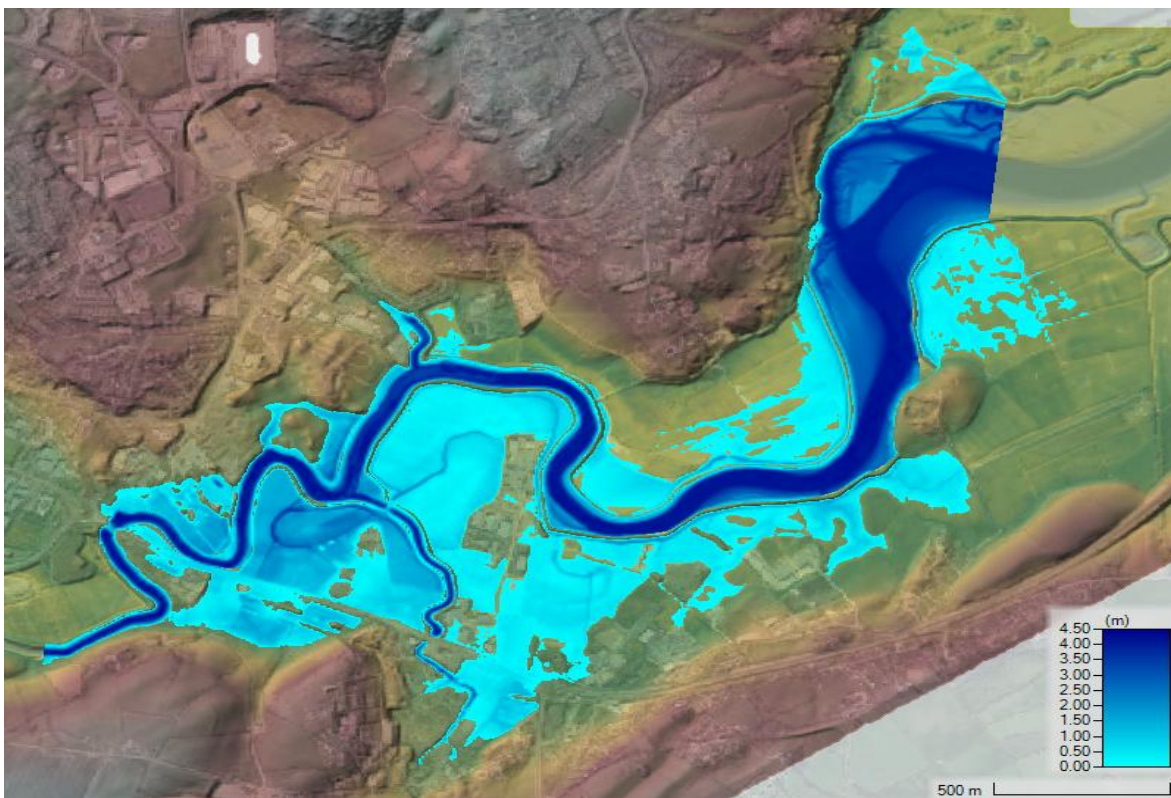


Figure 4-11 Flood extents/depths for the existing condition (0.5% AEP flood event)

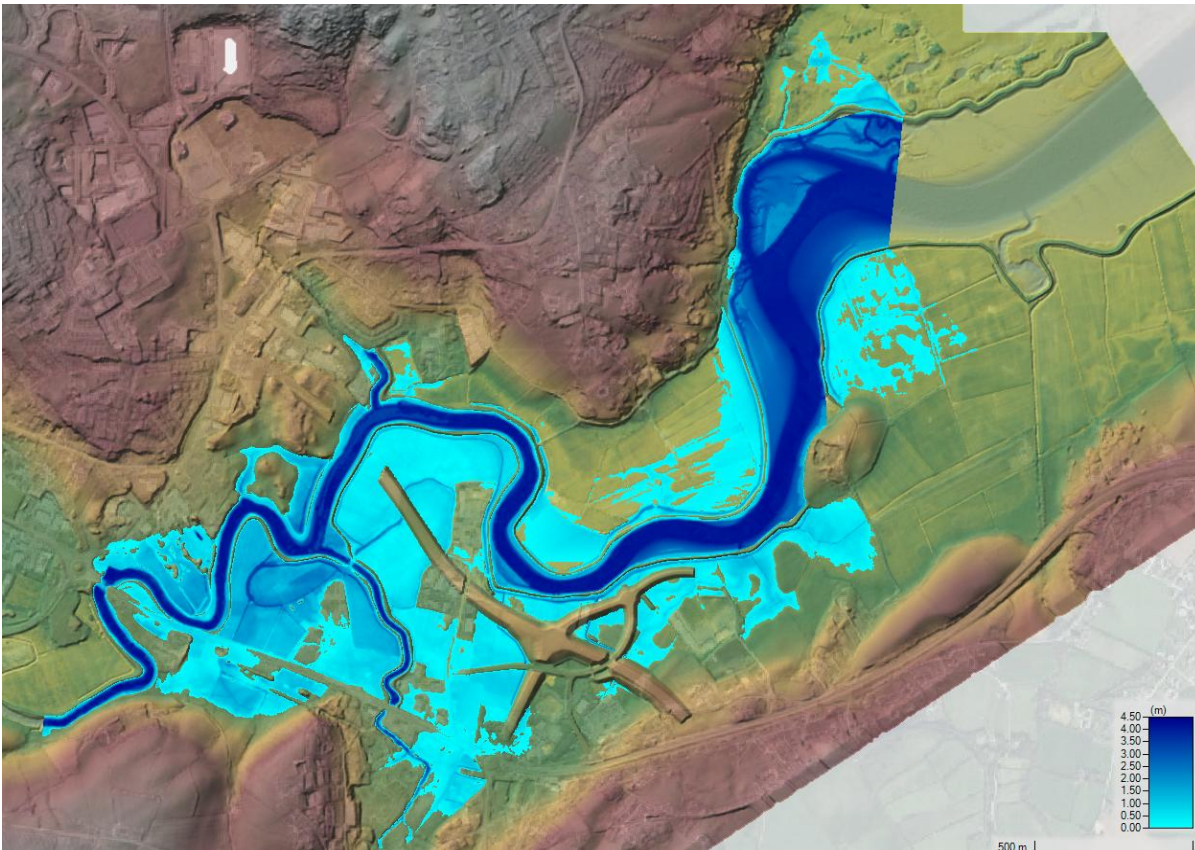


Figure 4-12 Flood extents/depths for the proposed condition (0.5%AEP flood event)

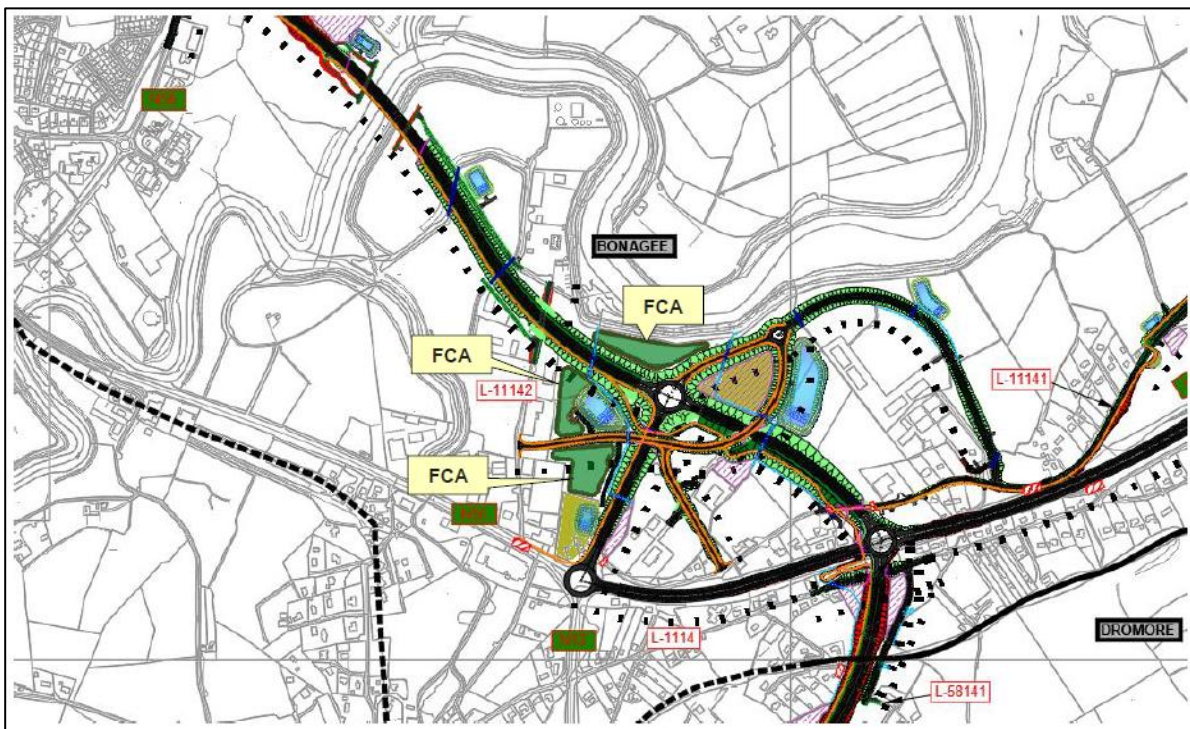
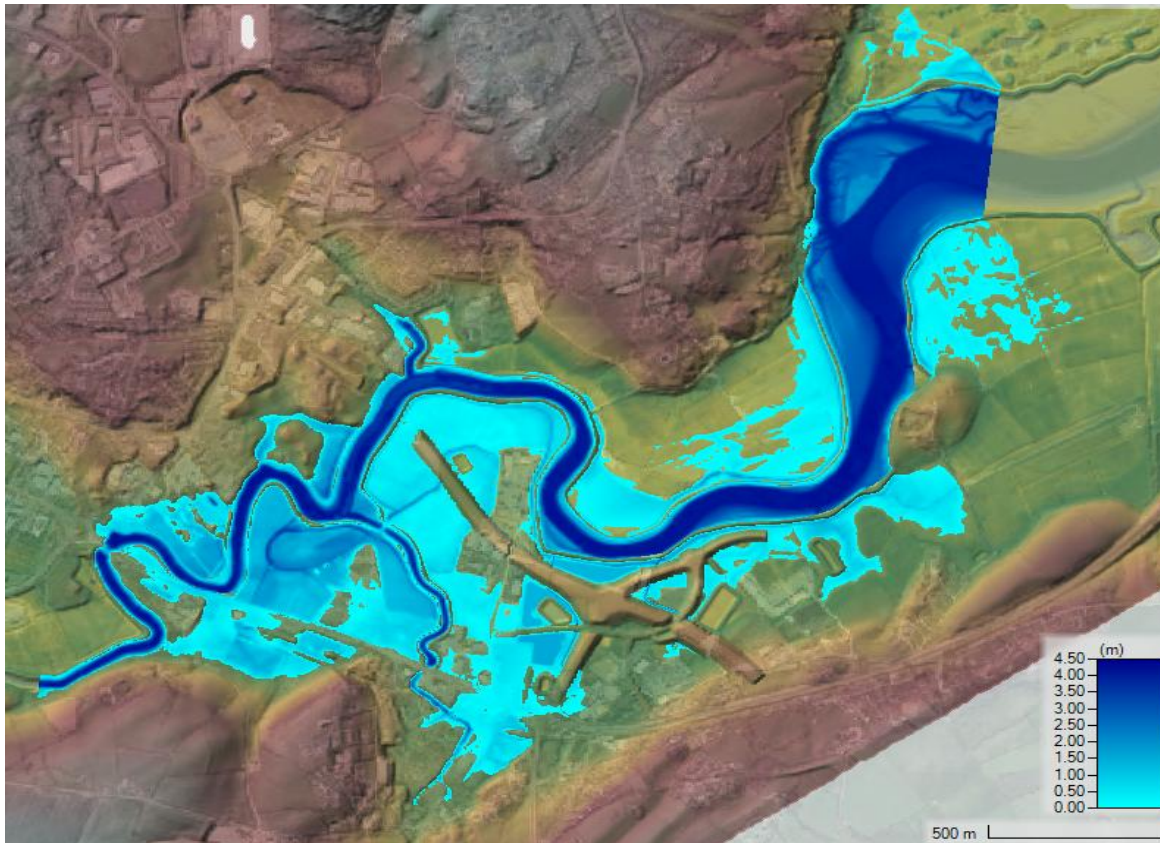


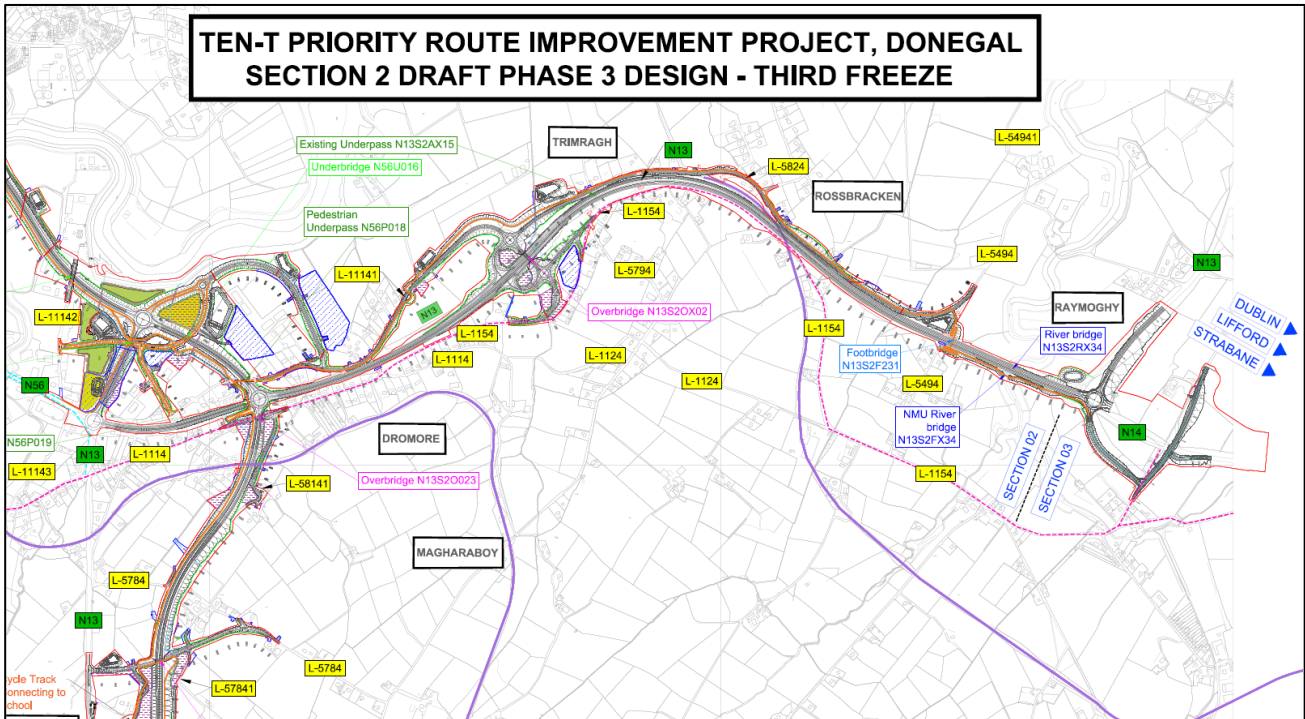
Figure 4-13 Locations of Flood Compensations Areas (FCA)



**Figure 4-14 Flood extents/depths for the proposed condition with mitigation measures (0.5% AEP flood event)**

#### 4.5.2 Isle Burn Footbridge

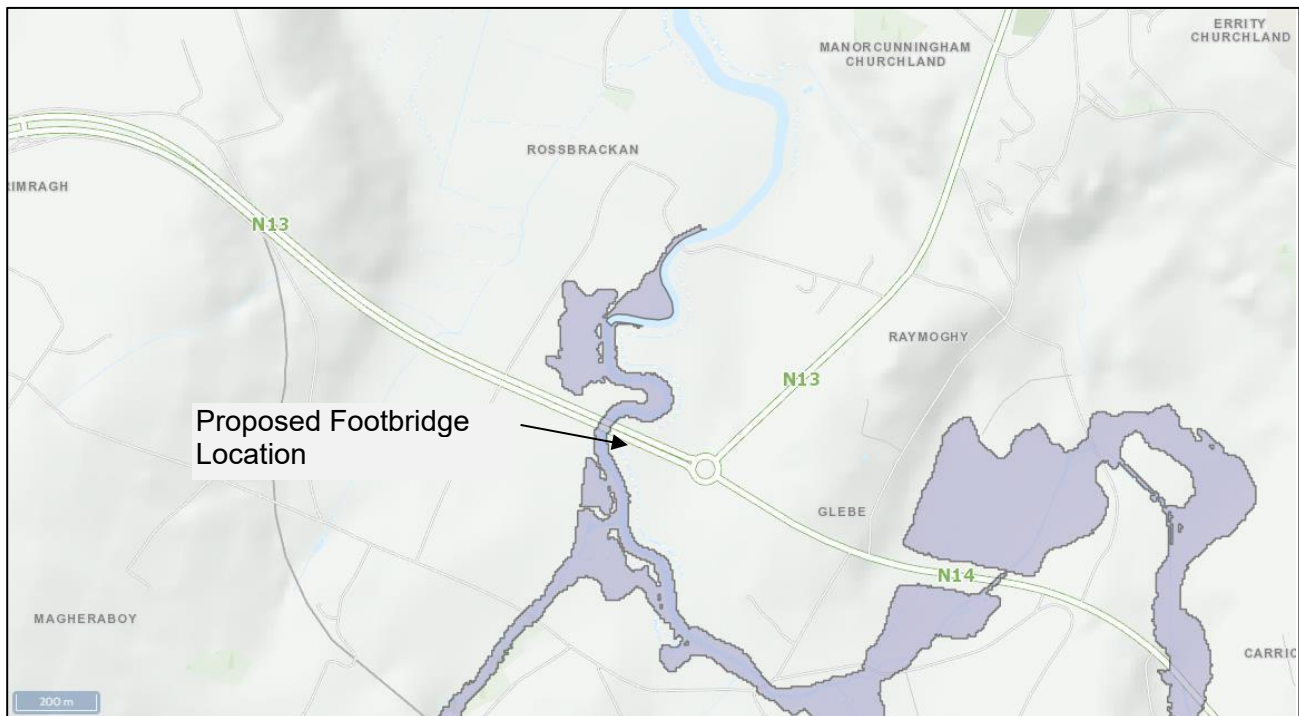
The proposed works at Section 2 – N56/N13 Letterkenny to Manorcunningham include the provision of a pedestrian footbridge (ref. N13S2FX34). The proposed footbridge is located on the eastern arm of Section 2 at CH. 3400 and will traverse the Isle Burn approximately 5km east of Letterkenny. The stream at this location flows in a south-north direction and outfalls to the River Swilly/Lough Swilly Estuary approximately 4km downstream. The location of the proposed bridge is shown in Figure 4-15.



**Figure 4-15 Location of the Isle Burn footbridge**

The proposed footbridge is a 40 m single span bridge with a minimum soffit level of 6.3mOD and a finished deck level of 6.5mOD.

The OSi 25inch historical map shows evidence of flood defence berms along the riverbank and lands “liable to floods”. The map also shows the location of the highest point to which ordinary tides flow just downstream of the proposed footbridge. The Isle Burn was not included under the CFRAM study, so no predictive flood extents are available for the river at the proposed footbridge location. The Lough Swilly estuary was included in the model in the 2D domain and some predicted flood levels in the estuary downstream of the Isle Burn are available. The NIFM mapping available on floodinfo.ie has also been consulted to identify any flood risk to the existing site. The mapping shows some out of bank flooding upstream and downstream of the proposed crossing (see Figure 4-16).



**Figure 4-16 NIFM Flood Mapping**

A detailed flood study for this bridge crossing was carried out to determine any flood risks to the proposed bridge crossing and associated approach road and also to assess any impacts of the proposed works on the existing flooding regime in the vicinity. This flood study report is included in Appendix B. A summary of this flood study is provided below:

- A steady state 1D model was built using HEC-RAS software to model the impacts of the proposed bridge on flooding in the subject area. See **Figure 4-17** for the HEC-RAS model extent. The model was run for 1%AEP fluvial flow inclusive of an additional 20% flow for climate change with the 200-year tidal level inclusive of 500mm climate change addition to water level at the model downstream boundary.
- The estimation of design flows is based on the best practice guidance for Irish catchments generally as outlined in the Flood Studies Update (FSU). This methodology included the estimation of Qmed using the PCD 7-v equation and the measured PCDs of the ungauged catchment as well as using a pivotal site to adjust the Qmed estimates. Growth curves required to generate the design floods were developed using the FSU methodology for pooling group analysis utilising a Region-Of-Influence (ROI) approach and hydrometric records as of 2019. The Generalized Logistic distribution was used as a conservative measure as it has a more conservative concave upward increasing shape with increase in return period while the GEV distribution appears to flatten out.
- Both the existing and proposed scenarios were modelled to illustrate any impacts the proposed works may have on the flooding regime at the site. The existing scenario was modelled using detailed topographical survey information while the proposed scenario considered the proposed footbridge works.
- It was found that there was 2.24m freeboard between the 0.5%AEP MRFS water level and the proposed footbridge soffit. There was no increase in water level at the site from existing to proposed scenarios.
- A Section 50 Application for this footbridge was submitted to OPW (see Appendix B).



Figure 4-17 HEC-RAS model extent

### 4.5.3 Culvert Crossings along Proposed Road

A Section 50 Application and Technical Report for all 37 culverts was submitted to OPW in accordance with the Section 50 of the Arterial Drainage Act, 1945, where the proposed road crosses an existing watercourse. This Section 50 Technical Report assessed the design flood flows for these culverts, the existing and proposed flood levels and the potential impact on flooding by the proposed culverts and the proposed road. This report is included in Appendix C and a summary of the findings outlined below.

The design flood flow for each of the culverts is the 100-year return period flood flow with 20% Climate Change allowance. Where relevant the OPW arterial drainage scheme factor of 1.6 was used. In estimating the design flows the UK Institute of Hydrology Report 124 recommended method (IH 124) and the OPW FSU research recommended 3-Variable and 5-Variable methods were used. Refer to the Section 50 report provided in Appendix C for further details of the design flow estimation methods.

All culverts were sized based on the calculations set out in the updated CIRIA Culvert, Screen and Outfall Manual (2019), CIRIA Report No. C786. A summary of the results for each of the culvert references is presented below in Table 4-5 below.

**Table 4-5 Proposed Culvert Sizes & Hydrological Calculation Outputs**

Culvert Ref	Catchment Area (km <sup>2</sup> )	SAAR (mm)	Design Flow (Q <sub>100</sub> + 20% CCA)	Culvert Diameter (m) / Width (m) x Height (m)	Length (m)	Depth of Embedment (m)	Culvert Gradient (1:x)	Freeboard (m)	Net Head Loss (m)
S2-CUL.01	0.06	1215.9	0.130	1.2Ø	26.3	0.3	28.7	0.595	0.009
S2-CUL.02	0.06	1215.9	0.139	1.2Ø	8.047	0.3	6.2	0.759	0.034
S2-CUL.03	0.06	1215.9	0.139	1.2Ø	40.840	0.3	128.0	0.674	0.001
S2-CUL.04	0.06	1215.9	0.139	1.2Ø	8.324	0.3	108.1	0.674	0.001
S2-CUL.05	0.05	1215.9	0.136	1.2Ø	20.086	0.3	499.6	0.573	0.005
S2-CUL.06	0.09	1215.9	0.221	1.2Ø	55.443	0.3	37.6	0.621	0.068
S2-CUL.07	0.29	1215.9	0.507	1.2Ø	20.371	0.3	83.1	0.429	0.183
S2-CUL.08	0.29	1215.9	0.507	1.2Ø	20.191	0.3	26.9	0.332	0.127
S2-CUL.09	0.29	1215.9	0.507	1.2Ø	32.717	0.3	79.8	0.316	0.130
S2-CUL.10	0.19	1215.9	0.441	1.2Ø	10.144	0.3	10.1	0.495	0.182
S2-CUL.11	0.20	1215.9	0.480	1.2Ø	21.152	0.3	70.5	0.444	0.164
S2-CUL.12	0.24	1215.9	0.415	1.2Ø	28.139	0.3	281.4	0.488	0.145
S2-CUL.13	0.34	1215.9	0.616	1.5Ø	45.669	0.3	374.3	0.714	0.094
S2-CUL.14	0.11	1215.9	0.270	1.2Ø	45.915	0.3	499.1	0.421	0.036
S2-CUL.15	0.11	1215.9	0.270	1.2Ø	10.000	0.3	500.0	0.551	0.021
S2-CUL.16	0.80	1137.71	2.820	1.25 x 1.75	52.64	0.5	11.0	0.384	0.205
S2-CUL.16A	0.80	1137.71	2.820	1.75 x 1.75	59.1	0.5	51.4	0.386	0.266
S2-CUL.17	1.15	1137.71	3.950	2.5 x 2.0	8.96	0.5	90.5	0.360	0.075
S2-CUL.18	1.24	1137.71	4.240	2.9 x 2.1	83.070	0.5	276.9	0.503	0.280
S2-CUL.19	1.24	1137.71	4.240	2.9 x 2.5	34.500	0.5	65.7	1.040	0.002
S2-CUL.20	1.33	1137.71	4.520	2.9 x 3.3	65.032	0.5	168.9	1.731	0.204
S2-CUL.21	0.20	1215.9	0.383	2.0 x 3.2	48.406	0.5	444.1	2.005	0.293
S2-CUL.22	0.32	1215.9	0.584	2.5 x 3.4	25.419	0.5	334.5	2.248	0.290
S2-CUL.23	0.32	1215.9	0.584	3.3 x 3.5	71.011	0.5	438.3	2.374	0.230
S2-CUL.24	0.14	1215.9	0.215	1.25 x 1.35	67.670	0.5	284.3	0.559	0.053
S2-CUL.25	0.26	1215.9	0.252	2.0 x 2.5	95.214	0.5	857.7	1.699	0.103
S2-CUL.26	0.07	1215.9	0.149	1.5 x 2.6	41.017	0.5	156.6	1.826	0.002
S2-CUL.27	0.08	1215.9	0.181	1.2Ø	31.335	0.3	482.1	0.650	0.021
S2-CUL.27A	0.04	1215.9	0.098	1.2Ø	13.490	0.3	269.8	0.517	0.003
S2-	0.04	1215.9	0.098	1.2Ø	20.400	0.3	408.0	0.636	0.008

Culvert Ref	Catchment Area (km <sup>2</sup> )	SAAR (mm)	Design Flow (Q <sub>100</sub> + 20% CCA)	Culvert Diameter (m) / Width (m) x Height (m)	Length (m)	Depth of Embedment (m)	Culvert Gradient (1:x)	Freeboard (m)	Net Head Loss (m)
CUL.27B									
S2-CUL.28	0.35	1215.9	0.743	1.5Ø	35.500	0.3	23.3	0.682	0.193
S2-CUL.29	0.93	1135.91	2.950	3.5 x 2.0	26.553	0.5	53.1	0.816	0.260
S2-CUL.30	0.93	1135.91	2.950	3.5 x 2.0	37.919	0.5	379.2	0.734	0.297
S2-CUL.31	0.93	1135.91	2.950	3.5 x 2.0	66.879	0.5	27.3	0.828	0.187
S2-CUL.32	1.54	1135.91	7.540	3.5 x 4.0	79.190	0.5	92.9	2.254	0.147
S2-CUL.33	0.23	1215.9	0.482	1.2Ø	89.350	0.3	20.1	0.438	0.251
S2-CUL.34	1.02	1136.13	2.500	1.8Ø	75.700	0.3	232.2	0.514	0.249

It can be seen from the above table that net headlosses are less than the OPW Section 50 Guidelines specified headloss of 300mm in all cases, and the available freeboards above the design flood levels are greater than the OPW Section 50 Guidelines specified freeboard of 300mm in all cases.

At all crossings encroachments within the watercourses floodplains have been minimised such that any increase in flood levels in the upstream or downstream vicinity due to flood volume storage loss will be minimal. Furthermore, rock armours have been proposed at the inlets/outlets of all culverts in order to reduce any risk of scouring in the channel beds.

#### 4.5.4 Road Drainage Outfalls and Attenuation Ponds

The proposed road development drainage solution involves the collection of pavement runoff and the discharge of this storm water to watercourses. For the mainline carriageway a total of 2 no. drainage networks have been proposed, while for the side roads 10no. separate drainage network have been proposed. Road runoff from the drainage network will initially discharge into 12no. attenuation ponds and then into the existing natural watercourses via 12no. outfalls. Figure 3-2 illustrates the locations of all outfalls.

Attenuation features are sized for the 1 in 100year design storm event, and a controlled discharge not exceeding the existing greenfield flood runoff rate is achieved through use of a flow control such as a hydrobrake device or orifice plate on the outfall. They will be designed as hybrid wetlands, so they provide both an attenuation function and a water treatment function. Flood compensatory measures will be provided where the provision of the attenuation pond reduces the area available to flood in the current scenario.

The details of the 12-no. attenuation are provided in Table 4-6 below.

The drainage system as designed will mitigate the flood risk due to the proposed development. However, any residual flood risk associated with the attenuation pond and potential blockage of the flow control will be mitigated by providing pond overflow. Regular inspection of the ponds and their flow control outfall device is proposed, and such inspections will significantly reduce the potential residual risk.

**Table 4-6 Section 2 – Proposed Attenuation Pond details and outfall locations**

Ref. No.	Attenuation Pond Details							Outfall locations	
	Easting	Northing	Total Catchment Drainage Area (ha)	Greenfield Runoff Rate (l/s)	Pavement Area (ha)	Attenuation Pond – Volume of Storage (m3)	Invert Level of Attenuation Pond (m)	Easting	Northing
1	619889.418	908312.272	1.656	16.13	1.132	793	89.266	620014.4	908275.508
2	619218.194	909029.663	1.776	17.296	0.772	851	92.822	619207.8	909103.96
3	619569.217	909729.556	1.79	17.438	0.882	857	61.715	619583.1	909764.597
4	619510.998	910798.814	0.552	5.378	0.48	243	1.969	619536.1	910832.264
5	619984.873	911080.825	18.959	184.679	11.43	9299	1.417	619978.6	911202.441
6	619272.069	911526.450	2.048	19.953	1.862	985	1.3	619238.2	911551.28
7	619032.408	911816.693	1.062	10.343	0.559	459	5.333	619084.1	911775.622
8	620799.231	911295.331	1.181	11.503	0.69	583	1.828	620843.3	911429.385
9	621267.942	911562.239	7.126	69.419	5.07	3420	2.417	621219	911625.643
10	622807.578	911039.897	1.835	17.873	0.686	915	2.13	622739.7	911157.954
11	619533.722	911034.733	2.067	20.134	0.753	1019	0.536	619516.7	911096.939
12	620241.474	911266.207	1.915	18.654	1.844	941	2.051	620205.8	911296.037

#### 4.5.5 Material Extraction and Deposition (MED) Areas

A number of Material Extraction and Deposition (MED) areas have been highlighted for permanent placement of non-structural engineering fill material across the Proposed Development. Any material resulting from the earthworks operations that cannot be re-used as engineering fill will be placed into the MED areas for filling and landscaping purposes. The placement of the material could potentially impact on the flood risk in certain areas if it is placed within existing flood risk areas. A number of MED areas have been identified along the proposed route and generally these sites have avoided floodplain areas and flood risk areas. A drainage system for these deposit sites will be designed that achieves a SuDS response allowing these areas to discharge at natural greenfield runoff rates.

## 5 CONCLUSIONS AND SUMMARY

A Flood Risk Assessment of the proposed road development was carried out and the findings are summarised in Table 5-1 below:

**Table 5-1 Proposed Road Development FRA Summary**

SECTION 1	FRA Summary
Site Description	<p>Section 2 route corridor is 9 km long and runs to the south and east of Letterkenny with a number of local road interfaces including with N13 and N56. It includes, 4.4 km of Type 2 divided Road in total across several sections, extending from Listellian to Dromore to Ballyraine , 0.3 km of Type 1 single carriageway extending from N13 southern tie-in to the Listellian junction, 0.7 km of Type 1 Dual Carriageway (realigned and improved) extending from Dry Arch Junction to Dromore Junction, and 3.7 km of Type 1 Dual Carriageway (realigned and improved) extending from Dromore Junction to the interface with Section 3 west of the existing N13/N14 Pluck Roundabout.</p> <p>The alignment of the proposed road development and its associated link roads cross several fluvial floodplain areas as a result of the nature of transport infrastructure which in some cases is unavoidable.</p> <p>The proposed route for Section 2 lies within the River Swilly catchment area Catchment and forms part of the National Hydrometric Area -39. The main surface water features include the River Swilly, River Pluck (Leslie Hill Stream) and their tributaries, as well as the Swilly Estuary. There are two bridge structures proposed along the mainline carriageway of Section 2 road, namely, River Swilly crossing at Letterkenny an and a footbridge over Isle Burn.</p>
Vulnerability Category	The proposed road development is essential infrastructure and is therefore considered to be highly vulnerable development in accordance with the FRMPG.
Flooding Mechanisms	Fluvial flooding from the River Swilly and its tributaries. River Swilly at Letterkenny is also affected by tidal flooding from Swilly estuary.
Benefitting from flood defences or flood relief scheme	There are a significant number of existing streams and rivers that the proposed development traverses along the Section 2 route. The OPW Arterial drainage mapping was consulted and there is evidence that the River Swilly and surrounding lands benefit from arterial drainage.
Historical Flooding	There are three instances of historical flooding recorded upstream of the Shell Bridge on the Corravaddy Burn and a further two instances of previous flooding recorded upstream on the River Swilly. It is apparent from the recorded flood history that the River Swilly and Corravaddy Burn has frequently flooded its banks in the past. However, there are no recorded instances of flooding at the proposed crossings of River Swilly and Isle Burn River. River Swilly at Letterkenny is also affected by tidal flooding from Swilly estuary.

**SECTION 1****FRA Summary****Flood Risk**

In the North – Western Neagh Bann CFRAM Study the low-lying floodplains of River Swilly at the proposed bridge crossing are predicted to be liable to flooding from 1% AEP & 0.1%AEP fluvial flood . The Irish Coastal Wave and Water Levels Modelling Study prepared coastal flood maps also show that much of the approach road of the Swilly River crossing and Bonagee junction Letterkenny re also liable to 0.5% AEP tidal flooding.

A detailed flood study was carried out in order to determine any flood risks to the proposed Swilly River bridge crossing and associated approach road and also to assess any impacts of the proposed works on the existing flooding regime in the vicinity. This impact assessment was carried out through building an unsteady 1D/2D HEC-RAS hydraulic model. The flood extents output by the model showed an increase in inundated flood areas from the existing to proposed scenarios. Flood compensation areas were proposed to increase flood volume storage locally. The flood compensation areas have been reduced to 1.0mOD (between 500mm and 1600mm deeper than existing ground level) and together they provide approximately 28,000m<sup>3</sup> of storage. The model outputs indicate that the flood compensation areas effectively mitigate the impacts of the proposed route alignment on flood impact locally.

The historical OSi 25inch historical map shows evidence of some flooding at the proposed Isle Burn footbridge crossing. The OPW NIFM mapping shows some out of bank flooding upstream and downstream of the proposed crossing. A detailed flood risk assessment (FRA) for this bridge crossing was carried out to determine any flood risks to the proposed bridge crossing and associated approach road and also to assess any impacts of the proposed works on the existing flooding regime in the vicinity. This impact assessment was carried out through building a steady 1D HEC-RAS hydraulic model. It was found that there was adequate freeboard available above the 0.5%AEP water level at this proposed footbridge soffit. There was no increase in water level at the site from existing to proposed scenarios.

A total of 37 culverts will be required where the proposed road development crosses existing watercourses. The topography and small catchment areas ensure that the associated flood zones to these streams are localised with relatively narrow floodplain widths along these streams. The proposed culvert sizes are very generous and will not result in any constriction to flow.

Section 50 approval concerning flooding and flood capacity of all culverts and the River Bridges is subject to OPW Consent.

Other localised sections where the proposed road crosses and encroaches on flood areas were identified. There are some attenuation ponds and sections of the road embankment that encroaches on fluvial and/or coastal flood extents for different AEP. They have been assessed to analyse the impact on flood areas and determine the minimum level of the road and attenuation ponds. The impact is generally minor or imperceptible.

Road drainage outfalls discharging to receiving surface and groundwaters without flood flow attenuation could increase downstream and local flooding at the discharge points. This has been mitigated in the drainage design through suitably sized attenuation ponds and outlet flow controls for the mainline and large side roads.

**Climate Change**

The predicted increases in fluvial flood flows of 20% is generally considered and catered for in the design.

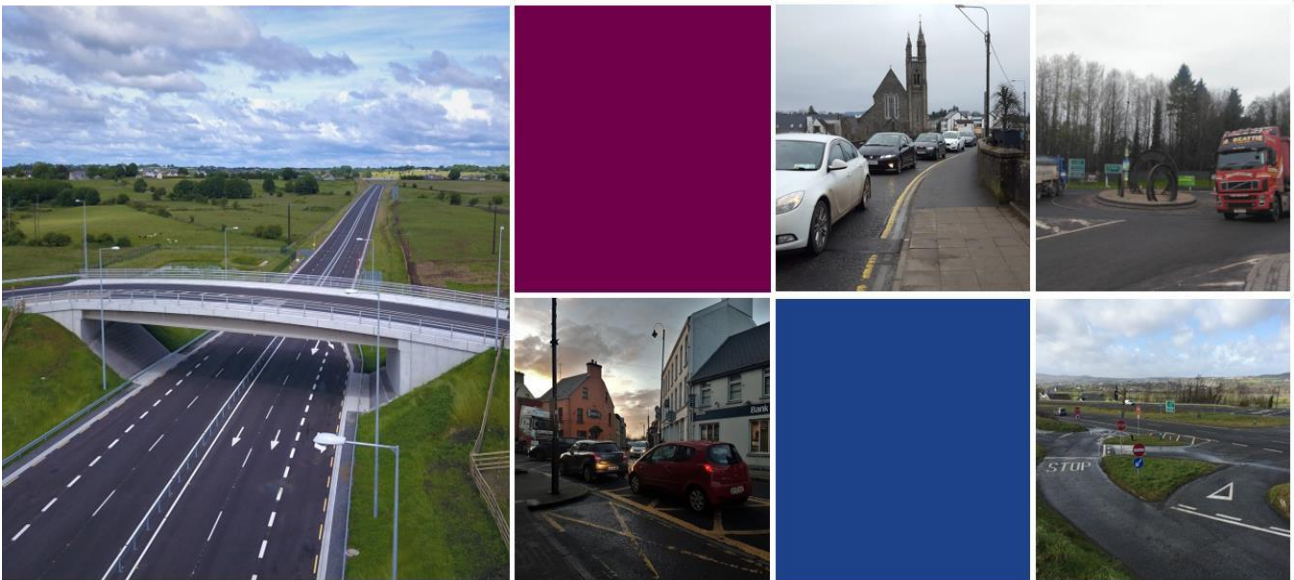
**SECTION 1 FRA Summary**

Mitigation Measures	<p>At all crossings, encroachments within the watercourse's floodplains have been minimised such that any increase in flood levels in the upstream or downstream vicinity due to flood volume storage loss would be minimal.</p> <p>All bridge/culverts are sized for 1% AEP design flows such that net headlosses are less than the OPW section 50 Guidelines specified headloss of 300 mm, and also the available freeboards above the design flood levels are greater than the OPW section 50 Guidelines specified freeboard of 300 mm in all cases. Any deviations from this will be subject to approval by the OPW and subsequent Section 50 Consent.</p> <p>Increased road runoff is proposed to be attenuated to greenfield runoff rates through attenuation ponds before discharging into the natural watercourses or infiltration trenches when discharging into the groundwater for small sections of side roads.</p> <p>Rock armours have been proposed at the inlets/outlets of all culverts in order to reduce any risk of scouring in the channel beds.</p> <p>Sustainable road drainage systems, e.g., filter drain, grass surface water channels are generally proposed in areas where the groundwater vulnerability risks are not high.</p> <p>Provision of surface water collector drains parallel, and adjacent to, the toe of earth embankments.</p> <p>Provision of granular drainage blankets (starter layers) at the base of earth embankments over sloping ground to minimise confinement of overland and/or near-surface flow on the upslope side of the embankment.</p> <p>Attenuation ponds within flood plains are to be bunded 500 mm above the flood level.</p>
Residual Risk	<p>Mitigation measures have been implemented as specified above and through the report for the flood risk areas but also for the impact that the proposed road involves in terms of causing flood risk. There is still a residual risk in some of the areas and elements of the proposed road:</p> <p>Potential blockages to culverts and bridges on streams and the lack of maintenance could present a localised residual flood risk.</p> <p>The construction of attenuation ponds and infiltration trenches along the proposed scheme development represent a potential source of flood risk should these ponds/infiltration trenches be overtopped or fail.</p> <p>Residual risk of localised flooding on proposed road carriageway due to blockages/failure within drainage network.</p> <p>The disposal of storm water via engineered infiltration trenches represents a potential source of flood risk should the discharge exceed the infiltration capacity of the trench or the reduction over time of the performance of the trench as a result of silt deposition etc.</p>

# APPENDIX A: HYDROLOGICAL IMPACT STUDY RIVER SWILLY CROSSING, BONAGEE

# HYDROLOGICAL IMPACT STUDY RIVER SWILLY CROSSING, BONAGEE

TEN-T Priority Route Improvement Project, Donegal  
 Section 2 N56/N13 Letterkenny to Manorcunningham



TT\_MGT0337-RPS-P3-S2-RP-D-DR0002 S3 P03

Hydrological Impact Study  
 River Swilly Crossing, Bonagee  
 S3 P03

June 2025

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Appendix A – Section 50 Application Form

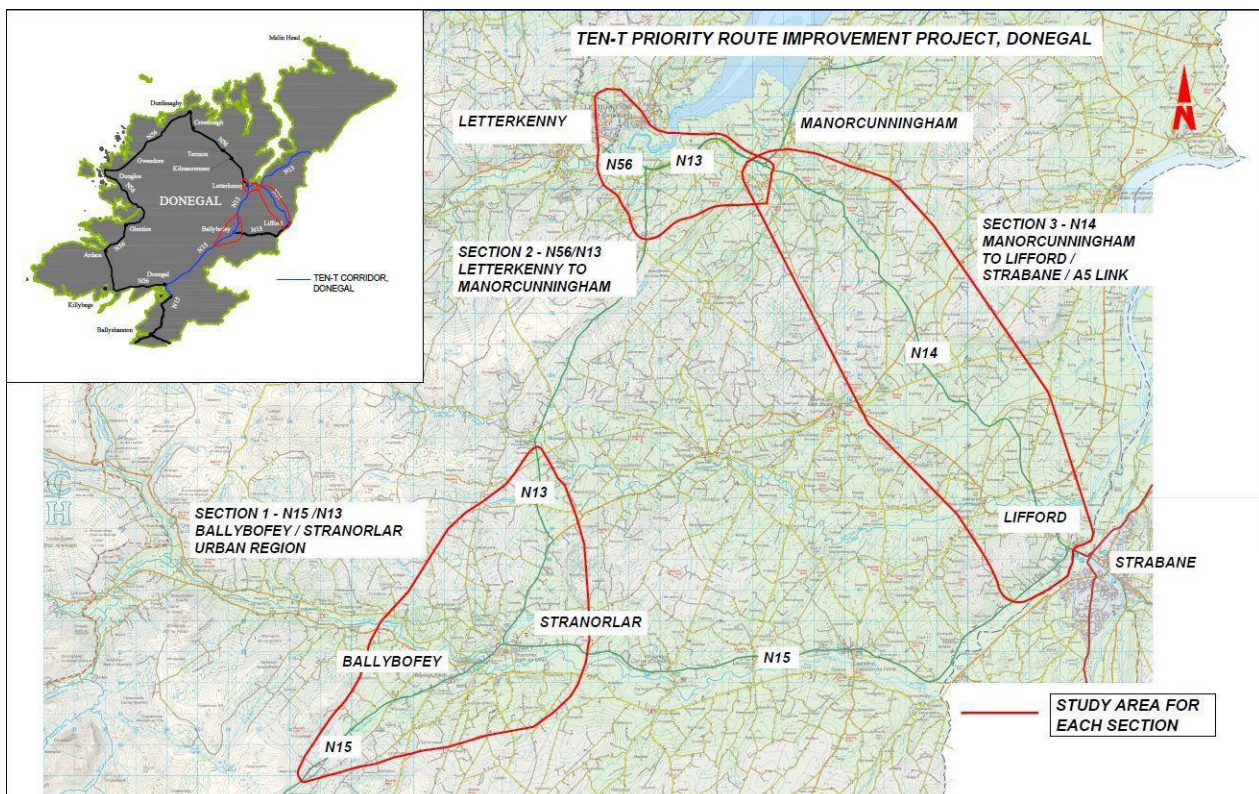
Appendix B - Drawings

# 1 INTRODUCTION

In January 2017, Donegal County Council appointed joint venture RPS/Barry Transportation as design consultants for the Trans-European Network - Transportation (TEN-T) Priority Route Improvement Project, Donegal. The project is divided into three sections as illustrated in **Figure 1.1**.

- Section 1 – N15/N13 Ballybofey / Stranorlar Urban Region
- Section 2 – N56/N13 Letterkenny to Manorcunningham
- Section 3 – N14 Manorcunningham to Lifford / Strabane / A5 Link.

The study areas were developed based on the Sections above and allowing for areas to sufficiently consider constraints, options development, and future road improvements.



**Figure 1.1 Study Areas for the TEN-T Priority Route Improvement Project, Donegal**

## 1.1 Purpose of Report

This report is solely concerned with Section 2 – N56/N13 Letterkenny to Manorcunningham and the determination of the flood impact (if any) to the River Swilly, its tributaries, and their respective floodplains and to outline and evaluate any proposed mitigation measures associated with the River Swilly crossing at Bonagee.

## 1.2 Proposed Route

The proposed Section 2 route upgrade commences at Lurgybrack at the existing N13 Ballybofey/Letterkenny Road approximately 2.1km south of the existing Dry Arch Roundabout. The proposed realignment takes a north-northeast direction from the proposed Lurgy roundabout as it departs from the existing N13 road and continues similarly until it meets the existing N13 Letterkenny-Derry Road at Dromore. From here, a proposed roundabout will provide access to the N13 Letterkenny-Derry Road to the east as well as to the Dry Arch Roundabout to the west. Another alignment will be provided in a north western direction through the townland of Bonagee, across the River Swilly to connect to the existing N56 via roundabout at Ballyrairie. Another major roundabout is proposed at Bonagee to connect the local roads with the Dry Arch Roundabout. The route upgrade also provides many tie-ins and minor roundabouts to maintain access and egress to and from local roads.

As seen in **Figure 1.2**, the proposed route crosses the River Swilly approximately 1.5km downstream of the Port Bridge N14 crossing.

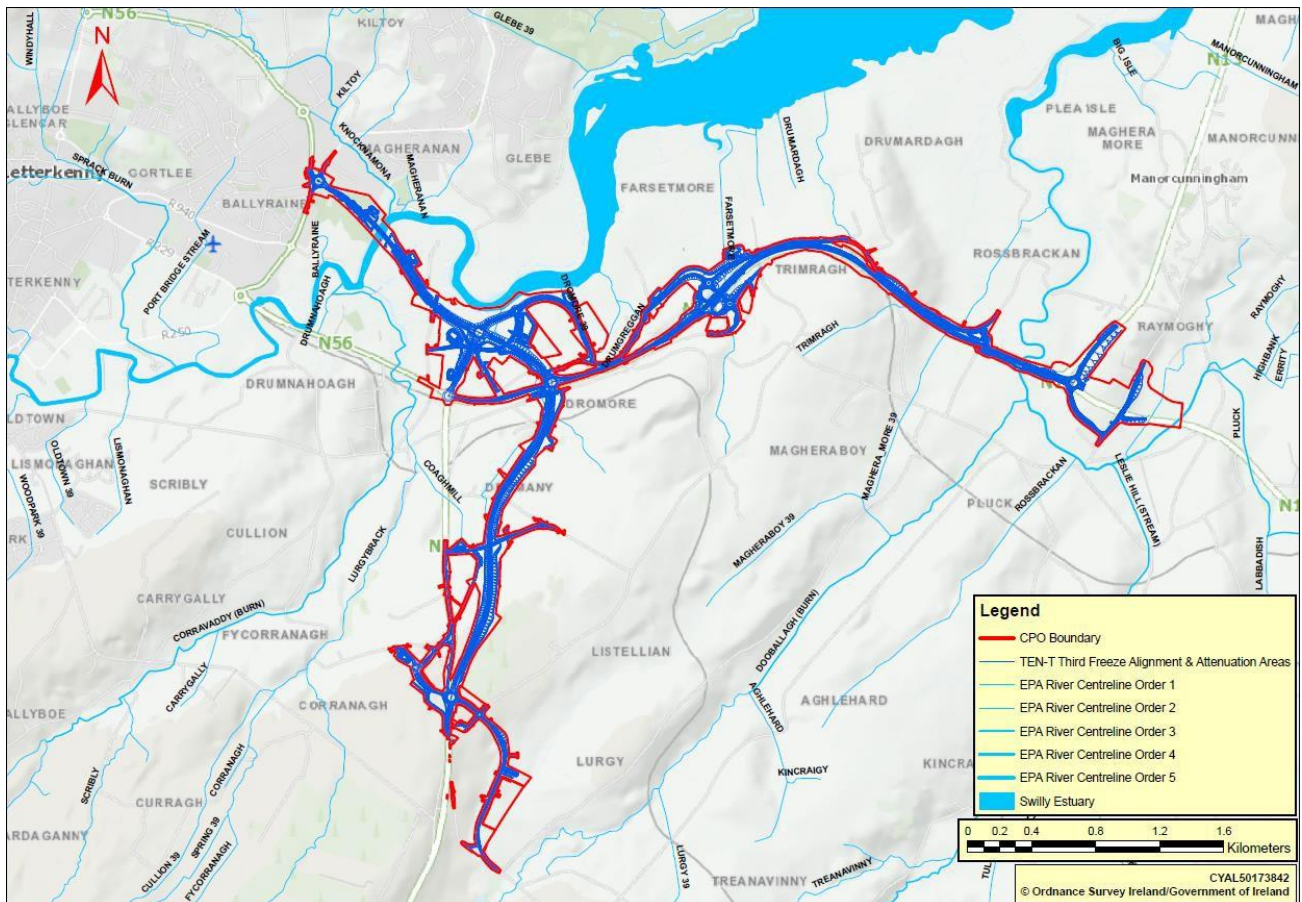


Figure 1.2 Proposed Route Plan

## 1.3 Report Structure

**Chapter 2** of this report gives an overview of the affected watercourses and the proposed route. **Chapter 3** consists of a desk study outlining information on flood history and previous flood studies and identifies flood risk at the site. A flood impact study is detailed in **Chapter 4** establishing the hydrology of the catchment, calculations and hydraulic modelling undertaken to identify and evaluate the flood impact arising from the construction of the proposed route as well as providing information of any necessary mitigation. The conclusion is provided in **Chapter 5**.

## 2 SITE BACKGROUND

This chapter describes the potentially impacted site at the proposed River Swilly channel and floodplain crossing at Dromore and Bonagee north of the existing N56 and N13.

### 2.1 Site Description

The proposed River Swilly river crossing is located at CH385-630 on the main N56/N13 realignment arm where it spans from the townland of Ballyraine to Bonagee. From CH630 the proposed alignment consists of fill embankment through the Swilly floodplain as it approaches the proposed roundabout junction with the existing N13. Within the floodplain area there are also several proposed local access arms and a roundabout that links with the existing N13 at the Dry Arch Roundabout to provide access to the local business parks and other public amenities.

The River Swilly channel bed level varies from -2.04mOD at the upstream face of the proposed crossing to -2.32mOD at the downstream face. The left channel bank raises to an area of pasture with a ground level rising from 2.40mOD to 4.35mOD. The right channel bank has an existing ground level of approximately 2.60mOD for a length of 8m before rising to a flood defence embankment with level of 4.25mOD. The right overbank (floodplain) consists of agricultural pastures with some business developments dotted throughout. There are also several drains within the floodplain that outfall to the River Swilly and Corravaddy Burn at several locations. These drains are included in the OPW Arterial Drainage Scheme as well as the flood defence embankments. The river at the proposed crossing structure location is meandering as would be expected with a transitional/estuarial water body and has a main channel width of approximately 50m.

### 3 DESK STUDY – EXISTING FLOOD INFORMATION

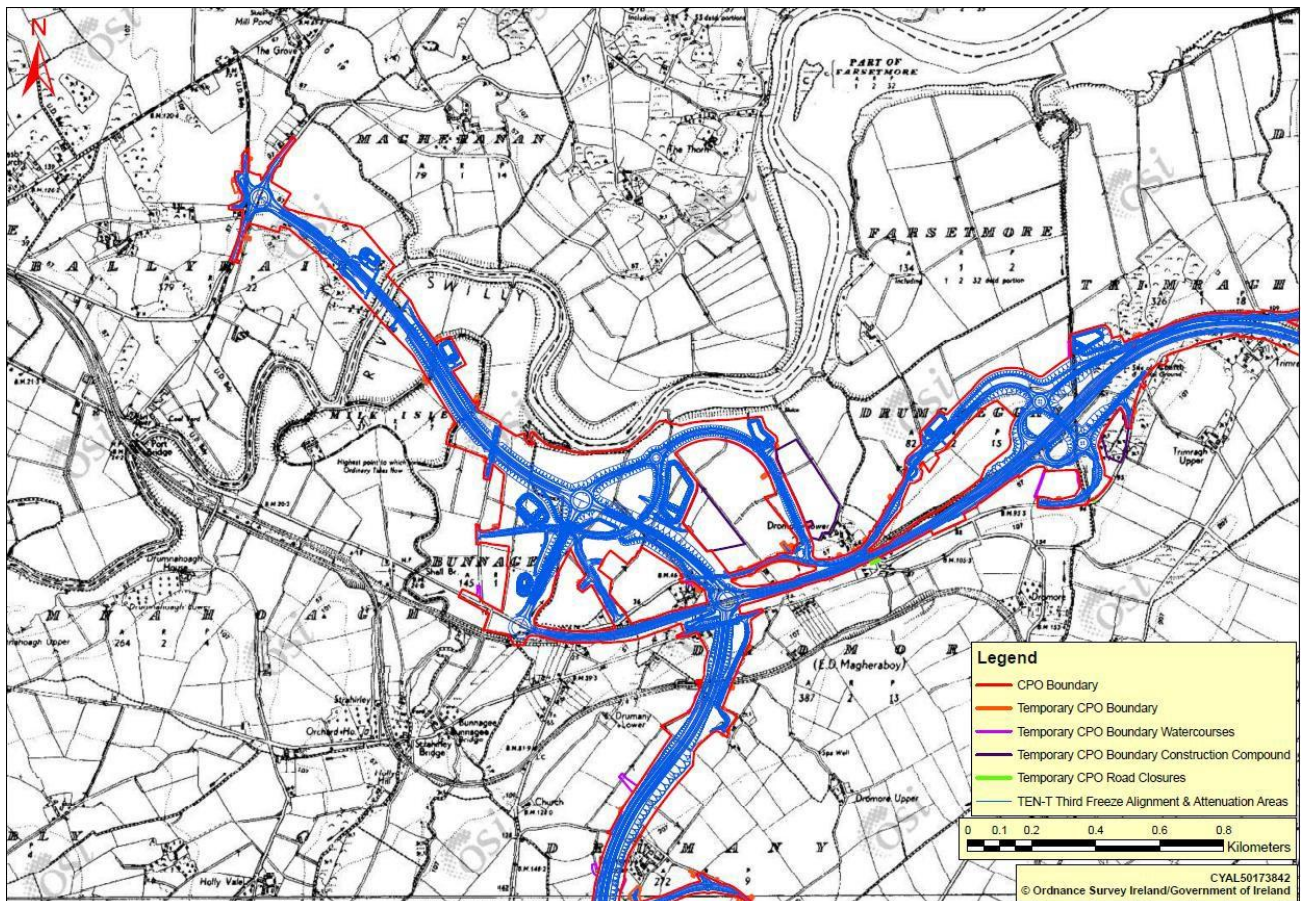
This chapter identifies existing flooding information known about the subject area. The information referenced as part of this desk study includes historical and predictive sources. This chapter will highlight areas of interest with regard to flooding where the proposed works may impact upon flood risk elsewhere or may itself be vulnerable to flooding.

#### 3.1 Historical Flooding

The historical sources interrogated for this chapter include the Ordnance Survey Ireland (OSI) 6inch Cassini historical mapping, Office of Public Works (OPW) website floodmaps.ie and OPW Hydrometric Records.

##### 3.1.1 OSI Historical Mapping

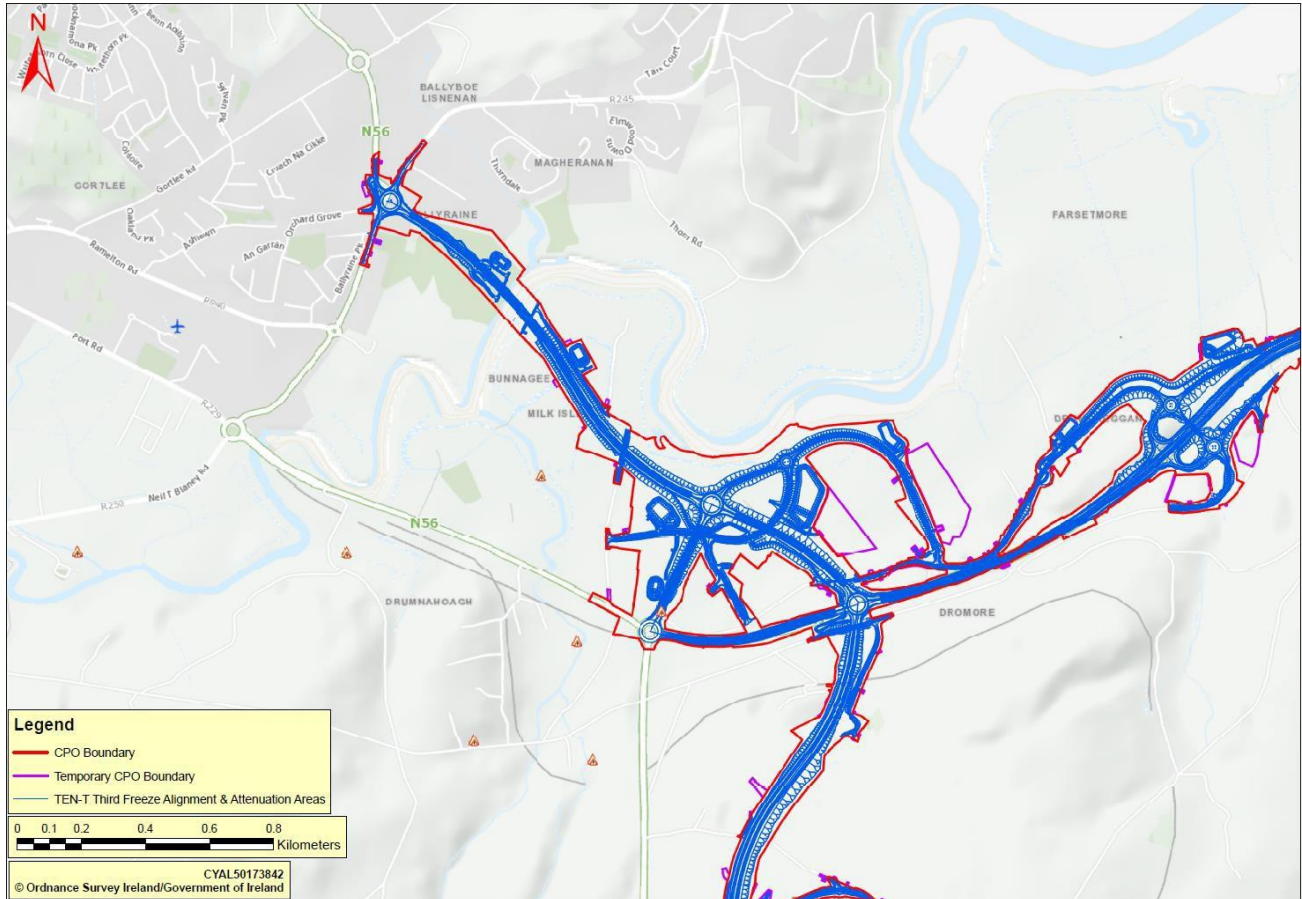
The 6inch Cassini historical maps do not illustrate any evidence of flooding in the past. Lands that have been identified as prone to periodic flooding in these historical maps are typically labelled “Lands liable to floods”. It appears that the ‘Ordinary Tide’ historically flowed as far as Milk Isle. The map illustrates a relatively intricate network of open drains that outfall to the River Swilly and Corravaddy Burn. Some of these drains still exist while some have been combined and redirected to other locations. It is understood that the design proposals will include culverts for these drains that will allow flow to pass through the infill embankments without obstruction. From the interpretation of **Figure 3.1** it is not envisaged that the proposed route will be vulnerable to or will impact upon flooding at the site.



**Figure 3.1 River Swilly Crossing - OSI 6inch Cassini historical mapping with proposed route overlaid**

### 3.1.2 OPW Flood Hazard Mapping

There are two instances of previous recurring flood events recorded in the immediate vicinity of the proposed route. There are a further three instances of historical flooding recorded upstream of the Shell Bridge on the Corravaddy Burn and a further two instances of previous flooding recorded upstream on the River Swilly (see **Figure 3.2**). These are summarized in **Table 3.1** below.



**Figure 3.2 River Swilly Crossing - OPW Historical Flood Mapping (FloodInfo.ie)**

It is apparent from the recorded flood history that the River Swilly and Corravaddy Burn has frequently flooded its banks in the past. There are no recorded instances of flooding at the proposed crossing. FloodInfo.ie can be interrogated for further flood reports and press articles. There is also a detailed assessment of historical flood events included in the North Western - Neagh Bann CFRAM Study UoM 01 Hydraulics Report (RPS, 2017) as part of the hydraulic model calibration and verification.

**Table 3.1 River Swilly Crossing - Summary of Historical Flood Events provided by FloodInfo.ie**

Flood ID	Location	Date(s) of Report(s)	Recorded date of occurrence	Frequency	Description
4036	Milk Isle/Bonagee	11/01/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides. The road is liable to flood, and properties are affected. The Halting site is also prone to flooding. Area affected is from the Port roundabout to the Dry Arch roundabout
552	Navenny Bridge, Ballybofey	01/12/1999 21/12/1999	November 1999 05/07/1999 11/09/1999 24/09/1999	Annual	Flooding of back drain at Bonagee – has occurred on numerous occasions. Flooding on main Derry-Letterkenny road at Bonagee roundabout and on the minor road at Bonagee. Believed to be caused by insufficient storage in drain network when high tides occur during periods of high rainfall.
4478	Letterkenny Area (notably houses adjacent to Clanree Hotel)	October 2002	N/A	N/A	Letterkenny Localised Flood Study, JB Barry & Partners. Mentions possibility that flooding is due to construction of Holiday Inn (Clanree) hotel.
4477	UNIFI Factory	October 2002	N/A	N/A	Letterkenny Localised Flood Study, JB Barry & Partners. Refers to flooding at Lisnenan Road. Undersized culvert and trash screen blocking causes flooding.
4478	Letterkenny Area (notably houses adjacent to Clanree Hotel)	October 2002	N/A	N/A	Letterkenny Localised Flood Study, JB Barry & Partners. Mentions possibility that flooding is due to construction of Holiday Inn (Clanree) hotel.
4038	Bunbeg	11/01/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides.
4037	Drumnaoagh	11/01/2006 26/11/2006	N/A	Annual	Low lying land floods every year through a combination of heavy rain and high tides. Port Bridge area on N14 due to tidal influence – infrequent.
4039	Neil T Blaney Road	11/01/2006 26/11/2006	N/A	Annual	A combination of low-lying land and a stream overflowing its banks every year due to heavy rain and high tides. Areas either side of the Neil T. Blaney road are flooded

## 3.2 Predictive Flooding

The site has been included in predictive modelling as part of broader OPW studies. These are namely the Preliminary Flood Risk Assessment (PFRA) and the Catchment Flood Risk and Management (CFRAM) programme.

### 3.2.1 Preliminary Flood Risk Assessment (PFRA)

The PFRA study was undertaken as part of the scoping phase of the CFRAM study to identify areas for further assessment (AFAs) where the flood risk was determined to be potentially significant from one or more sources of flooding. This was undertaken as a requirement of the EU 'Floods' Directive.

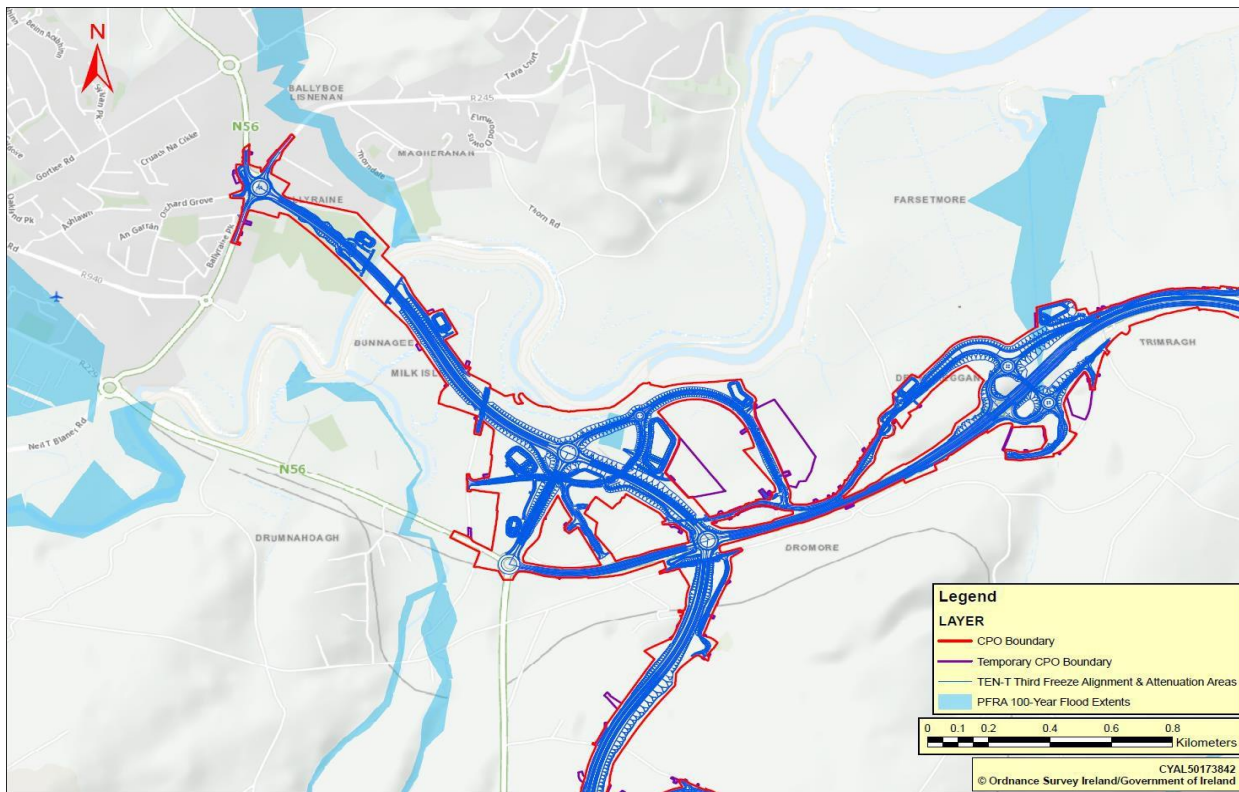
It is important to note that the PFRA was not a detailed assessment of flood risk. It was rather a broad assessment, based on available and readily derivable information to identify areas where there was a genuine cause for concern about a risk and impact of flooding that may require further assessment.

The OPW used three sources of information to designate these AFAs:

- Historic information on floods that happened in the past.

- Public consultation to gain local and expert knowledge from Local Authorities and other Government departments and agencies to identify areas prone to flooding and the potential consequences.
- Engineering techniques to analyse potential damage that could be caused by flooding.

The PFRA 100-year flood extents are illustrated in **Figure 3.3** below. It is important to note that these maps were based on broad-brush datasets and coarse methodologies to flag areas of potential flood risk. The Letterkenny area was highlighted as an AFA because of the PFRA process and as such was included in the North Western - Neagh Bann CFRAM Study. The outputs and recommendations from the CFRAM study supersede the information provided by the PFRA and are discussed in **Chapter 3.2.2**.



**Figure 3.3 River Swilly Crossing - PFRA 100-Year flood Extents**

### 3.2.2 Catchment Flood Risk and Management (CFRAM) Study

The OPW commissioned RPS to undertake the North Western – Neagh Bann CFRAM Study in March 2012 and final flood maps were issued in July 2017. The Letterkenny AFA is located in east Donegal and is affected by the lower reaches of the River Swilly, its adjoining tributaries, and the Swilly Estuary.

The hydrological analyses involved the rating of existing hydrometric gauging stations, catchment boundary review, index flow estimation, flood frequency analysis and growth curve development, hydrograph development, coastal hydrology, joint probability analysis, flood risk map and flood management plan preparation for UoM01.

The North Western - Neagh Bann CFRAM Study UoM 01 Hydrology Report (RPS, 2016) describes the River Swilly catchment to the downstream HEP of the model is a medium to large sized catchment (121km<sup>2</sup>) with a mixture of forested land (23%), pasture (38%), peat bog (35%) and urban area (4%) coverage. The largest tributaries to the River Swilly within the study area is the Knocknamona and Corravaddy Stream with catchment sizes of 4.57km<sup>2</sup> and 13.81km<sup>2</sup> respectively. See **Figure 3.4** for the AFA catchment boundaries and Hydrological Estimations Point (HEP) locations.

#### 3.2.2.1 Estimation of Index Flood, Qmed

The report describes that the hydrometric station New Mills 39001 was given a B/U rating classification under FSU indicating that flows may be determined up to Qmed with confidence, but also contradictorily that the

data is totally unusable for determining high flows. The rating review for this gauge indicated that there was uncertainty with the difference in Qmed, and the spot flow gauging data at the station was of poor range to calibrate to with the highest spot gauging being less than 25% of the station Qmed value. The FSU study AMAX Qmed value was taken forward for further hydrological analyses. The Qmed values for the Corravaddy burn and Knocknamona Watercourse were estimated using FSU 7-variable equation.

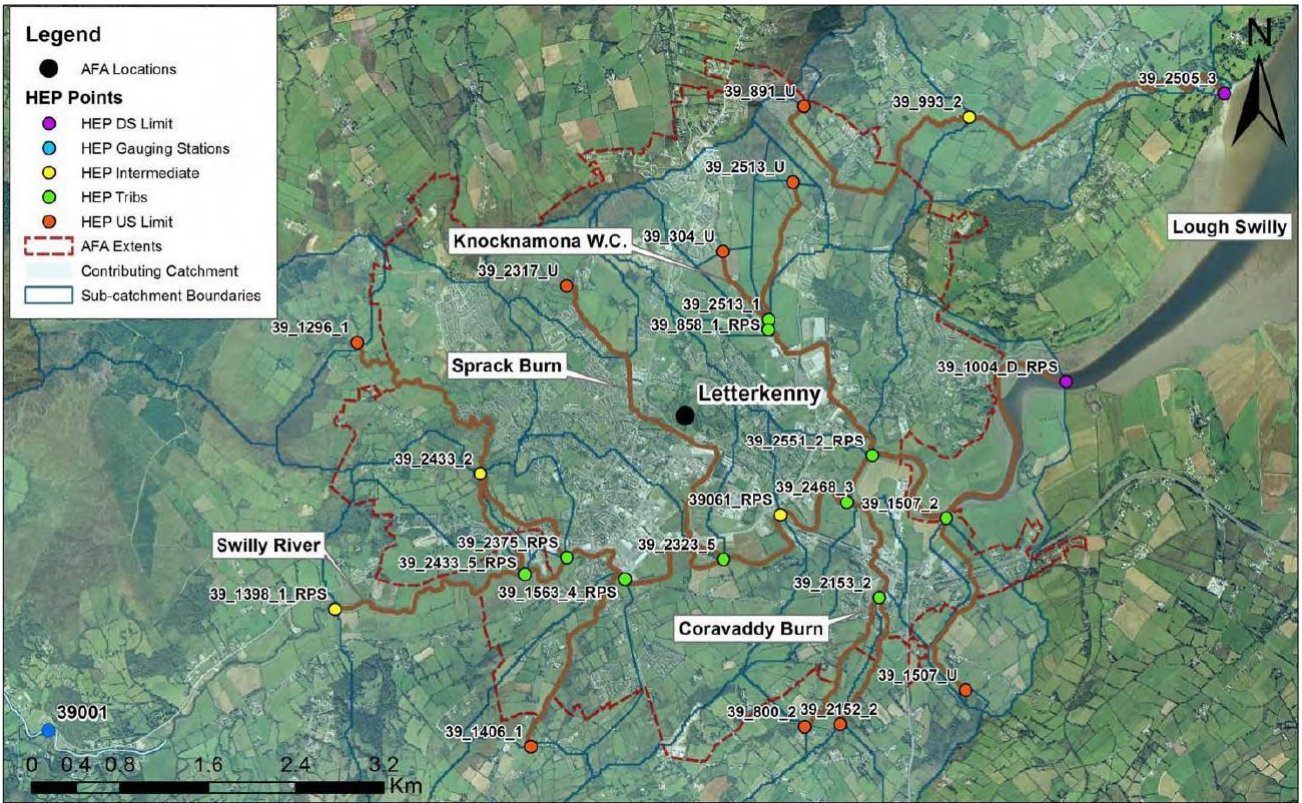


Figure 3.4 Letterkenny AFA Catchment Boundaries and HEPs

### 3.2.2.2 Flood Frequency Analysis and Growth Curve Development

Once the Qmed was established on the River Swilly, a flood frequency analysis was undertaken to develop the growth curves for the design floods of varying magnitude. Growth curves have been developed based on single site and pooled analysis of gauged hydrometric data based on the FSU methodology. It was recommended to adopt the GLO distribution derived concave upward shape growth curve for UoM 01. Growth curves were derived for 125 HEPs in UoM01 and were analysed to determine the relationship between flood growth factors and the physical catchment descriptors AREA (catchment area), SAAR (Standard Annual Average Rainfall) and BFI (Baseflow Index). A good relationship was determined between flood growth factors and catchment area for the 125 HEPs in UoM01.

The flood growth factors for the River Swilly, Corravaddy Burn and Knocknamona watercourse at their downstream HEPs are summarised in **Table 3.2** below.

Table 3.2 CFRAM Flood Growth Factors for

Node ID	AEP (%) Return Period (Years)	Growth Factors			
		50.0%	10.0%	1.0%	0.1%
		2 (Qmed)	10	100	1000
39061_RPS (Swilly)		1.000	1.423	2.100	3.066
39_2468_3 (Knocknamona)		1.000	1.508	2.399	3.784
39_2551_2_RPS (Corravaddy)		1.000	1.521	2.472	4.028

### 3.2.2.3 Design Flow Peaks

The design flood flows for HEPs were calculated by multiplying the Index Flood, Qmed by the above relevant growth factors. These design flows calculations are outlined in Table 3.3 below.

**Table 3.3 CFRAM Design Flows**

Return Period (Years)	2	10	100	1000
39061_RPS (Swilly) Design Flood (m <sup>3</sup> /s)	71.86	102.26	150.92	220.34
39_2468_3 (Knocknamona) Design Flood (m <sup>3</sup> /s)	13.75	20.74	32.98	52.03
39_2551_2_RPS (Corravaddy) Design Flood (m <sup>3</sup> /s)	2.9	4.41	7.17	11.68

### 3.2.2.4 Hydrograph Development

Once the design flows were calculated, the temporal distribution of the flood events were determined. At HEPs representing larger catchments (generally 10km<sup>2</sup> or larger) within UoM 01 hydrographs were generated using the Hydrograph Shape Generator (version 5) developed by OPW. The Hydrograph Shape Generator centres around FSU Work Package 3.1 'Hydrograph Width Analysis' and contains a library of parametric, semi dimensionless hydrograph shapes derived from gauge records of pivotal sites using the HWA software previously discussed. Based on hydrological similarity, a pivotal site hydrograph is 'borrowed' and applied at the subject site (in this case the CFRAMS HEP) based on catchment descriptors.

Hydrographs for catchments less than 10km<sup>2</sup> in the study were generated through Flood Studies Supplementary Report (FSSR) 16 Unit Hydrograph Method.

### 3.2.2.5 Coastal Boundary Conditions

Using information from the Secondary Port of Fanad Head in the Admiralty Tide Tables, a tidal water level approaching MHWS was established. A tidal curve was generated by fitting this tide level to a sinusoidal curve. A normalised surge profile of 48-hour duration was scaled based on the difference between the peak water level of the generated tidal profile and the target TWL from the Irish Coastal Protection Strategy Study (ICPSS) predicted combined tidal and surge water elevations. The scaled residual surge profile was then appended to the tidal profile to obtain the total combined water level time series as required for the relevant ICPSS Annual Exceedance Probabilities.

### 3.2.2.6 Joint Probability

As a starting point, RPS reviewed both coastal dominated and fluvial dominated scenarios for each AFA, combining low probability events from one source, with a more frequently occurring 50% AEP event from the other. It was assumed that in order for such an event to be extreme, the likelihood of at least some activity from the other source was high before joint probability was considered further.

As such, coastal events of 10%, 0.5% and 0.1% AEP were combined with a fluvial event of 50% AEP in order to produce joint return periods of 10%, 0.5% and 0.1% AEP for a coastal dominated scenario. Conversely, fluvial events of 10%, 1% and 0.1% AEP were combined with a coastal event of 50% AEP for joint return periods of 10%, 1% and 0.1% AEP for a fluvial dominated scenario.

### 3.2.2.7 Hydraulic Model

The North Western - Neagh Bann CFRAM Study UoM 01 Hydraulics Report (RPS, 2017) states that all watercourses within the Letterkenny AFA were modelled as 1D-2D using the MIKE suite of software. The 1D domain was built using channel cross-section and structure topographical survey while the 2D mesh was generated using a combination of 5m resolution OPW LiDAR provided as part of the CFRAM Study, 5m resolution NDHM, 10m and 25m resolution INFOMAR bathymetric survey and Admiralty Chart data as digitally supplied by C-Map of Norway.

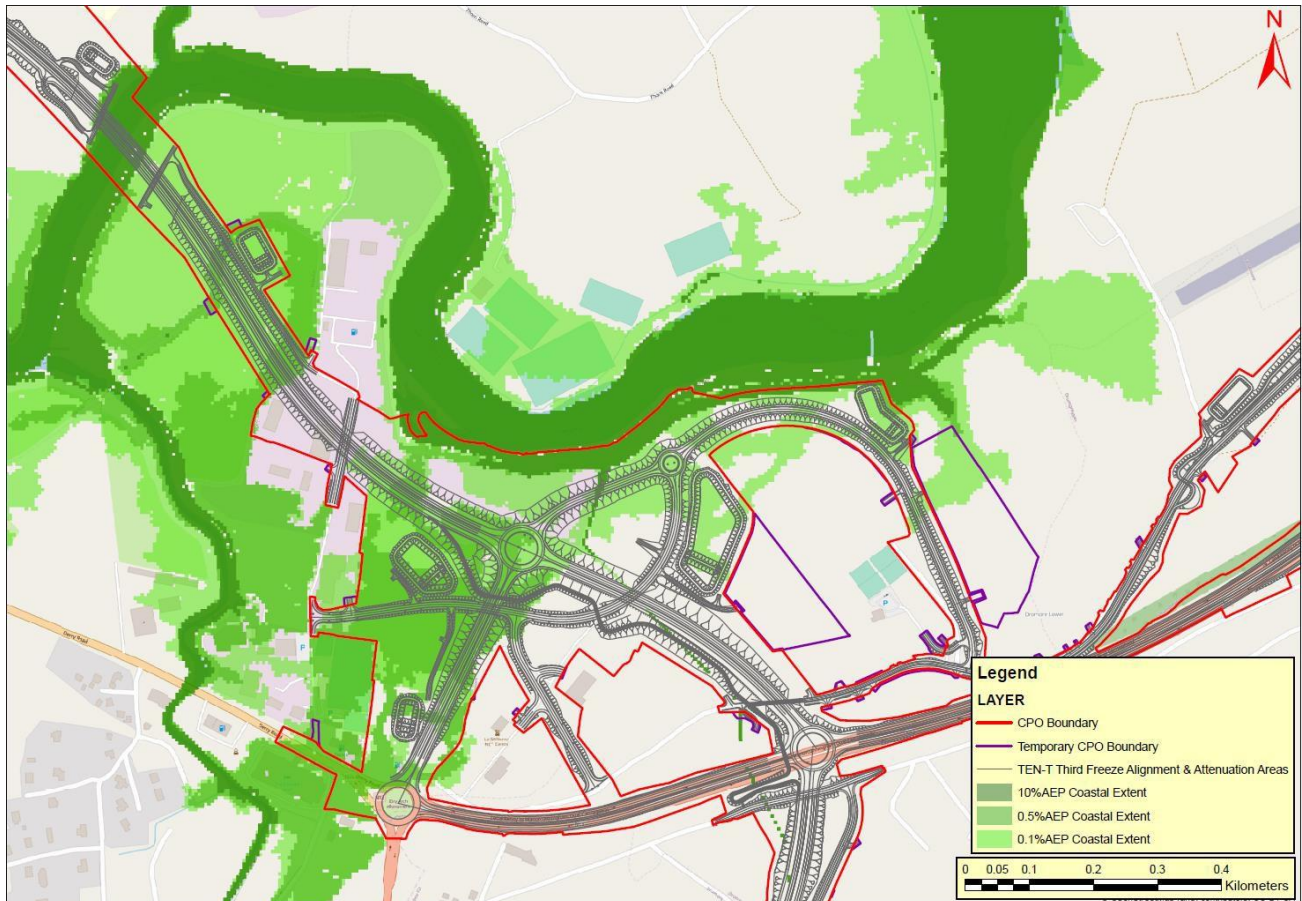
LiDAR data was used for all areas landward of the OSI High Water Mark where available except at Letterkenny General Hospital where spot levels from construction drawings were used. For areas landward of the high-water mark where LiDAR data wasn't available, NDHM data was used. These datasets were post-processed to remove details of any embankments or defences as these were modelled using the dike structure tool within MIKE.

### 3.2.2.8 CFRAM Flood Extents Mapping

The outputs from the CFRAM current scenario fluvial modelling for the predictive 0.1%, 1% and 10% AEP events can be seen in **Figure 3.5** while the outputs for the 0.1%, 0.5% and 10%AEP for the coastal scenario can be seen in **Figure 3.6**. The proposed route alignment has been overlaid to illustrate the foreseeable impacts on flooding and will be discussed in **Chapter 3.3**.



**Figure 3.5 River Swilly Crossing - CFRAM current fluvial flood extents with proposed route alignment**



**Figure 3.6 River Swilly Crossing - CFRAM current coastal flood extents with proposed route alignment**

### 3.2.2.9 CFRAM Proposed Flood Relief Measures

The North Western - Neagh Bann CFRAM Study UoM 01 Preliminary Options Report (RPS, 2016) outlines four flood defence option schemes for Letterkenny AFA. The four options were subject to a Multi Criteria Analysis (MCA) and preliminary costing to calculate the Benefit Cost Ratio (BCR). Option 1 scored more favourably in the MCA and BCR and has been brought forward to the North Western Flood Risk Management Plan (FRMP).

**Figure 3.7** outlines the Option 1 proposed flood relief measures to be further considered under future Flood Relief Schemes. It is not yet known if these proposed flood defences will increase flood levels elsewhere in the River Swilly or its tributaries. It is assumed that any flood defence measures that increase flood levels will not pass through the planning phase and so will not be considered for inclusion in the implementation of any future Flood Relief Schemes.

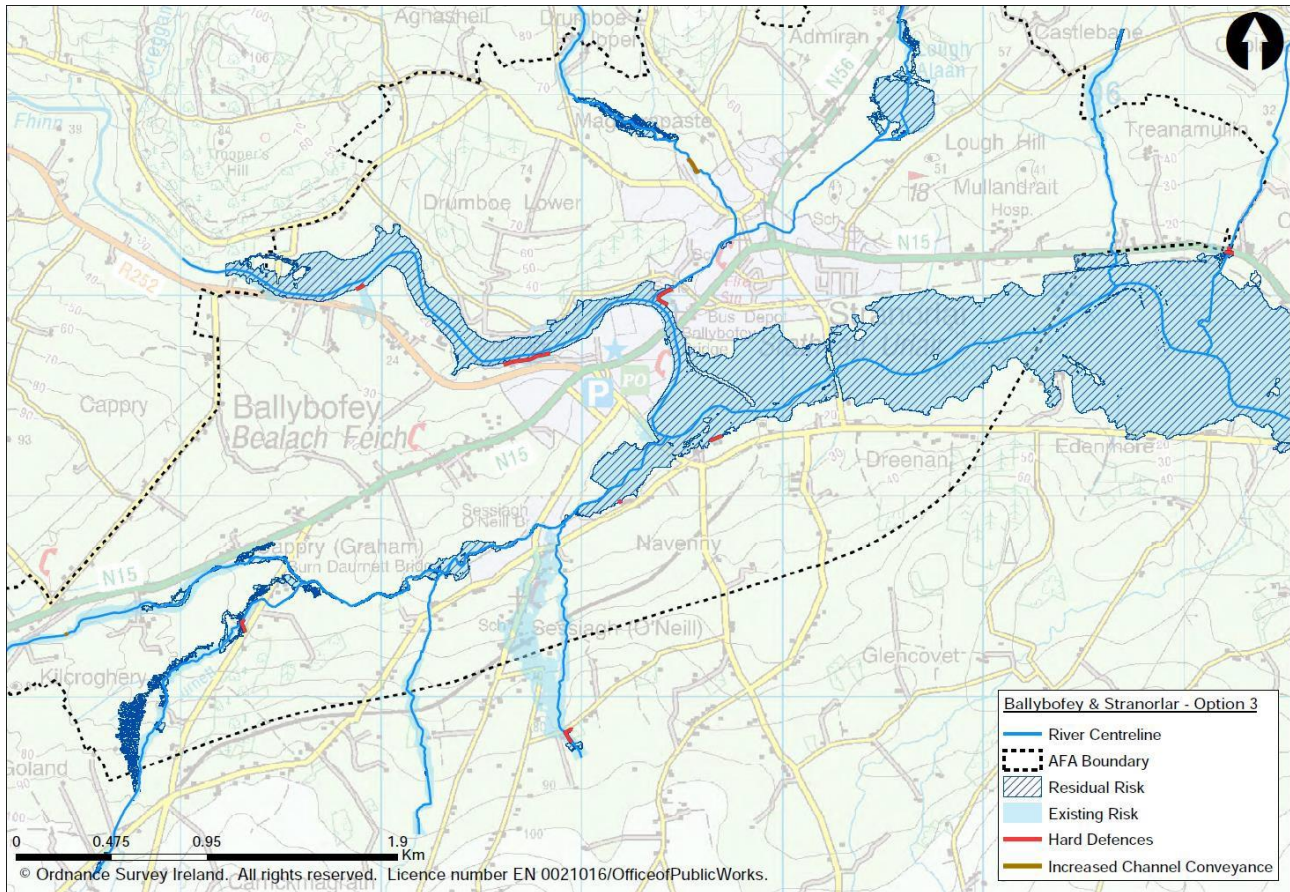


Figure 3.7 Letterkenny Proposed Flood Relief Measures RB01 FRMP

### 3.2.3 Geological Survey Ireland (GSI) GW Flood Groundwater Flooding

Historical and predictive maps prepared by GSI as part of the GW Flood Project indicate that there is no potential flooding from groundwater sources at the proposed crossing of the River Swilly. This is consistent with the geology of the area and hydrological catchment.

## 3.3 Sources of Flooding to Development & Potential Impacts

### 3.3.1 Fluvial

The most reliable indicators of flooding at the proposed crossing are the CFRAM flood extent outputs. The CFRAM fluvial extents map in **Figure 3.5** shows that the proposed route will effectively span over the River Swilly main channel. There are flood waters that spill into the proposed works area for the 0.1% and 1% AEP events. The proposed route will impact upon these flood waters. Further modelling will be required to assess these impacts and will be discussed in **Chapter 4.1.2**.

### 3.3.2 Coastal

The CFRAM coastal extents map in **Figure 3.6** shows a considerable area of the proposed works under flood for the 0.1% and 0.5% AEP events. Further modelling will be required to assess these impacts and will be discussed in **Chapter 4.1.2**.

### 3.3.3 Groundwater

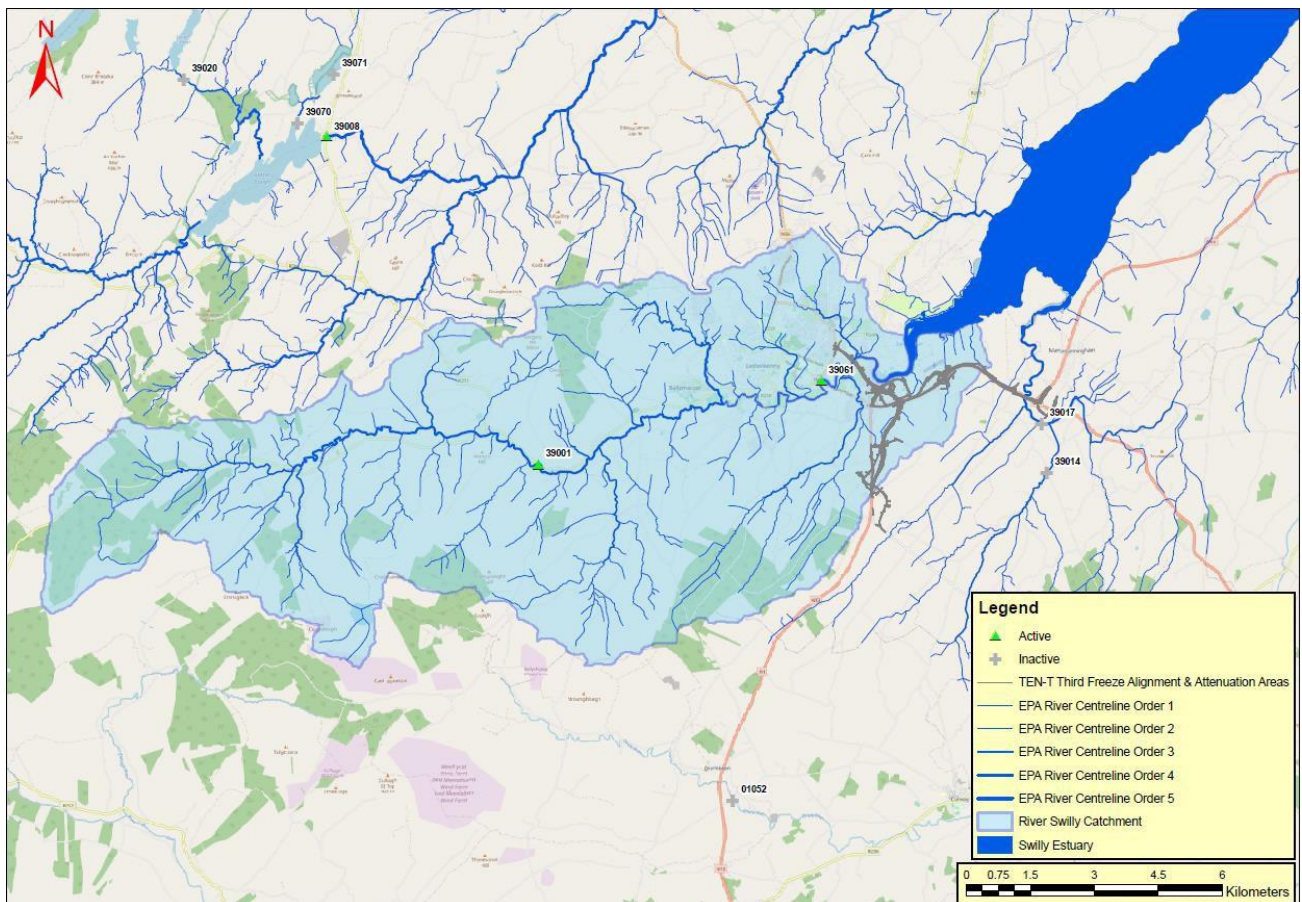
Historical and predictive maps prepared by GSI as part of the GW Flood Project indicate that there is no potential flooding from groundwater sources at the proposed crossing of the River Swilly.

## 4 HYDROLOGICAL IMPACT STUDY

A predictive hydrological assessment was undertaken, and a hydraulic model was developed at the proposed River Swilly crossing to assess the impact of the proposed works upon flood risk in the study area.

### 4.1 Hydrology

The hydrology of the area has been examined using hydrometric records and the Physical Catchment Descriptors (PCDs) prepared as part of the Flood Studies Update (FSU) programme. The closest active hydrometric station to the crossing is Port Bridge (39061). This hydrometric gauge is tidally influenced with water level series and AMAX published from October 2006 onward. A large proportion of the data is coded as poor or unreliable and the long-term median value is not currently published due to data quality. **Figure 4.1** illustrates that The River Swilly rises near Glendora, a mountain in County Donegal, and flows for around 41.8 km through Letterkenny, before flowing into the Atlantic Ocean at Lough Swilly.



**Figure 4.1 River Swilly Catchment Map at Letterkenny**

The PCDs have been prepared as part of the FSU programme and are readily available for ungauged nodes located at 500-metre intervals along each river/stream in Ireland for which the catchment drainage area is greater than 1km<sup>2</sup>. The PCDs for the Swilly catchment at the proposed crossing have been extracted from FSU Ungauged Node 39\_2543\_3 at the existing Port Bridge while the PCDs for the Corravaddy and Knocknamona were extracted from 39\_2468\_3 and 39\_2551\_2 respectively (see **Figure 4.2** for location). The FSU PCDs for the three watercourses are outlined in **Table 4.1** below.

Table 4.1 FSU PCDs for River Swilly, Corravaddy Burn and Knocknamona Stream

Watercourse	River Swilly	Corravaddy Burn	Knocknamona Stream
Location Number	39_2543_3	39_2468_3	39_2551_2
Contributing Catchment Area (km <sup>2</sup> )	96.761	13.81	4.568
BFISOIL (unitless)	0.3188	0.3473	0.324
SAAR (mm)	1568.43	1340.99	1141.95
FARL (unitless)	0.993	1	1
DRAIND (km/km <sup>2</sup> )	2.081	2.044	2.329
S1085 (m/km)	8.1566	26.3637	39.026
ARTDRAIN2 (unitless)	0.0606	0.0347	0.017
URBEXT (unitless)	0.0422	0.0286	0.382

In the table above it can be seen that none of the watercourses experience flood attenuation from reservoirs and lakes. The baseflow index (BFI) value, indicative of catchment permeability, are similar for the three catchments lying within a range of 0.32-0.35. This BFI value is would indicate high runoff response in the catchment and little interaction between groundwater and surface water. The Standard Annual Average Rainfall (SAAR) values are consistent with the climate of the north-west of Ireland. The PCD values show very little influence from urbanisation in the Swilly and the Corravaddy while Knocknamona Stream shows a high level of urbanisation.



Figure 4.2 Location of FSU Ungauged Nodes and Existing Hydrometric Stations

## 4.1.1 Design Flow Estimation

The estimation of design flows is based on the best practice guidance for Irish catchments generally as outlined in the Flood Studies Update (FSU). Design flow estimation began with the estimation of the index flood, or median flow,  $Q_{med}$ . In a set of hydrometric records,  $Q_{med}$  represents the median of the observed annual maximum flood flows and has an annual exceedance probability (AEP) of 50%, i.e., a 2-year return period.

### 4.1.1.1 Estimation of Index Flood, $Q_{med}$

The  $Q_{med}$  values for the study area were estimated using the FSU methodology for ungauged catchments at the closest FSU ungauged nodes (see **Figure 4.2**).

The FSU methodology for  $Q_{med}$  estimation in ungauged catchments involves the use of a 7-variable catchment descriptor equation:

$$Q_{medrural} = 1.237 \cdot 10^{-5} \cdot Area^{0.937} \cdot BFI^{-0.922} \cdot SAAR^{1.306} \cdot FARL^{2.217} \cdot DRAIN^{0.341} \cdot S^{1085^{0.185}} \cdot (1 + ARTDRAIN2)^{0.408}$$

The above PCDs were input into the 7-variable equation to calculate  $Q_{med}$ . The  $Q_{med}$  outputs were adjusted for the effect of urbanisation within the catchment:

$$Q_{med} = Q_{medrural} \times (1 + URBEXT)^{1.482}$$

The  $Q_{med}$  estimates for the three watercourses were then adjusted to account for the discrepancy between gauged  $Q_{med}$  and 7-variable  $Q_{med}$  in the catchment. The pivotal station chosen was New Mills gauging station (39001) upstream on the River Swilly. The gauged  $Q_{med}$  / 7-variable  $Q_{med}$  ratio is 0.924 suggesting the FSU catchment descriptor equation slightly overestimates  $Q_{med}$  along the main channel of the Swilly. The calculations for  $Q_{med}$  at the catchment are tabulated in **Table 4.2** below.

**Table 4.2 TEN-T  $Q_{med}$  calculations**

Watercourse	River Swilly	Corravaddy Burn	Knocknamona Stream
$Q_{medrural}$ (m <sup>3</sup> /s)	73.15	11.96	3.781
$Q_{med}$ (m <sup>3</sup> /s)	77.771	12.471	6.107
$Q_{medadjusted}$ (m <sup>3</sup> /s)	71.86	11.523	5.643

### 4.1.1.2 Design Flow Peaks

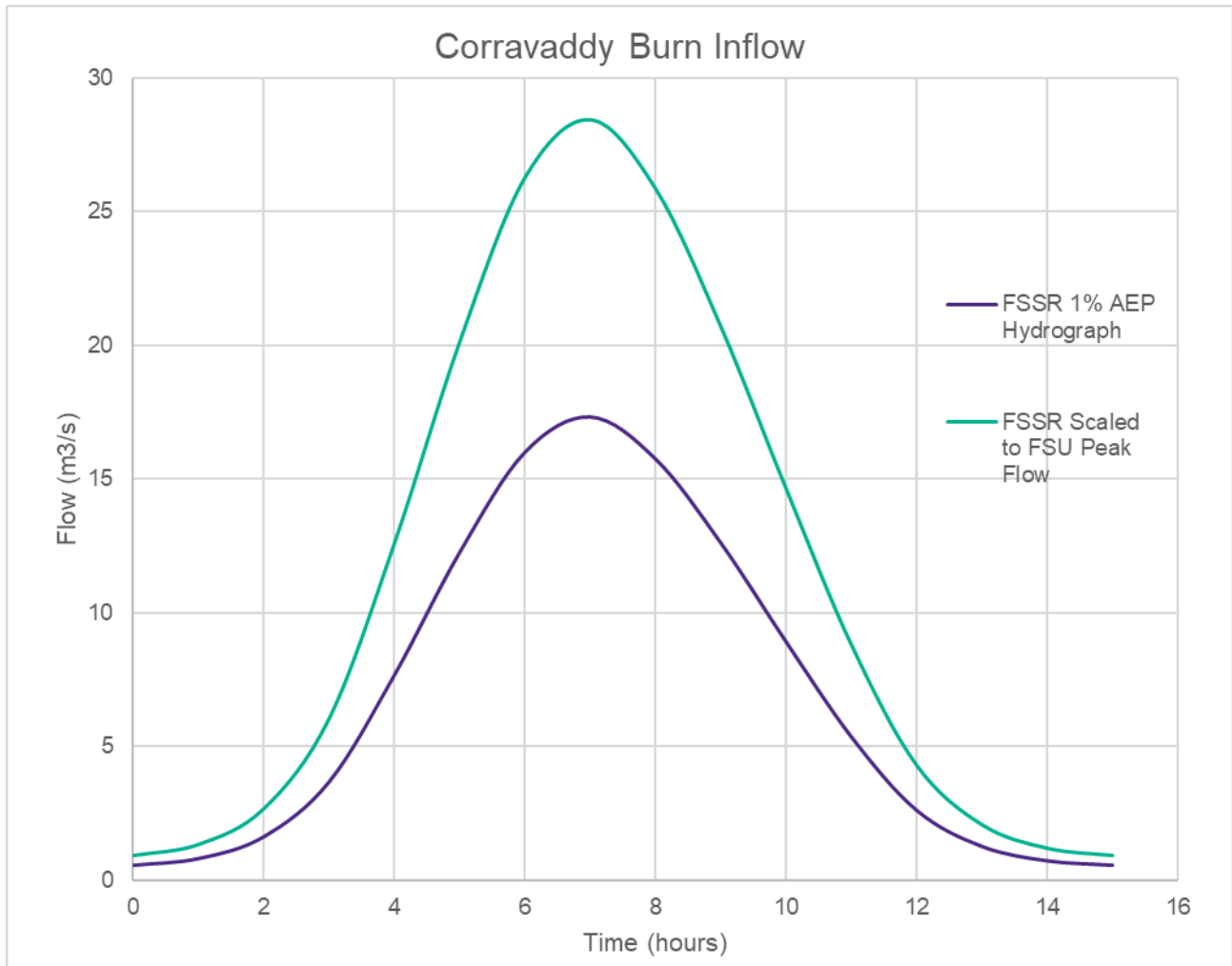
The design flood flow is calculated by applying the  $Q_{med}$  flow to a growth curve derived from a pooling group of recorded data. The pooling group was developed from a group of hydrologically similar catchments. The flood growth factors and design flows for the 100-year flow are outlined below:

**Table 4.3 TEN-T Design peak flow estimates**

Watercourse	River Swilly	Corravaddy Burn	Knocknamona Stream
$Q_{med}$ (m <sup>3</sup> /s)	71.86	11.523	5.643
Q100 Flood Growth Factor	2.1	2.468	2.468
Q100 (m <sup>3</sup> /s)	150.907	28.439	13.927

## 4.1.2 Hydrograph Development

The flood hydrographs for the Corravaddy Burn and Knocknamona Stream were generated using Flood Studies Supplementary Report (FSSR) 16 Unit Hydrograph method on Flood Modeller for the 2-year ( $Q_{med}$ ) and 100-year flood event. This method utilises catchment descriptors and meteorological data to determine the rising and recession limbs of the hydrograph. These hydrographs were then scaled to the FSU generated 2-year and 100-year flood peaks.



**Figure 4.3 Hydrographs generated using FSSR16 and scaled to FSU design flows**

A hydrograph was extracted from hydrometric records for Hydrometric Station 39001 New Mills for the River Swilly and scaled to the peak flows calculated above. The return period for the extracted hydrograph is unknown but was utilised to get a more accurate representation of the rising and receding limbs of floods in the Swilly catchment.

### 4.1.3 Coastal Hydrology

Analysis of the hydrological elements which contribute to coastal flood risk has been undertaken at a national level through the Irish Coastal Wave and Water Level Modelling Study (ICWWS) 2018. Outputs from the study have resulted in extreme tidal and storm surge water levels being made available around the Irish Coast for a range of Annual Exceedance Probabilities (AEPs). The locations of ICWWS nodes are shown in **Figure 4.4**. Levels for a range of AEPs have been extracted from the ICWWS and are shown in **Table 4.4**.

From **Figure 4.4** it is apparent that the design water levels output for the ICWWS node NW42 should be used in defining the downstream tidal boundary condition for the model. The 50% (median) and 0.5% AEP levels for NW42 will be applied as the maximum level on the oscillating average tidal cycle observed at the nearest tidal gauge.

The stage hydrograph was generated through analysis of the tidal levels from early January 2014. The predicted and observed tides at Malin Head (40060) were used to estimate the storm surge of ‘Storm Christine’ that caused notable flooding at the Irish coastline. The extracted residual storm surge was scaled and combined with the predicted perigean spring tide to achieve a tidal profile of duration of 80 hours with a

peak matching that of the NW42 ICWWS levels. **Figure 4.5** illustrates the tidal profile, storm surge profile and resultant combined TWL profile for a 0.5% AEP design event.



Figure 4.4 Location of ICWWS Nodes

Table 4.4 ICWWS Node NW42 Elevations

AEP (%)	Elevation to OD Malin for a Range of AEPs for NW42
50	3.18
20	3.32
10	3.41
50	3.51
2	3.63
1	3.73
0.5	3.82
0.1	4.03

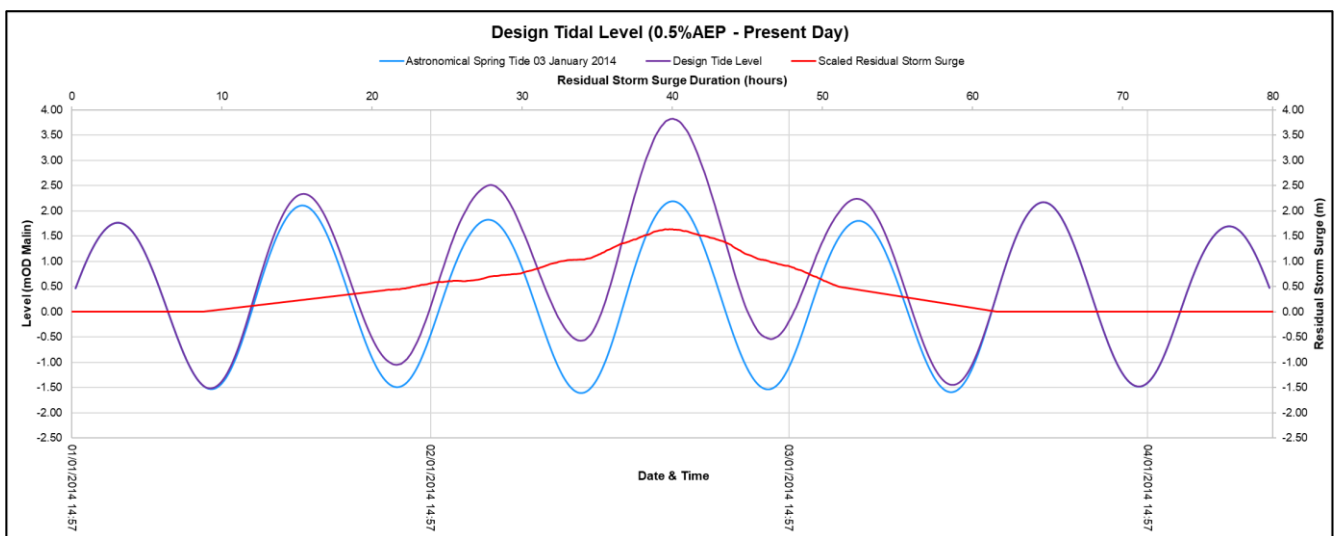


Figure 4.5 Lough Swilly Tide and Surge Profile

## 4.2 Joint Probability

Joint probability is a consideration in Letterkenny due to the downstream tidal reach. It is important to determine whether the fluvial dominated or coastal dominated scenario is more extreme as well as determining the impact of the proposed development on the two scenarios.

A coastal event of 0.5% AEP was combined with a fluvial event of 50% AEP in order to produce a joint return period of 0.5% AEP for a coastal dominated scenario. Conversely, a fluvial event of 1% AEP was combined with a coastal event of 50% AEP for a joint return period of 1% AEP for a fluvial dominated scenario.

## 4.3 Hydraulic Modelling

The hydraulic modelling for this analysis was undertaken using HEC-RAS 1D/2D. The River Swilly was modelled in the 1D domain while the floodplain and tributaries were included in the 2D domain.

### 4.3.1 Existing Scenario

#### 4.3.1.1 Geometry

The geometry for the existing scenario was built using several sources of topographical survey information:

1. OPW CFRAM Cross-Sections for the River Swilly (Survey January 2013)
2. OPW LiDAR 2m Digital Terrain Model (DTM) (Flight date 23 June 2008)
3. As-built surveys of bridges/culverts

The 2m DTM had been developed from the surveyed 2m Digital Elevation Model (DEM) through removal of noise that may affect the representation of the terrain such as buildings, trees, and other features. This removal process resulted in areas of 'No-Data' values, i.e., areas with no elevation applied to the elevation model. HEC-RAS cannot create computational mesh through these 'No-Data' values; therefore these 'No-Data' values were removed through a Focal Statistic processing methodology in ArcGIS. This process filled in the 'No-Data' values with average values from surrounding areas. This processed DTM provided the terrain data in the 2D domain for the existing scenario.

The cell size for the computational mesh cell size in the floodplain south of the River Swilly was chosen as 10m. The computational mesh cell size to the north of the River Swilly was chosen as 20m. 'Break Lines' were utilised to manipulate the orientation of the computational cells along roads and high ridges/crests in the terrain. The cell size was reduced to 5m along some of these break lines to ensure that the higher terrain elevations were captured. Cell sizes were also refined in areas of increasing slope to ensure satisfaction of courant condition. The Manning's 'n' value for the 2D domain was set to 0.06.

The LiDAR data was imported into Civil 3D, converted to contours, and examined to identify the high points of the river channel and flood defence embankments. This process was undertaken to delineate the appropriate locations along the channel where flow should pass from the 1D domain to the 2D domain (1D-2D transition boundary).

The cross-sectional survey data was imported to Civil 3D to allow trimming of the cross-sections at the 1D-2D transition boundary. This was necessary as portions of cross-sections that extend into the lower lying floodplain areas confuse the model and allow flows access to the floodplain contrary to realistic conditions. These trimmed cross-sections were then imported into HEC-RAS and suitable manning coefficients were chosen for the main channel (0.035) and overbank locations (0.050). Once brought into HEC-RAS, the terrain data was supplemented to extend some of the cross-sections to ensure they reached the high points of the riverbanks.

The 1D-2D transition boundary was incorporated into the model using a series of lateral structures along the channel banks and flood defence embankments. These lateral structures essentially act as weirs that allow flow to pass from 1D domain to 2D domain and vice-versa. The elevations for the weirs were clipped from the terrain profile and suitable weir coefficients were chosen based on the frequency of inundation.

The N14 was modelled as a 2D area connection which allowed the inclusion of culverts and openings in the 2D domain so that flow could pass through raised roads in the terrain.

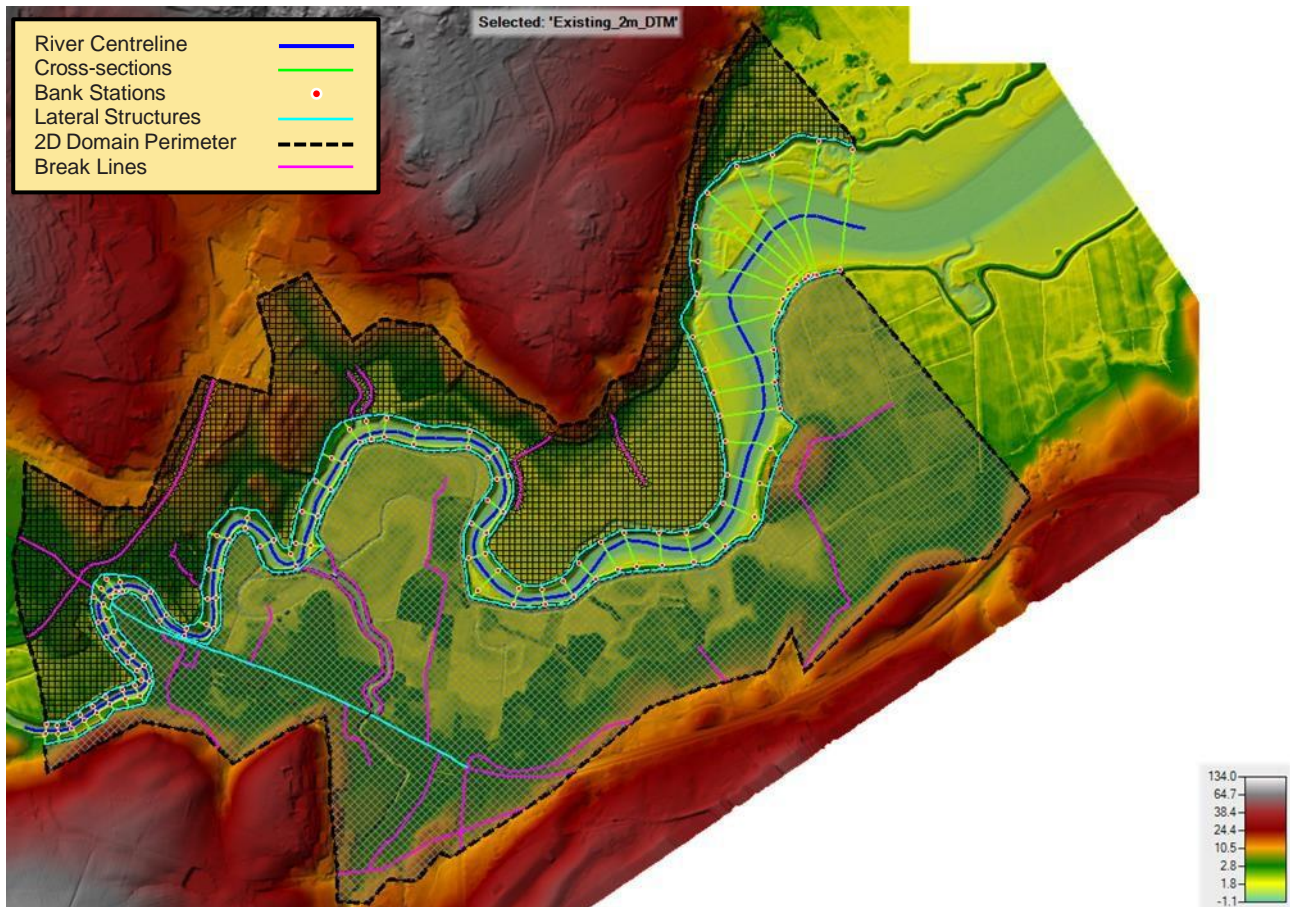


Figure 4.6 Existing Geometry Plan

### 4.3.1.2 Boundary Conditions

The boundary conditions for the unsteady model are outlined in **Table 4.5** below:

**Table 4.5 Boundary Conditions applied to HEC-RAS model**

	Swilly Upstream (1D)	Swilly Downstream (1D)	Corravaddy Upstream (2D)	Knocknamona Upstream (2D)
Coastal Dominant Scenario (0.5%AEP)	50.0%AEP Flow Hydrograph	0.5%AEP Stage Hydrograph	50.0%AEP Flow Hydrograph	50.0%AEP Flow Hydrograph
Fluvial Dominant Scenario (1.0%AEP)	1.0%AEP Flow Hydrograph	50.0%AEP Stage Hydrograph	1.0%AEP Flow Hydrograph	1.0%AEP Flow Hydrograph

The peaks of the flow and stage hydrographs were timed to be coincidental. This would not be the case in reality due to the size and differing hydrology of the catchments (some being flashier than others) but was considered a conservative measure for this modelling exercise. The unsteady simulation was run for a duration of 80 hours. The timestep was set to adjust itself to satisfy the courant condition rather than selecting a rigid timestep.

### 4.3.1.3 Results

The flooding extents illustrated in **Figure 4.7** occur at the peak of the coastal and fluvial boundary conditions. The water levels in the Corravaddy Burn overtop the embankments at Bonagee. Flows also overtop the N14 at the Clanree Hotel from the upstream portion of the Corravaddy Burn and inundate the study area. It was apparent that the 0.5%AEP coastal dominant event was more extreme than the 1.0%AEP fluvial dominant event and so the 0.5%AEP coastal dominant event was brought forward to the flood impact study.

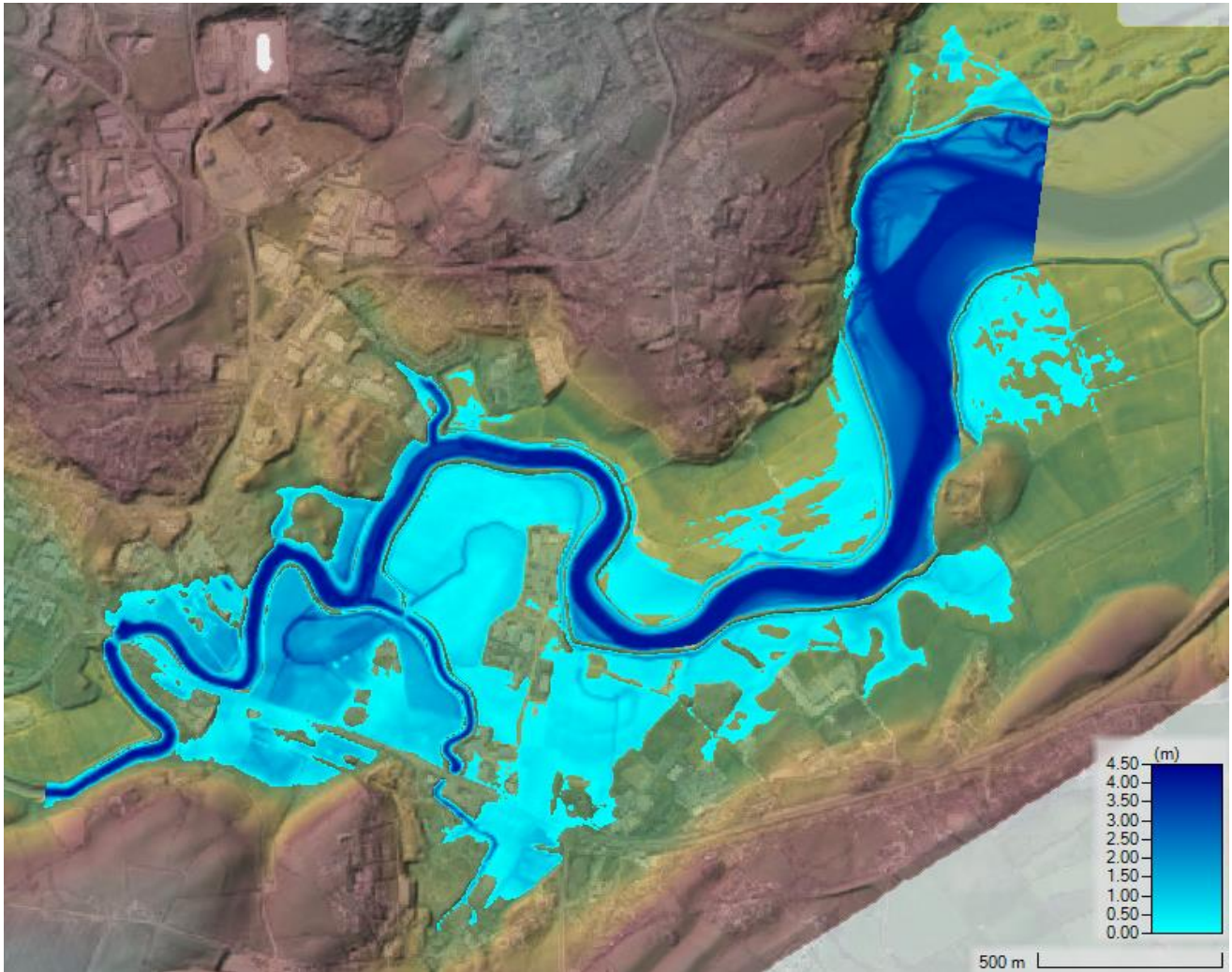
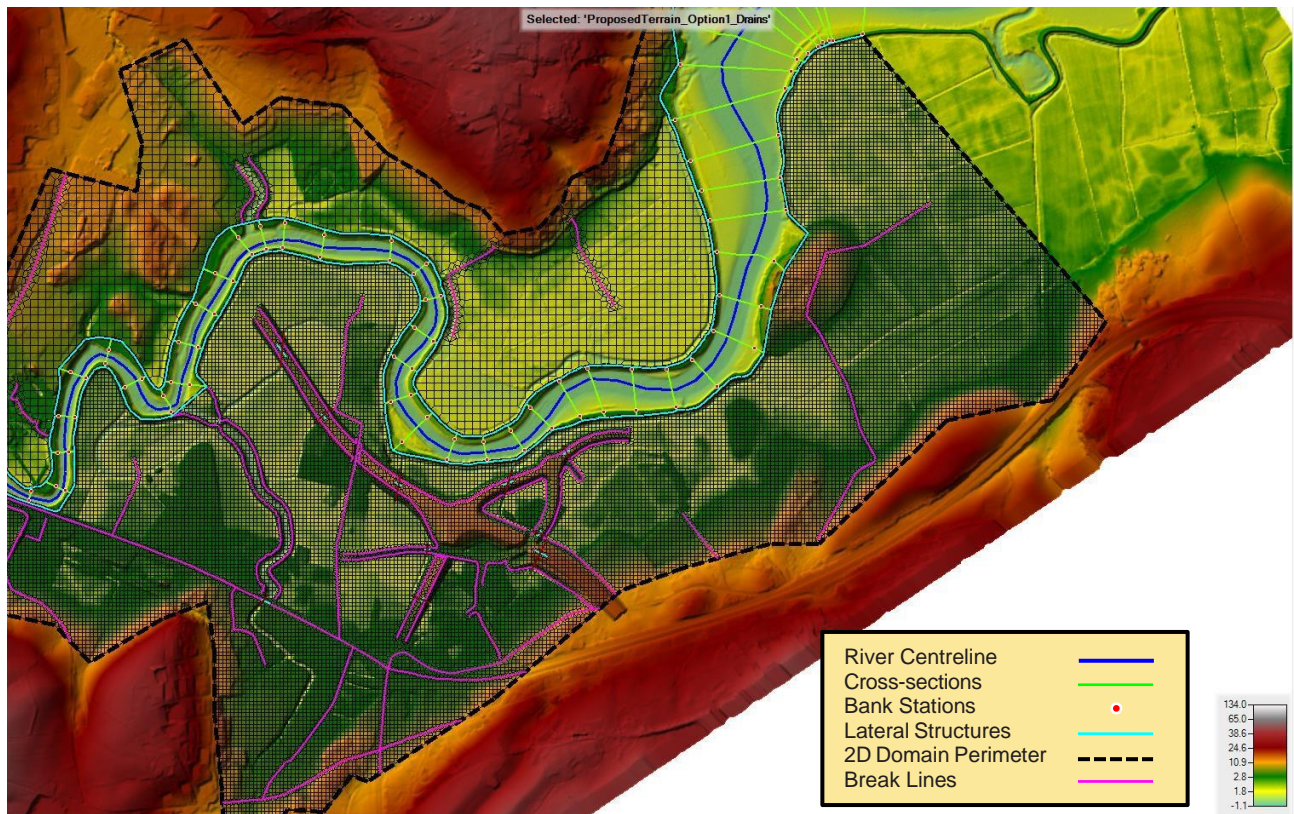


Figure 4.7 Existing Scenario 200-year current scenario coastal flooding extents

### 4.3.2 Proposed Scenario

#### 4.3.2.1 Geometry

The geometry for the proposed scenario was prepared by ‘burning’ the proposed route alignment and proposed drain realignment surfaces onto the existing terrain. Proposed culverts were modelled in the 2D domain through the use of 2D area connections. Computational cell sizes were kept consistent with the sizes in the Existing Scenario where possible. Break lines were used to adapt the computational mesh to the proposed terrain.



**Figure 4.8 Proposed Geometry Plan**

#### 4.3.2.2 Boundary Conditions

Boundary conditions are consistent with those modelled in the Existing Scenario (see **Table 4.5**).

#### 4.3.2.3 Results

The Proposed Scenario depth outputs illustrated in **Figure 4.9** show that the proposed route causes a displacement of flood waters from the Existing Scenario. Flooding in the area originates from the breaches over the embankment on the Corravaddy Burn. The most notable increase in flooding extents occur at the lands to the north of the Dry Arch Roundabout around the Bonagee Business Parks. It is clear that mitigation measures will have to be included in the proposed development. These measures are discussed in **section 4.3.3**.

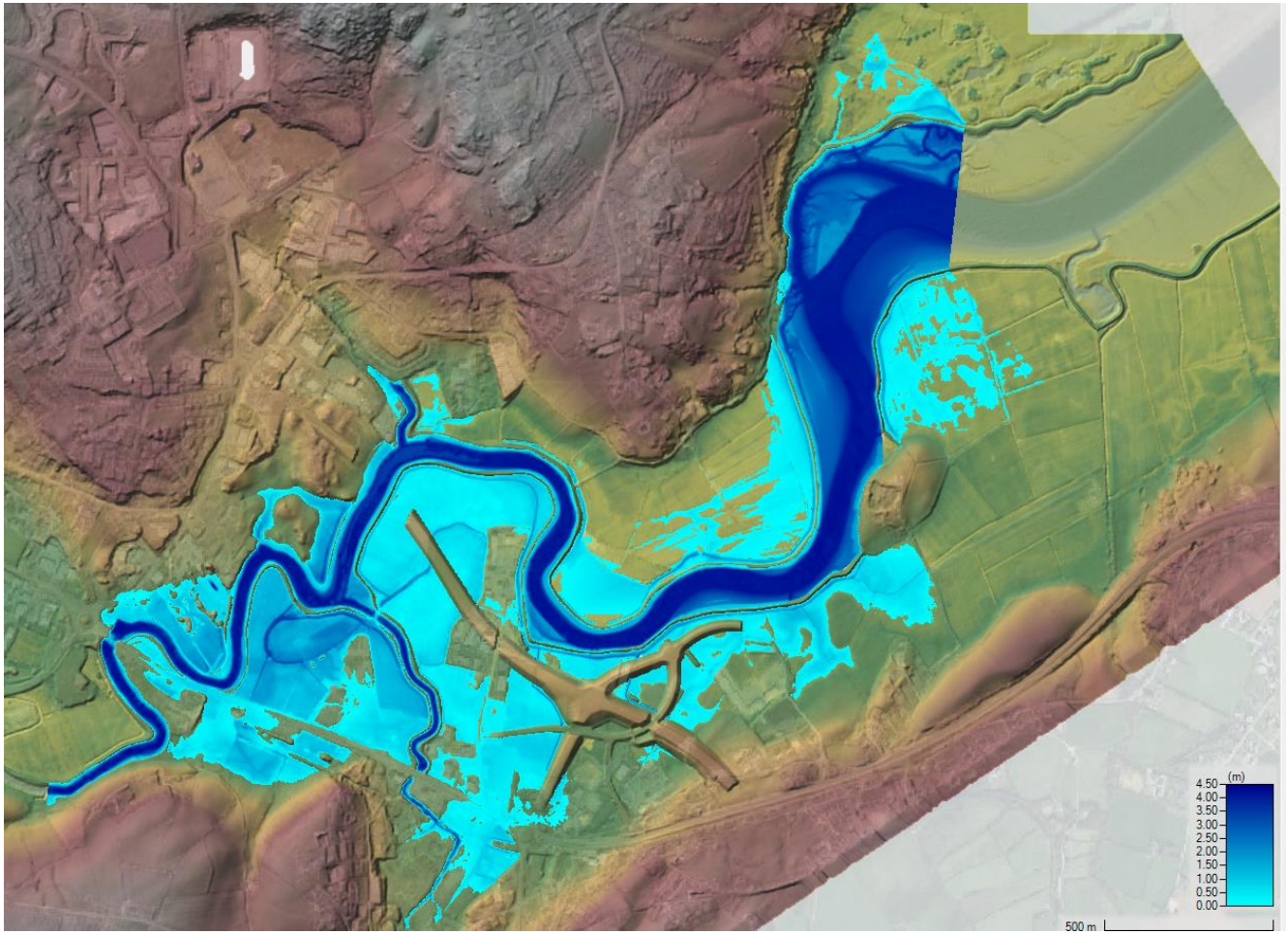


Figure 4.9 Proposed Scenario HEC-RAS Flood Depth Outputs

### 4.3.3 Proposed Scenario with Mitigation Measures

#### 4.3.3.1 Geometry

The geometry for the proposed scenario with mitigation measures was prepared by ‘burning’ the proposed flood compensation area surfaces onto the proposed scenario terrain. These areas have been reduced to 1.0mOD (between 500mm and 1600mm deeper than existing ground level) and together they provide approximately 28,000m<sup>3</sup> of storage (see **Figure 4.11** for location of Flood Compensation Areas). Computational cell sizes were kept consistent with the sizes in the existing and proposed scenarios where possible. Break lines were used to adapt the computational mesh to the flood compensation areas.

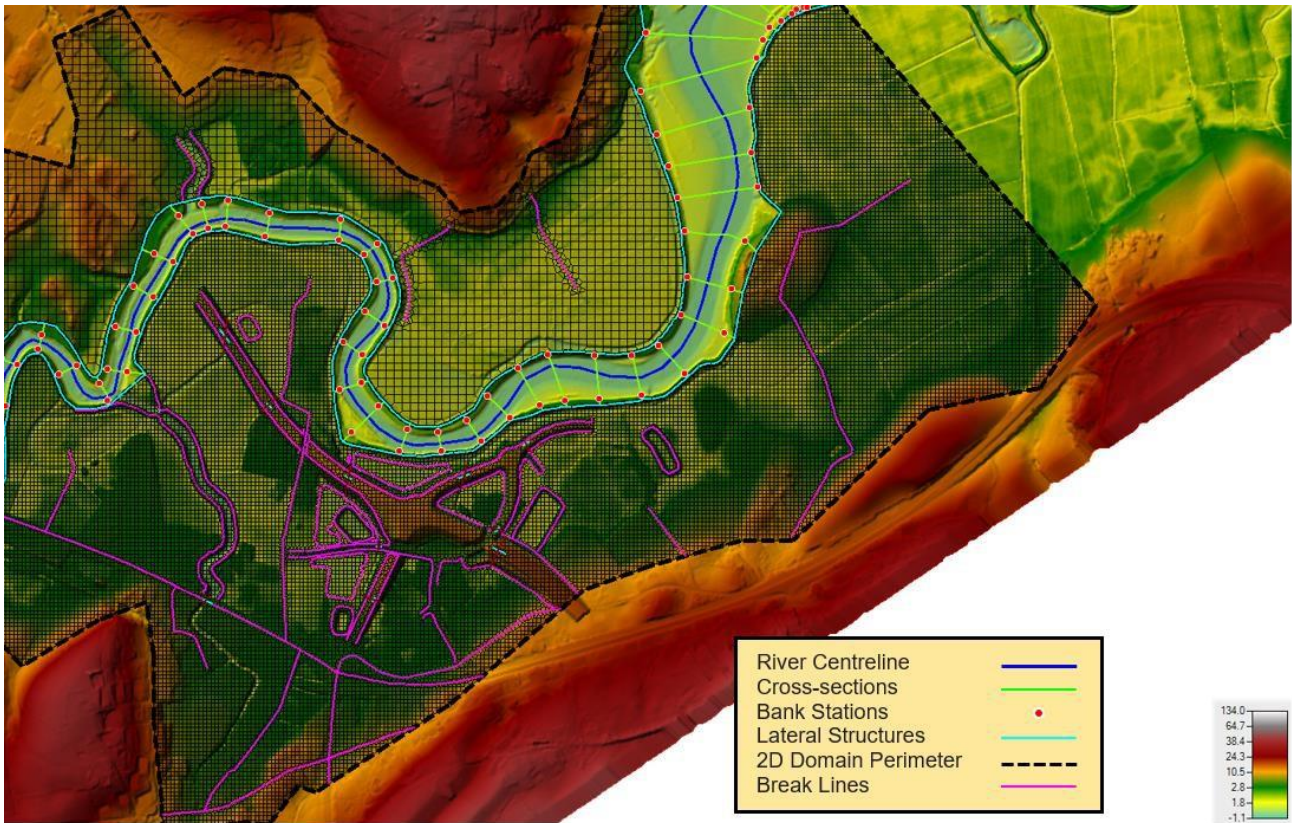


Figure 4.10 Proposed Geometry with Flood Compensation Areas Plan

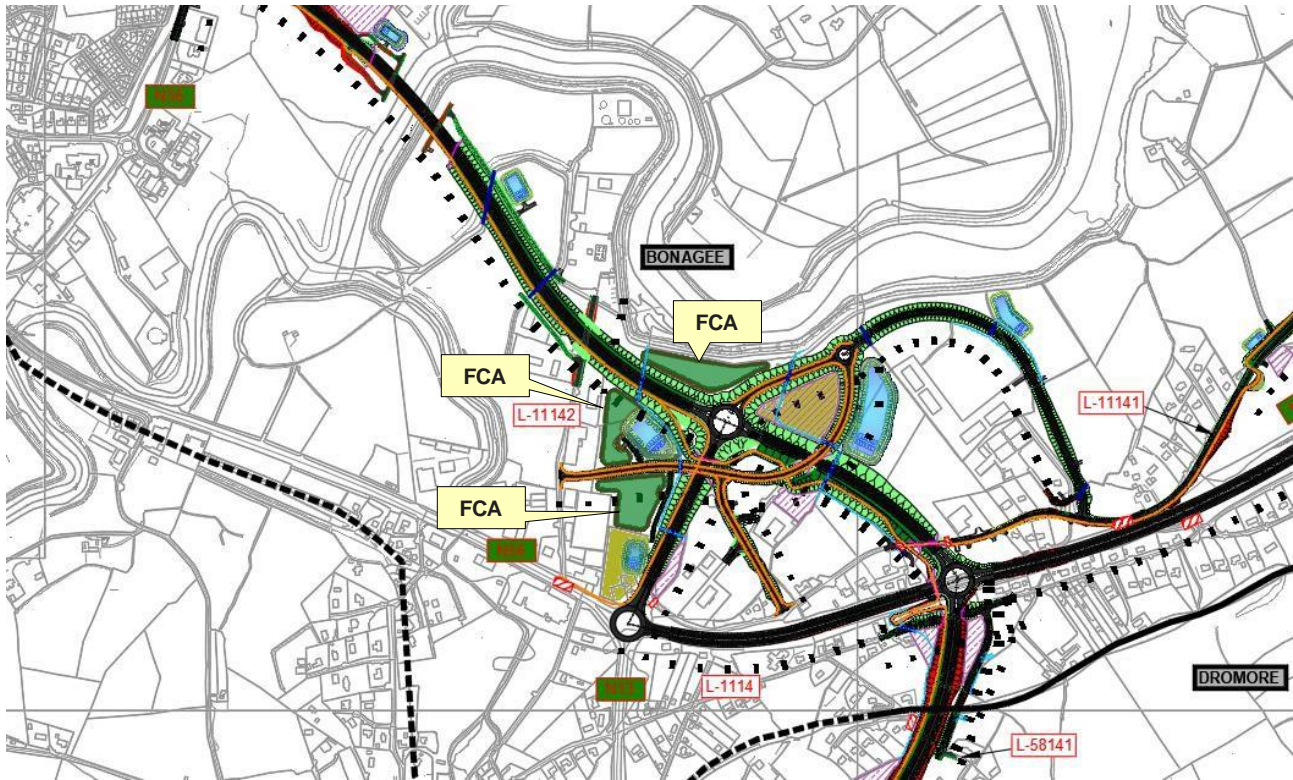


Figure 4.11 Locations of Flood Compensation Areas (FCAs)

#### 4.3.3.2 Boundary Conditions

Boundary conditions are consistent with those modelled in the Existing Scenario. See **Table 4.5**.

#### 4.3.3.3 Results

The Proposed Scenario with flood compensation areas depth outputs illustrated in **Figure 4.12** show that the proposed flood compensation areas have a positive effect on flood risk in the study area. Flooding in the area originates from the breaches over the embankment on the Corravaddy Burn during the peak of the tidal and fluvial hydrographs.

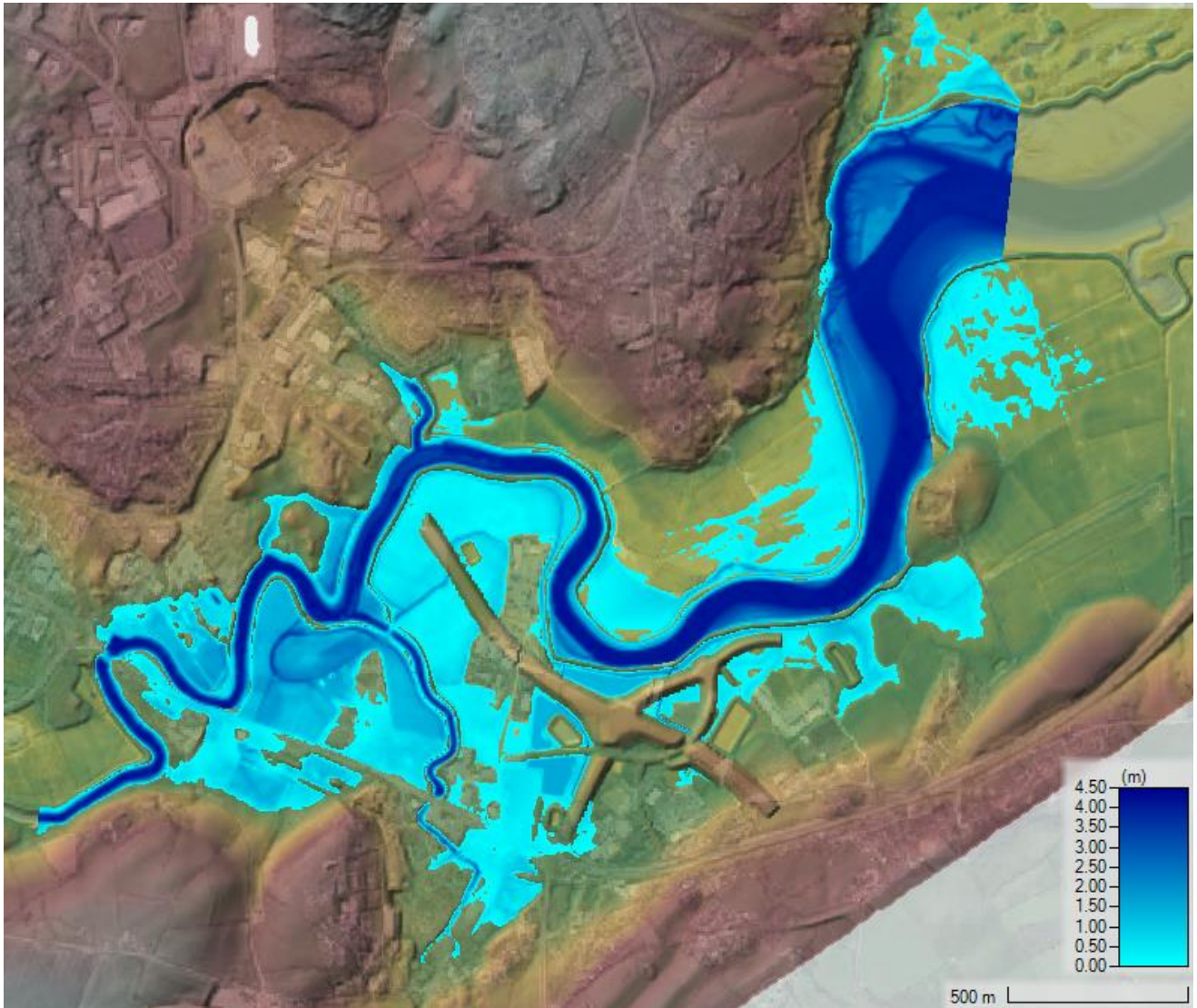


Figure 4.12 Proposed Scenario with Flood Compensation Areas HEC-RAS Flood Depth Outputs

## 5 CONCLUSION

- In January 2017, Donegal County Council appointed joint venture RPS/Barry Transportation as design consultants for the Trans-European Network - Transportation (TEN-T) Priority Route Improvement Project, Donegal. The project is divided into three sections:
  - Section 1 – N15/N13 Ballybofey / Stranorlar Urban Region
  - Section 2 – N56/N13 Letterkenny to Manorcunningham
  - Section 3 – N14 Manorcunningham to Lifford / Strabane / A5 Link.
- This report is solely concerned with Section 2 – N56/N13 Letterkenny to Manorcunningham and the determination of the flood impact (if any) to the River Swilly and associated floodplains and to outline any proposed mitigation measures.
- The Preliminary Flood Risk Assessment (PFRA) study identified Letterkenny as an Area for Further Assessment (AFA) to be included in the North Western – Neagh Bann CFRAM Study.
- The North Western – Neagh Bann CFRAM study consisted of hydrological analyses that involved the rating of existing hydrometric gauging stations, catchment boundary review, index flow estimation, flood frequency analysis and growth curve development, hydrograph development, coastal hydrology, and joint probability analysis. Flood inundation mapping was prepared for the Letterkenny AFA for both fluvial and coastal dominant scenarios for flood events of varying magnitude. Review of these inundated areas and the proposed Section 2 route alignment indicated that the proposed route alignment may impact upon flood risk at the River Swilly and its floodplains.
- An unsteady 1D/2D model was built using HEC-RAS software to model the impacts of the earthworks' volumes on flooding in the study area. The topographical data used to build the existing scenario model geometry included:
  - OPW CFRAM Cross-Sections for the River Swilly (Survey January 2013)
  - OPW LiDAR 2m Digital Terrain Model (DTM) (Flight date 23 June 2008)
  - As-built surveys of bridges/culverts
- The hydrological inputs to the model consisted of both fluvial and tidal inputs. Fluvial inputs were developed through use of FSU methodologies for design flow estimates and FSSR16 for hydrographs shapes for Corravaddy and Knocknamona and 'hydrograph borrowing' for River Swilly Hydrograph. The tidal inputs were developed through combination of ICWSS extreme water level outputs, predicted perigeon spring tides from January 2014 and an observed design storm surge from January 2014. The hydrological inputs were kept consistent across all scenarios.
- The flood extents output by the model showed an increase in inundated flood areas from the existing to proposed scenarios. Flood compensation areas were proposed to increase flood volume storage locally. The flood compensation areas have been reduced to 1.0mOD (between 500mm and 1600mm deeper than existing ground level) and together they provide approximately 28,000m<sup>3</sup> of storage. The model outputs indicate that the flood compensation areas effectively mitigate the impacts of the proposed route alignment on flood impact locally.

# Appendix A - Section 50 Application Form



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>River Swilly Crossing</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	River Swilly	Catchment:	Lough Swilly
Address (Townland – County):	Bunnagee, Letterkenny, Co. Donegal		
Grid Reference	X: 219133	Y:	411724
Hydrometric Station(s) utilized (including reference number):	New Mills 39001 Port Bridge 39061		
Area of Contributing Catchment:	96.76 Km <sup>2</sup>	Road Reference:	N13/N14
Design Flood Flow:	71.86 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	50 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>05 June 2025</u>

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

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	
3 – Variable Catchment Characteristics	<input type="checkbox"/>		Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	
IH 124	<input type="checkbox"/>		Irish Growth Curve (ADAS)	
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	
ADAS	<input type="checkbox"/>			
Other	<input checked="" type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input checked="" type="checkbox"/> 71.86 m3/s	Other <input type="checkbox"/>	Tidal <input checked="" type="checkbox"/>	
Comments			Comments <i>ICWWS 0.5%AEP NW42 level applied as downstream boundary condition (see report)</i> <i>Qmed used for fluvial inputs as per Joint Probability Analysis.</i>	

Hydraulic/Structure Details	
Description of Structure*3 Construction of a new 240m long bridge.	
Effective Conveyance Area *4 N/A	
Upstream Invert Level <b>-2.04</b> mOD	Downstream Invert Level <b>-2.30</b> mOD
Upstream Soffit Level <b>7.913</b> mOD	Downstream Soffit Level <b>7.913</b> mOD
Upstream Design Flood Level <b>3.84</b> mOD	Downstream Design Flood Level <b>3.84</b> mOD

**NOTES :**

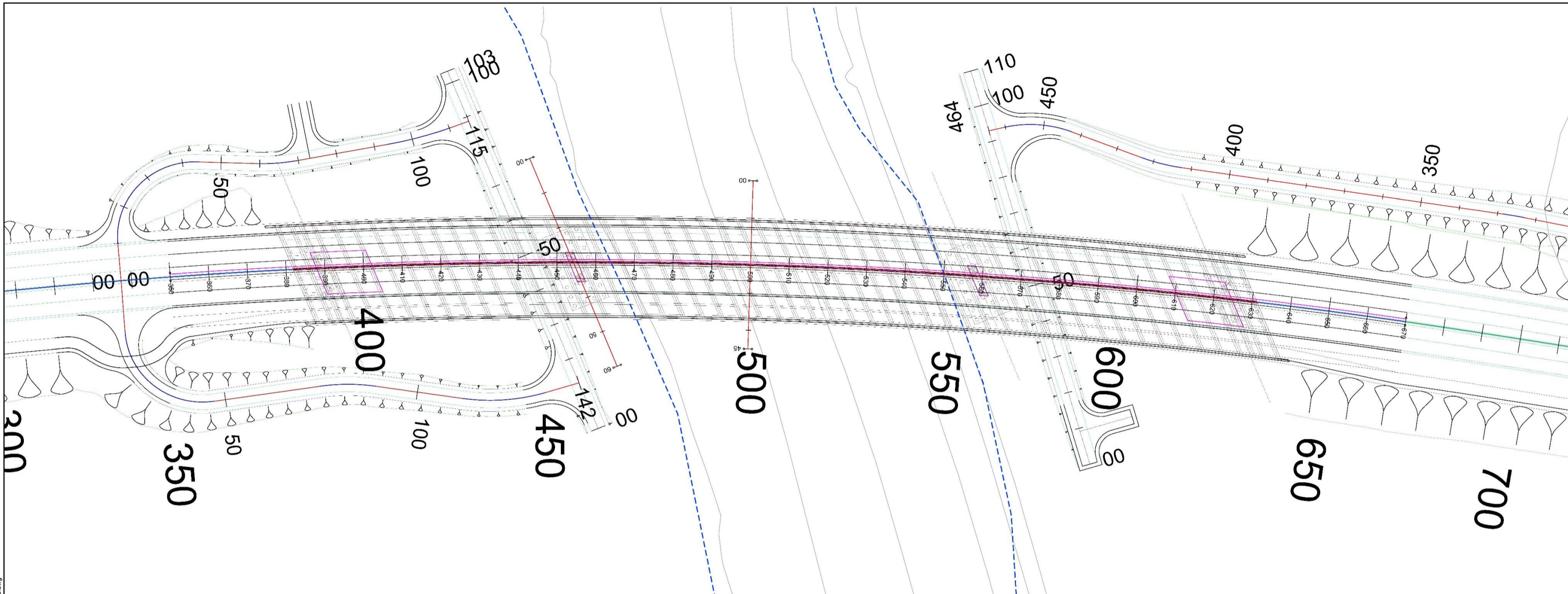
- In line with OPW policy, section 50 approvals should be sought for bridges and culverts that are necessary for access or deemed acceptable by the planning authority. A copy of the notice of grant of planning permission with all conditions should be enclosed with all applications, that are not exempt development under the Planning and Development Act, 2000, as evidence that these factors have been considered.
- Flow is the estimated flow from the catchment, without any factors applied.

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

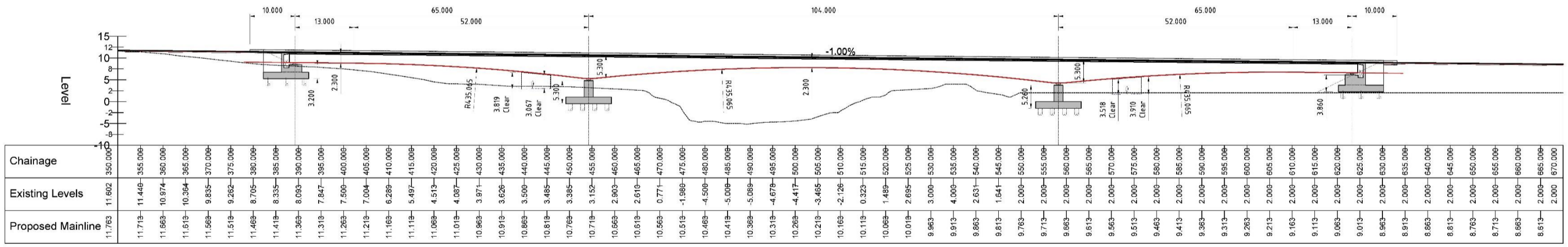
3. The following details are to be included: the channel bed level, invert and soffit levels of the structure along with the width, length and total conveyance area. Any environmental considerations such as bed depression, baffles, mammal walkways etc. should be described.
4. Effective conveyance area 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.

## Appendix B - Drawings



PLAN LAYOUT  
(Scale 1 : 500)



LONG SECTION  
(Scale 1 : 500)

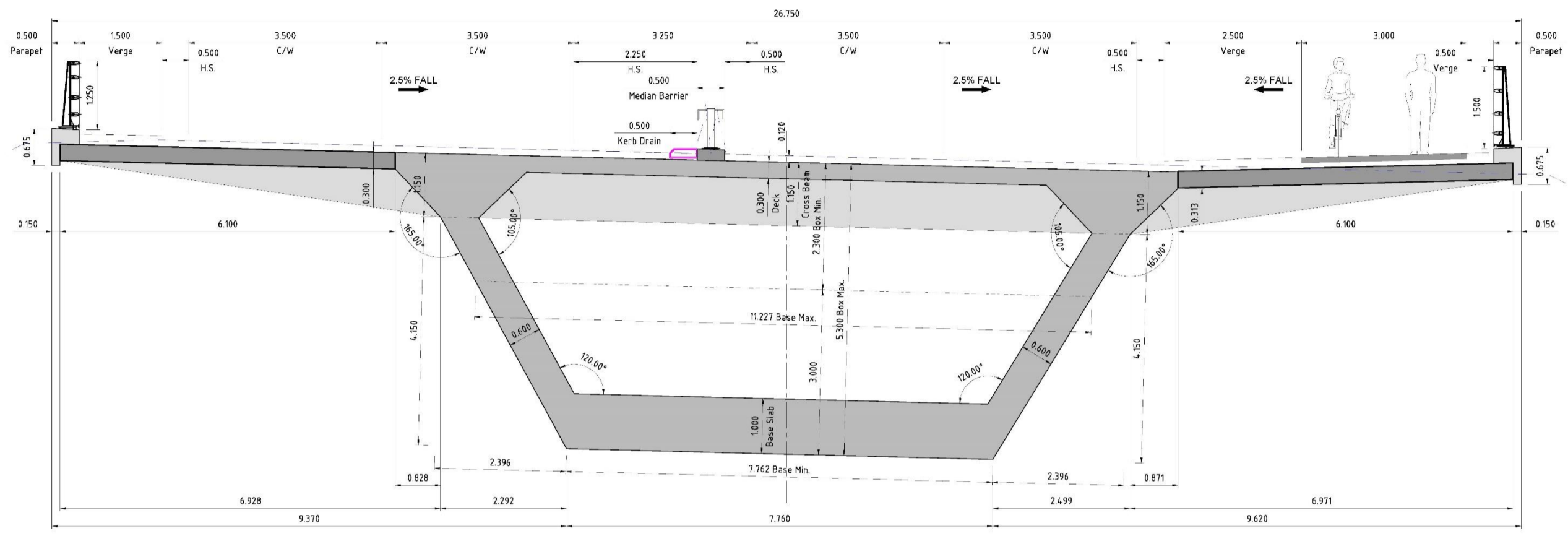
\\vaiko-bpc-01\Work\Transport\MG10337 - Ten-T Priority Route Imp - Donegal\8.0 Drawings\Phase 3\BRVT - MG10337-RPS-P3-S2-DR-C-RB N56RB005 BR0103.dwg



**NOTES**  
DO NOT SCALE, use figured dimensions only.  
All levels are referred to Ordnance Survey Datum, Mean High Water.  
This drawing is the property of the Donegal County Council. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. The document should not be relied on or used in circumstances other than those for which it was originally prepared. RPS/BARRY Transportation accepts no responsibility for this document to any other party other than the party by whom it was commissioned.

Rev.	Date	Drawn	Description	Chk'd	Appr.
S3 P01	Oct '22	DC	ISSUE FOR APPROVAL	TP	EC

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 1 - N15/N13 Ballybofey / Stranorlar Urban Region		Status: S3
Drawing Title: Overbridge N56RB005 General Arrangement (Sheet 1 of 2)		Rev: P01.01
Designed: JM	Date: Oct, 2022	Model File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-RB N56RB005 BR0000
Drawn: DC	Scale: @ A1: As Shown	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-RB N56RB005 BR0103
Approved: EC	@ A3: Half	
Checked: TP	Sheet: 01 of 02	



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**NOTES**  
DO NOT SCALE, use figured dimensions only.  
All levels are referred to Ordnance Survey Datum, Malin Head.  
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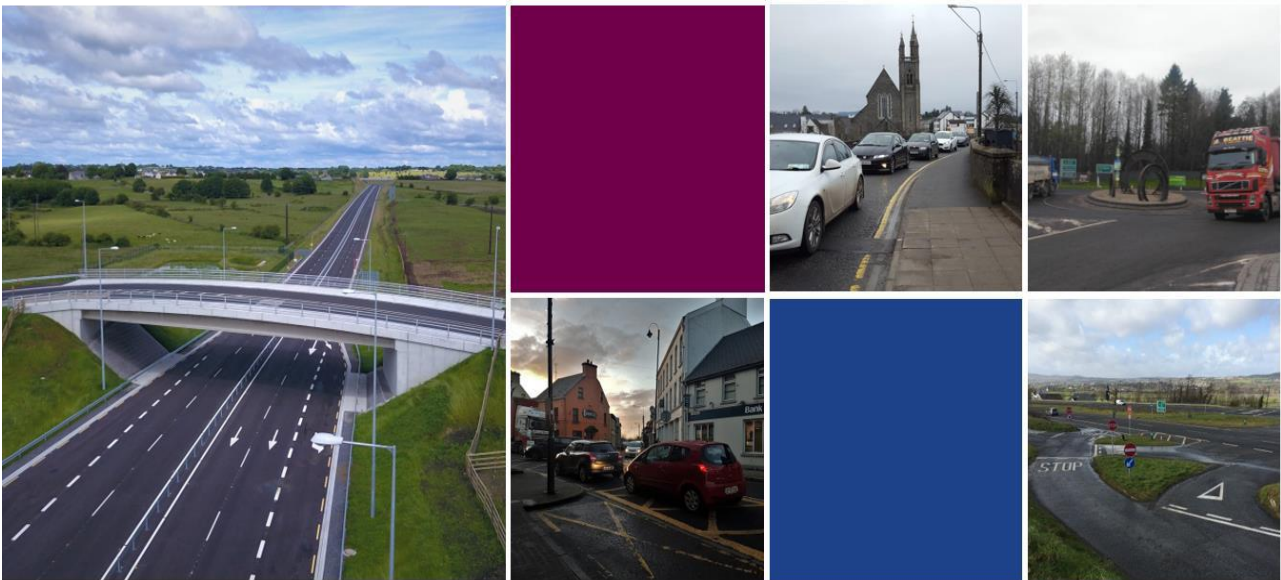
Rev.	Date	Drawn	Description	Chkd	Appr.
S3 P01	Oct '22	DC	ISSUE FOR APPROVAL	TP	EC

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 1 - N15/N13 Ballybofey / Stranorlar Urban Region		Status: S3
Drawing Title: Overbridge N56RB005 General Arrangement (Sheet 2 of 2)		Rev: P01.01
Designed: JM	Date: Oct. 2022	Model File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-RB N56RB005 BR0000
Drawn: DC	Scale @ A1: As Shown	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-RB N56RB005 BR0103
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# APPENDIX B: HYDROLOGICAL IMPACT STUDY ISLE BURN FOOTBRIDGE, LETTERKENNY

# Hydrological Impact Study, Isle Burn Footbridge, Letterkenny

TEN-T Priority Route Improvement Project, Donegal Section 2  
 N56/N13 Letterkenny to Manorcunningham  
 Isle Burn Footbridge



TT\_MGT0337-RPS-P3-S2-RP-D-DR0003 S3 P02

Technical Report for OPW Section 50  
 Application  
 Isle Burn Footbridge  
 S3 P02

June 2025



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## Appendices

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# 1. INTRODUCTION

This report details the preliminary design location, size and associated hydrological calculations for the proposed watercourse crossing required to construct the works at Isle Burn Footbridge as part of the Section 2 – N56/N13 Letterkenny to Manorcunningham section of the TEN-T Priority Route Improvement Project, Donegal.

## 1.1. Proposed Development

The N13, N14 and N15 form part of the TEN-T Priority Route Improvement Project, Donegal, which is a selection of strategic transport corridors throughout the European Union (EU) that have been identified to play a key role in the mobility of goods and passengers through the EU. EU Regulation Number 1315/2013 sets the requirements for the TEN-T network. Letterkenny is connected to Derry via the N13, to Lifford (the County Town) via the N13-N14 and to Ballybofey/Stranorlar via the N13-N15.

The proposed works at Section 2 – N56/N13 Letterkenny to Manorcunningham include the provision of a pedestrian footbridge (ref. N13S2FX34) immediately upstream of the existing Isle Burn bridge (ref. N13S2RX34).

## 1.2. Objective

The objective of this report is to review and appraise information pertinent to flood risk and drainage at the subject footbridge location along with any impacts of the proposed on the existing hydrological regime upstream and downstream of the crossing. This report is prepared in support of an application for footbridge N13S2FX34 under Section 50 of the Arterial Drainage Act, 1945 and forms the basis for Section 50 approval of crossings located along the proposed works in Section 2. The Section 50 application form for this crossing is enclosed in **Appendix A**.

The assessment involves a desk study as well as the creation of a hydraulic model to inform the predicted flood water levels from the Isle Burn for both existing and proposed conditions.

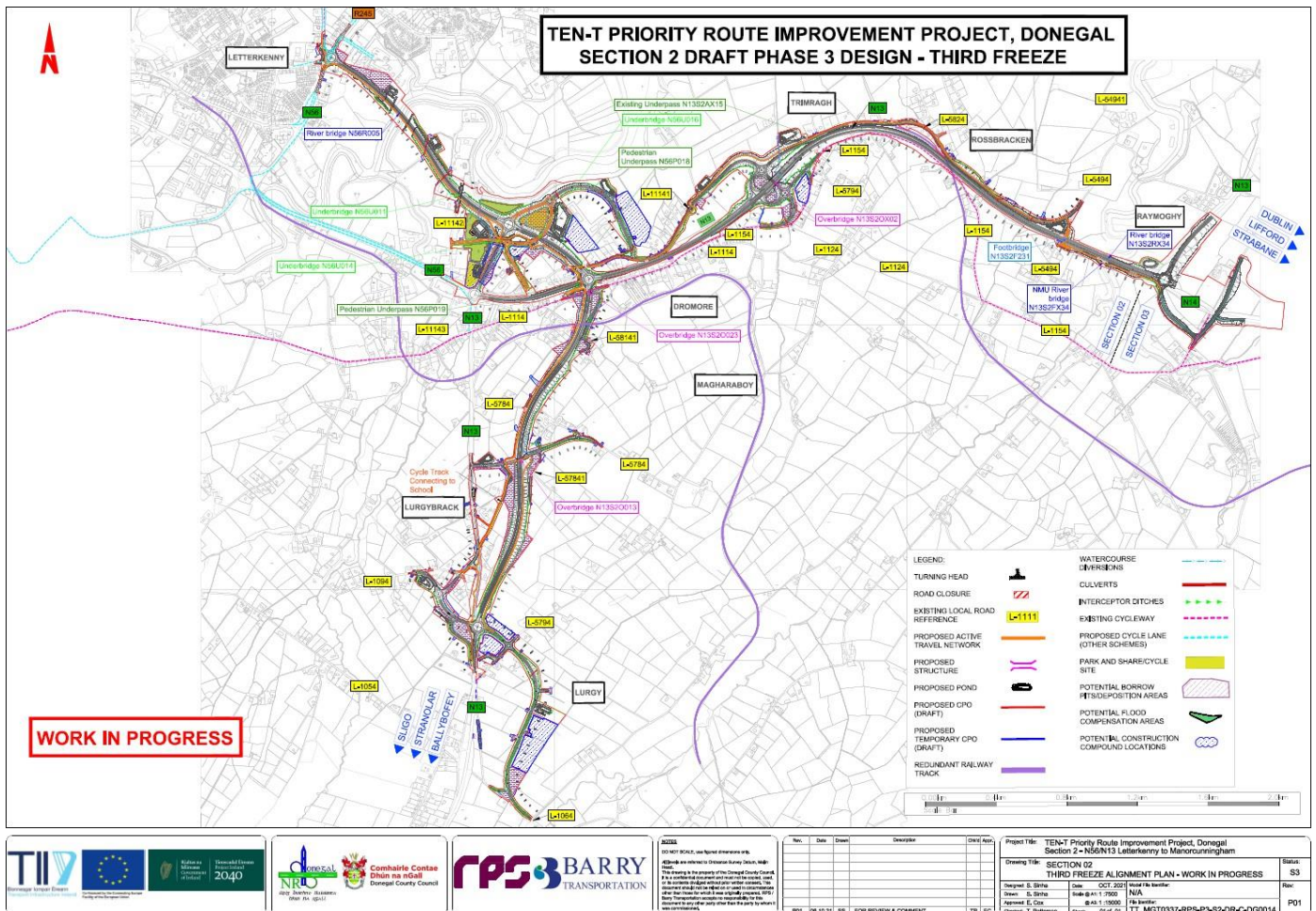
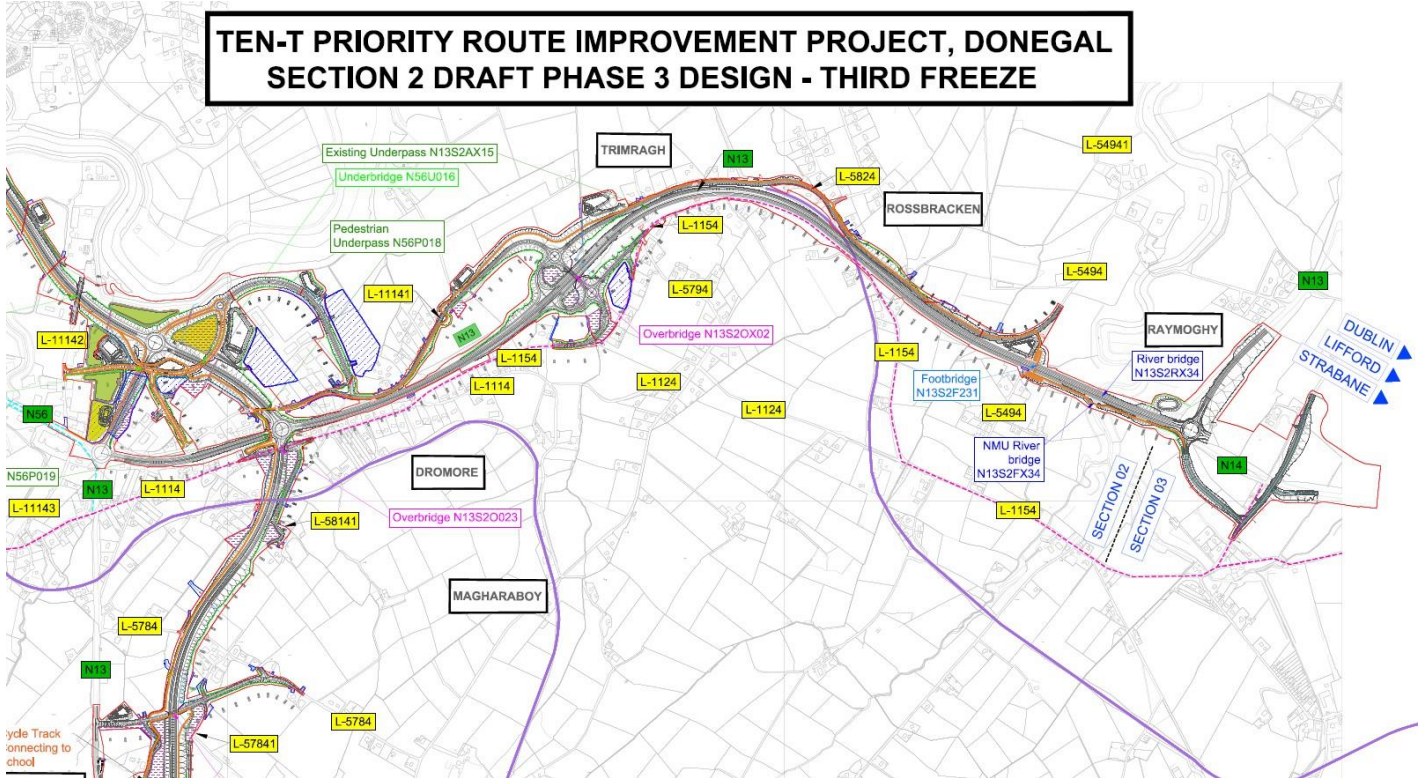


Figure 1-1 Section 02 Alignment Plan

## 2. EXISTING SITE AND PROPOSED DEVELOPMENT

### 2.1. Culvert Location

The proposed footbridge is located on the eastern arm of Section 2 at CH. 3400 and will traverse the Isle Burn approximately 5km east of Letterkenny. The stream at this location flows in a south-north direction and outfalls to the River Swilly/Lough Swilly Estuary approximately 4km downstream. The location of the proposed land drain crossing is shown in **Figure 2-1**.



**Figure 2-1** Location of proposed footbridge

### 2.2. Proposed Footbridge Installation

The proposed footbridge coincides with the stream at approximate Ch.17+520 of the eastern arm of the N13. At this location, the stream is crossed by the existing Dual Carriageway main alignment.

The proposed footbridge will span a distance of 40m over the Isle Burn with a minimum soffit level of 6.3mOD and a finished deck level of 6.5mOD. The proposals will be checked in line with OPW Section 50 guidance standards, most notably:

- A bridge or culvert must be capable of passing a fluvial flood flow with a 1% annual exceedance probability (AEP) or 1 in 100 year flow without significantly changing the hydraulic characteristics of the watercourse.
- In addition to the above fluvial flood flow standard, if a bridge or culvert is located within a tidal zone, it must cater for a tide level with a 0.5 % (AEP) or 1 in 200 year flow without significantly changing the hydraulic characteristics of the watercourse.
- A bridge must be capable of operating under the above design conditions while maintaining a freeboard of at least 300mm.
- If the land potentially affected does not include dwellings and infrastructure, a culvert must be capable of operating under the above design conditions while causing a hydraulic loss of no more than 300 mm (excluding the culvert gradient).
- If the land potentially affected includes dwellings and infrastructure, it must be demonstrated that those dwellings and/or infrastructure are not adversely affected by constructing the bridge or culvert.
- A culvert diameter, height and width must not be less than 900 mm to facilitate maintenance access and reduce the likelihood of debris blockage.

### 3. EXISTING DRAINAGE CHARACTERISTICS AND FLOODING INFORMATION

#### 3.1. Stream Catchment Characteristics

The subject stream catchment is located within hydrometric area 39 – Lough Swilly. The stream conveys flows from approximately 54.57km<sup>2</sup> of upstream land areas at the proposed footbridge location. The catchment characteristics have been examined through the use of the Physical Catchment Descriptors (PCDs) prepared during the Flood Studies Update (FSU) programme. The PCDs are readily available for ungauged nodes located at 500-metre intervals along each river/stream in Ireland for which the catchment drainage area is greater than 1km<sup>2</sup>. The PCDs for the Isle Burn catchment at the proposed footbridge have been extracted from FSU Ungauged Node 39\_741\_2 immediately downstream of the existing bridge (**Figure 3-1**).

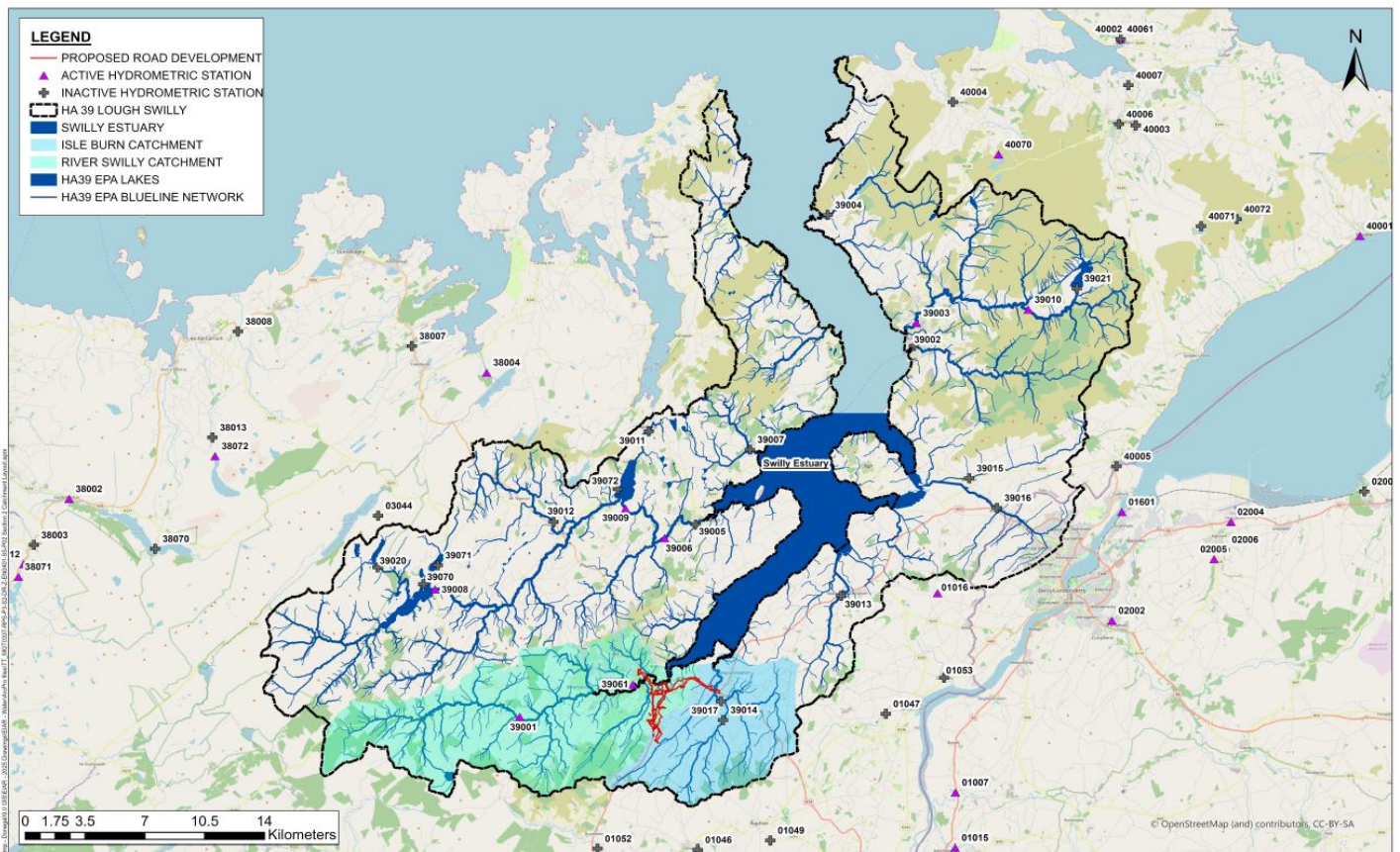


Figure 3-1 Location and catchment for FSU ungauged node 39\_741\_2

Table 3-1 FSU PCDs for Isle Burn at Ungauged Node 39\_741\_2

Watercourse	Isle Burn
Location Number	39_741_2
Contributing Catchment Area (km <sup>2</sup> )	54.567
Soil Baseflow Index, BFISOIL (unitless)	0.5141
Standard Average Annual Rainfall, SAAR (mm)	1110.34
Index of Flood Attenuation by Reservoirs and Lakes, FARL (unitless)	1
Drainage Density, DRAIN (km/km <sup>2</sup> )	1.58
Slope of main stream excluding the bottom 10% and top 15% of its length, S1085 (m/km)	11.487
Proportion of river network length included in Arterial Drainage Schemes, ARTDRAIN2 (unitless)	0.0212
Proportional extent of catchment area mapped as urbanised, URBEXT (unitless)	0.0012

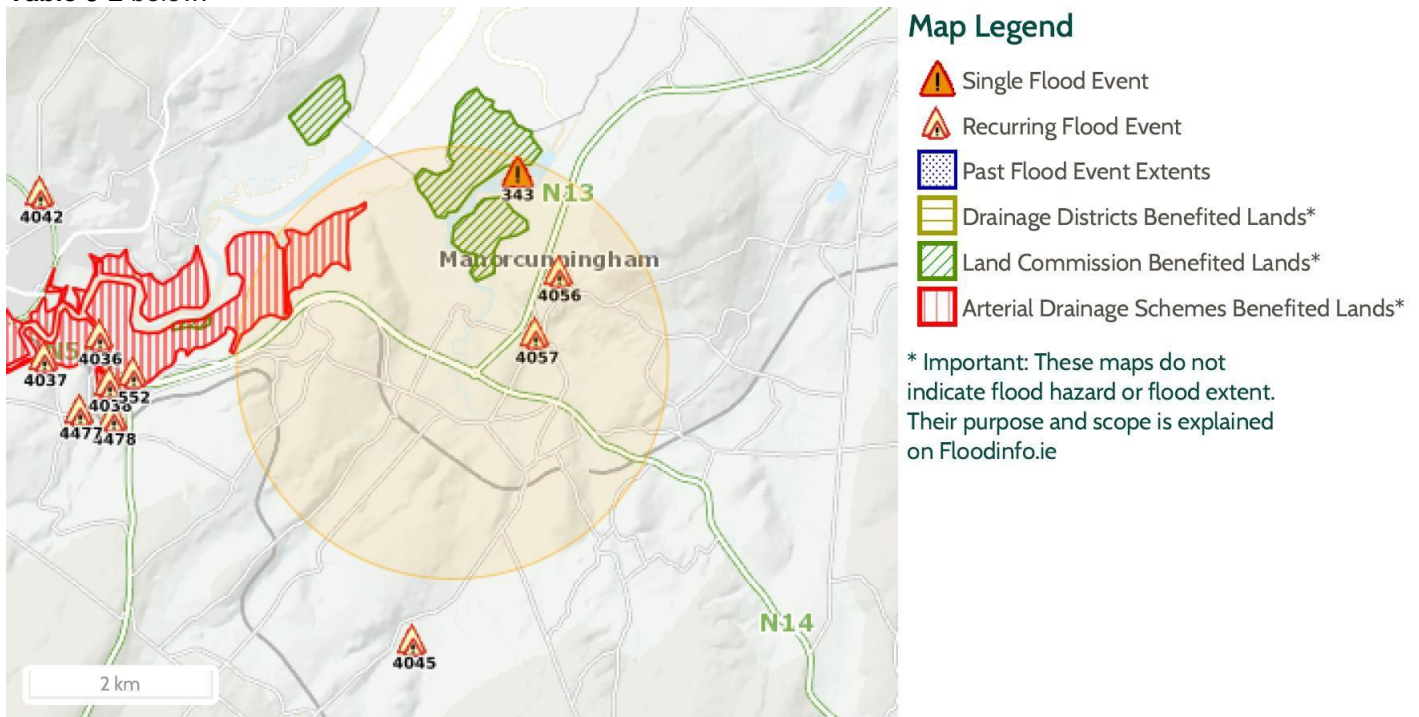
In **Table 3-1** above it can be seen that the watercourse does not experience flood attenuation from reservoirs and

lakes. The baseflow index (BFI) value is indicative of the proportion of base flow contributing to total flow and also a predictor of soil permeability and geology of a catchment. The theoretical limits for BFI are between 0 and 1. Low values of BFI typically indicate shallow and/or impermeable soils. High values of BFI typically indicate highly permeable soils, e.g., associated with major aquifers. The BFI value of 0.5141 describes a moderately well-drained catchment and examination of Teagasc Soils Maps would indicate that this is the case with the catchment predominantly underlain by a mixture of poorly drained and deep well-drained metamorphic tills. The SAAR value of 1110.34 is consistent with the climate of the north-west of Ireland. The drainage density is higher than most gauged catchments that informed the FSU programme, with the most frequent DRAIN values lying in the range of 0.8-1.2 km/km<sup>2</sup>. The catchment and drainage layout plan view from FSU Hydronet portal in **Figure 3-1** show that the catchment has a high density of streams in the catchment. The S1085 value for the catchment is also higher than the most frequent S1085 values that occur in gauged Irish catchments during the FSU study with most gauged catchments lying in the range of 0.5-5.5 m/km. This deviation from the median S1085 values in the FSU study are to be expected, however, as most catchment gauges are located at the downstream portions of larger Irish rivers where the watercourse is at its lower, flatter course. The PCDs also show some influence of arterial drainage on the catchment and very minute levels of urbanisation.

### 3.2. Flooding History

#### 3.2.1. OPW Past Flood Events

The Past Flood Event Local Area Summary report generated from FloodInfo.ie has indicated three locations of historical flood events withing 2.5km radius of the proposed footbridge (see **Figure 3.2**). These are summarized in **Table 3-2** below.



**Figure 3-2 Plan of Past Flood Events from FloodInfo.ie**

There are no recorded instances of flooding at the proposed crossing. FloodInfo.ie can be interrogated for further flood reports and press articles. There is also a detailed assessment of historical flood events included in the North Western - Neagh Bann CFRAM Study UoM 01 Hydraulics Report (RPS, 2017) as part of the hydraulic model calibration and verification.

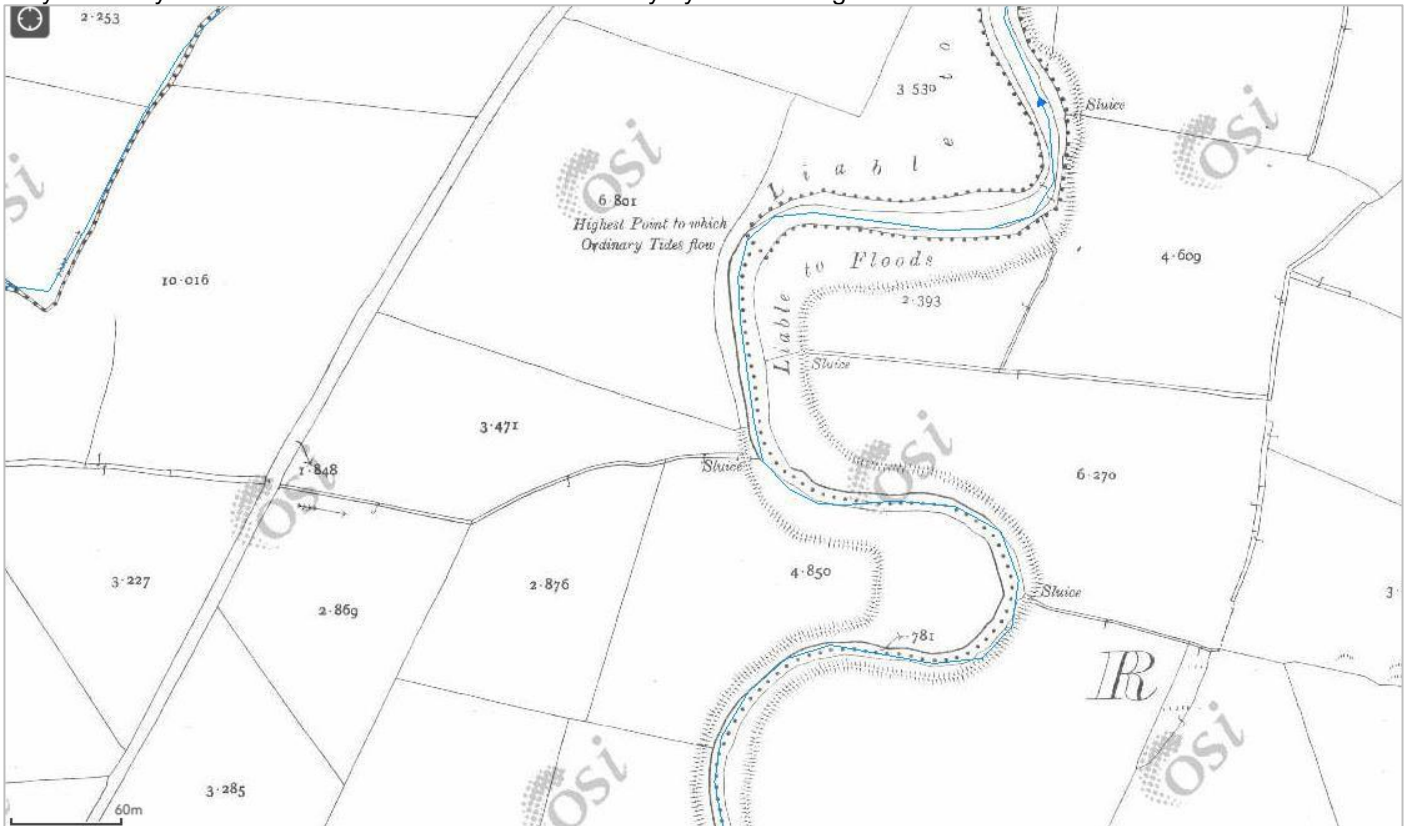
**Table 3-2 Isle Burn Footbridge - Summary of Historical Flood Events provided by FloodInfo.ie**

Flood ID	Location	Date(s) of Report(s)	Recorded date of occurrence	Frequency	Description
343	Big Isle Letterkenny	26/02/1990	February 1990	Unique event	Reports, photos and news articles describe gale force winds directed toward south-eastern shores at Letterkenny and Big Isle embankments. Combination of high tides and storm surge resulted in embankment overtopping and some embankment failure in locations.
4056	Manorcunningham	21/03/2006	N/A	Every 5 years	Runoff from high ground causes flooding every 5 years approximately after very heavy rain. The road is liable to flood and properties are affected.
4057	Manorcunningham	21/03/2006	N/A	Every 10 years	Runoff from high ground causes flooding every 10 years approximately after very heavy rain. The road is liable to flood and properties are affected.

There is no indication from the above to suggest that the past flood events have impacted upon the location of the proposed footbridge. However, the potential impact of high tides may need to be considered under this assessment.

### 3.2.2. OSi Historical Mapping

The OSi 25inch mapping has been consulted to identify any sources of flooding at the proposed site. The mapping in **Figure 3-3** shows evidence of flood defence berms along the riverbank and lands “liable to floods”. The map also shows the location of the highest point to which ordinary tides flow. This would indicate that water levels in the river may be tidally affected and should be considered in any hydraulic design.



**Figure 3-3 OSi historical 25inch mapping**

### 3.3. Predictive Flooding

#### 3.3.1. Preliminary Flood Risk Assessment (PFRA)

The PFRA study was undertaken as part of the scoping phase of the CFRAM study to identify areas for further assessment (AFAs) where the flood risk was determined to be potentially significant from one or more sources of flooding. This was undertaken as a requirement of the EU 'Floods' Directive.

It is important to note that the PFRA was not a detailed assessment of flood risk. It was rather a broad assessment, based on available and readily derivable information to identify areas where there was a genuine cause for concern about a risk and impact of flooding that may require further assessment.

The OPW used three sources of information to designate these AFAs:

- Historic information on floods that happened in the past.
- Public consultation to gain local and expert knowledge from Local Authorities and other Government departments and agencies to identify areas prone to flooding and the potential consequences.
- Engineering techniques to analyse potential damage that could be caused by flooding.

The PFRA 100-year flood extents are illustrated in **Figure 3-4** below. It is important to note that these maps were based on broad-brush datasets and course methodologies in order to flag areas of potential flood risk. The Letterkenny area was highlighted as an AFA as a result of the PFRA process and as such was included in the North Western - Neagh Bann CFRAM Study. The outputs and recommendations from the CFRAM study supersede the information provided by the PFRA and are discussed in **Chapter 3.3.2**.



Figure 3-4 PFRA 100-year flood extents

### 3.3.2. Catchment Flood Risk and Management (CFRAM) Study

The OPW commissioned RPS to undertake the North Western – Neagh Bann CFRAM Study in March 2012 and final flood maps were issued in July 2017. The Letterkenny AFA is located in east Donegal and is affected by the lower reaches of the River Swilly, its adjoining tributaries, and the Swilly Estuary.

Unfortunately, the Isle Burn was not included under the CFRAM study, so no predictive flood extents are available for the river at the proposed footbridge location. The Lough Swilly estuary was included in the model in the 2D domain and some predicted flood levels in the estuary downstream of the Isle Burn are available (see **Figure 3-6**).

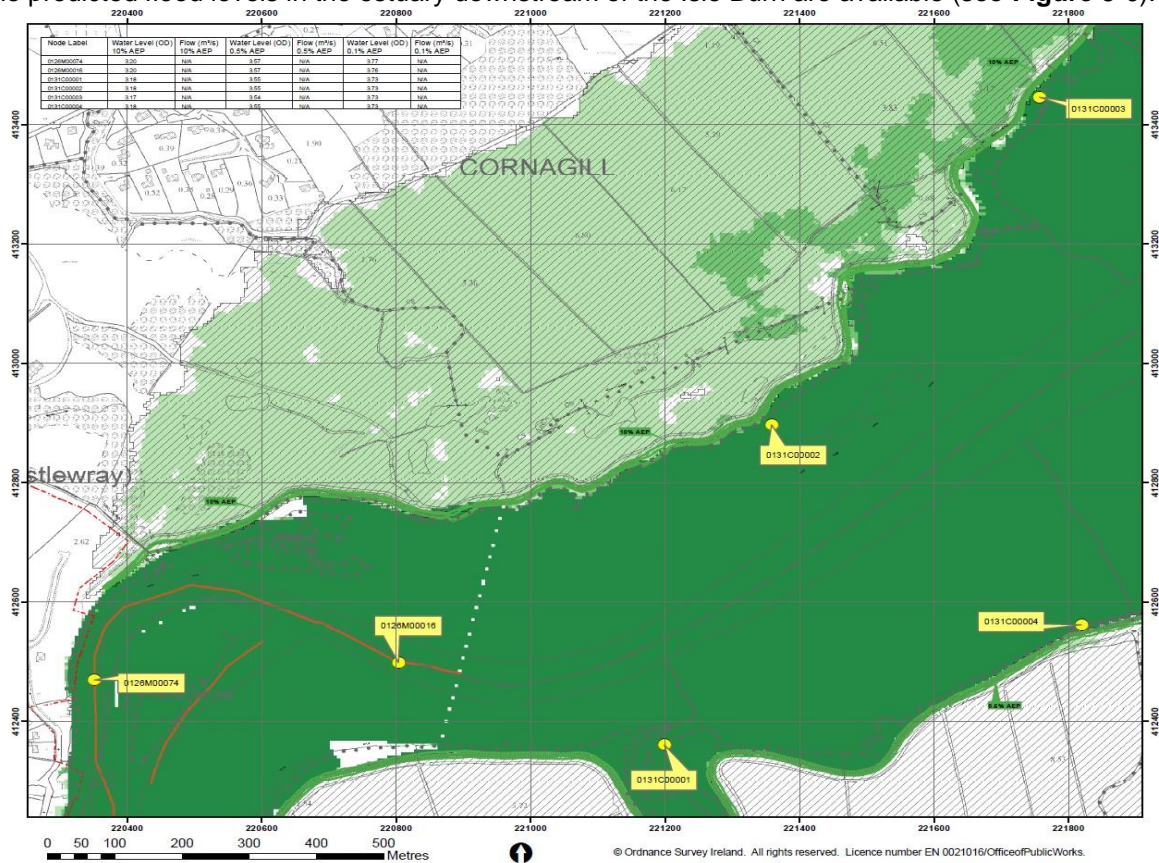


Figure 3-5 CFRAM Coastal Flood Maps at Lough Swilly Estuary

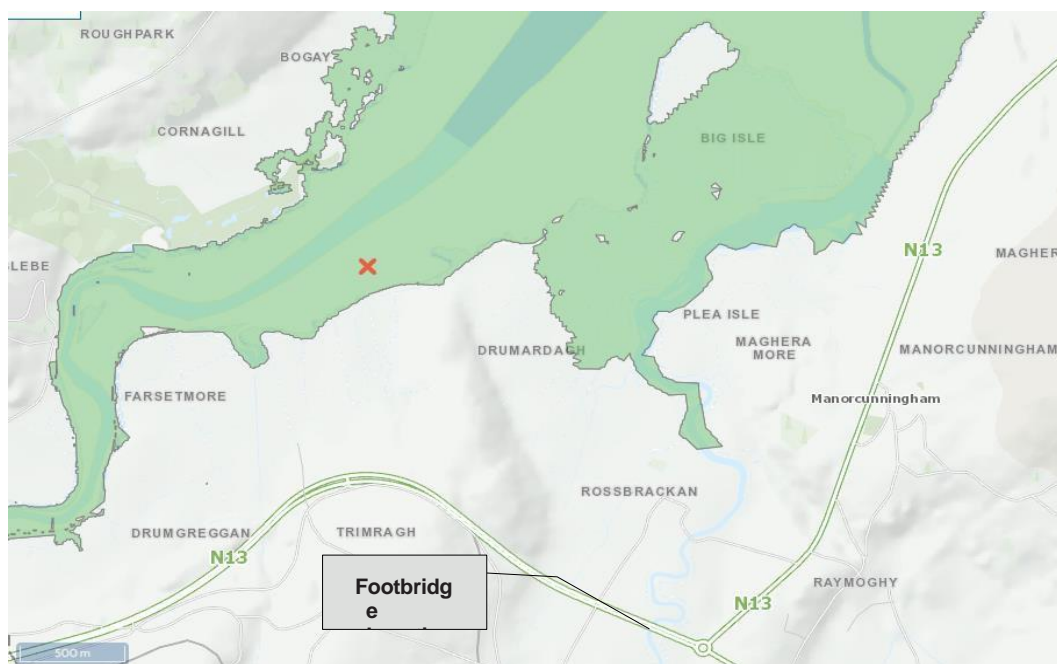


Figure 3-6 CFRAM Flood Extents Maps

### 3.3.3. National Indicative Fluvial Mapping (NIFM)

The NIFM mapping available on floodinfo.ie has also been consulted to identify any flood risk to the existing site. **Figure 3-7** shows some out of bank flooding upstream and downstream of the proposed crossing. It is important to note that the NIFM modelling approach was quite coarse and any flood extents and potential impacts from the proposed footbridge will have to be checked through detailed hydraulic modelling at the site.



Figure 3-7 NIFM Mapping

## 4. HYDROLOGICAL ANALYSIS

### 4.1. Design Flow Estimation

The estimation of design flows is based on the best practice guidance for Irish catchments generally as outlined in the Flood Studies Update (FSU). Design flow estimation began with the estimation of the index flood, or median flow,  $Q_{med}$ . In a set of hydrometric records,  $Q_{med}$  represents the median of the observed annual maximum flood flows and has an annual exceedance probability (AEP) of 50%, i.e., a 2-year return period.

#### 4.1.1. Estimation of Index Flood, $Q_{med}$

The  $Q_{med}$  for the Isle Burn footbridge was estimated using the FSU methodology for ungauged catchments at the closest FSU ungauged node 39\_741\_2 immediately downstream of the proposed crossing (see **Figure 3.1**).

The FSU methodology for  $Q_{med}$  estimation in ungauged catchments involves the use of a 7-variable catchment descriptor equation:

$$Q_{medrural} = 1.237 \cdot 10^{-5} \cdot Area^{0.937} \cdot BFI^{-0.922} \cdot SAAR^{1.306} \cdot FARL^{2.217} \cdot DRAIN^{0.341} \cdot S1085^{0.185} \cdot (1 + ARTDRAIN2)^{0.408}$$

The above PCDs were input into the 7-variable equation to calculate  $Q_{med}$ . The  $Q_{med}$  output was adjusted for the effect of urbanisation within the catchment:

$$Q_{med} = Q_{medrural} \times (1 + URBEXT)^{1.482}$$

The  $Q_{med}$  estimate was then adjusted to account for the discrepancy between gauged  $Q_{med}$  and 7-variable  $Q_{med}$  using a pivotal gauging station or donor gauged site. The pivotal station chosen was Aughnagross (16005) in the Suir catchment due to its hydrological similarity. The calculations for  $Q_{med}$  at the catchment are tabulated in Error! Not a valid bookmark self-reference. below.

**Table 4-1  $Q_{med}$  calculations**

FSU Ungauged Node 39_741_2		
$Q_{med_{PCD}}$	Adjustment factor (16005)	$Q_{med_{adjusted}}$
17.06	1.0185	17.38

#### 4.1.2. Flood Frequency Analysis and Growth Curve Development

The growth curves required to generate the design floods were developed using the FSU methodology for pooling group analysis utilising a Region-Of-Influence (ROI) approach. A pooled flood frequency analysis was undertaken using gauged records at stations with hydrologically similar catchments using up to date records as of 2019 hydrometric year. The 2 Parameter Log Normal (LN2), Extreme Value Type 1 (EV1), Generalized Extreme Value (GEV) and Generalized Logistic Distribution (GLO) were used to fit the pooled data.

The growth curves produced by the pooling group for each distribution is tabulated in **Table 4-2** below. The growth curves are seen to be quite agreeable for the 100-year flood event. The growth curves are seen to be quite agreeable for the 100-year flood event. It was decided to take the GLO flood growth factor forward to the 100-year design event estimate as it has a more conservative concave up increasing shape with increase in return period while the GEV distribution appears to flatten out.

**Table 4-2 Growth Curve Factors**

Return Period (Years)	2	5	10	20	30	50	100	200	500	1000
EV1 Growth Factors	1	1.23	1.38	1.53	1.61	1.71	1.86	2	2.18	2.32
GEV Growth Factors	1	1.23	1.38	1.52	1.6	1.7	1.83	1.96	2.13	2.25
GLO Growth Factors	1	1.21	1.35	1.5	1.59	1.72	1.9	2.1	2.41	2.67
LN2 Growth Factors	1	1.22	1.36	1.48	1.55	1.63	1.74	1.85	1.99	2.09

### 4.1.3. Design Flow Peaks

The peak flow calculations are outlined in **Table 4-3**. A Climate Change consideration of 20% in line with Mid-Range Future Scenario (MRFS) climate projections was included in the design peak flow as recommended in OPW Section 50 guidance documents.

**Table 4-3 Design peak flow estimates**

Qmed (m <sup>3</sup> /s)	100-year growth factor	Q100 (m <sup>3</sup> /s)	Q100+CC (20%) (m <sup>3</sup> /s)
17.38	1.90	33.01	39.61

## 5. HYDRAULIC MODELLING AND DESIGN FLOOD LEVEL ESTIMATION

The hydraulic modelling for this analysis was undertaken using HEC-RAS 1D. The Isle Burn was modelled as a steady state model in order to produce peak water levels for the 100-year flood inclusive of climate change.

### 5.1. Existing

The model geometry for the existing scenario was modelled using topographical cross-section survey data provided by Murphy Surveys in September 2020. The survey file imported into HEC-RAS was namely MSL36919\_S3\_R30. The survey covers a reach of the Isle Burn approximately 625m long that includes the existing N13 bridge. The cross-sections do not extend to the confluence with the Lough Swilly estuary where CFRAM has indicated coastal flooding. There are no hydrometric gauges within the reach, so calibration of the model wasn't achievable.

The cross-sections were imported into HEC-RAS and suitable manning coefficients were applied for the main channel (0.040) and the overbanks (0.060). The existing N13 bridge was built into the model using the bridge data editor.



Figure 5-1 HEC-RAS Model Existing Geometry with proposed alignment overlaid

The model was run for two scenarios, a 1%AEP+20%CC fluvial dominant scenario with normal depth downstream and a coastal dominant scenario with 0.5%AEP+500mmCC extreme water level downstream in line with the climate change Mid-Range Future Scenario (MRFS) and CFRAM joint probability analysis guidelines. The coastal water levels were taken from the CFRAM coastal mapping outputs. The combinations of the two scenarios are summarised in Table 5-1 below:

Table 5-1 Boundary Condition Combinations

Scenario	Combination	
	Fluvial (Upstream Boundary Condition)	Coastal (Downstream Boundary Condition)
Fluvial Dominant	1%AEP+20%CC	N/A
Coastal Dominant	50%AEP+20%CC	0.5%AEP+500mmCC

It was found that the coastal dominant scenario was the more extreme scenario and is used for modelling purposes hereafter.

**Table 5-2 Modelled Coastal Water Levels at Proposed Footbridge Crossing**

Modelled Flood Level (mOD)	
U/S Face Proposed Footbridge Main Channel	D/S Face Proposed Footbridge Main Channel
4.06	4.06

## 5.2. Proposed

The proposed scenario was modelled in order to assess the impacts of the proposed bridge on the flood levels in the Isle Burn. The proposed bridge was incorporated into the model and the increase in flood level in the Isle Burn for the proposed scenario was imperceptible. **Table 5-3** below shows that there is a 2.24m freeboard between the design water elevation and the proposed soffit level of the bridge.

**Table 5-3 Model Outputs at Proposed Footbridge**

		Soffit Level (mOD)	Water Level (mOD)	Freeboard (m)
Q100+CC Fluvial & Q200+CC Coastal	Upstream	6.30	4.06	2.24
	Downstream	6.30	4.06	2.24

## 6. CONCLUSIONS

The main findings of the study are as follows:

- A desk study found that the upstream catchment (54.57km<sup>2</sup>) of the Isle Burn does not experience flood attenuation from reservoirs and lakes. The BFI value of 0.5141 describes a moderately well-drained catchment and examination of Teagasc Soils Maps would indicate that this is the case with the catchment predominantly overlaid by a mixture of poorly drained and deep well-drained metamorphic tills. The SAAR value of 1110.34 is consistent with the climate of the north-west of Ireland. The drainage density is higher than most gauged catchments that informed the FSU programme, with the most frequent DRAINND values lying in the range of 0.8-1.2 km/km<sup>2</sup>. The catchment and drainage layout plan view from FSU Hydronet portal in Figure 3.1 show that the catchment has a high density of streams in the catchment. The S1085 value for the catchment is also higher than the most frequent S1085 values that occur in gauged Irish catchments during the FSU study with most gauged catchments lying in the range of 0.5-5.5 m/km. This deviation from the median S1085 values in the FSU study are to be expected, however, as most catchment gauges are located at the downstream portions of larger Irish rivers where the watercourse is at its lower, flatter course. The PCDs also show some influence of arterial drainage on the catchment and very minute levels of urbanisation.
- Review of OPW historical flood mapping (floodinfo.ie) revealed that flood events had occurred within a 2.5km radius of the proposed footbridge location. The embankments downstream at Big Isle were overtopped and failed in February 1990 due to a combination of gale winds (storm surge) and high tides. Recurring Flooding was also noted at Manorcunningham but was more localised due to surface water runoff. There is no indication from the above to suggest that the past flood events have impacted upon the location of the proposed footbridge. However, the potential impact of high tides may need to be considered under this assessment.
- OSi 25inch historical map shows evidence of flood defence berms along the riverbank and lands “liable to floods”. The map also shows the location of the highest point to which ordinary tides flow just downstream of the proposed footbridge. This would indicate that water levels in the river may be tidally affected and should be considered in any hydraulic design.
- The 100-year (1%AEP) Preliminary Flood Risk Assessment (PFRA) maps show no flooding at the proposed footbridge site.
- The Isle Burn was not included under the CFRAM study, so no predictive flood extents are available for the river at the proposed footbridge location. The Lough Swilly estuary was included in the model in the 2D domain and some predicted flood levels in the estuary downstream of the Isle Burn are available.
- The NIFM mapping available on floodinfo.ie has also been consulted to identify any flood risk to the existing site. The mapping shows some out of bank flooding upstream and downstream of the proposed crossing.
- The development of a detailed hydraulic model was required to determine the water levels associated with the 100-year design flood inclusive of an additional 20% flow for climate change as well as the 200-year tidal event inclusive of 500mm climate change addition to water level.
- The estimation of design flows is based on the best practice guidance for Irish catchments generally as outlined in the Flood Studies Update (FSU). This methodology included the estimation of Qmed using the PCD 7-v equation and the measured PCDs of the ungauged catchment as well as using a pivotal site to adjust the Qmed estimates. Growth curves required to generate the design floods were developed using the FSU methodology for pooling group analysis utilising a Region-Of-Influence (ROI) approach and hydrometric records as of 2019. The Generalized Logistic distribution was used as a conservative measure as it has a more conservative concave upward increasing shape with increase in return period while the GEV distribution appears to flatten out.
- Both the existing and proposed scenarios were modelled to illustrate any impacts the proposed works may have on the flooding regime at the site. The existing scenario was modelled using detailed topographical survey information while the proposed scenario considered the proposed footbridge works.
- It was found that there was 2.24m freeboard between the 0.5%AEP MRFS water level and the proposed footbridge soffit. There was no increase in water level at the site from existing to proposed scenarios.
- An associated Section 50 application form is available in **Appendix A** while a drawing for the Culvert in plan and elevation are provided in **Appendix B**.

# Appendix A - Section 50 Application Form



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project</b> <b>Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>Isle Burn Footbridge N13S2FX34</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Isle Burn	Catchment:	39 - Lough Swilly
Address (Townland – County):	Rossbrackan, Letterkenny, Co. Donegal		
Grid Reference	X: 223123	Y:	410868
Hydrometric Station(s) utilized (including reference number):	Aughnagross (16005) Pivotal Adjustment Gauge		
Area of Contributing Catchment:	54.57 Km <sup>2</sup>	Road Reference:	N13/N14
Design Flood Flow:	20.86 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	50 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	09 <sup>th</sup> December 2021

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

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	20% Fluvial, 500mm Coastal (MRFS)
3 – Variable Catchment Characteristics	<input type="checkbox"/>			
IH 124	<input type="checkbox"/>			
Gauged Flow	<input type="checkbox"/>			
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input checked="" type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input checked="" type="checkbox"/> 20.86 m <sup>3</sup> /s	Other <input type="checkbox"/>	Tidal <input checked="" type="checkbox"/>	
Comments			Comments CFRAM 0.5%AEP +500mm (MRFS) water level outputs applied as downstream boundary condition (see report) Qmed used for fluvial inputs as per Joint Probability Analysis.	

Hydraulic/Structure Details	
Description of Structure*3 The proposed footbridge will span a distance of 40m over the Isle Burn with a minimum soffit level of 6.3mOD and a finished deck level of 6.5mOD.	
Effective Conveyance Area *4	N/A
Upstream Invert Level N/A mOD	Downstream Invert Level N/A mOD
Upstream Soffit Level <b>6.30</b> mOD (minimum)	Downstream Soffit Level <b>6.30</b> mOD (minimum)
Upstream Design Flood Level <b>4.06</b> mOD	Downstream Design Flood Level <b>4.06</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.
- 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.

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

4. Effective conveyance area is from channel bed level to design flood level.
5. All levels must be given to Ordnance Datum, Malin Head.

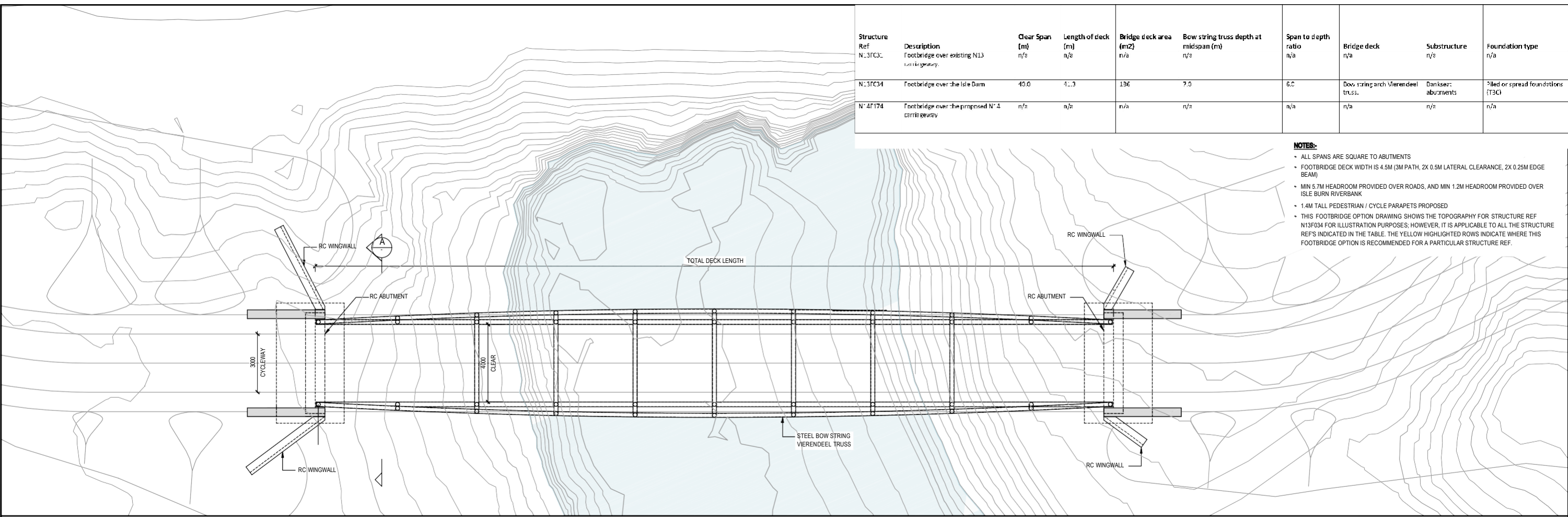
If the application form is not completed correctly, and in its entirety, the application may be deemed invalid and returned for correction.

## Appendix B - Drawings

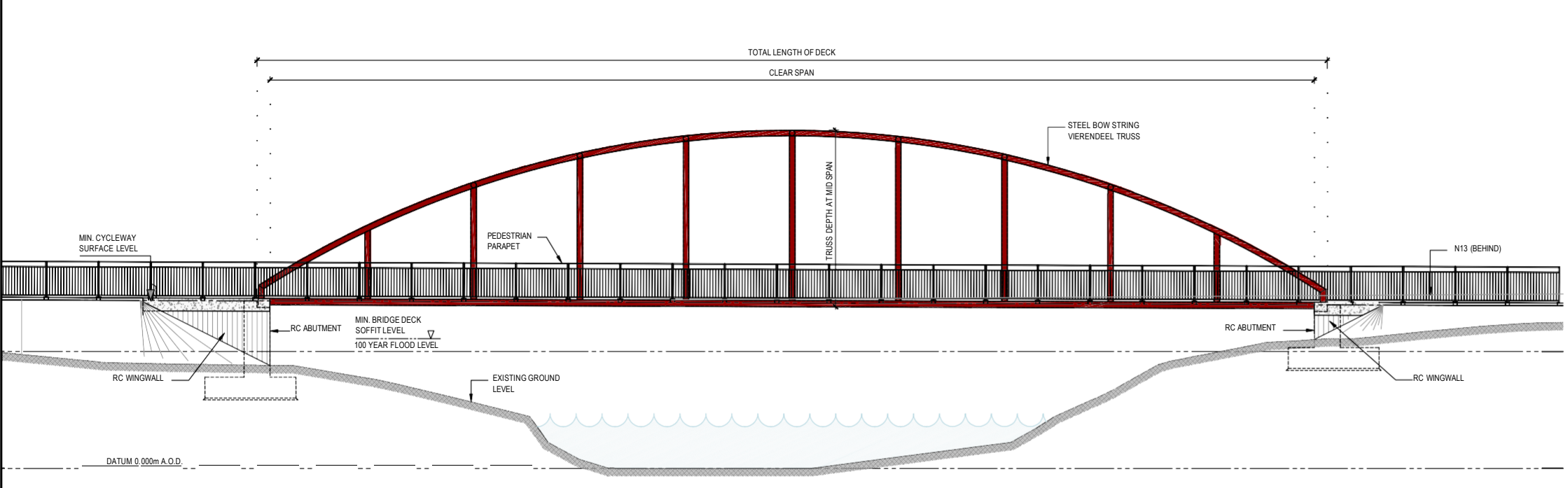
W:\barnd02\Projects\Hilow\Barry\Y16\Projects\Y16112 - TEN-T Priority Route Improvement Project - Donegal\Structure-Cad\WIP\STRD\WG-ATT\_Y16112-BT-1A-SBR-S3-SK-S-00933 - Footbridge GA Option 4.dwg

Structure Ref	Description	Clear Span (m)	Length of deck (m)	Bridge deck area (m <sup>2</sup> )	Bow string truss depth at midspan (m)	Span to depth ratio	Bridge deck	Substructure	Foundation type
N-3FC33	Footbridge over existing N13 carriageway.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N-3FC34	Footbridge over the Isle Durn	43.0	41.3	136	7.0	6.0	Dow string arch Vierendeel truss.	Danksee abutments	Piled or spread foundations (T3C)
N-4F174	Footbridge over the proposed N14 carriageway	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

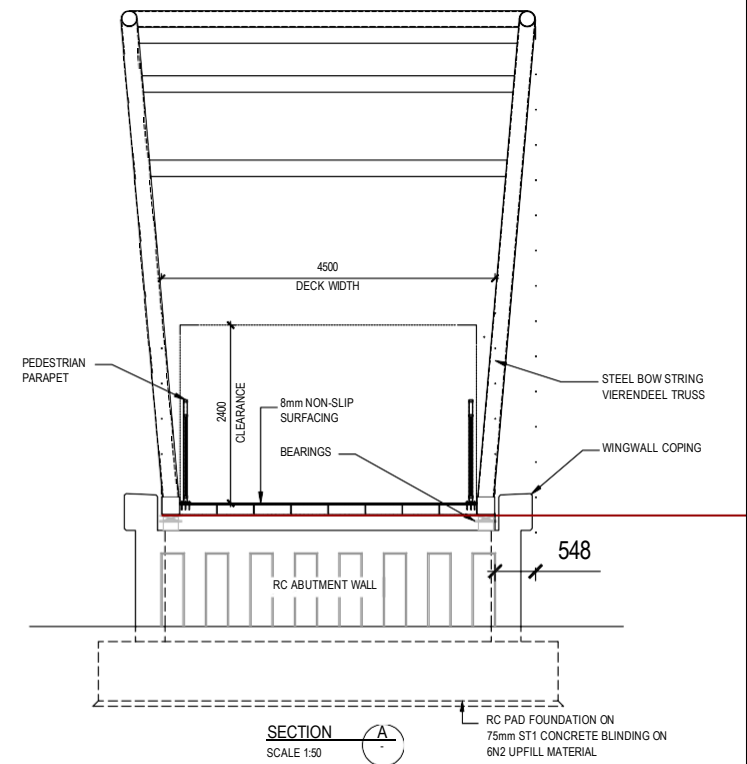
- NOTES:**
- ALL SPANS ARE SQUARE TO ABUTMENTS
  - FOOTBRIDGE DECK WIDTH IS 4.5M (3M PATH, 2X 0.5M LATERAL CLEARANCE, 2X 0.25M EDGE BEAM)
  - MIN 5.7M HEADROOM PROVIDED OVER ROADS, AND MIN 1.2M HEADROOM PROVIDED OVER ISLE BURN RIVERBANK
  - 1.4M TALL PEDESTRIAN / CYCLE PARAPETS PROPOSED
  - THIS FOOTBRIDGE OPTION DRAWING SHOWS THE TOPOGRAPHY FOR STRUCTURE REF N13F034 FOR ILLUSTRATION PURPOSES; HOWEVER, IT IS APPLICABLE TO ALL THE STRUCTURE REFS INDICATED IN THE TABLE. THE YELLOW HIGHLIGHTED ROWS INDICATE WHERE THIS FOOTBRIDGE OPTION IS RECOMMENDED FOR A PARTICULAR STRUCTURE REF.



**PLAN**  
**FOOTBRIDGE OPTION 3**  
 SCALE 1:100



**ELEVATION**  
**FOOTBRIDGE OPTION 3**  
 SCALE 1:100



**SECTION A-A**  
 SCALE 1:50

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**Notes**  
 DO NOT SCALE. Use figured dimensions only. All levels are referred to Ordnance Survey Datum, Malin Head.  
 This drawing is the property of Donegal County Council. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. This document should not be relied on or used in circumstances other than those for which it was originally prepared. Barry Transportation accepts no responsibility for this document to any other party other than the party by whom it was commissioned.

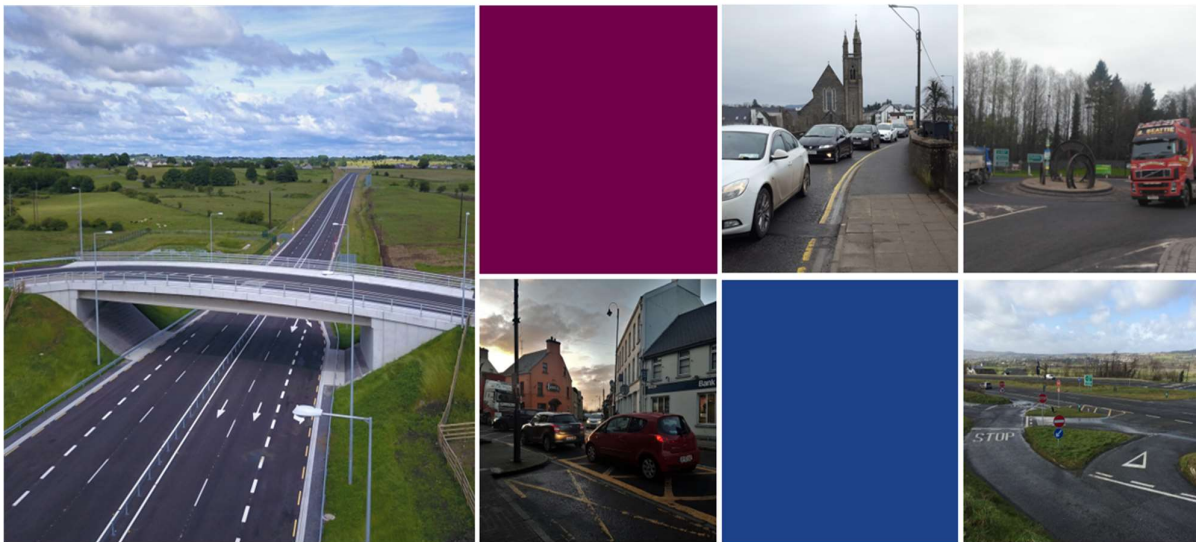
Rev.	Date	Drawn	Description	Chkd	Appr.
P01	12/11/2021	DG	FOR REVIEW	DM	WL

**Project Title:** TEN-T Priority Route Improvement Project, Donegal  
 Section 3 - N14 Manorcunningham to Lifford/Strabane/A5 Link  
**Drawing Title:** FOOTBRIDGE GA - OPTION 4  
 SINGLE SPAN BOW STRING TRUSS ON BANKSEAT ABUTMENTS  
**Status:** S3  
**Rev:** P01  
 Designed: DM Date: OCTOBER 2021 Model File Identifier:  
 Drawn: DG Scale: @ A3 AS SHOWN File Identifier: TT\_Y16112-BT-1A-SBR-S3-SK-S-00933\_Footbridge GA Option 4.dwg  
 Approved: WL @ A3 AS SHOWN File Identifier:  
 Checked: MC Sheet: TT\_Y16112-BT-1A-SBR-S3-SK-S-00933

# APPENDIX C: TECHNICAL REPORT FOR OPW SECTION 50 APPLICATION

# TECHNICAL REPORT FOR OPW SECTION 50 APPLICATIONS

## TEN-T Priority Route Improvement Project, Donegal Section 2 – N56/N13 Letterkenny to Manorcunningham



TT\_MGT0337-RPS-P3-S2-RP-  
 D-DR0001 S3 P01

TECHNICAL REPORT FOR  
 OPW SECTION 50  
 APPLICATIONS  
 S3 P01

07 September 2021

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# 1 INTRODUCTION

This report details the preliminary design location, size and associated hydrological calculations for the proposed watercourse crossings required to construct the works as part of the Section 2 – N56/N13 Letterkenny to Manorcunningham section of the TENT-T Priority Route Improvement Project, Donegal.

## 1.1 Proposed Development

The proposed route is approximately 17.6km long. It commences at the N13/N14 junction and runs along a similar alignment as the existing N14 for approximately 800m. The mainline route then continues in a similar westerly direction offline towards Drumoghill before turning south through Drumcairn. The route continues towards the existing N14 at Sheskinapoll and then aligns in a south-easterly direction for approximately 4km to Feddyglass running close to the existing N14. At this point, the mainline route crosses the existing N14 continuing to the townland of Tamnawood. From here, it continues in a south easterly direction to Murlough and then curves around to the east side of Croaghan Hill and subsequently in a southerly direction between Coneyburrow and Beechwood park. Here the termination point occurs next to the existing N15 on greenfield land.

## 1.2 Existing Watercourses

The proposed alignments of the mainline, side roads and access roads cross existing watercourses in numerous locations. Where these streams will be crossed by the proposed road and require the consent of the OPW in accordance with Section 50 of the Arterial Drainage Act, 1945 a Section 50, an application will be submitted to the OPW for approval.

This report is prepared in support of a preliminary application for all 34 such culverts under Section 50 of the Arterial Drainage Act, 1945 and forms the basis for preliminary Section 50 approval of these culverts located along this section of road in Co. Donegal. The Section 50 application forms for all culverts are enclosed in Appendix A. The location of all culverts, necessary stream diversions and typical construction details are provided in Appendix B.

## 2 CULVERT CATCHMENTS & DESIGN FLOWS

### 2.1 Calculation Methods

Most streams are ungauged and so the design flows have been estimated using methods dictated by the catchment size.

The catchment size for the watercourses upstream of the proposed culverts were derived using the EPA contours available on the GSI GIS Data Viewer maps (<https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=bc0dba38f3f5477c8fd400f66b5eedcd>).

The UK Institute of Hydrology Methodology (IH 124), the 3-variable revision of the original Flood Studies Supplementary Report No. six variable equation, the Agricultural Development and Advisory Service (ADAS) method or flood frequencies module of the Flood Studies Update (FSU) online portal were used to estimate flow depending on the catchment size.

Table 1 below outlines the applicable calculation method based on the catchment size.

**Table 1: Design Flow Calculation Methods**

Catchment Size (km <sup>2</sup> )	Calculation Method	Method Reference
< 0.4	ADAS	DN-DNG-03064 (TII)
0.4 to 25.0	IH 124	DN-DNG-03064 (TII)
0.5 to 25.0	FSSR 6, 3-Variable	FSR
> 25.0	FSU Web Portal	opw.hyrdonet.com

As indicated by the table, the flows from catchments between 0.5km<sup>2</sup> and 25km<sup>2</sup> were calculated by both the UK Institute of Hydrology Methodology (IH 124) and the 3-variable revision of the original Flood Studies Supplementary Report No. Six variable equation with the most conservative flow (i.e. the largest flow) adopted as the design flow.

### 2.2 Design Flows

If the watercourse forms part of an OPW arterial drainage scheme, a drainage district factor of 1.6 was applied to all methods as required by the OPW. A factorial standard error (FSE) of 1.651 was applied to the IH 124 method and a factor of 1.58 was applied to the FSSR 3-variable method. Irish growth curve figure of 1.96 was applied to IH124 and FSSR 3 variable and a growth factor of 1.95 was applied to the FSU method to account for the 100-year flood flows. After reviewing the results from each method with relevant factors applied, the most conservative (i.e. the highest) estimated flow was adopted as the design flow for the culvert sizing calculations.

The Standard Average Annual Rainfall (SAAR) of 1215.9mm was obtained from the Flood Studies Update (FSU website) and the SOIL index value was calculated as 0.3 from the winter rain acceptance potential (WRAP) map.

All flow estimates are subject to a 20% climate change allowance.

**Table 2: Catchment Design Flows**

Culvert	Catchment (km <sup>2</sup> )	Q100*				Q100 + 20% (CC) (m <sup>3</sup> /s)
		IH 124 Method (m <sup>3</sup> /s)	ADAS Method (m <sup>3</sup> /s)	FSR 6, 3-Variable Method (m <sup>3</sup> /s)	FSU Web Portal (m <sup>3</sup> /s)	
S2-CUL.01	0.06	-	<b>0.108</b>	-	-	0.130
S2-CUL.02	0.06	-	<b>0.116</b>	-	-	0.139
S2-CUL.03		-				
S2-CUL.04						
S2-CUL.05	0.05	-	<b>0.113</b>	-	-	0.136
S2-CUL.06	0.09	-	<b>0.184</b>	-	-	0.221
S2-CUL.07	0.29	-	<b>0.422</b>	-	-	0.507
S2-CUL.08		-				
S2-CUL.09		-				
S2-CUL.10	0.19	-	<b>0.367</b>	-	-	0.440
S2-CUL.11	0.20	-	<b>0.400</b>	-	-	0.479
S2-CUL.12	0.24	-	<b>0.345</b>	-	-	0.414
S2-CUL.13	0.34	-	<b>0.513</b>	-	-	0.615
S2-CUL.14	0.11	-	<b>0.225</b>	-	-	0.270
S2-CUL.15		-				
S2-CUL.16	0.80	0.854	-	<b>0.869</b>	-	1.043
S2-CUL.17	1.15	1.180	-	<b>1.214</b>	-	1.456
S2-CUL.18	1.24	1.262	-	<b>1.301</b>	-	1.561
S2-CUL.19		-				
S2-CUL.20	1.33	1.343	-	<b>1.387</b>	-	1.665
S2-CUL.21	0.20	-	<b>0.319</b>	-	-	0.383
S2-CUL.22	0.32	-	<b>0.487</b>	-	-	0.584
S2-CUL.23		-				
S2-CUL.24	0.14	-	<b>0.179</b>	-	-	0.215
S2-CUL.25	0.26	-	<b>0.210</b>	-	-	0.252
S2-CUL.26	0.07	-	<b>0.124</b>	-	-	0.149
S2-CUL.27	0.08	-	<b>0.151</b>	-	-	0.181
S2-CUL.28	0.35	-	<b>0.619</b>	-	-	0.743
S2-CUL.29	0.93	-				
S2-CUL.30		0.977	-	<b>0.998</b>	-	1.198
S2-CUL.31		-				
S2-CUL.32	1.54	2.448	-	<b>2.540</b>	-	3.049
S2-CUL.33	0.23	-	<b>0.402</b>	-	-	0.482
S2-CUL.34	1.02	1.060	-	<b>1.087</b>	-	1.304

\*Values in bold indicate the adopted Q<sub>100</sub> (excl CC allowance)

## 3 PROPOSED CULVERT DETAILS

### 3.1 Environmental Requirements

As part of a preliminary Environmental assessment, a number of proposed crossings were deemed to be fisheries sensitive and were required to be constructed as box culverts. Such crossings include:

- S2-CUL.14
- S2-CUL.15
- S2-CUL.16
- S2-CUL.17
- S2-CUL.21
- S2-CUL.22
- S2-CUL.23
- S2-CUL.24
- S2-CUL.28
- S2-CUL.29
- S2-CUL.30
- S2-CUL.31

### 3.2 Culvert Sizing Calculations

The culverts were sized based on the calculations set out in CIRIA Report No. C689 and a summary of the resulting calculation outputs and proposed culvert details are given in **Error! Reference source not found.** below.

In addition to catering for the catchment design flows, culverts affected by tidal flooding were sized to ensure 300mm freeboard was maintained during the 1 in 200yr tidal flood event. Such crossings include;

- S2-CUL.18
- S2-CUL.19
- S2-CUL.20
- S2-CUL.21
- S2-CUL.22
- S2-CUL.23
- S2-CUL.24
- S2-CUL.25
- S2-CUL.26

**Table 3: Proposed Culvert Sizes & Hydrological Calculation Output**

Culvert Name	Type	Length (m)	Size			Depth of Embedment (m)	USIL (Top of Embedment) (mOD)	DSIL (Top of Embedment) (mOD)	Culvert Gradient (1:x)	Proposed Freeboard (Min. 0.3m) (m)	Proposed Net Head Loss (Max. 0.3m) (m)
			Diameter (m)	Width (m)	Height (incl. embed) (m)						
S2-CUL.01	Pipe	17.500	1.2	-	-	0.3	94.338	94.077	67.0	0.581	0.004
S2-CUL.02	Pipe	8.047	1.2	-	-	0.3	95.707	94.416	6.2	0.759	0.034
S2-CUL.03	Pipe	40.840	1.2	-	-	0.3	91.008	90.689	128.0	0.674	0.001
S2-CUL.04	Pipe	8.324	1.2	-	-	0.3	90.576	90.499	108.1	0.674	0.001
S2-CUL.05	Pipe	20.086	1.2	-	-	0.3	89.820	89.780	499.0	0.573	0.005
S2-CUL.06	Pipe	55.443	1.2	-	-	0.3	94.975	93.500	37.6	0.621	0.068
S2-CUL.07	Pipe	20.371	1.2	-	-	0.3	107.943	107.698	83.1	0.429	0.183
S2-CUL.08	Pipe	20.191	1.2	-	-	0.3	104.099	103.349	26.9	0.332	0.127
S2-CUL.09	Pipe	32.717	1.2	-	-	0.3	98.986	98.576	79.8	0.316	0.130
S2-CUL.10	Pipe	10.144	1.2	-	-	0.3	72.700	71.700	10.1	0.495	0.182
S2-CUL.11	Pipe	21.152	1.2	-	-	0.3	66.900	66.600	70.5	0.444	0.164
S2-CUL.12	Pipe	28.139	1.2	-	-	0.3	73.700	73.600	281.4	0.488	0.145
S2-CUL.13	Pipe	45.669	1.5	-	-	0.3	55.400	55.278	374.3	0.714	0.094
S2-CUL.14	Pipe	45.915	1.2	-	-	0.3	43.500	43.408	499.1	0.421	0.036
S2-CUL.15	Pipe	10.000	1.2	-	-	0.3	43.388	43.368	500.0	0.551	0.021
S2-CUL.16	Pipe	32.509	1.5	-	-	0.3	19.750	18.800	34.2	0.529	0.253
S2-CUL.17	Box	7.208	-	1.750	1.500	0.5	9.000	8.986	497.1	0.355	0.265
S2-CUL.18	Box	83.070	-	2.500	2.100	0.5	0.900	0.600	276.9	0.868	0.238
S2-CUL.19	Box	34.500	-	2.500	2.500	0.5	0.525	0.000	65.7	1.114	0.193
S2-CUL.20	Box	65.032	-	2.500	3.300	0.5	-0.315	-0.700	168.9	1.960	0.222
S2-CUL.21	Box	48.406	-	2.000	3.200	0.5	0.023	-0.086	444.1	2.005	0.293
S2-CUL.22	Box	25.419	-	2.500	3.400	0.5	-0.350	-0.426	334.5	2.248	0.290
S2-CUL.23	Box	71.011	-	3.300	3.500	0.5	-0.775	-0.937	438.3	2.374	0.230
S2-CUL.24	Box	74.920	-	1.250	1.350	0.5	1.500	1.229	276.5	0.640	0.001
S2-CUL.25	Box	103.512	-	2.000	2.500	0.5	0.218	0.095	841.6	1.692	0.096
S2-CUL.26	Box	41.017	-	1.500	2.600	0.5	0.410	0.148	156.6	1.826	0.002
S2-CUL.27	Pipe	31.335	1.2	-	-	0.3	0.645	0.580	482.1	0.650	0.021
S2-CUL.28	Pipe	36.586	1.5	-	-	0.3	12.240	11.780	79.5	0.650	0.182
S2-CUL.29	Box	26.553	-	2.000	1.500	0.5	19.300	17.600	15.6	0.504	0.219
S2-CUL.30	Box	37.919	-	2.000	1.500	0.5	11.300	11.200	379.2	0.498	0.209
S2-CUL.31	Box	66.879	-	2.000	1.500	0.5	8.200	5.900	29.1	0.504	0.186
S2-CUL.32	Box	87.453	-	2.000	3.500	0.5	2.900	1.960	93.0	2.094	0.094
S2-CUL.33	Pipe	60.868	1.2	-	-	0.3	13.142	8.354	12.7	0.447	0.179
S2-CUL.34	Pipe	26.898	1.5	-	-	0.3	1.945	1.791	174.7	0.337	0.267

## **Appendix A - SECTION 50 APPLICATION FORMS**




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.01</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219756	Y: 407820	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.06 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.13 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.103		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>94.038</b> mOD	Downstream Invert Level <b>93.777</b> mOD
Upstream Soffit Level <b>95.238</b> mOD	Downstream Soffit Level <b>94.977</b> mOD
Upstream Design Flood Level <b>94.657</b> mOD	Downstream Design Flood Level <b>94.392</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.02</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219768	Y: 408167	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.06 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.139 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.110		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>95.407</b> mOD	Downstream Invert Level <b>94.116</b> mOD
Upstream Soffit Level <b>96.607</b> mOD	Downstream Soffit Level <b>95.316</b> mOD
Upstream Design Flood Level <b>95.848</b> mOD	Downstream Design Flood Level <b>94.523</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.03</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream Tributary No. 1	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219796	Y:	408166
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.05 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.139 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.110		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>90.708</b> mOD	Downstream Invert Level <b>90.389</b> mOD
Upstream Soffit Level <b>91.908</b> mOD	Downstream Soffit Level <b>91.589</b> mOD
Upstream Design Flood Level <b>91.234</b> mOD	Downstream Design Flood Level <b>90.914</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.04</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219844	Y: 408182	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.09 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.139 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.026	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.110		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>90.276</b> mOD	Downstream Invert Level <b>90.199</b> mOD
Upstream Soffit Level <b>91.476</b> mOD	Downstream Soffit Level <b>91.399</b> mOD
Upstream Design Flood Level <b>90.802</b> mOD	Downstream Design Flood Level <b>90.724</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.05</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream Tributary No.2	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219859	Y: 408305	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.05 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.136 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.022	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.022	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.110		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>89.520</b> mOD	Downstream Invert Level <b>89.480</b> mOD
Upstream Soffit Level <b>90.720</b> mOD	Downstream Soffit Level <b>90.680</b> mOD
Upstream Design Flood Level <b>90.147</b> mOD	Downstream Design Flood Level <b>90.102</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.06</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream Tributary No.3	Catchment:	Swilly-Coastal
Address (Townland – County):	Listellian , Letterkenny, Co. Donegal		
Grid Reference	X: 219864	Y:	408504
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.09 Km <sup>2</sup>	Road Reference:	L-1064
Design Flood Flow:	0.221 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.038	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.038	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.175		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>94.675</b> mOD	Downstream Invert Level <b>93.200</b> mOD
Upstream Soffit Level <b>95.875</b> mOD	Downstream Soffit Level <b>94.400</b> mOD
Upstream Design Flood Level <b>95.254</b> mOD	Downstream Design Flood Level <b>93.711</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.07</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Corranagh Stream Tributary No 1	Catchment:	Swilly-Coastal
Address (Townland – County):	Corranagh, Letterkenny, Co. Donegal		
Grid Reference	X: 219443	Y: 408732	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.29 Km <sup>2</sup>	Road Reference:	L-1094
Design Flood Flow:	0.507 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.107	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.110	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.402		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>107.643</b> mOD	Downstream Invert Level <b>107.398</b> mOD
Upstream Soffit Level <b>108.843</b> mOD	Downstream Soffit Level <b>108.598</b> mOD
Upstream Design Flood Level <b>108.414</b> mOD	Downstream Design Flood Level <b>107.986</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.08</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Corranagh Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Corranagh, Letterkenny, Co. Donegal		
Grid Reference	X: 219441	Y: 408821	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.29 Km <sup>2</sup>	Road Reference:	L-1094
Design Flood Flow:	0.507 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.107	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.110	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.402		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>103.799</b> mOD	Downstream Invert Level <b>103.049</b> mOD
Upstream Soffit Level <b>104.999</b> mOD	Downstream Soffit Level <b>104.249</b> mOD
Upstream Design Flood Level <b>104.667</b> mOD	Downstream Design Flood Level <b>103.790</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.09</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Corranagh Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Corranagh, Letterkenny, Co. Donegal		
Grid Reference	X: 219372	Y: 408967	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.29 Km <sup>2</sup>	Road Reference:	L-1094
Design Flood Flow:	0.507 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.107	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.107	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.402		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>98.686</b> mOD	Downstream Invert Level <b>98.276</b> mOD
Upstream Soffit Level <b>99.886</b> mOD	Downstream Soffit Level <b>99.476</b> mOD
Upstream Design Flood Level <b>99.570</b> mOD	Downstream Design Flood Level <b>99.031</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.10</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Corranagh Stream Tributary No.2	Catchment:	Swilly-Coastal
Address (Townland – County):	Lurgybrack, Letterkenny, Co. Donegal		
Grid Reference	X: 219732	Y: 409653	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.19 Km <sup>2</sup>	Road Reference:	L-5784
Design Flood Flow:	0.440 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.075	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.073	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.350		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>72.400</b> mOD	Downstream Invert Level <b>71.400</b> mOD
Upstream Soffit Level <b>73.600</b> mOD	Downstream Soffit Level <b>72.600</b> mOD
Upstream Design Flood Level <b>73.105</b> mOD	Downstream Design Flood Level <b>71.923</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.11</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Corranagh Stream Tributary No.2	Catchment:	Swilly-Coastal
Address (Townland – County):	Lurgybrack, Letterkenny, Co. Donegal		
Grid Reference	X: 219694	Y: 409700	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.20 Km <sup>2</sup>	Road Reference:	L-5784
Design Flood Flow:	0.479 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.078	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.077	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.380		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>66.600</b> mOD	Downstream Invert Level <b>66.300</b> mOD
Upstream Soffit Level <b>67.800</b> mOD	Downstream Soffit Level <b>67.500</b> mOD
Upstream Design Flood Level <b>67.356</b> mOD	Downstream Design Flood Level <b>66.892</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.12</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumany, Letterkenny, Co. Donegal		
Grid Reference	X: 219925	Y: 409774	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.24 Km <sup>2</sup>	Road Reference:	L-5784
Design Flood Flow:	0.414 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.093	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.090	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.329		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>73.400</b> mOD	Downstream Invert Level <b>73.300</b> mOD
Upstream Soffit Level <b>74.600</b> mOD	Downstream Soffit Level <b>74.500</b> mOD
Upstream Design Flood Level <b>74.112</b> mOD	Downstream Design Flood Level <b>73.867</b> mOD

**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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.13</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumany, Letterkenny, Co. Donegal		
Grid Reference	X: 219845	Y: 409893	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.34 Km <sup>2</sup>	Road Reference:	N13
Design Flood Flow:	0.615 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.128	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.123	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.488		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.5m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	1.516m <sup>2</sup>
Upstream Invert Level <b>55.100</b> mOD	Downstream Invert Level <b>54.978</b> mOD
Upstream Soffit Level <b>56.600</b> mOD	Downstream Soffit Level <b>56.478</b> mOD
Upstream Design Flood Level <b>55.886</b> mOD	Downstream Design Flood Level <b>55.670</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.14</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumany, Letterkenny, Co. Donegal		
Grid Reference	X: 219947	Y: 410128	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.11 Km <sup>2</sup>	Road Reference:	N13
Design Flood Flow:	0.270 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.045	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.045	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.214		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>43.200</b> mOD	Downstream Invert Level <b>43.108</b> mOD
Upstream Soffit Level <b>44.400</b> mOD	Downstream Soffit Level <b>44.308</b> mOD
Upstream Design Flood Level <b>43.979</b> mOD	Downstream Design Flood Level <b>43.851</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.15</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream Tributary No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumany, Letterkenny, Co. Donegal		
Grid Reference	X: 219907	Y: 410167	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.11 Km <sup>2</sup>	Road Reference:	N13
Design Flood Flow:	0.270 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.045	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.045	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.214		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>43.088</b> mOD	Downstream Invert Level <b>43.068</b> mOD
Upstream Soffit Level <b>44.288</b> mOD	Downstream Soffit Level <b>44.268</b> mOD
Upstream Design Flood Level <b>43.737</b> mOD	Downstream Design Flood Level <b>43.696</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.16</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 220114	Y:	410656
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.80 Km <sup>2</sup>	Road Reference:	L-1114
Design Flood Flow:	1.043 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.281	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.264	Factor for Standard Error (IH 124)	1.65
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal <input type="checkbox"/>	
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure*3 Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area *4	1.516m <sup>2</sup>
Upstream Invert Level <b>19.450</b> mOD	Downstream Invert Level <b>18.500</b> mOD
Upstream Soffit Level <b>20.950</b> mOD	Downstream Soffit Level <b>20.000</b> mOD
Upstream Design Flood Level <b>20.421</b> mOD	Downstream Design Flood Level <b>19.218</b> mOD

**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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.17</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 220078	Y:	410819
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.15 Km <sup>2</sup>	Road Reference:	L-11141
Design Flood Flow:	1.456 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
			Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
			Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.392	Factor for Standard Error (IH 124)	1.65
IH 124	<input checked="" type="checkbox"/>	0.365		
Gauged Flow	<input type="checkbox"/>			
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal <input type="checkbox"/>	
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure*3 Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 1.75m x 1.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts	
Effective Conveyance Area *4	1.750m <sup>2</sup>
Upstream Invert Level <b>8.500</b> mOD	Downstream Invert Level <b>8.486</b> mOD
Upstream Soffit Level <b>10.000</b> mOD	Downstream Soffit Level <b>9.986</b> mOD
Upstream Design Flood Level <b>9.645</b> mOD	Downstream Design Flood Level <b>9.366</b> mOD

NOTES :

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.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.18</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 219928	Y:	410935
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.24 Km <sup>2</sup>	Road Reference:	N13
Design Flood Flow:	1.561 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.420	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.390	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal	<input checked="" type="checkbox"/>
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments 1 in 200yr tidal flood levels; Upstream Flood Level <b>1.700</b> mOD Downstream Flood Level <b>1.800</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.5m x 2.1m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	4.0m <sup>2</sup>
Upstream Invert Level <b>0.400</b> mOD	Downstream Invert Level <b>0.100</b> mOD
Upstream Soffit Level <b>2.500</b> mOD	Downstream Soffit Level <b>2.200</b> mOD
Upstream Design Flood Level <b>1.632</b> mOD	Downstream Design Flood Level <b>1.095</b> mOD

**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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.19</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 219963	Y:	411018
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.24 Km <sup>2</sup>	Road Reference:	LX-2011
Design Flood Flow:	1.561 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.420	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.390	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal	<input checked="" type="checkbox"/>
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments 1 in 200yr tidal flood levels; Upstream Flood Level <b>1.800</b> mOD Downstream Flood Level <b>1.700</b> mOD	

Hydraulic/Structure Details	
Description of Structure*3 Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.5m x 2.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area *4	5.0m <sup>2</sup>
Upstream Invert Level <b>0.025</b> mOD	Downstream Invert Level <b>-0.500</b> mOD
Upstream Soffit Level <b>2.525</b> mOD	Downstream Soffit Level <b>2.000</b> mOD
Upstream Design Flood Level <b>1.411</b> mOD	Downstream Design Flood Level <b>0.693</b> mOD

**NOTES :**

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- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



AF50 Rev1113

**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.20</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumany Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 219874	Y:	411127
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.33 Km <sup>2</sup>	Road Reference:	LX-2010
Design Flood Flow:	1.665 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.448	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.415	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal	<input checked="" type="checkbox"/>
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments 1 in 200yr tidal flood levels; Upstream Flood Level <b>1.700</b> mOD Downstream Flood Level <b>1.690</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.5m x 3.3m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	7.0m <sup>2</sup>
Upstream Invert Level <b>-0.815</b> mOD	Downstream Invert Level <b>-1.200</b> mOD
Upstream Soffit Level <b>2.485</b> mOD	Downstream Soffit Level <b>2.100</b> mOD
Upstream Design Flood Level <b>0.525</b> mOD	Downstream Design Flood Level <b>-0.081</b> mOD

**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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.21</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Bunnagee Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Bunnagee, Letterkenny, Co. Donegal		
Grid Reference	X: 219656	Y: 407843	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.2 Km <sup>2</sup>	Road Reference:	LX-2008
Design Flood Flow:	0.383 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.078	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.077	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.304		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>2.220</b> mOD	
			Downstream Flood Level <b>2.220</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 3.2m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	5.4m <sup>2</sup>
Upstream Invert Level <b>-0.477</b> mOD	Downstream Invert Level <b>-0.586</b> mOD
Upstream Soffit Level <b>2.723</b> mOD	Downstream Soffit Level <b>2.614</b> mOD
Upstream Design Flood Level <b>0.718</b> mOD	Downstream Design Flood Level <b>0.317</b> mOD

NOTES :

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- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.22</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Bunnagee Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Bunnagee, Letterkenny, Co. Donegal		
Grid Reference	X: 219650	Y: 407968	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.32 Km <sup>2</sup>	Road Reference:	LX-2011
Design Flood Flow:	0.584 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.121	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.117	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.464		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>2.200</b> mOD	
			Downstream Flood Level <b>1.750</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.5m x 3.4m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	7.25m <sup>2</sup>
Upstream Invert Level <b>-0.850</b> mOD	Downstream Invert Level <b>-0.926</b> mOD
Upstream Soffit Level <b>2.550</b> mOD	Downstream Soffit Level <b>2.474</b> mOD
Upstream Design Flood Level <b>0.302</b> mOD	Downstream Design Flood Level <b>-0.064</b> mOD

NOTES :

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- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.23</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Bunnagee Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Bunnagee, Letterkenny, Co. Donegal		
Grid Reference	X: 219568	Y:	411110
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.32 Km <sup>2</sup>	Road Reference:	River Swilly Link Road
Design Flood Flow:	0.584 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.121	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.117	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.464		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>1.710</b> mOD	
			Downstream Flood Level <b>1.710</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 3.3m x 3.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	9.9m <sup>2</sup>
Upstream Invert Level <b>-1.275</b> mOD	Downstream Invert Level <b>-1.437</b> mOD
Upstream Soffit Level <b>2.225</b> mOD	Downstream Soffit Level <b>2.063</b> mOD
Upstream Design Flood Level <b>-0.149</b> mOD	Downstream Design Flood Level <b>-0.541</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.24</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Milk Isle Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Milk Isle, Letterkenny, Co. Donegal		
Grid Reference	X: 219406	Y: 411368	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.14 Km <sup>2</sup>	Road Reference:	River Swilly Link Road
Design Flood Flow:	0.215 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.056	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.056	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.170		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>1.710</b> mOD	
			Downstream Flood Level <b>1.740</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 1.250m x 1.350m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	1.063m <sup>2</sup>
Upstream Invert Level <b>1.000</b> mOD	Downstream Invert Level <b>0.729</b> mOD
Upstream Soffit Level <b>2.350</b> mOD	Downstream Soffit Level <b>2.079</b> mOD
Upstream Design Flood Level <b>1.710</b> mOD	Downstream Design Flood Level <b>1.438</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.25</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Milk Isle Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Milk Isle, Letterkenny, Co. Donegal		
Grid Reference	X: 219262	Y:	411458
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.26 Km <sup>2</sup>	Road Reference:	River Swilly Link Road
Design Flood Flow:	0.252 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.100	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.097	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.200		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>1.700</b> mOD	
			Downstream Flood Level <b>1.710</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 2.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	4.0m <sup>2</sup>
Upstream Invert Level <b>-0.282</b> mOD	Downstream Invert Level <b>-0.405</b> mOD
Upstream Soffit Level <b>2.218</b> mOD	Downstream Soffit Level <b>2.095</b> mOD
Upstream Design Flood Level <b>0.526</b> mOD	Downstream Design Flood Level <b>0.307</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.26</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Dromore Lower Stream No.1	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore Lower, Letterkenny, Co. Donegal		
Grid Reference	X: 220027	Y: 411220	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.07 Km <sup>2</sup>	Road Reference:	LX-2010
Design Flood Flow:	0.149 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.030	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.030	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.118		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal	<input checked="" type="checkbox"/>
			Comments	
			Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	
			1 in 200yr tidal flood levels;	
			Upstream Flood Level <b>1.690</b> mOD	
			Downstream Flood Level <b>1.690</b> mOD	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 1.5m x 2.6m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Design Flood Levels below refer to flood levels resulting from the hydrological analysis of the watercourse's catchment area.	
Effective Conveyance Area * <sup>4</sup>	3.15m <sup>2</sup>
Upstream Invert Level <b>-0.090</b> mOD	Downstream Invert Level <b>-0.352</b> mOD
Upstream Soffit Level <b>2.510</b> mOD	Downstream Soffit Level <b>2.248</b> mOD
Upstream Design Flood Level <b>0.684</b> mOD	Downstream Design Flood Level <b>0.420</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.27</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Dromore Lower Stream No.2	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore Lower, Letterkenny, Co. Donegal		
Grid Reference	X: 220260	Y: 411239	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.08 Km <sup>2</sup>	Road Reference:	LX-2010
Design Flood Flow:	0.181 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.034	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.034	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.144		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>0.345</b> mOD	Downstream Invert Level <b>0.280</b> mOD
Upstream Soffit Level <b>1.545</b> mOD	Downstream Soffit Level <b>1.480</b> mOD
Upstream Design Flood Level <b>0.895</b> mOD	Downstream Design Flood Level <b>0.809</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.28</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Drumgreggan Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumgreggan, Letterkenny, Co. Donegal		
Grid Reference	X: 220433	Y:	410915
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.35 Km <sup>2</sup>	Road Reference:	LX-2010
Design Flood Flow:	0.743 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.131	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.127	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.590		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;				
			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.5m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	1.516m <sup>2</sup>
Upstream Invert Level <b>11.940</b> mOD	Downstream Invert Level <b>11.480</b> mOD
Upstream Soffit Level <b>13.440</b> mOD	Downstream Soffit Level <b>12.980</b> mOD
Upstream Design Flood Level <b>12.790</b> mOD	Downstream Design Flood Level <b>12.149</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.



**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.29</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Farsetmore Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 221323	Y:	411076
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.93 Km <sup>2</sup>	Road Reference:	L-1154
Design Flood Flow:	1.198 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.322	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.302	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal <input type="checkbox"/>	
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure*3 Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 1.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Effective Conveyance Area *4	2.0m <sup>2</sup>
Upstream Invert Level <b>18.800</b> mOD	Downstream Invert Level <b>17.100</b> mOD
Upstream Soffit Level <b>20.300</b> mOD	Downstream Soffit Level <b>18.600</b> mOD
Upstream Design Flood Level <b>19.796</b> mOD	Downstream Design Flood Level <b>17.877</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.30</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Farsetmore Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 221283	Y: 411186	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.93 Km <sup>2</sup>	Road Reference:	LX-2012
Design Flood Flow:	1.198 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.322	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.302	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal	<input type="checkbox"/>
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 1.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Effective Conveyance Area * <sup>4</sup>	2.0m <sup>2</sup>
Upstream Invert Level <b>10.800</b> mOD	Downstream Invert Level <b>10.700</b> mOD
Upstream Soffit Level <b>12.300</b> mOD	Downstream Soffit Level <b>12.200</b> mOD
Upstream Design Flood Level <b>11.802</b> mOD	Downstream Design Flood Level <b>11.494</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.31</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Farsetmore Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Dromore, Letterkenny, Co. Donegal		
Grid Reference	X: 221251	Y:	411258
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.93 Km <sup>2</sup>	Road Reference:	Trimragh Link Road
Design Flood Flow:	1.198 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.322	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.302	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal <input type="checkbox"/>	
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 1.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Effective Conveyance Area * <sup>4</sup>	2.0m <sup>2</sup>
Upstream Invert Level <b>7.700</b> mOD	Downstream Invert Level <b>5.400</b> mOD
Upstream Soffit Level <b>9.200</b> mOD	Downstream Soffit Level <b>6.900</b> mOD
Upstream Design Flood Level <b>8.696</b> mOD	Downstream Design Flood Level <b>6.211</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.32</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Farsetmore Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Farsetmore, Letterkenny, Co. Donegal		
Grid Reference	X: 221275	Y: 411414	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.54 Km <sup>2</sup>	Road Reference:	LX-5824
Design Flood Flow:	3.049 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.513	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.473	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for OPW Arterial Drainage	1.6
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Box structure with reinforced concrete headwalls and wingwalls. The internal dimensions of the box will be 2.0m x 3.5m (WxH). The culvert will have 500mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culvert	
Effective Conveyance Area * <sup>4</sup>	6.0m <sup>2</sup>
Upstream Invert Level <b>2.400</b> mOD	Downstream Invert Level <b>1.460</b> mOD
Upstream Soffit Level <b>5.900</b> mOD	Downstream Soffit Level <b>4.960</b> mOD
Upstream Design Flood Level <b>3.806</b> mOD	Downstream Design Flood Level <b>2.772</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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

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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.33</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Trimragh Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Drumardagh, Letterkenny, Co. Donegal		
Grid Reference	X: 222497	Y: 411214	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	0.23 Km <sup>2</sup>	Road Reference:	N14
Design Flood Flow:	0.482 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	Brendan Lyons
Company/Organisation:	RPS
Signature:	
Date:	7 <sup>th</sup> September 2021

<b>Application Check List</b>	<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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.089	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.087	Irish Growth Curve (ADAS)	1.05
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>		Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
ADAS	<input checked="" type="checkbox"/>	0.383		
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>		
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Tidal <input type="checkbox"/>	
			Comments Irish Growth Curve (ADAS) used to convert 75yr to 100yr in ADAS.	

Hydraulic/Structure Details	
Description of Structure* <sup>3</sup> Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.2m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area * <sup>4</sup>	0.910m <sup>2</sup>
Upstream Invert Level <b>12.842</b> mOD	Downstream Invert Level <b>8.054</b> mOD
Upstream Soffit Level <b>14.042</b> mOD	Downstream Soffit Level <b>9.254</b> mOD
Upstream Design Flood Level <b>13.595</b> mOD	Downstream Design Flood Level <b>8.628</b> mOD

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.
- Flow is the estimated flow from the catchment, without any factors applied.

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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.




**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**

<b>Project Name</b>	<b>Ten-T Priority Route Improvement Project Section 2 – N56/N13 Letterkenny to Manorcunningham</b>	<b>Structure Ref No.</b>	<b>S2-CUL.34</b>
<b>Applicant (Correspondence will issue to agent)</b>			
Company or Organisation Name: Donegal National Roads Office			
Postal Address:	NRDO, Drumlonagher, Donegal Town, Co. Donegal		
Contact Person:	Damian McDermott		
Phone:	+353 (0)74 9724500	Fax:	
E-mail:	damian.mcdermott@dnrdo.ie		

<b>Agent (Correspondence will issue to agent)</b>			
Company or Organisation Name: RPS			
Postal Address:	Lyrr Building, IDA Business and Technology Park, Mervue, Galway		
Contact Person:	Brendan Lyons		
Phone:	+353 (0)91 400 200	Fax:	
E-mail:	brendan.lyons@rpsgroup.com		

<b>Location and Parameters of crossing</b>			
Watercourse:	Magheraboy Stream	Catchment:	Swilly-Coastal
Address (Townland – County):	Magheraboy, Letterkenny, Co. Donegal		
Grid Reference	X: 222699	Y: 411091	
Hydrometric Station(s) utilized (including reference number):	N/A		
Area of Contributing Catchment:	1.02 Km <sup>2</sup>	Road Reference:	N14
Design Flood Flow:	0.421 m <sup>3</sup> /s	Annual Exceedance Probability (AEP):	1.0 %

<b>Statement of Authenticity</b>	
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:	<u>Brendan Lyons</u>
Company/Organisation:	<u>RPS</u>
Signature:	
Date:	<u>7<sup>th</sup> September 2021</u>

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 checked="" type="checkbox"/>
SCALED PLAN OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED CROSS SECTION OF BRIDGE/CULVERT/APPROACH EARTHWORKS	<input type="checkbox"/>
SCALED LONG SECTION OF CHANNEL THROUGH BRIDGE/CULVERT	<input type="checkbox"/>
DETAILS OF RELEVANT EXISTING STRUCTURES	<input type="checkbox"/>
COMPLETED STATEMENT OF AUTHENTICITY	<input type="checkbox"/>
PLAN OF CATCHMENT AREA	<input type="checkbox"/>
COPY OF NOTICE OF GRANT OF PLANNING PERMISSION WITH CONDITIONS *1	<input type="checkbox"/>

<i>For OPW use only</i>	<i>Date of Receipt</i>							
<i>OPW Drainage Maintenance Region</i>	<i>East</i>	<input type="checkbox"/>	<i>South East</i>	<input type="checkbox"/>	<i>South West</i>	<input type="checkbox"/>	<i>West</i>	<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	1.2
3 – Variable Catchment Characteristics	<input checked="" type="checkbox"/>	0.351	Irish Growth Curve (IH 124 & 3 - Variable Catchment Characteristics)	1.96
IH 124	<input checked="" type="checkbox"/>	0.328	Factor for Standard Error (3 - Variable Catchment Characteristics)	1.58
Gauged Flow	<input type="checkbox"/>		Factor for Standard Error (IH 124)	1.65
Unit Hydrograph	<input type="checkbox"/>			
ADAS	<input type="checkbox"/>			
Other	<input type="checkbox"/>			
FSR <input type="checkbox"/>	FSU <input type="checkbox"/>	Other <input type="checkbox"/>	Tidal <input type="checkbox"/>	
Comments SAAR 1215.9mm/yr; Soil Factor=0.3;			Comments	

Hydraulic/Structure Details	
Description of Structure*3 Construction of a new pipe culvert with headwalls. The internal diameter of the culvert will be 1.5m. The culvert will have 300mm embedment.	
Upstream and downstream invert levels below refer to the <b>structural invert levels</b> of the culverts.	
Effective Conveyance Area *4	1.516m <sup>2</sup>
Upstream Invert Level <b>1.645</b> mOD	Downstream Invert Level <b>1.491</b> mOD
Upstream Soffit Level <b>3.145</b> mOD	Downstream Soffit Level <b>2.991</b> mOD
Upstream Design Flood Level <b>2.808</b> mOD	Downstream Design Flood Level <b>2.387</b> mOD

NOTES :

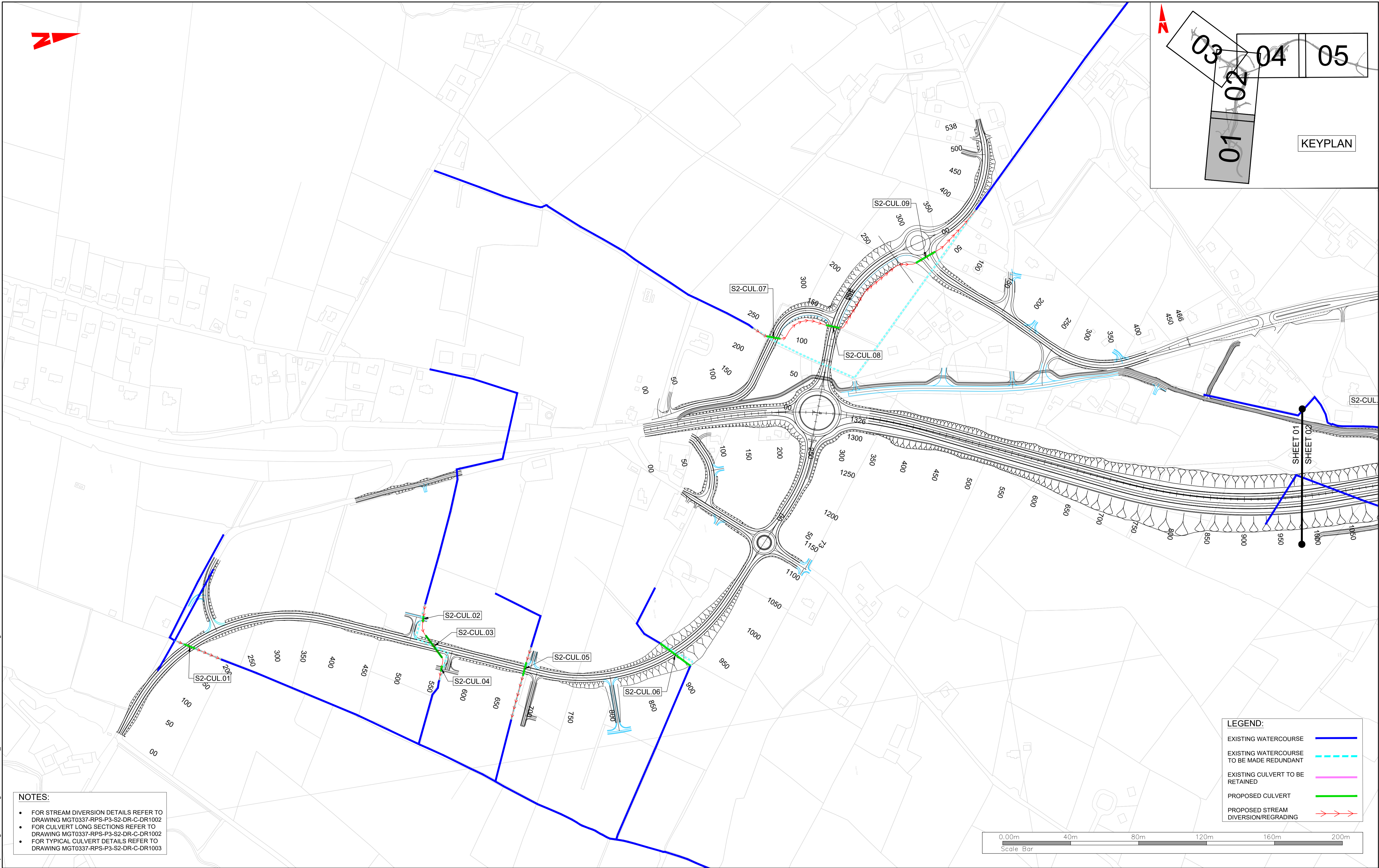
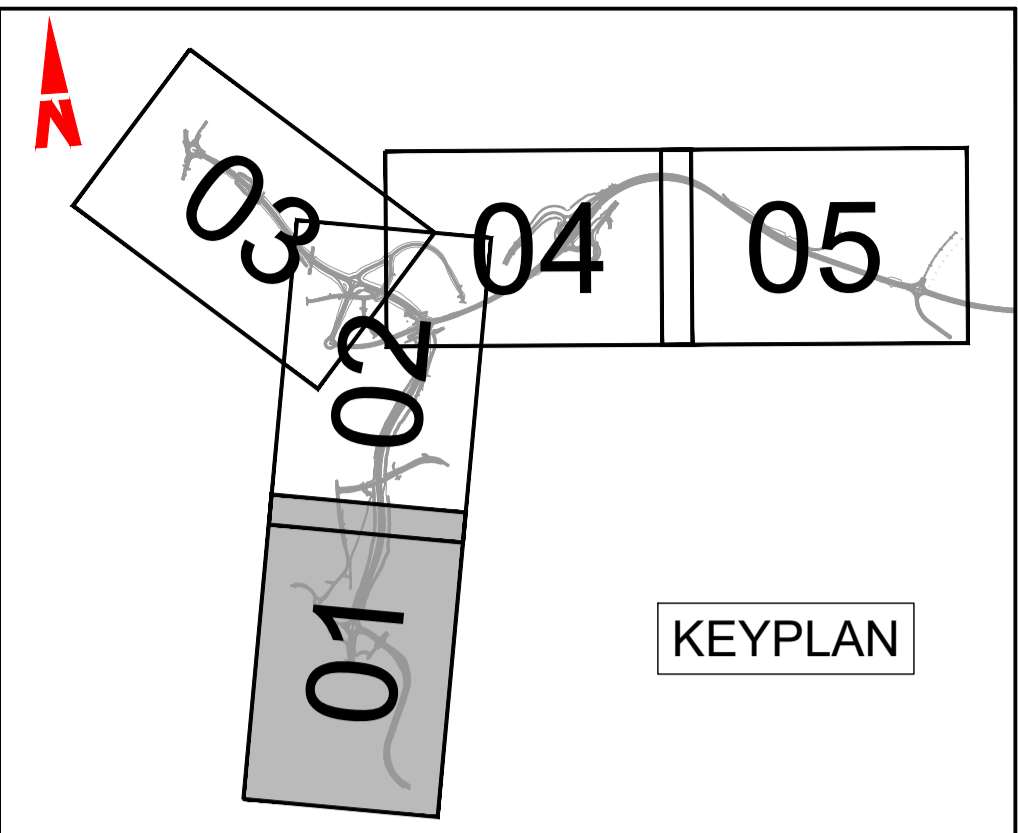
- In line with OPW policy, section 50 approvals should be sought for bridges and culverts that are necessary for access or deemed acceptable by the planning authority. A copy of the notice of grant of planning permission with all conditions should be enclosed with all applications, that are not exempt development under the Planning and Development Act, 2000, as evidence that these factors have been considered.
- Flow is the estimated flow from the catchment, without any factors applied.

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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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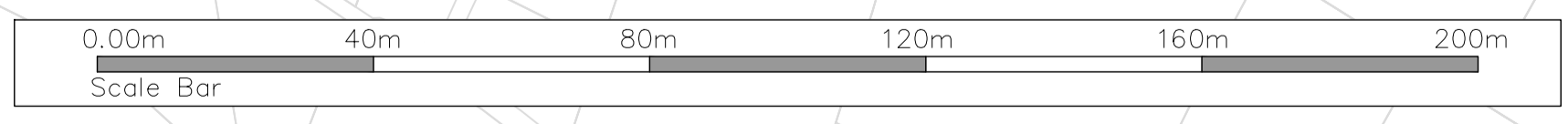
## Appendix B - DRAWINGS



- NOTES:**
- FOR STREAM DIVERSION DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR CULVERT LONG SECTIONS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR TYPICAL CULVERT DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1003

**LEGEND:**

EXISTING WATERCOURSE	
EXISTING WATERCOURSE TO BE MADE REDUNDANT	
EXISTING CULVERT TO BE RETAINED	
PROPOSED CULVERT	
PROPOSED STREAM DIVERSION/REGRAVING	

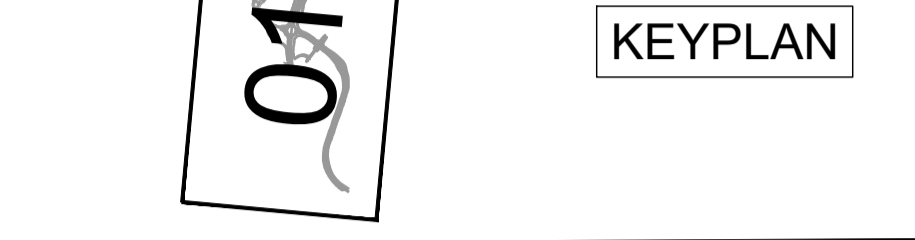
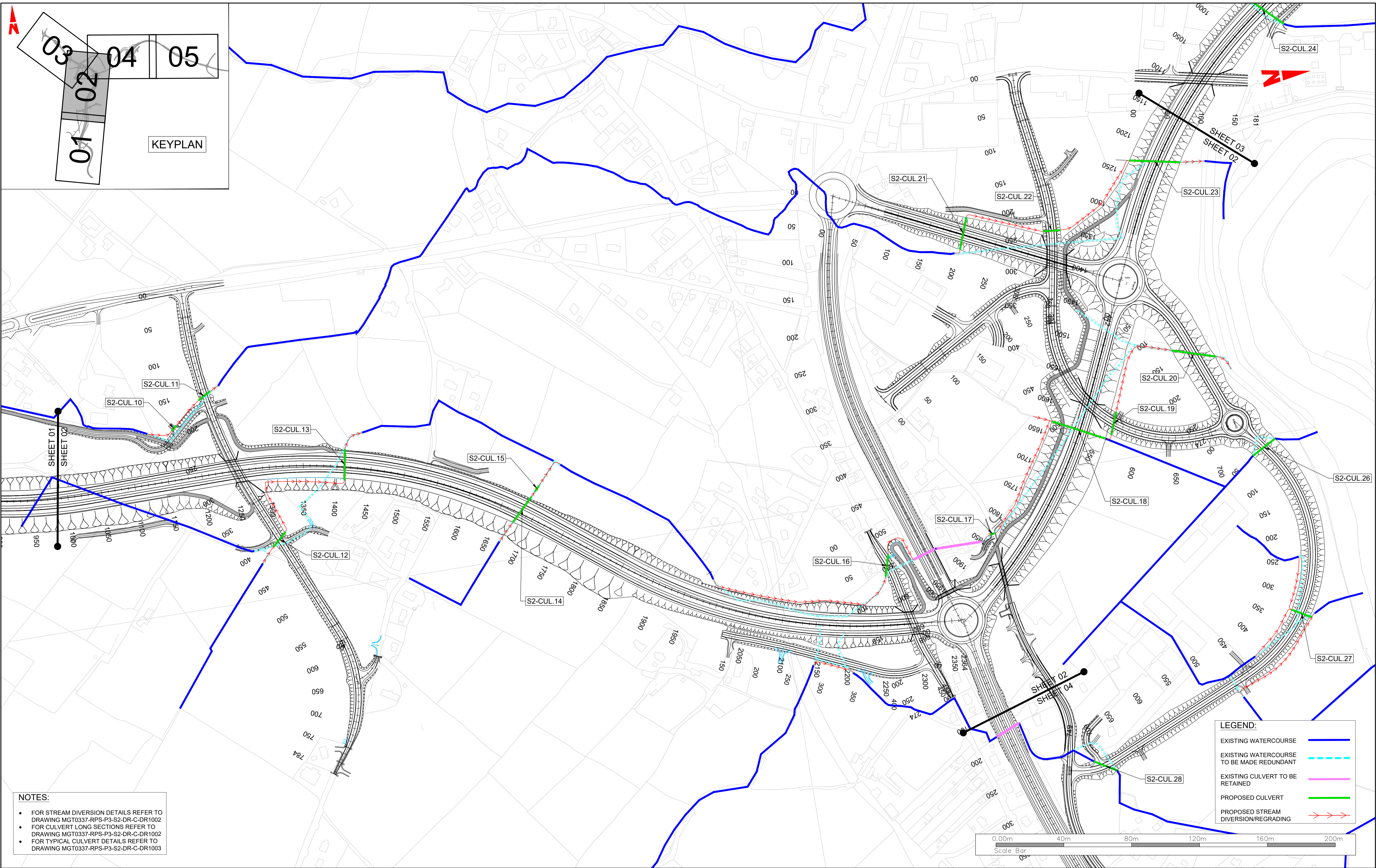


**NOTES**  
 DO NOT SCALE, use figured dimensions only.  
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 This drawing is the property of the Donegal County Council. It is a confidential document and must not be copied, used, or its contents divulged without prior written consent. This document should not be relied on or used in circumstances other than those for which it was originally prepared. RPS / Barry Transportation accepts no responsibility for this document to any other party other than the party by whom it was commissioned.

Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Section 50 Culverts Locations		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:2500	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1001
Approved: B. Lyons	@ A3: 1:5000	
Checked: B. Lyons	Sheet: 01 of 05	

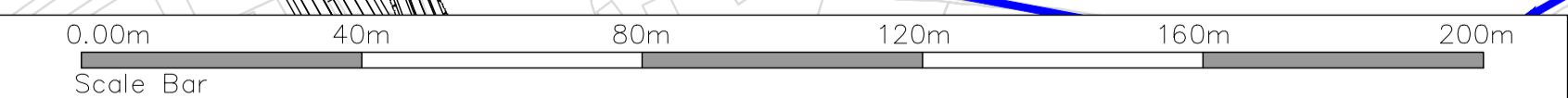
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- NOTES:**
- FOR STREAM DIVERSION DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR CULVERT LONG SECTIONS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR TYPICAL CULVERT DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1003

**LEGEND:**

EXISTING WATERCOURSE	
EXISTING WATERCOURSE TO BE MADE REDUNDANT	
EXISTING CULVERT TO BE RETAINED	
PROPOSED CULVERT	
PROPOSED STREAM DIVERSION/REGRAVING	

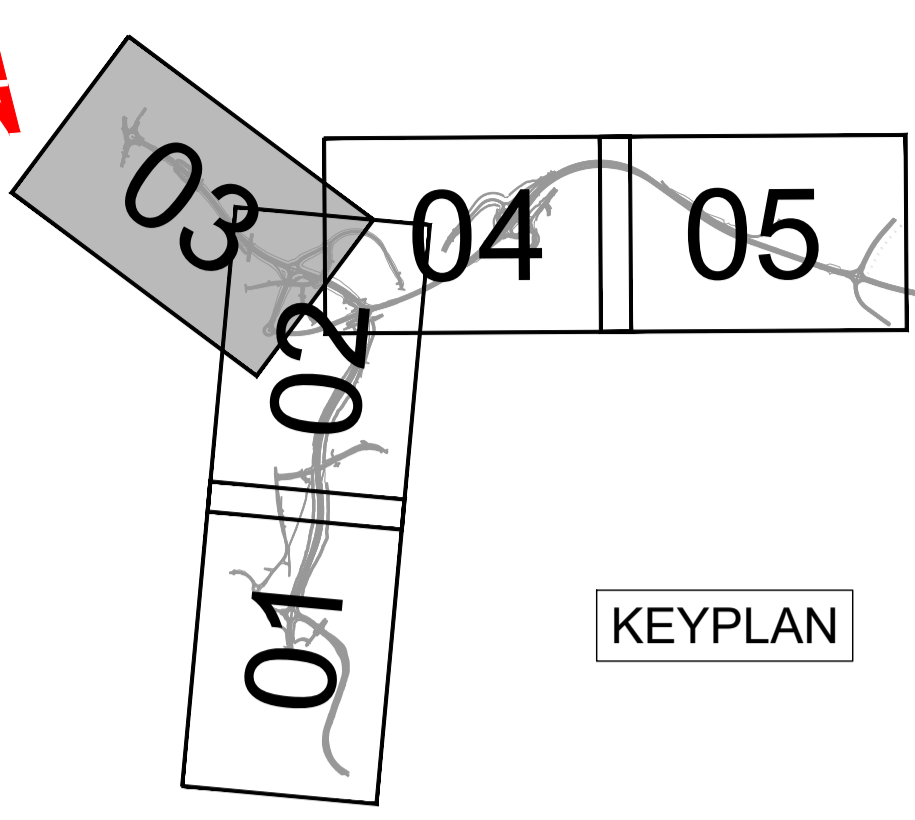
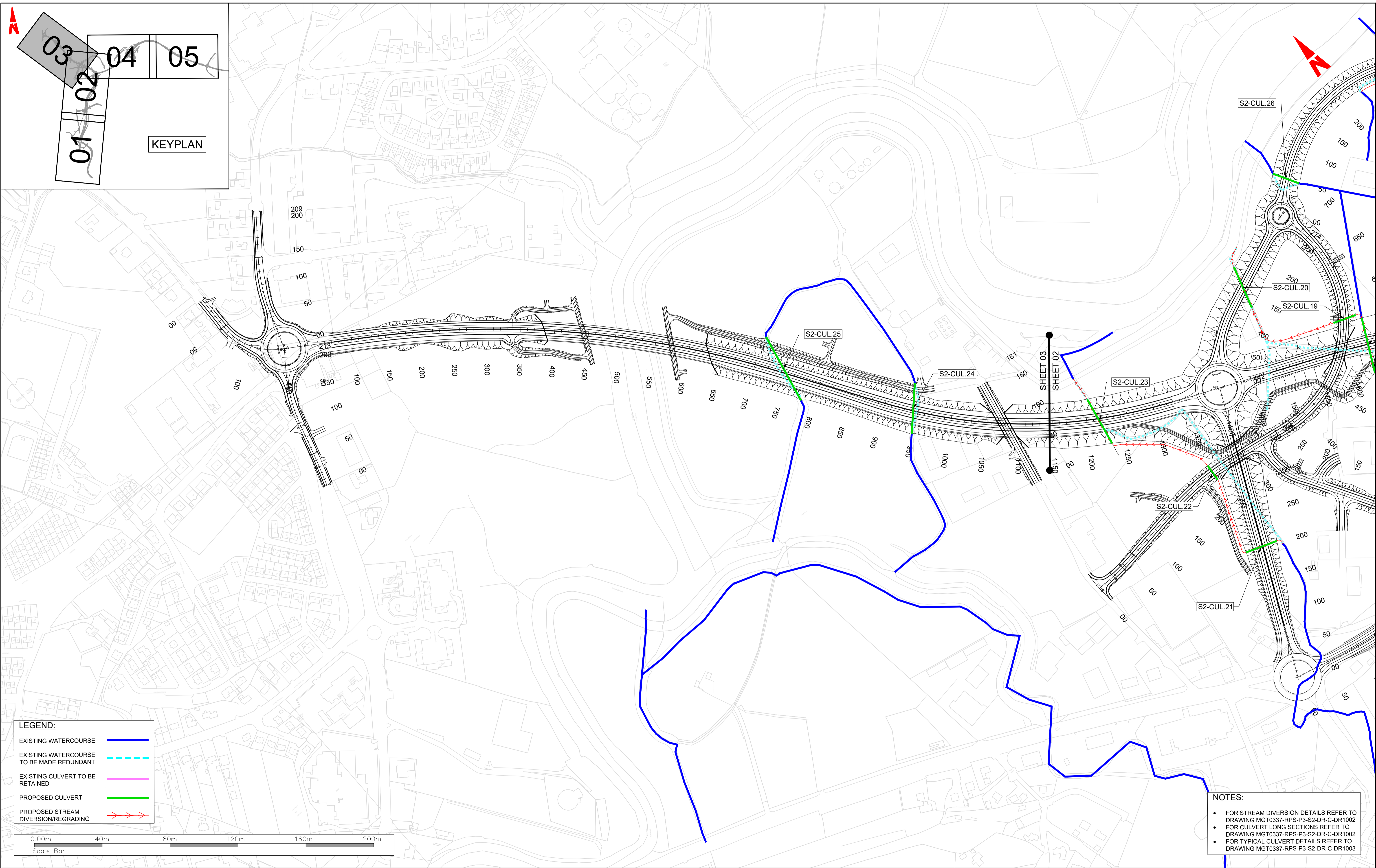


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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

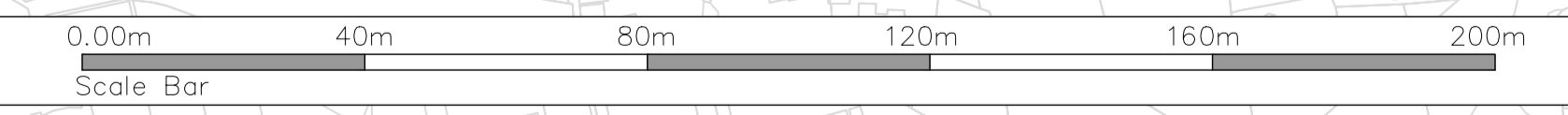
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culverts Locations		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:2500	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1001
Approved: B. Lyons	@ A3: 1:5000	
Checked: B. Lyons	Sheet: 02 of 05	

T:\MGT0337 - Ten-T Priority Route Imp - Donegal\8.0 Drawings\Phase 3\DRIT - MGT0337-RPS-P3-S2-DR-C-DR1001.dwg



**LEGEND:**

EXISTING WATERCOURSE	
EXISTING WATERCOURSE TO BE MADE REDUNDANT	
EXISTING CULVERT TO BE RETAINED	
PROPOSED CULVERT	
PROPOSED STREAM DIVERSION/REGRAIDING	



- NOTES:**
- FOR STREAM DIVERSION DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR CULVERT LONG SECTIONS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR TYPICAL CULVERT DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1003

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Bonneagar Iompair Éireann  
Transport Infrastructure Ireland

Rialtas na hÉireann  
Government of Ireland

Tionscadal Éireann  
Project Ireland  
2040

Donegal  
Comhairle Contae  
Dhún na nGall  
Donegal County Council

Donegal  
NRU  
Oifis Boicéana Naistena  
Dhún na nGall

Comhairle Contae  
Dhún na nGall  
Donegal County Council

RPS BARRY  
TRANSPORTATION

**NOTES**

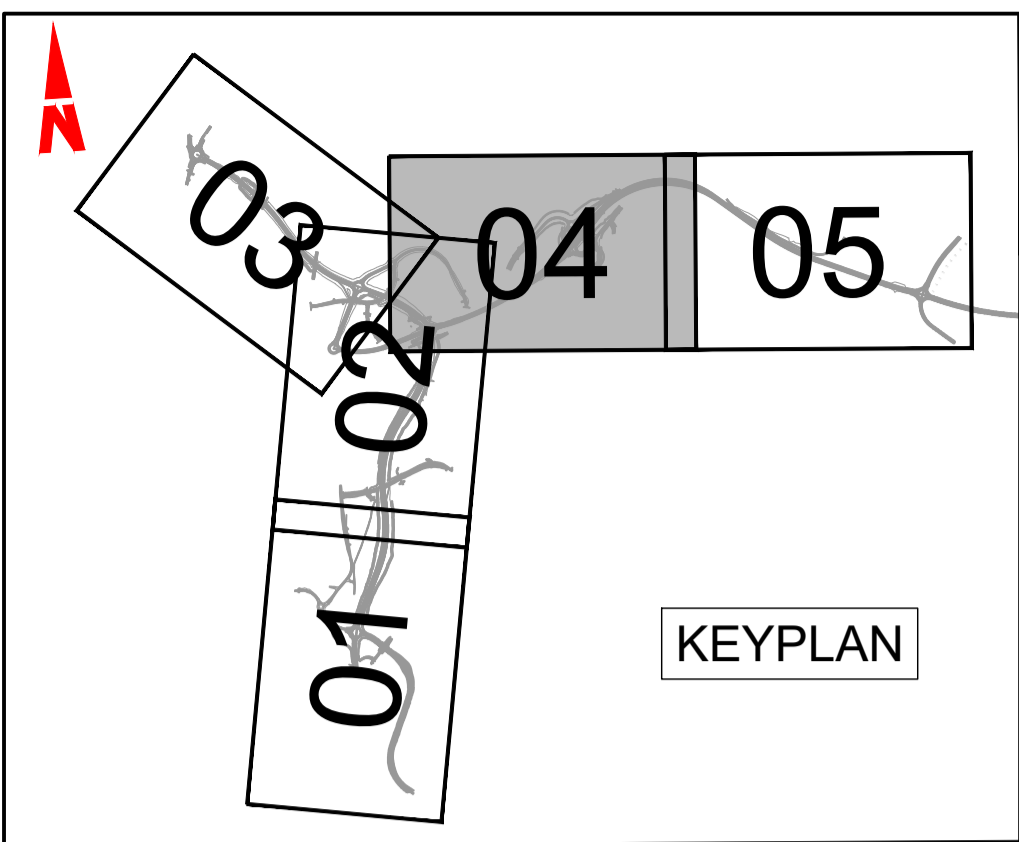
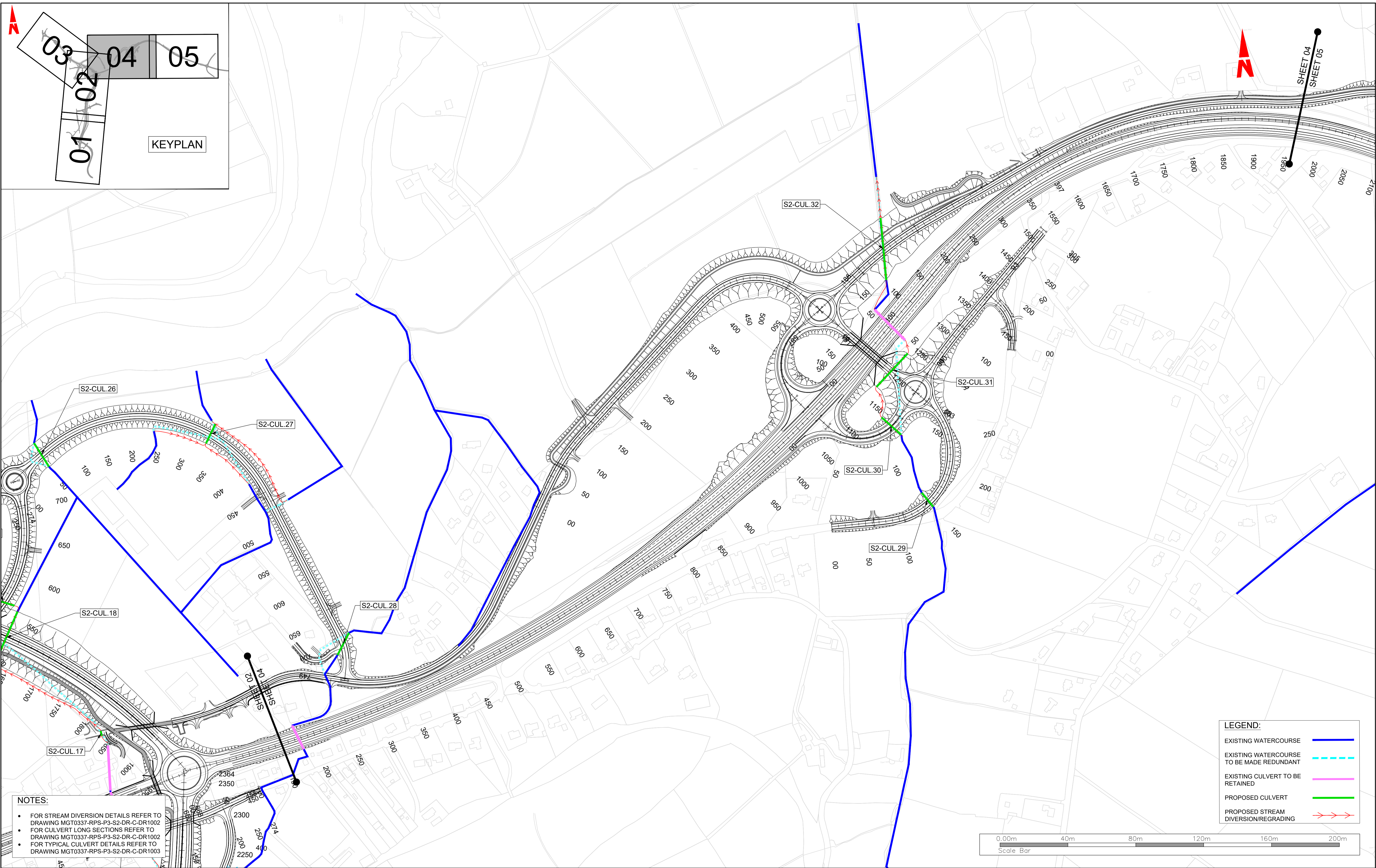
DO NOT SCALE, use figured dimensions only.

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	ÉMcK	FOR REVIEW & COMMENTS	BL	BL

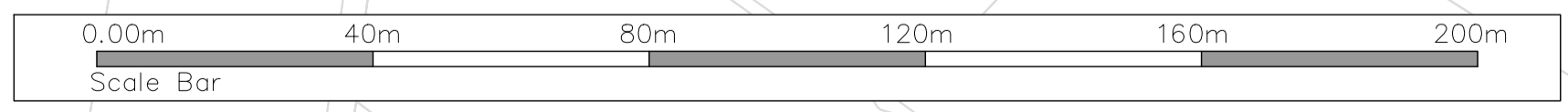
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Section 50 Culverts Locations		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:2500	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1001
Approved: B. Lyons	@ A3: 1:5000	
Checked: B. Lyons	Sheet: 03 of 05	



**LEGEND:**

EXISTING WATERCOURSE	
EXISTING WATERCOURSE TO BE MADE REDUNDANT	
EXISTING CULVERT TO BE RETAINED	
PROPOSED CULVERT	
PROPOSED STREAM DIVERSION/REGRAIDING	

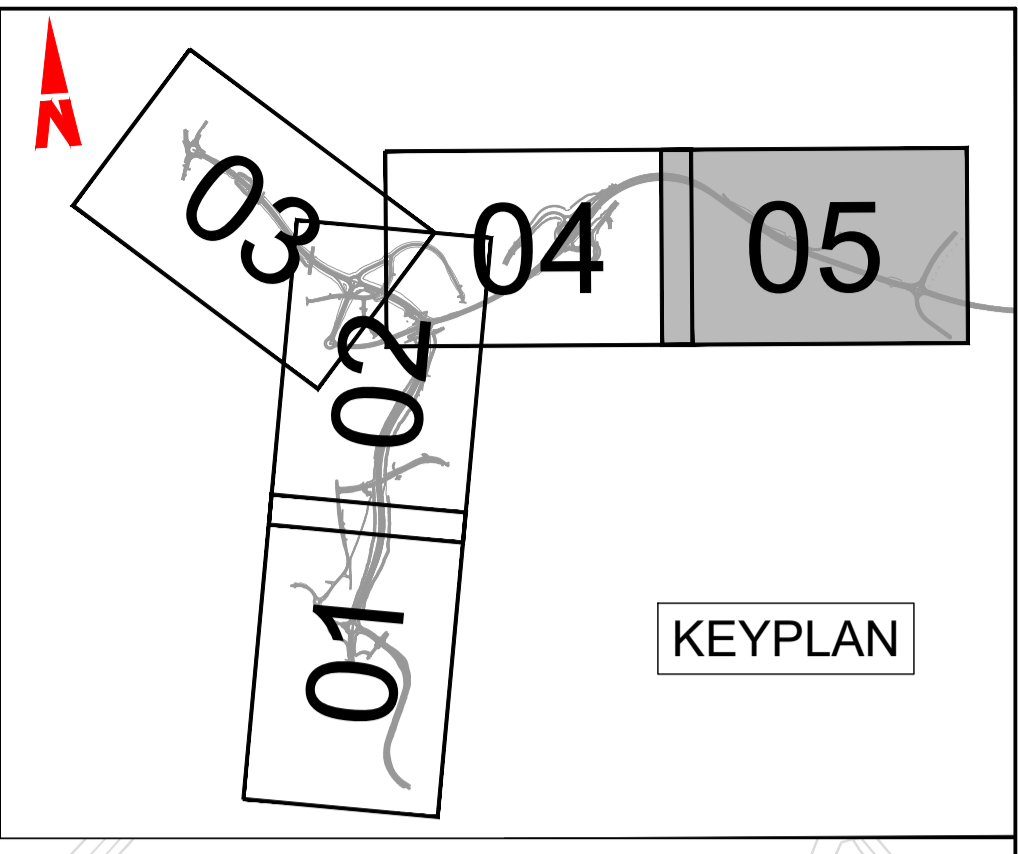
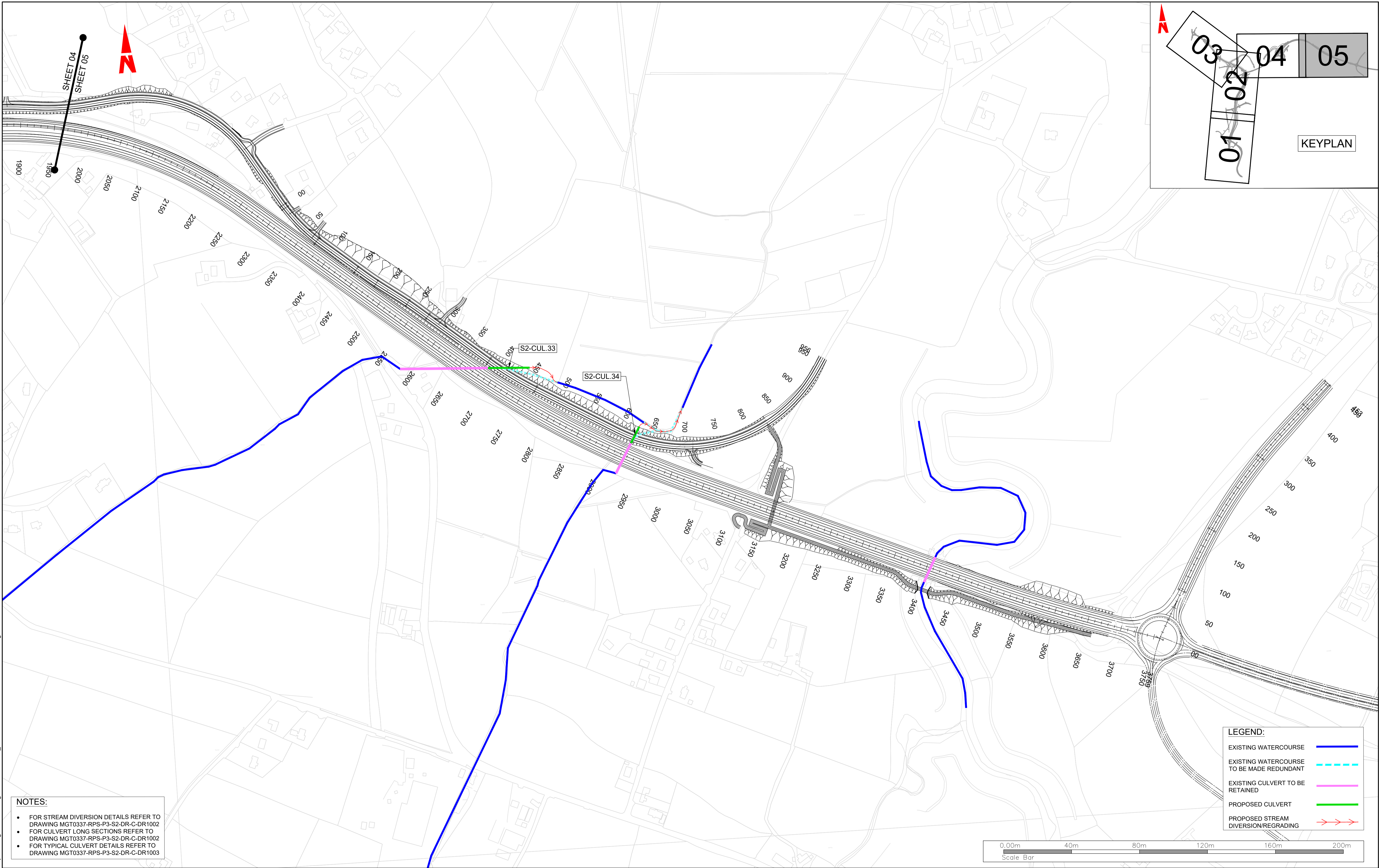
- NOTES:**
- FOR STREAM DIVERSION DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR CULVERT LONG SECTIONS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR TYPICAL CULVERT DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1003



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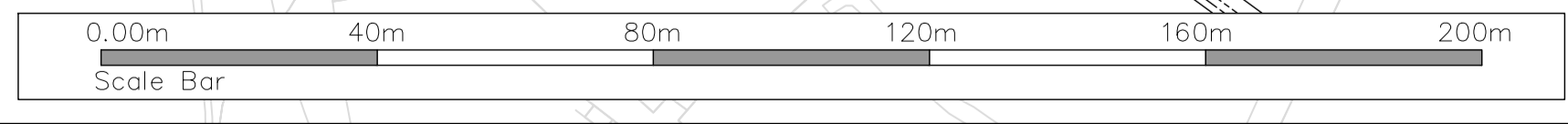
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Section 50 Culverts Locations		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:2500	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1001
Approved: B. Lyons	@ A3: 1:5000	
Checked: B. Lyons	Sheet: 04 of 05	



- NOTES:**
- FOR STREAM DIVERSION DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR CULVERT LONG SECTIONS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1002
  - FOR TYPICAL CULVERT DETAILS REFER TO DRAWING MGT0337-RPS-P3-S2-DR-C-DR1003

**LEGEND:**

EXISTING WATERCOURSE	
EXISTING WATERCOURSE TO BE MADE REDUNDANT	
EXISTING CULVERT TO BE RETAINED	
PROPOSED CULVERT	
PROPOSED STREAM DIVERSION/REGRAIDING	

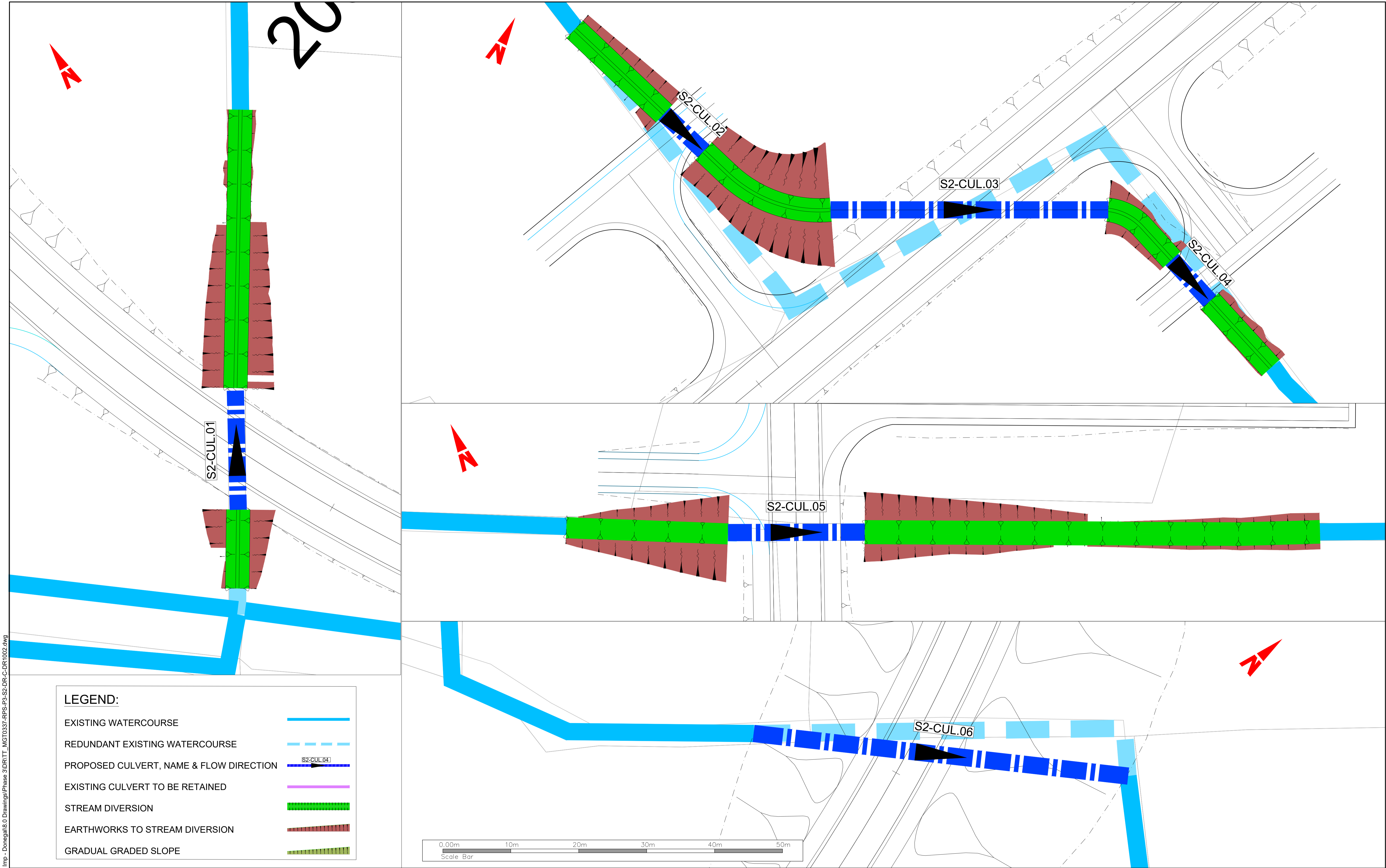


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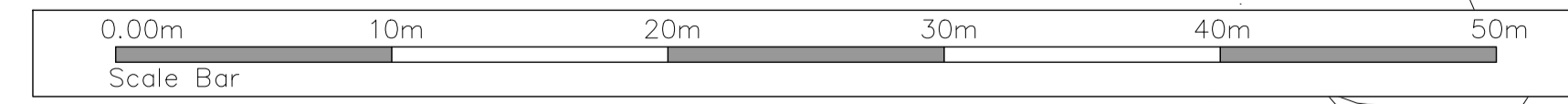
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Section 50 Culverts Locations		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:2500	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1001
Approved: B. Lyons	@ A3: 1:5000	
Checked: B. Lyons	Sheet: 05 of 05	

T:\MGT0337 - Ten-T Priority Route Imp - Donegal\8.0 Drawings\Phase 3\DRITT\_MGT0337-RPS-P3-S2-DR-C-DR1001.dwg



**LEGEND:**

- EXISTING WATERCOURSE
- REDUNDANT EXISTING WATERCOURSE
- PROPOSED CULVERT, NAME & FLOW DIRECTION
- EXISTING CULVERT TO BE RETAINED
- STREAM DIVERSION
- EARTHWORKS TO STREAM DIVERSION
- GRADUAL GRADED SLOPE



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Tionscadal Éireann  
Project Ireland  
2040

Comhairle Contae  
Dhún na nGall  
Donegal County Council

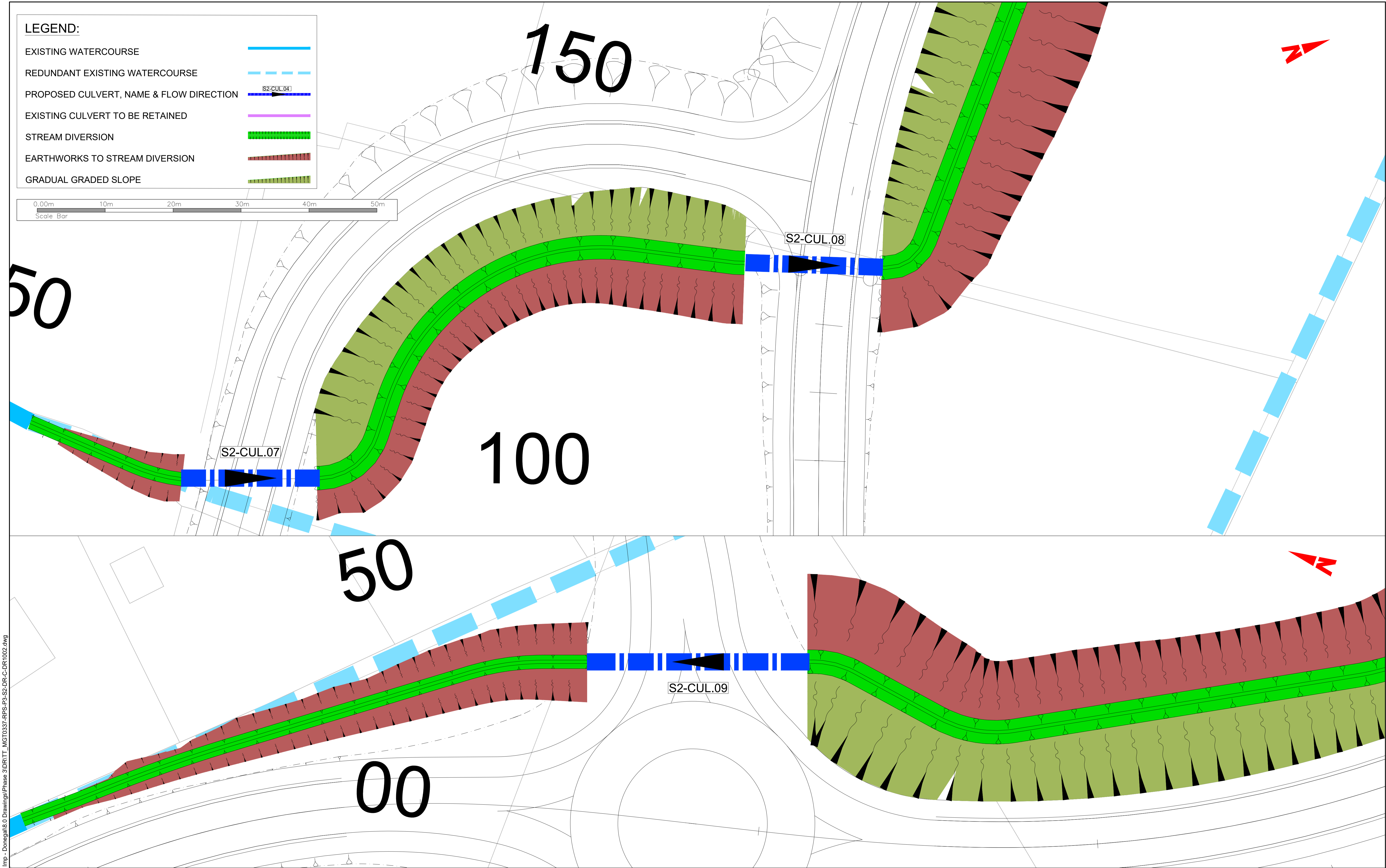
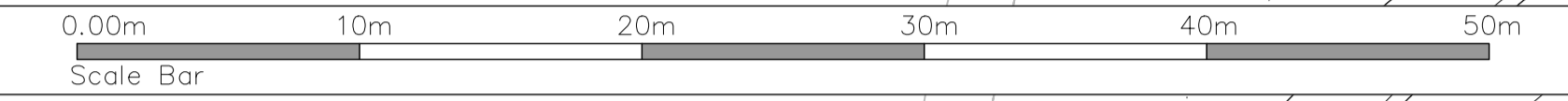
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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culverts & Stream Diversions Layouts		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 01 of 08	

**LEGEND:**

- EXISTING WATERCOURSE
- REDUNDANT EXISTING WATERCOURSE
- PROPOSED CULVERT, NAME & FLOW DIRECTION
- EXISTING CULVERT TO BE RETAINED
- STREAM DIVERSION
- EARTHWORKS TO STREAM DIVERSION
- GRADUAL GRADED SLOPE



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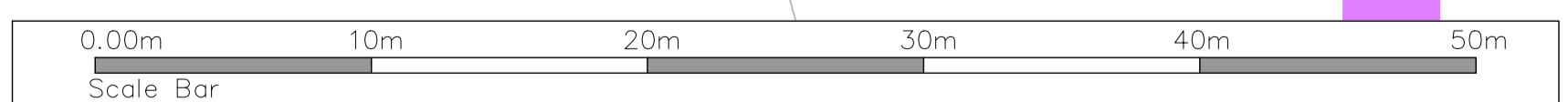
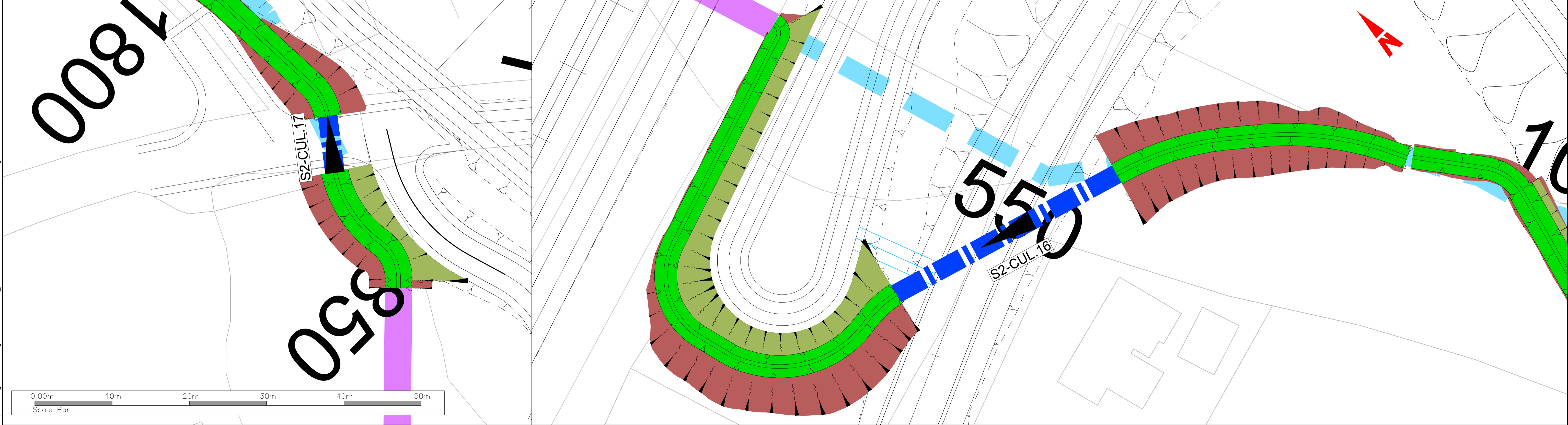
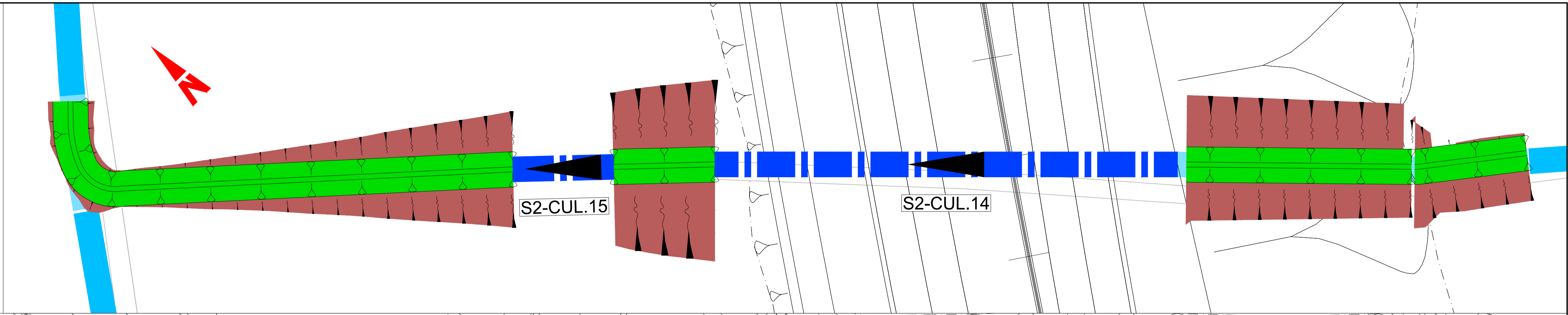
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Drawing Title: Section 2 Culverts & Stream Diversions Layouts		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 02 of 08	

**LEGEND:**

- EXISTING WATERCOURSE
- REDUNDANT EXISTING WATERCOURSE
- PROPOSED CULVERT, NAME & FLOW DIRECTION
- EXISTING CULVERT TO BE RETAINED
- STREAM DIVERSION
- EARTHWORKS TO STREAM DIVERSION
- GRADUAL GRADED SLOPE

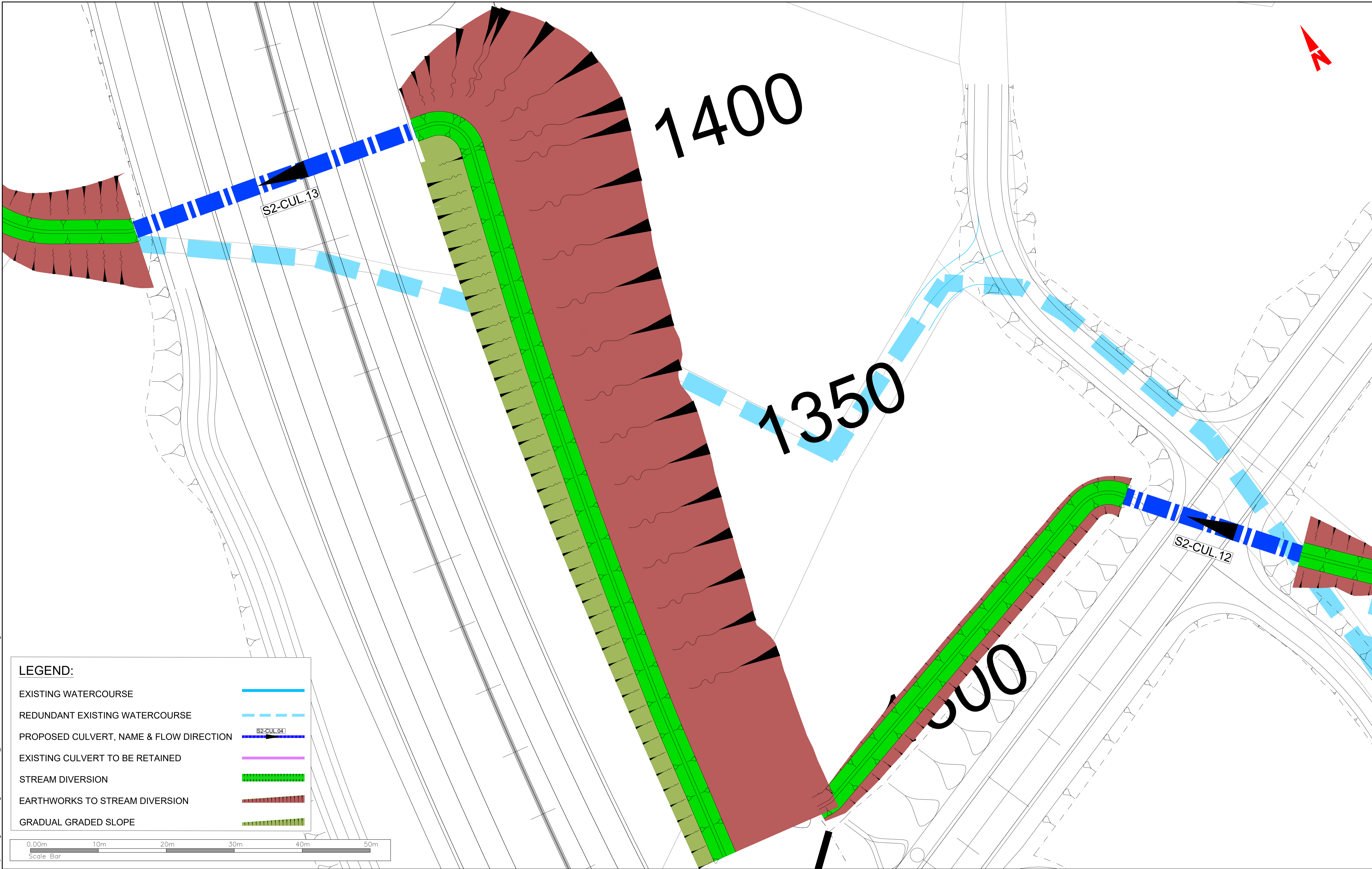
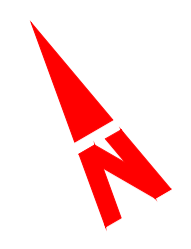


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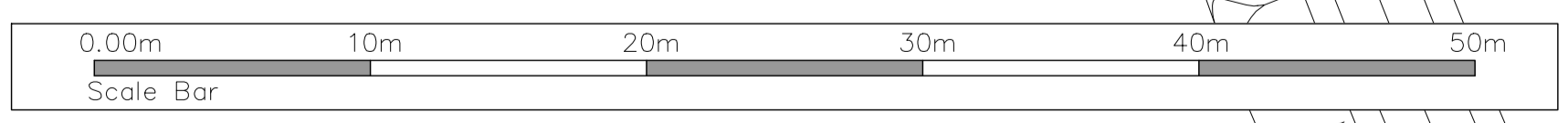
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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culverts & Stream Diversions Layouts		Rev: P01
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Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 03 of 08	



**LEGEND:**

- EXISTING WATERCOURSE: Solid blue line
- REDUNDANT EXISTING WATERCOURSE: Dashed blue line
- PROPOSED CULVERT, NAME & FLOW DIRECTION: Blue line with arrow and label (e.g., S2-CUL.04)
- EXISTING CULVERT TO BE RETAINED: Solid purple line
- STREAM DIVERSION: Green hatched area
- EARTHWORKS TO STREAM DIVERSION: Red hatched area
- GRADUAL GRADED SLOPE: Green hatched area



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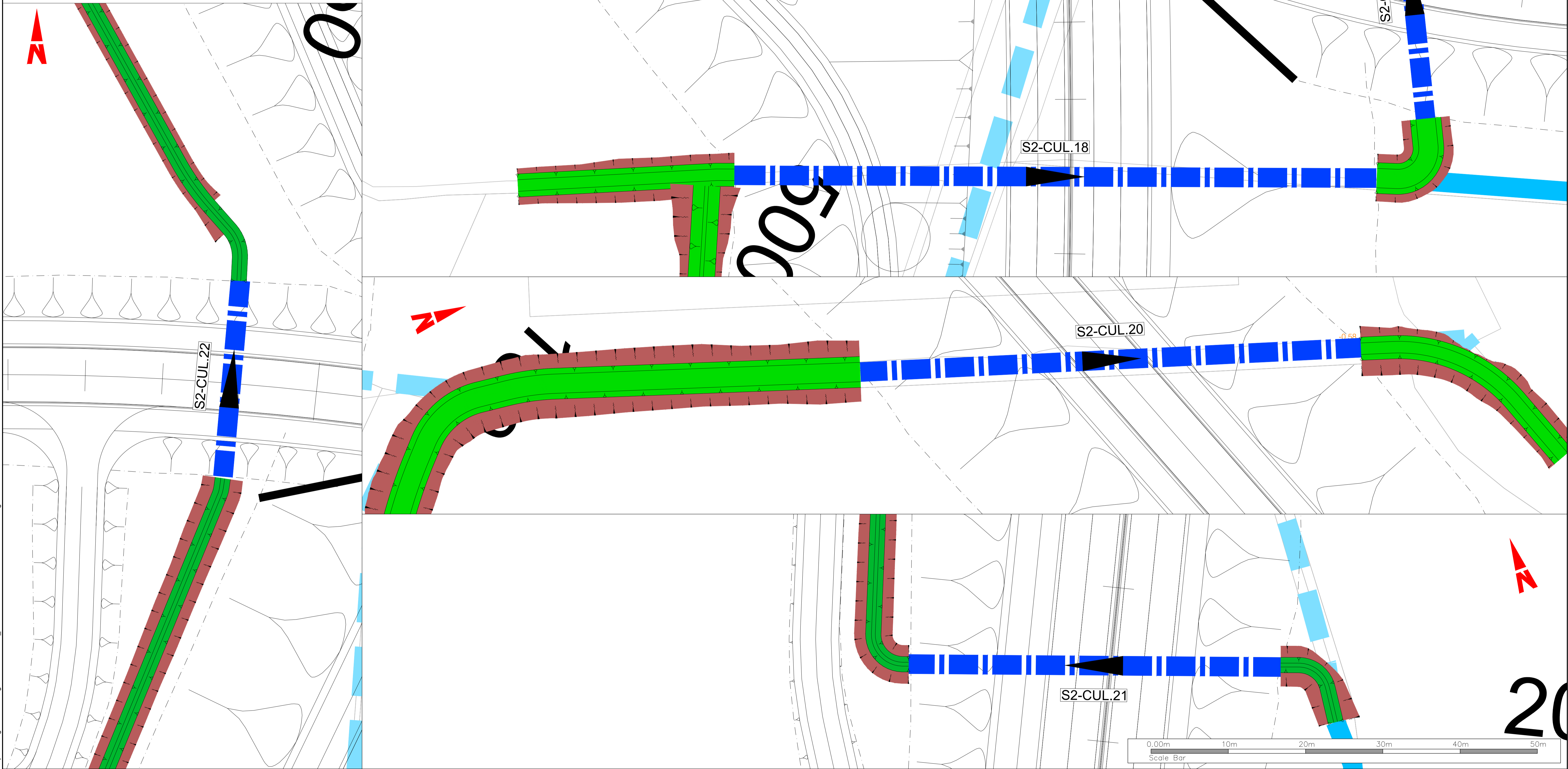
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Drawing Title: Section 2 Culverts & Stream Diversions Layouts		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 04 of 08	

**LEGEND:**

- EXISTING WATERCOURSE
- REDUNDANT EXISTING WATERCOURSE
- PROPOSED CULVERT, NAME & FLOW DIRECTION
- EXISTING CULVERT TO BE RETAINED
- STREAM DIVERSION
- EARTHWORKS TO STREAM DIVERSION
- GRADUAL GRADED SLOPE



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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culverts & Stream Diversions Layouts

Status: S3

Designed: É. McKeon Date: FEB. 2021 Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

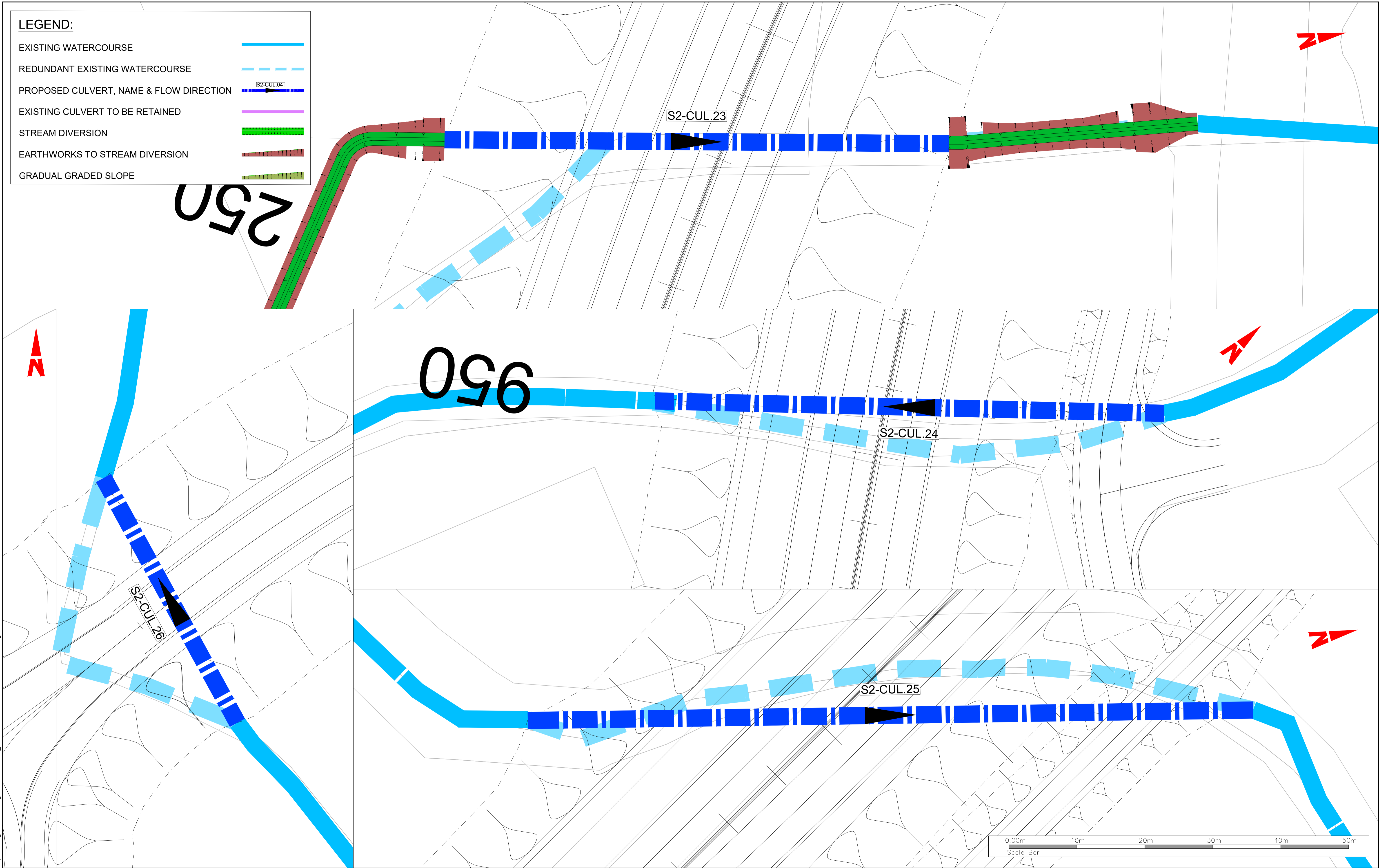
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Approved: B. Lyons Sheet: 05 of 08

Checked: B. Lyons

**LEGEND:**

- EXISTING WATERCOURSE
- REDUNDANT EXISTING WATERCOURSE
- PROPOSED CULVERT, NAME & FLOW DIRECTION
- EXISTING CULVERT TO BE RETAINED
- STREAM DIVERSION
- EARTHWORKS TO STREAM DIVERSION
- GRADUAL GRADED SLOPE



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**NOTES**

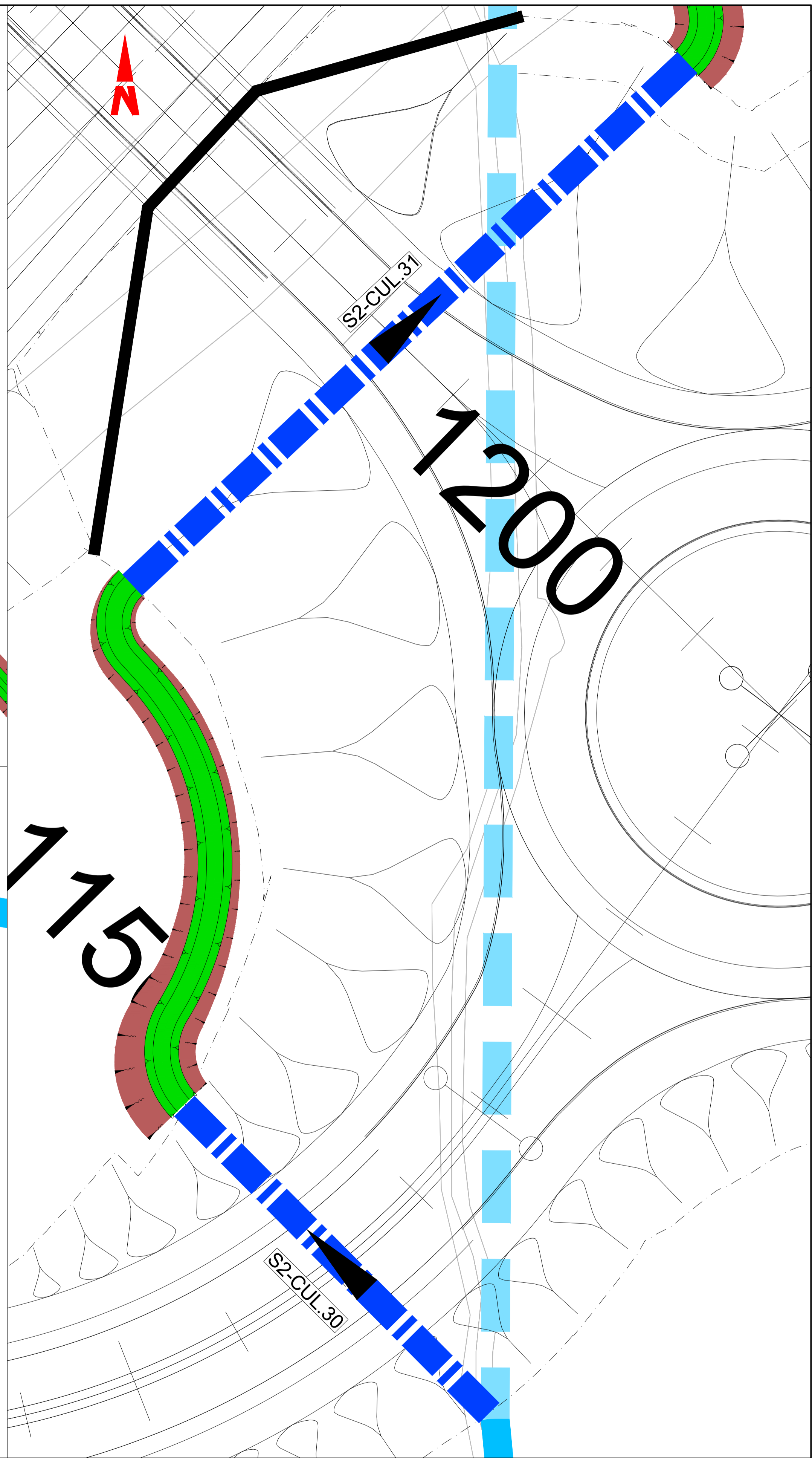
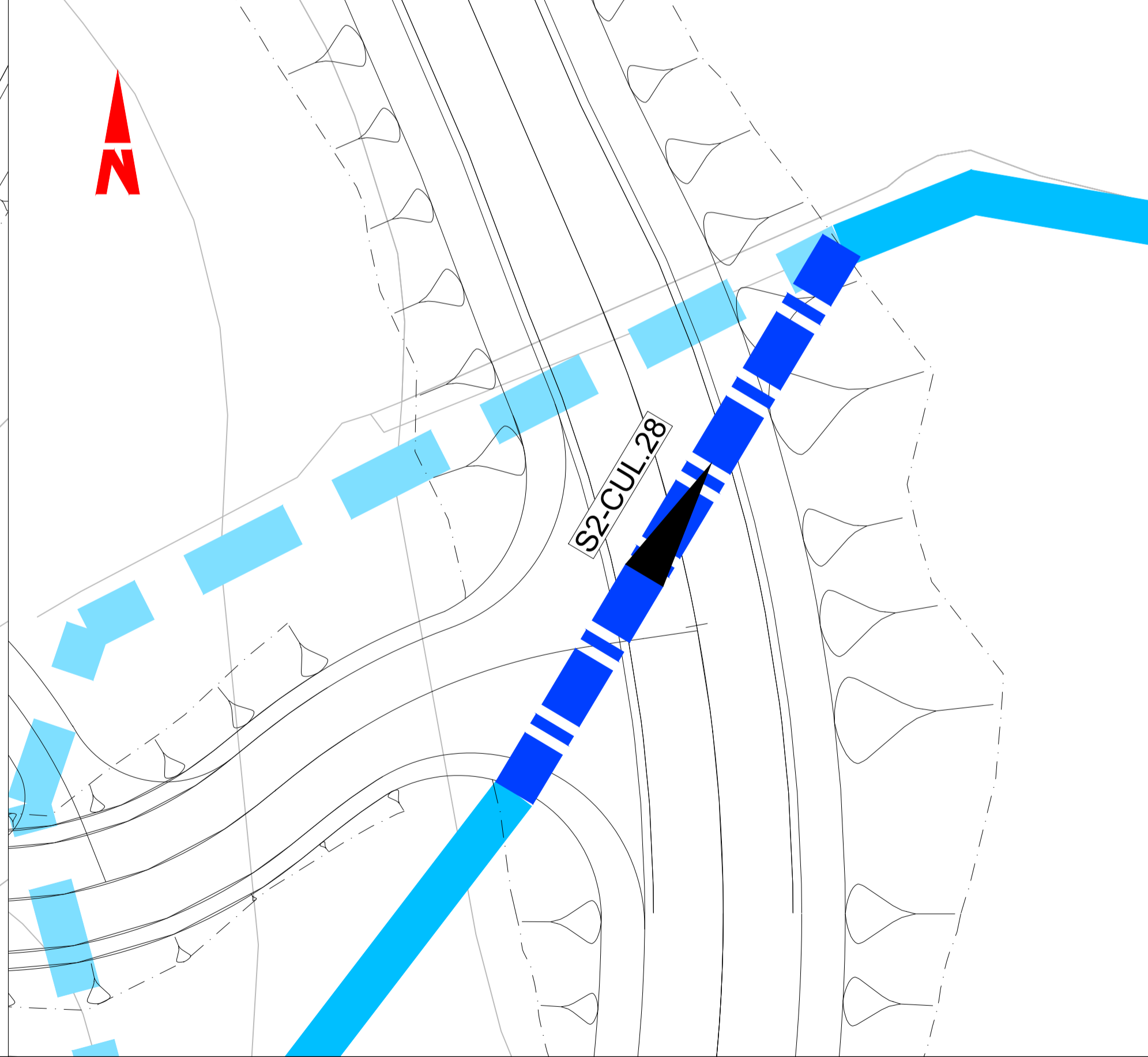
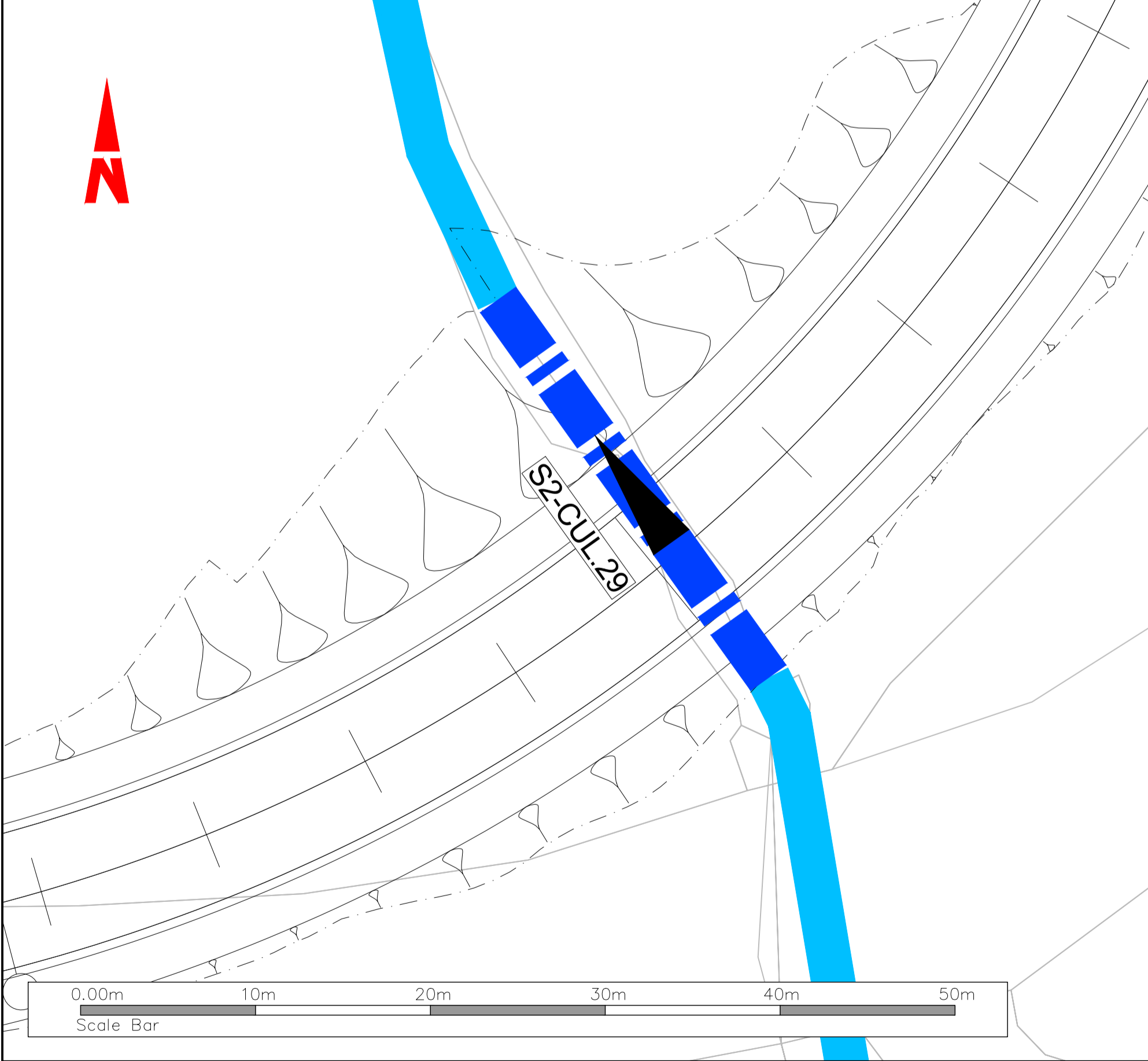
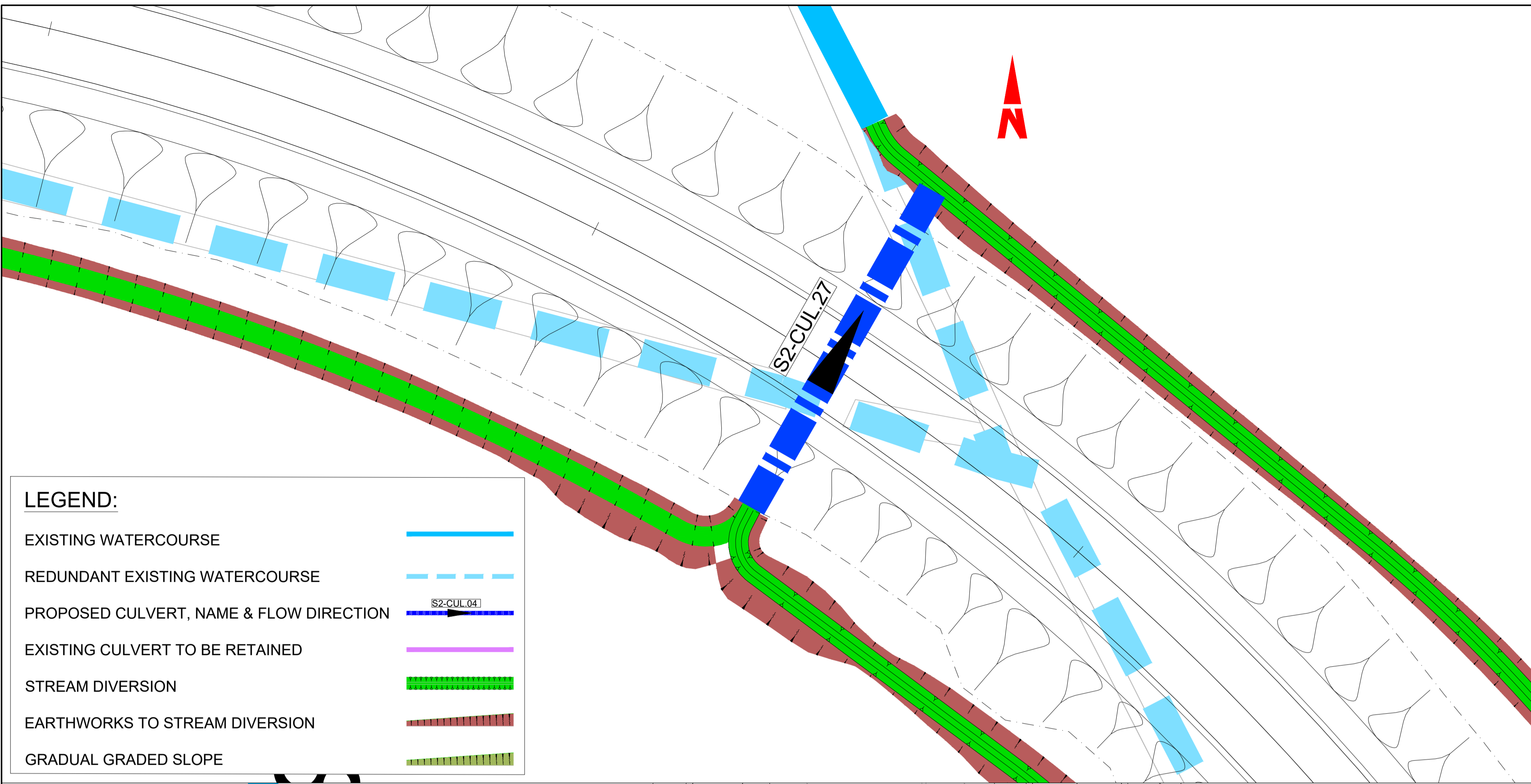
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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culverts & Stream Diversions Layouts		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 06 of 08	



**LEGEND:**

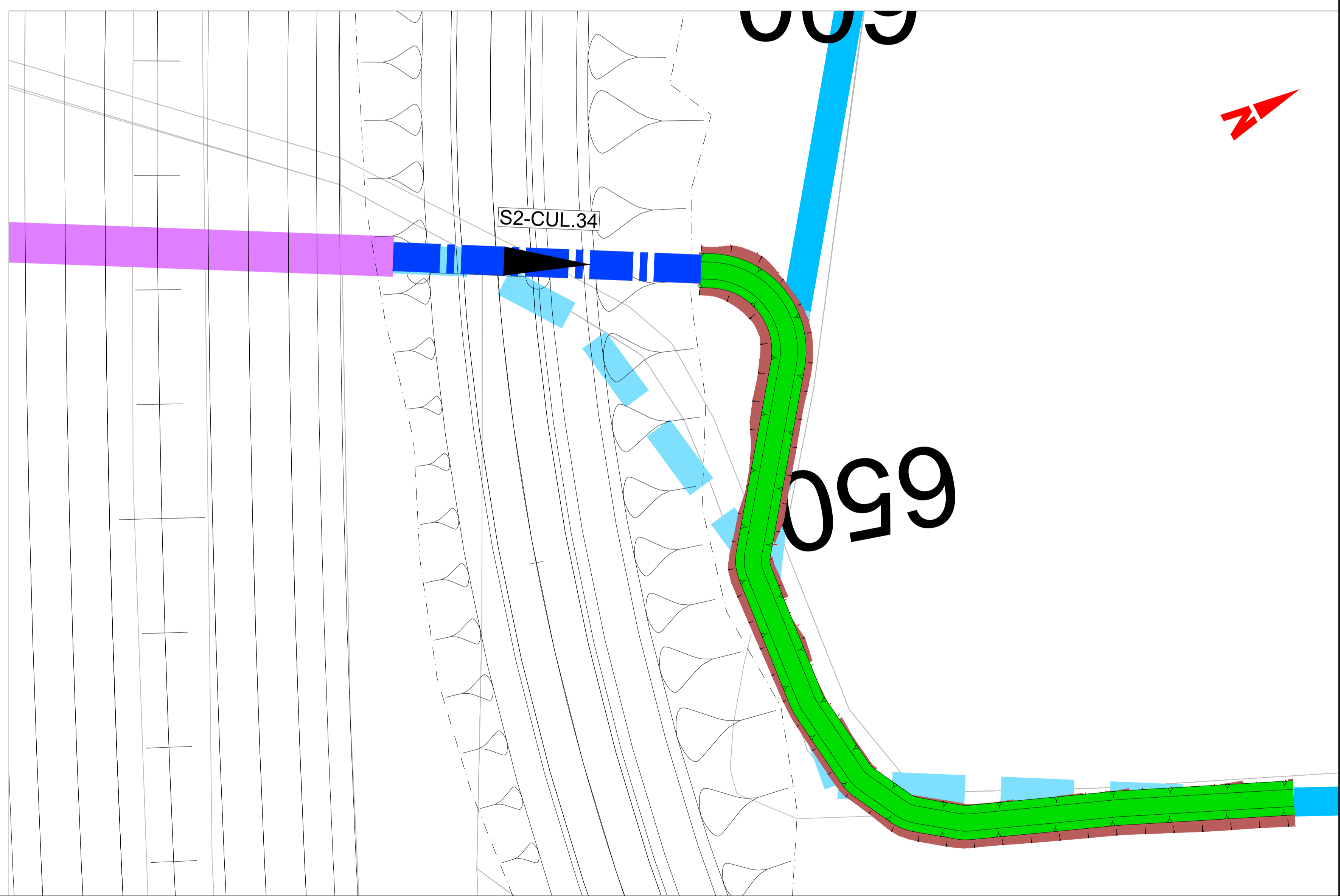
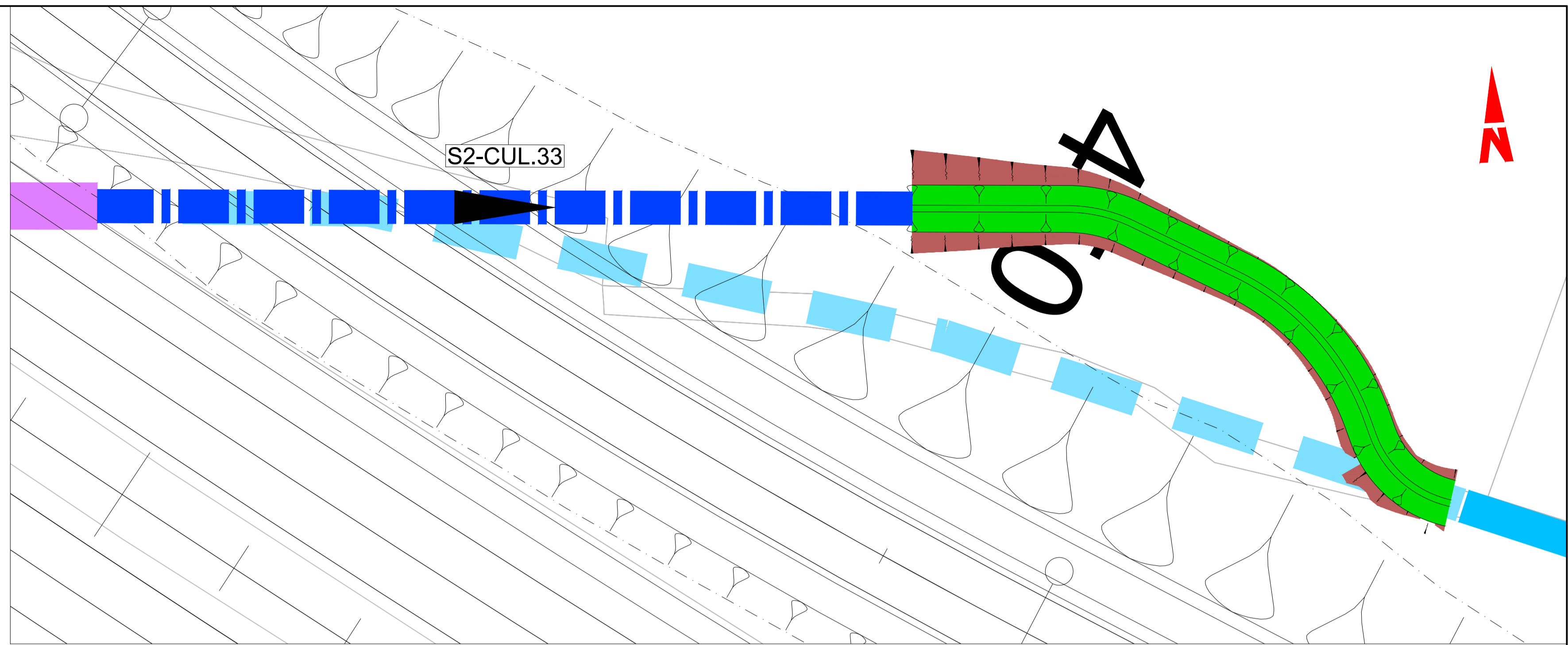
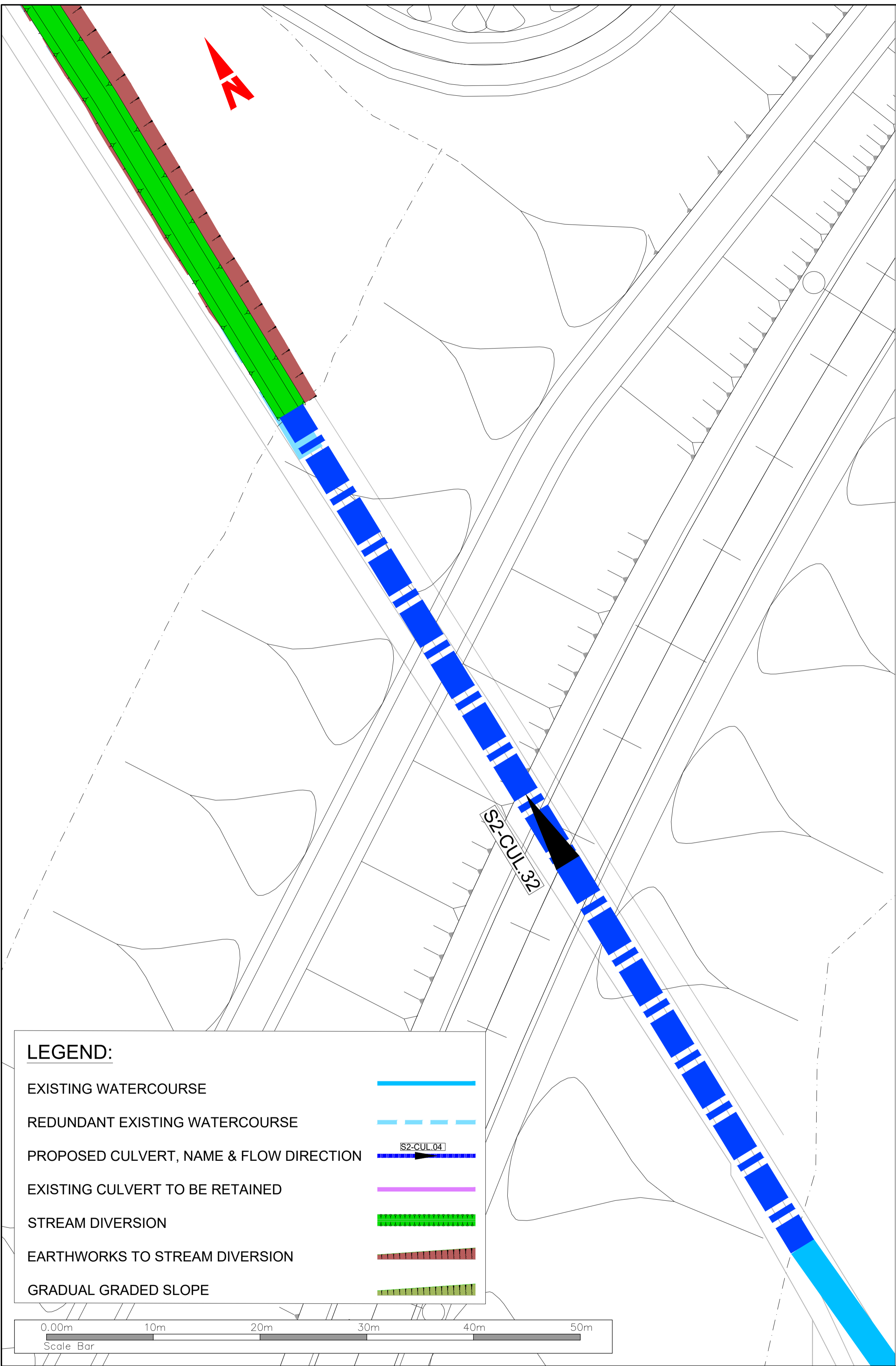
EXISTING WATERCOURSE	
REDUNDANT EXISTING WATERCOURSE	
PROPOSED CULVERT, NAME & FLOW DIRECTION	
EXISTING CULVERT TO BE RETAINED	
STREAM DIVERSION	
EARTHWORKS TO STREAM DIVERSION	
GRADUAL GRADED SLOPE	

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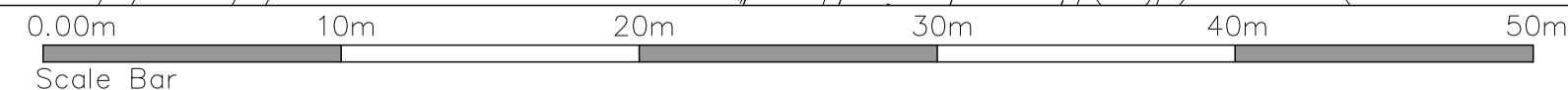
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Drawn: É. McKeon	Scale @ A1: 1:250	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1002
Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 07 of 08	

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- LEGEND:**
- EXISTING WATERCOURSE
  - REDUNDANT EXISTING WATERCOURSE
  - PROPOSED CULVERT, NAME & FLOW DIRECTION
  - EXISTING CULVERT TO BE RETAINED
  - STREAM DIVERSION
  - EARTHWORKS TO STREAM DIVERSION
  - GRADUAL GRADED SLOPE

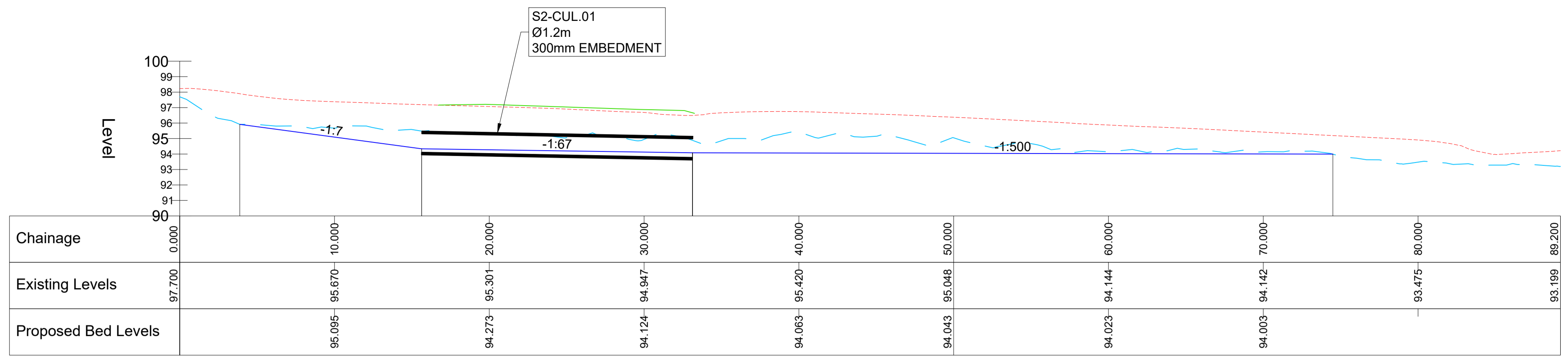


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Approved: B. Lyons	@ A3: 1:500	
Checked: B. Lyons	Sheet: 08 of 08	

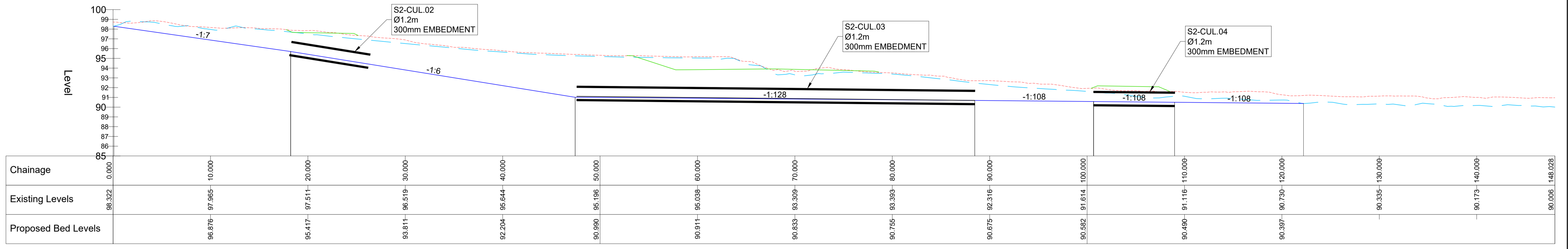
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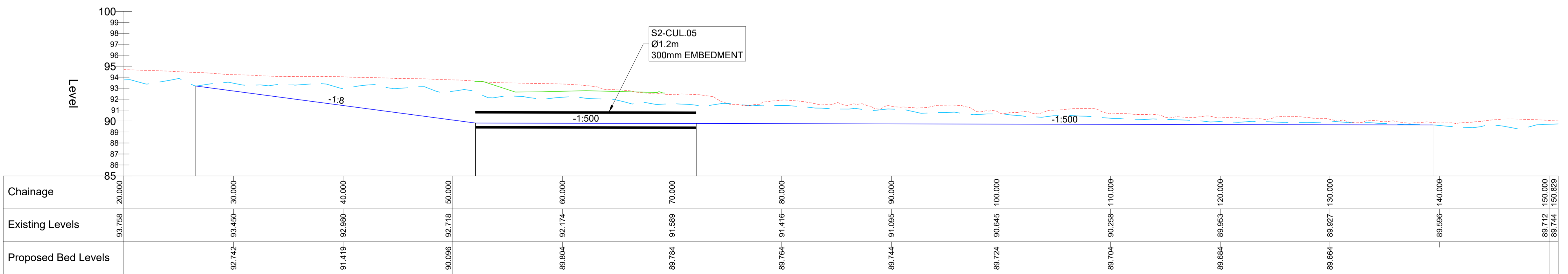
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**LEGEND:**

EXISTING GROUND LEVEL	---
PROPOSED GROUND LEVEL	---
EXISTING WATERCOURSE INVERT LEVEL	---
PROPOSED WATERCOURSE DIVERSION INVERT LEVEL	---
FLOOD COMPENSATION AREA INVERT LEVEL	---
CULVERT EMBEDMENT LEVEL	---



S2-CUL.02 TO S2-CUL.04  
SCALE: H 1:200, V 1:200. DATUM: 85.000



S2-CUL.05  
SCALE: H 1:200, V 1:200. DATUM: 85.000

T:\MGT0337 - Ten-T Priority Route Imp - Donegal\8.0 Drawings\Phase 3\DRITTT\_MGT0337-RPS-P3-S2-DR-C-DR1003.dwg

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**NOTES**

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

Status: S3

Designed: É. McKeon  
Date: FEB. 2021

Drawn: É. McKeon  
Scale @ A1: 1:200

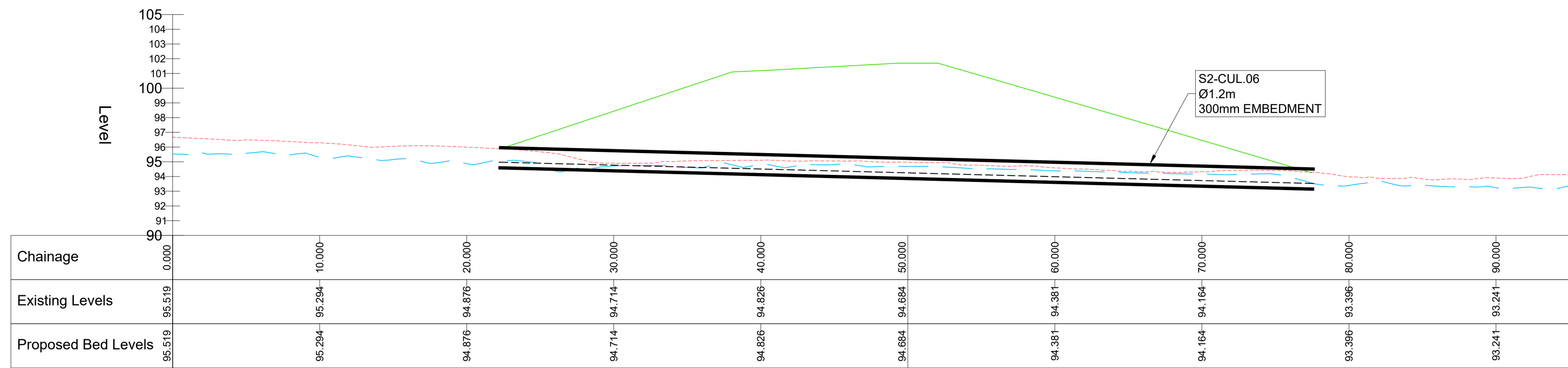
Approved: B. Lyons  
@ A3: 1:400

Checked: B. Lyons  
Sheet: 01 of 10

Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

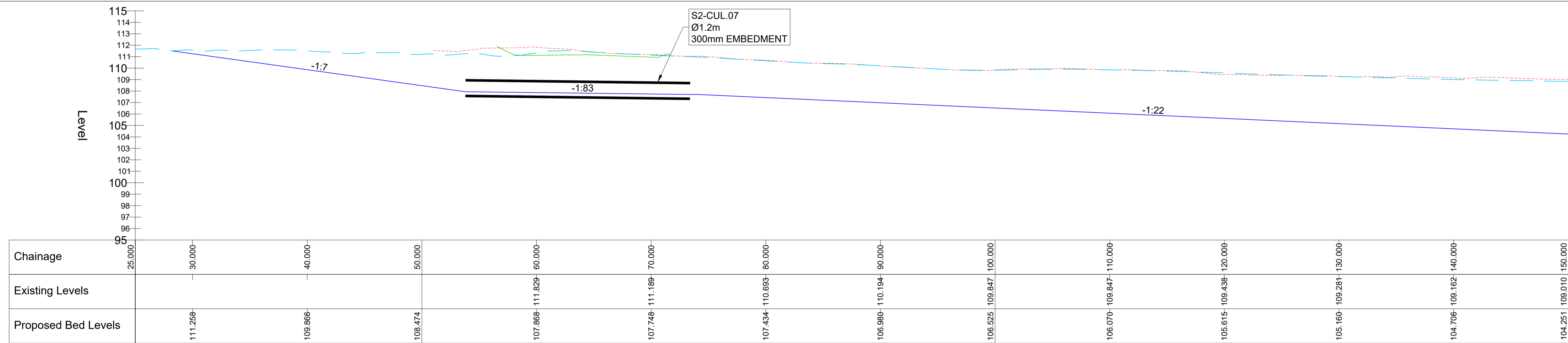
Rev: P01



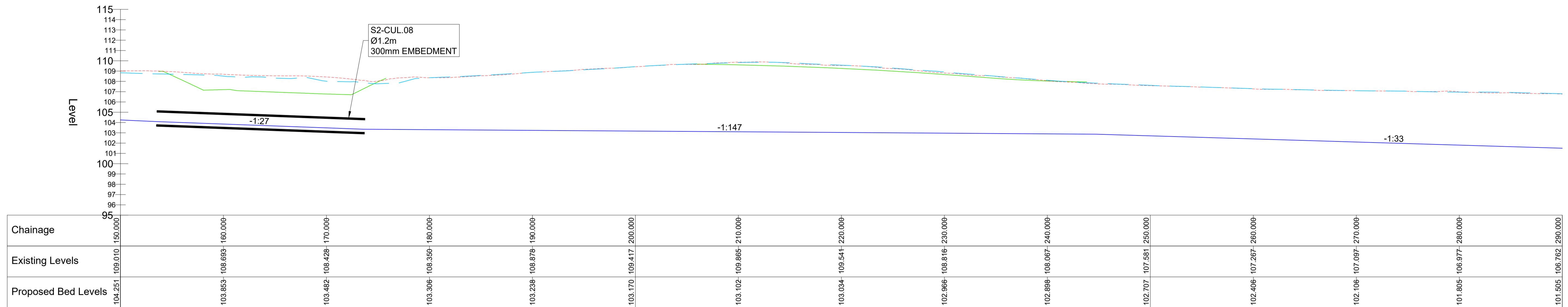
S2-CUL.06  
SCALE: H 1:200, V 1:200. DATUM: 90.000

**LEGEND:**

EXISTING GROUND LEVEL	--- (Red dashed)
PROPOSED GROUND LEVEL	--- (Green solid)
EXISTING WATERCOURSE INVERT LEVEL	--- (Blue dashed)
PROPOSED WATERCOURSE DIVERSION INVERT LEVEL	--- (Blue solid)
FLOOD COMPENSATION AREA INVERT LEVEL	--- (Pink solid)
CULVERT EMBEDMENT LEVEL	--- (Black dashed)



S2-CUL.07 TO S2-CUL.09 (1 OF 3)  
SCALE: H 1:200, V 1:200. DATUM: 95.000



S2-CUL.07 TO S2-CUL.09 (2 OF 3)  
SCALE: H 1:200, V 1:200. DATUM: 95.000

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

Status: S3

Designed: É. McKeon  
Date: FEB. 2021  
Scale @ A1: 1:200

Drawn: É. McKeon  
Scale @ A3: 1:400

Approved: B. Lyons

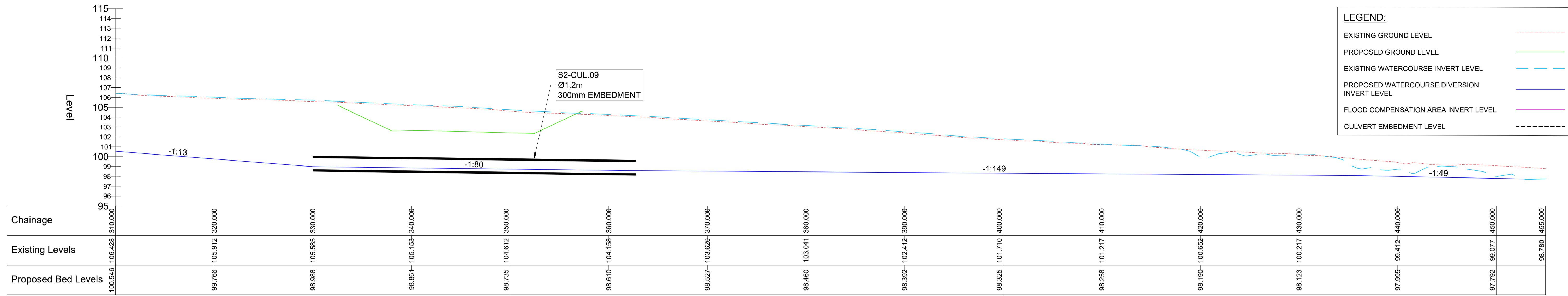
Checked: B. Lyons

Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

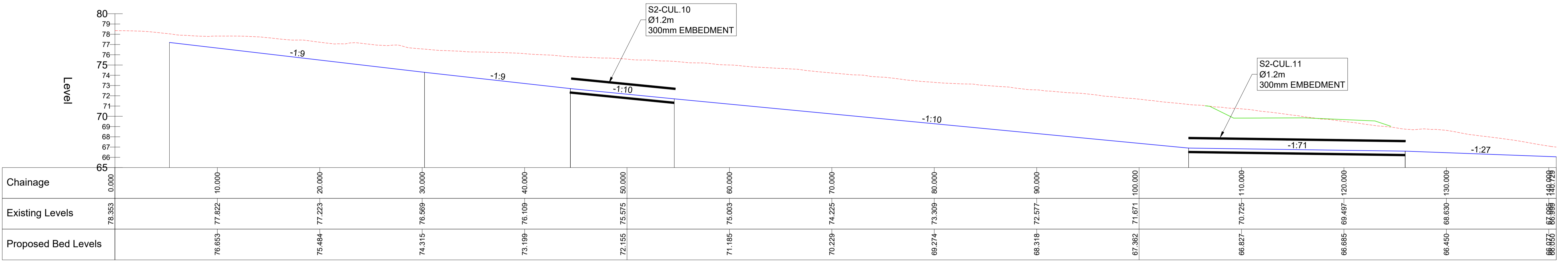
File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

Rev: P01

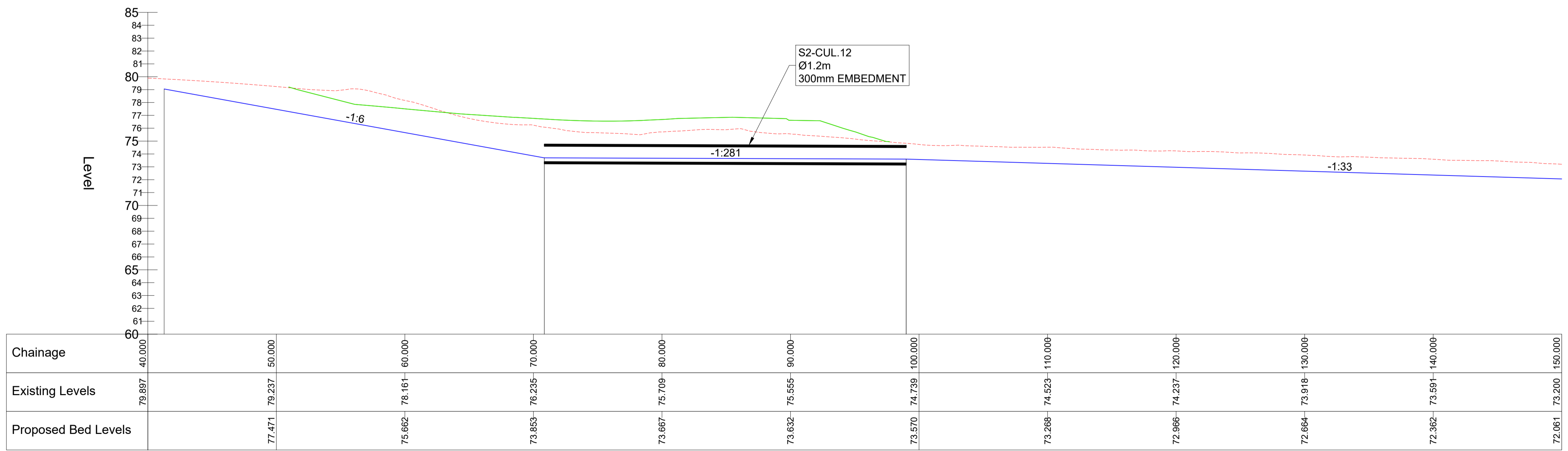
Sheet: 02 of 10



S2-CUL.07 TO S2-CUL.09 (3 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: 95.000



S2-CUL.10 & S2-CUL.11  
SCALE: H 1:200,V 1:200. DATUM: 65.000



S2-CUL.12 & S2-CUL.13 (1 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: 60.000

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Rev.	Date	Drawn	Description	Chk'd	Appr.
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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

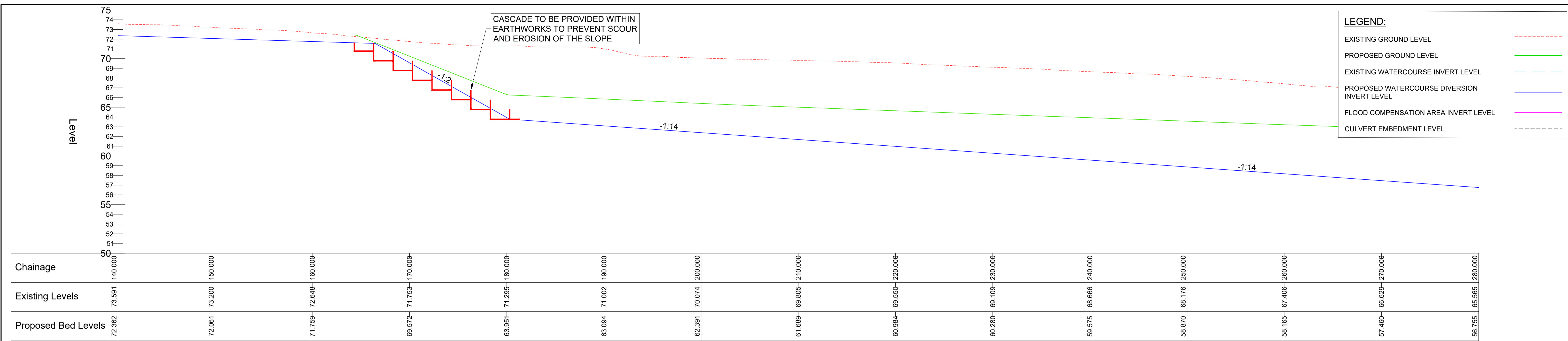
Status: S3

Designed: É. McKeon  
Drawn: É. McKeon  
Approved: B. Lyons  
Checked: B. Lyons

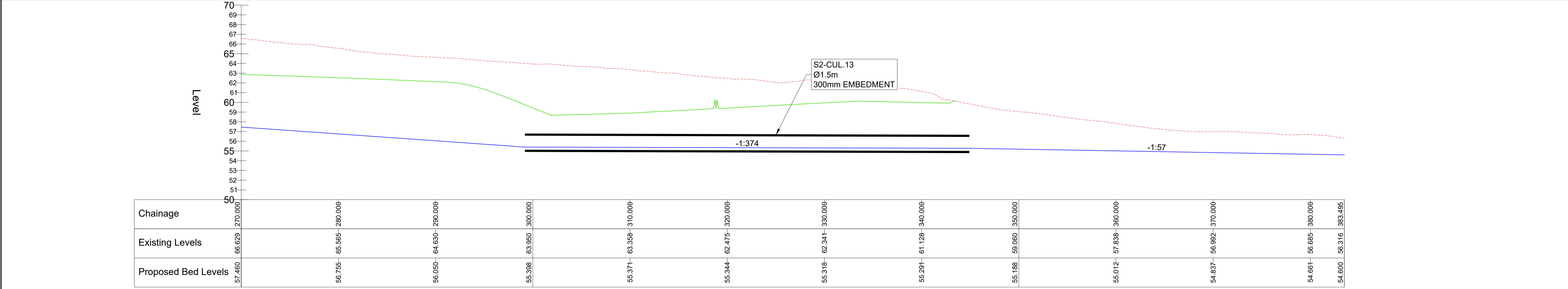
Date: FEB. 2021  
Scale @ A1: 1:200  
@ A3: 1:400  
Sheet: 03 of 10

Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001  
File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

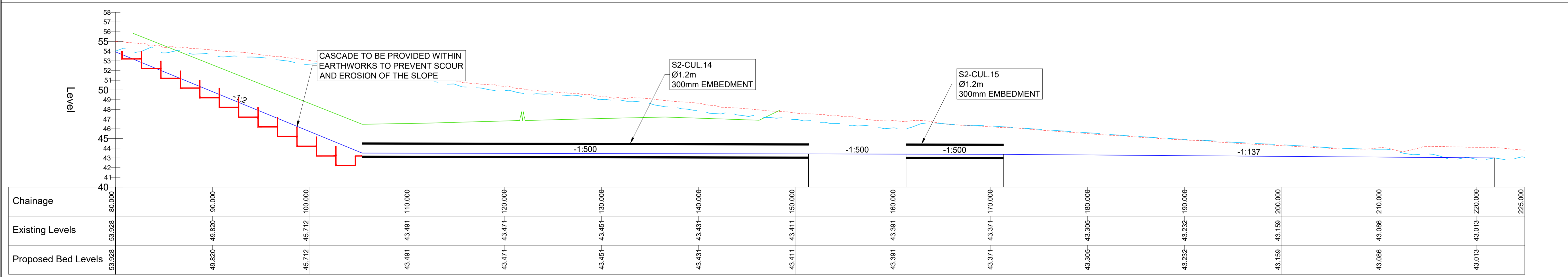
Rev: P01



S2-CUL.12 & S2-CUL.13 (2 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: 50.000



S2-CUL.12 & S2-CUL.13 (3 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: 50.000



S2-CUL.14 & S2-CUL.15  
SCALE: H 1:200,V 1:200. DATUM: 40.000

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

Status: S3

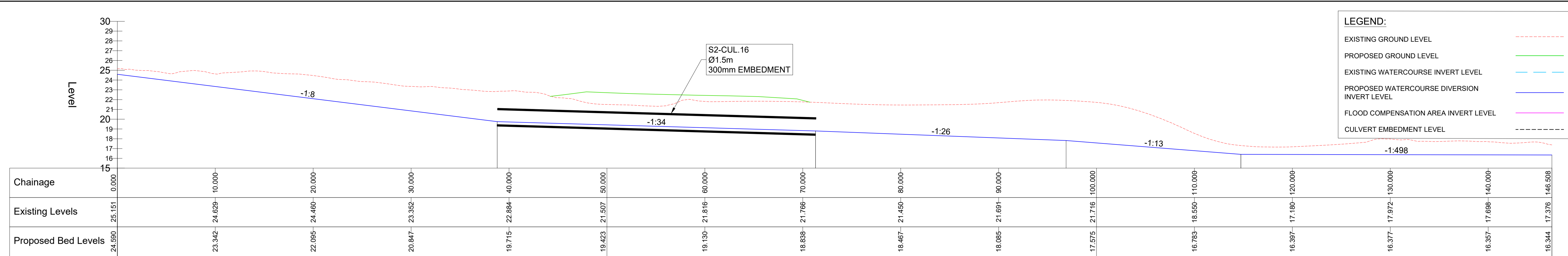
Designed: É. McKeon Date: FEB. 2021 Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

Drawn: É. McKeon Scale @ A1: 1:200 @ A3: 1:400 File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

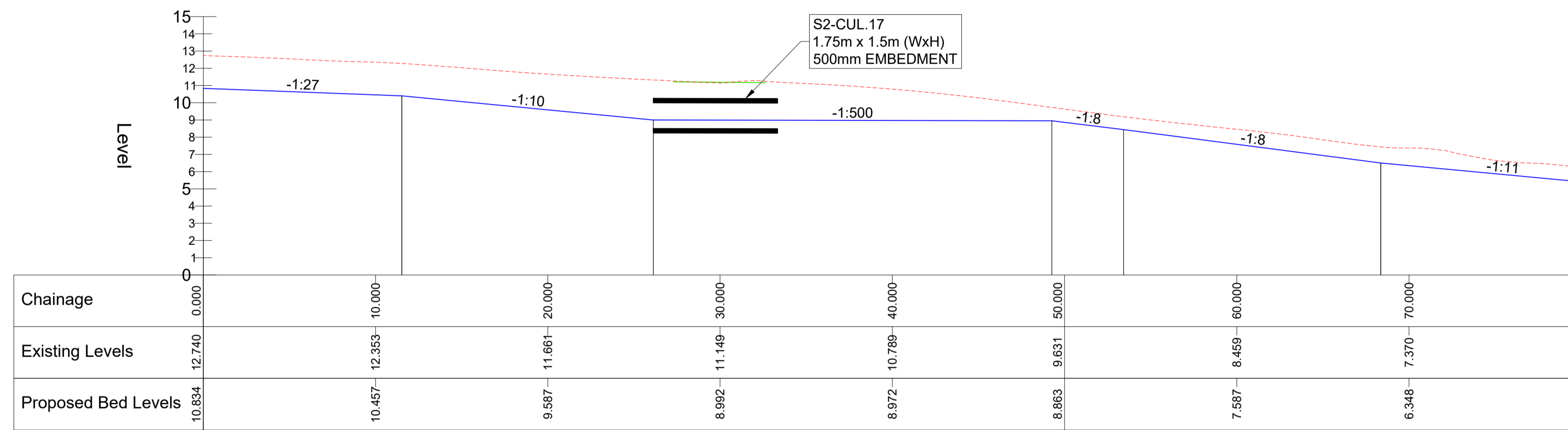
Approved: B. Lyons

Checked: B. Lyons Sheet: 04 of 10

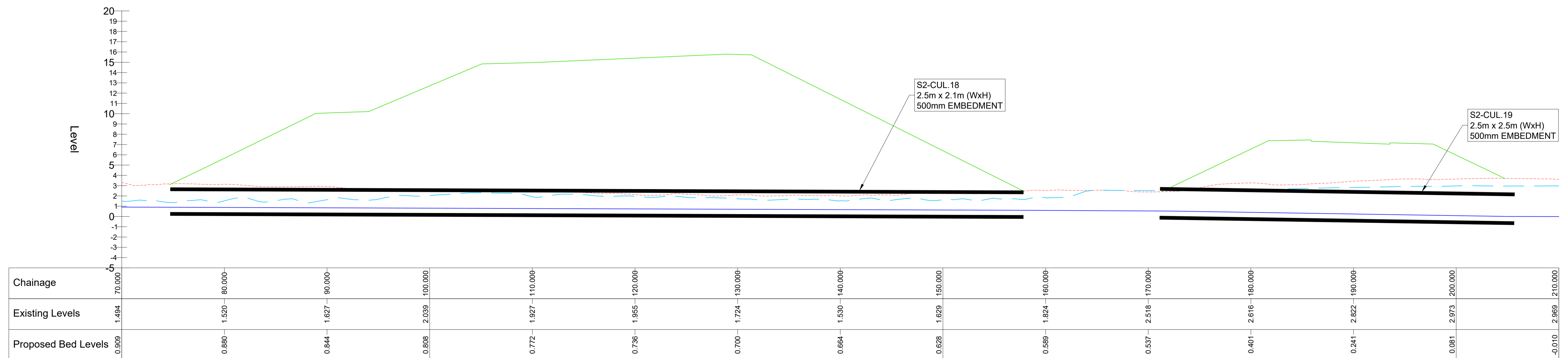
Rev: P01



S2-CUL.16  
SCALE: H 1:200,V 1:200. DATUM: 15.000



S2-CUL.17  
SCALE: H 1:200,V 1:200. DATUM: 0.000



S2-CUL.18 TO S2-CUL.20 (1 OF 2)  
SCALE: H 1:200,V 1:200. DATUM: -5.000

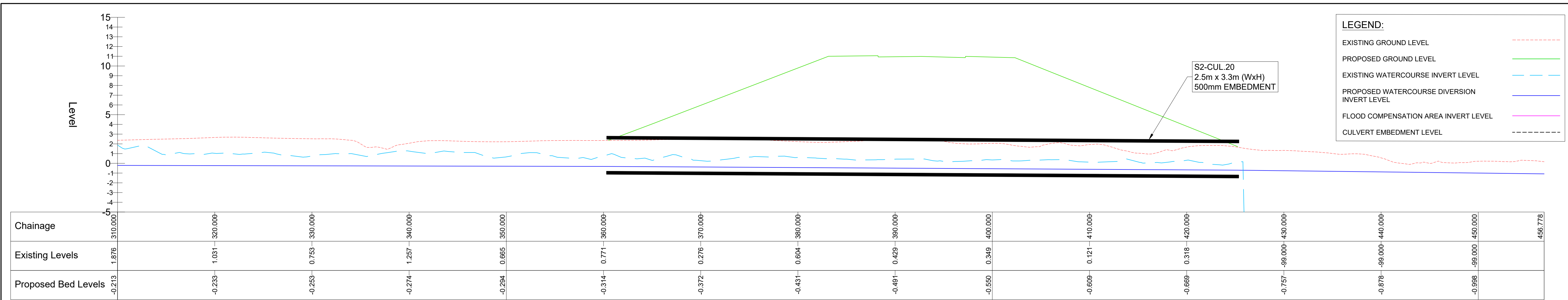
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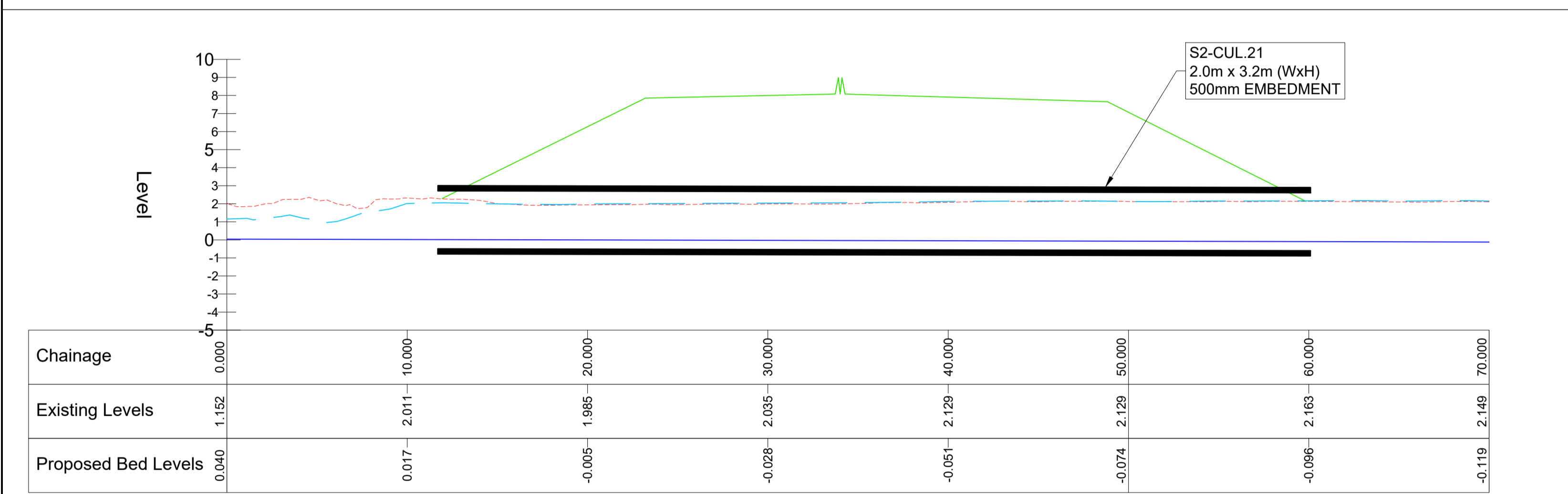
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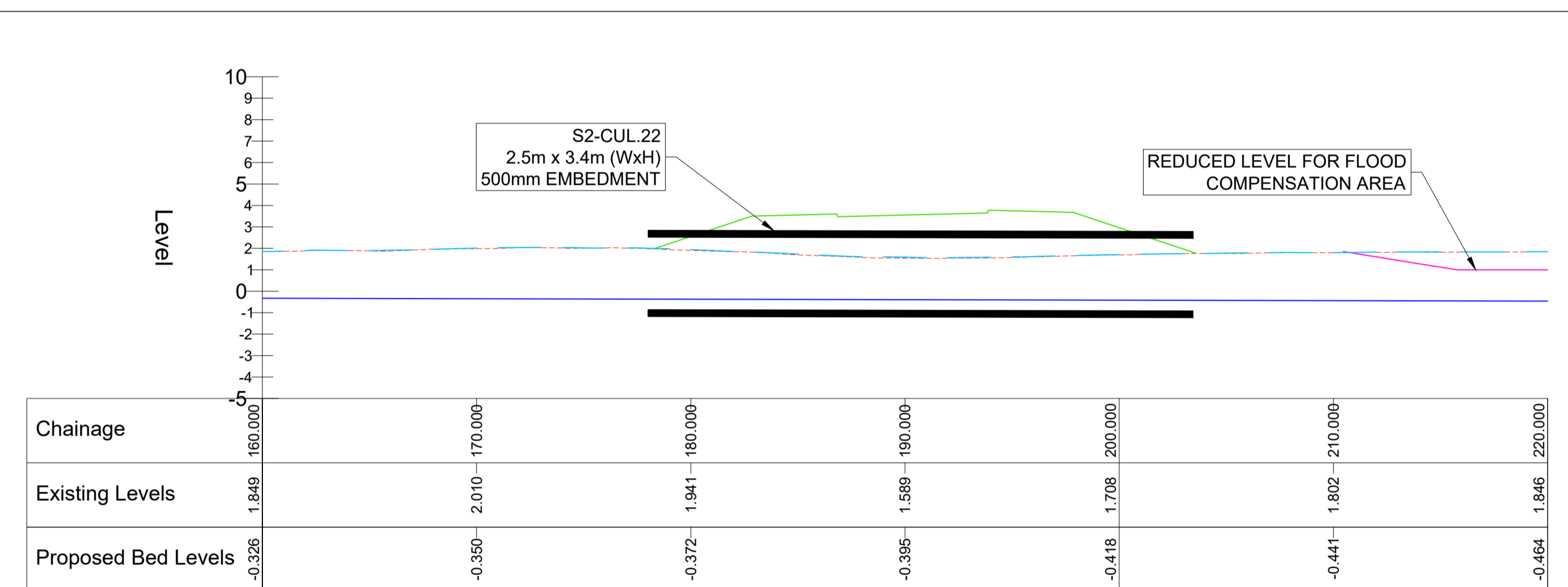
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culvert Long Sections		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:200	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1003
Approved: B. Lyons	@ A3: 1:400	
Checked: B. Lyons	Sheet: 05 of 10	



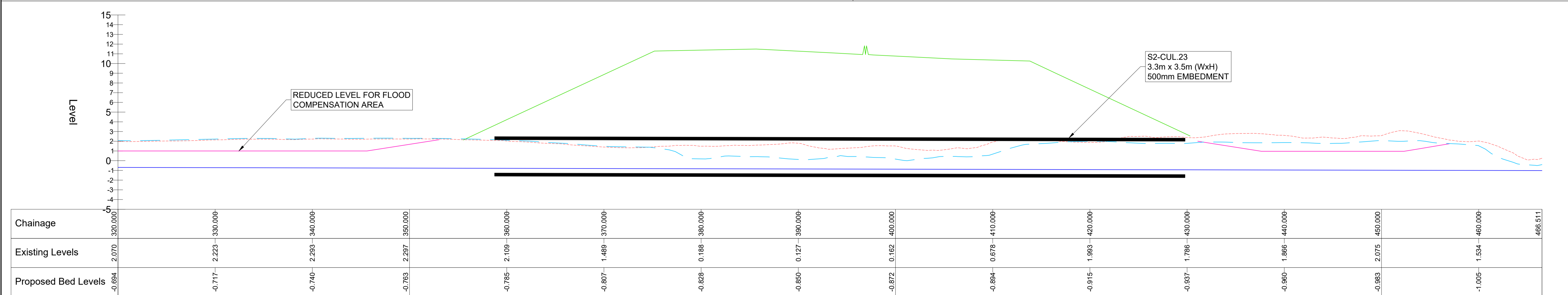
S2-CUL.18 TO S2-CUL.20 (2 OF 2)  
SCALE: H 1:200,V 1:200. DATUM: -5.000



S2-CUL.21 TO S2-CUL.23 (1 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: -5.000



S2-CUL.21 TO S2-CUL.23 (2 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: -5.000



S2-CUL.21 TO S2-CUL.23 (3 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: -5.000

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

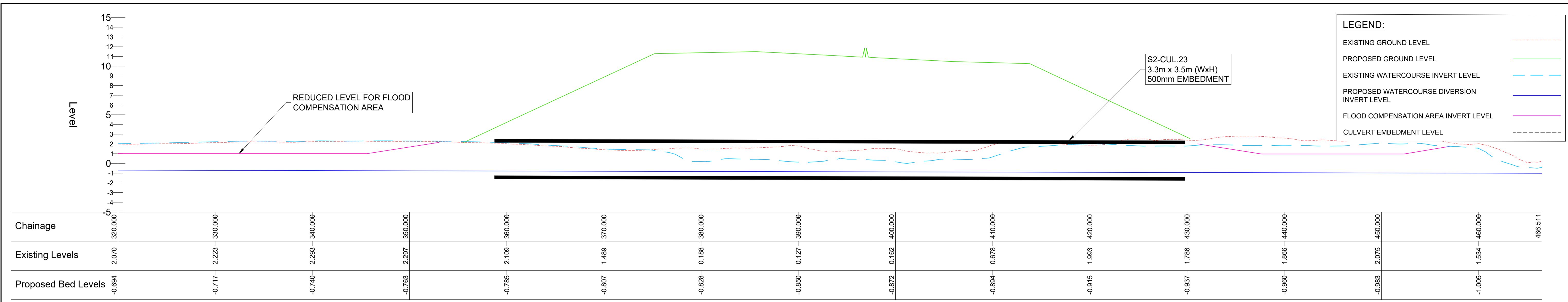
Status: S3

Designed: É. McKeon Date: FEB. 2021 Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

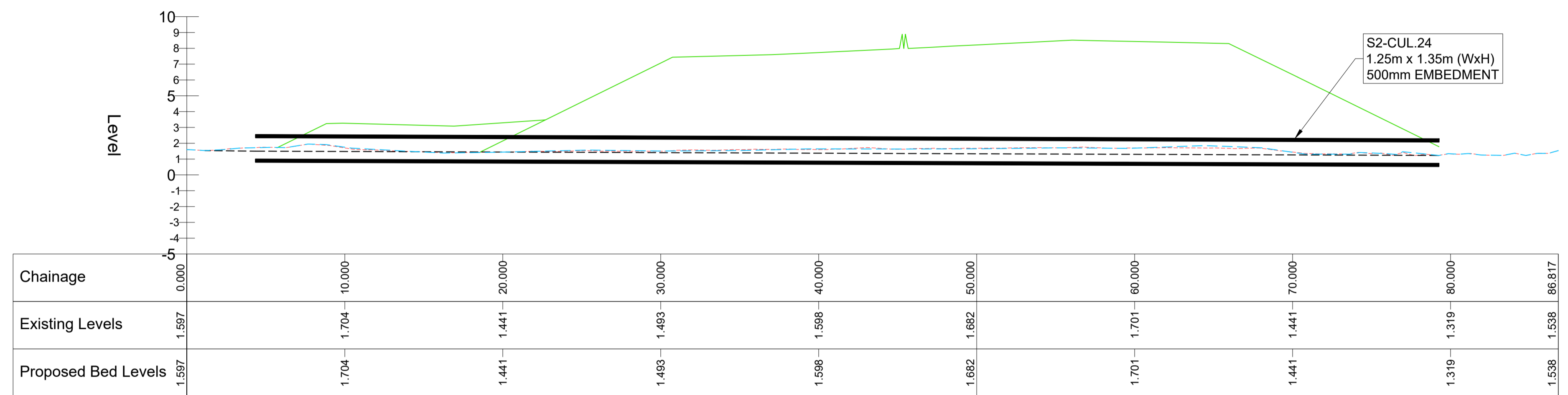
Drawn: É. McKeon Scale @ A1: 1:200 @ A3: 1:400 File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

Approved: B. Lyons Checked: B. Lyons Sheet: 06 of 10

Rev: P01



S2-CUL.21 TO S2-CUL.23 (3 OF 3)  
SCALE: H 1:200,V 1:200. DATUM: -5.000



S2-CUL.24  
SCALE: H 1:200,V 1:200. DATUM: -5.000



S2-CUL.25  
SCALE: H 1:200,V 1:200. DATUM: -5.000

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Rev.	Date	Drawn	Description	Chk'd	Appr.
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Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

Status: S3

Designed: É. McKeon  
Date: FEB. 2021

Drawn: É. McKeon  
Scale @ A1: 1:200

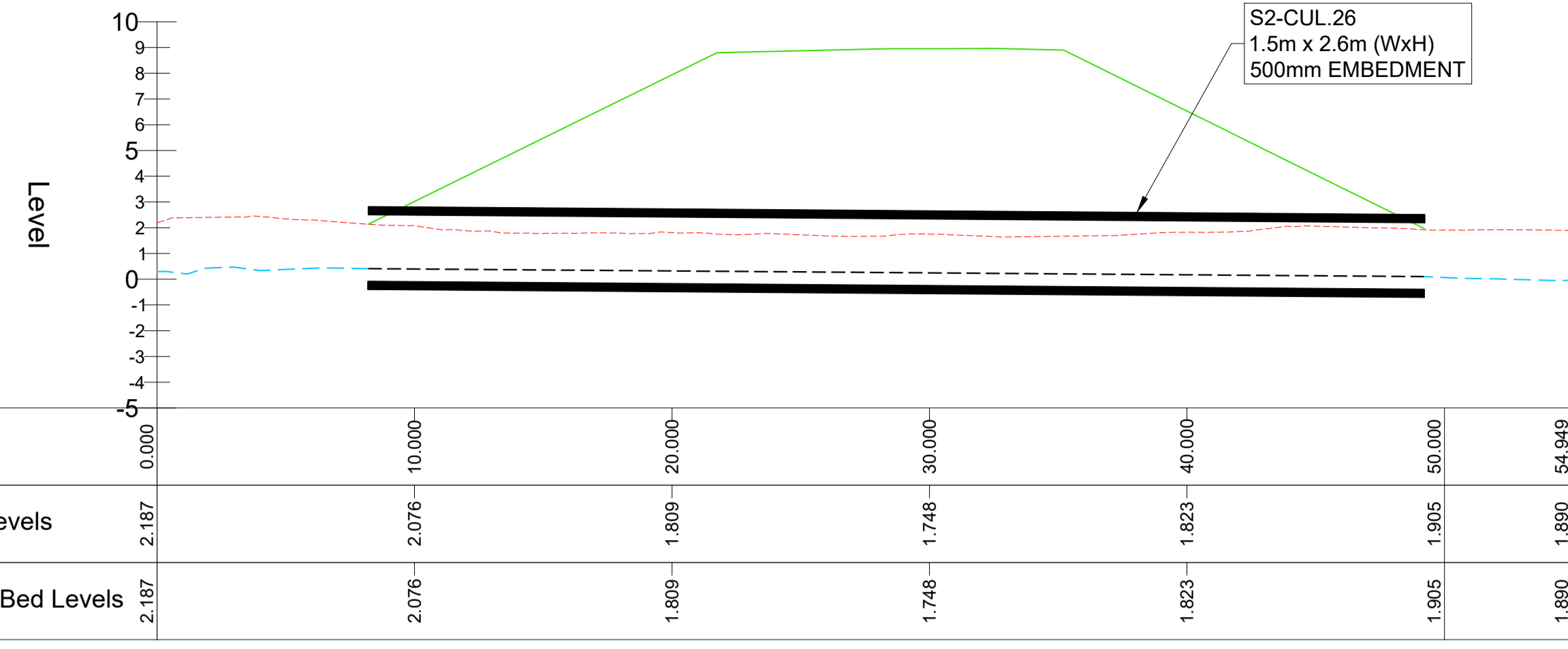
Approved: B. Lyons  
@ A3: 1:400

Checked: B. Lyons  
Sheet: 07 of 10

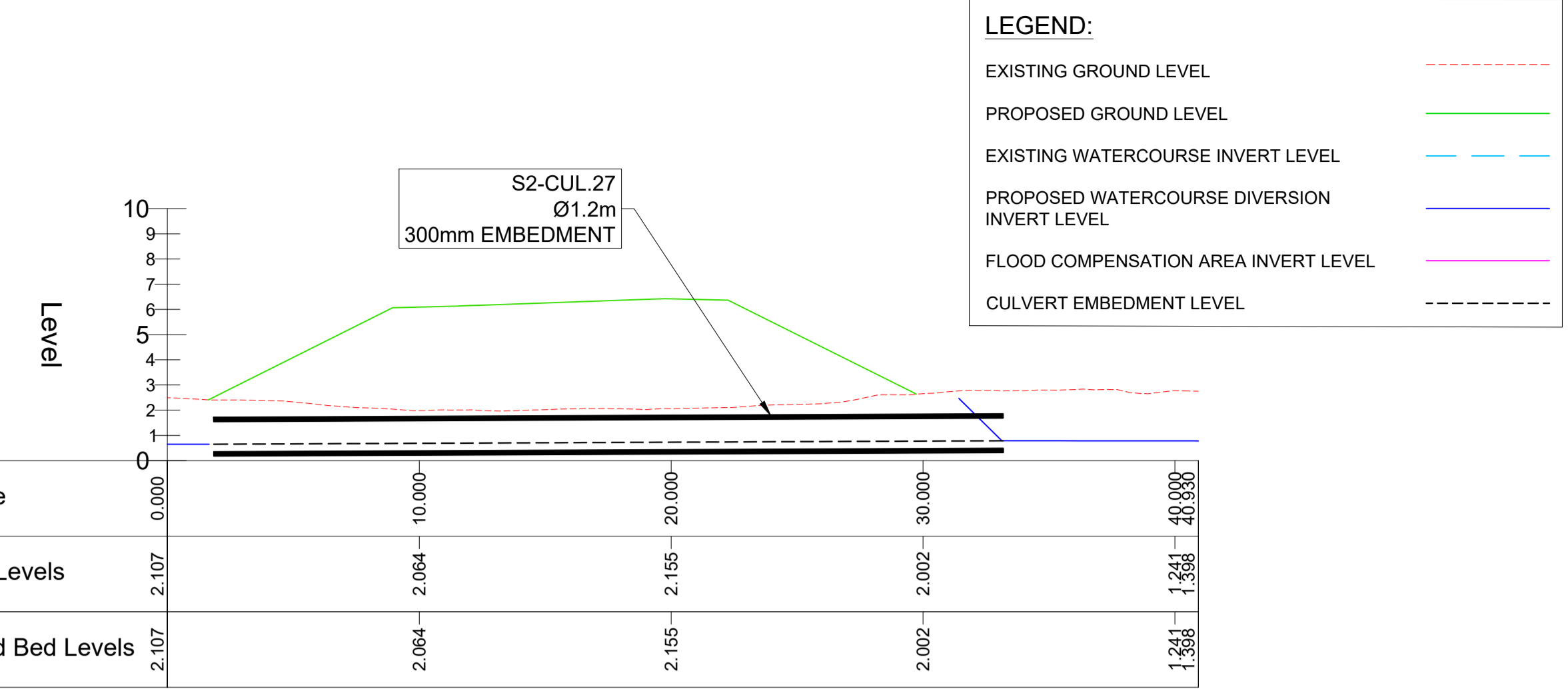
Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

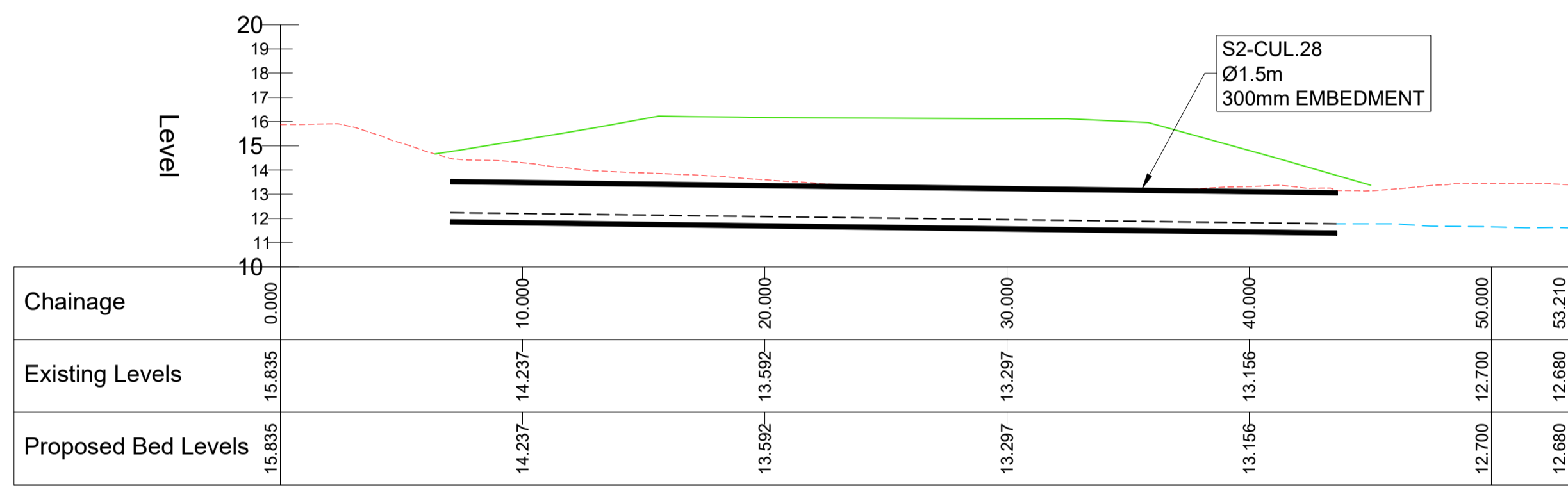
Rev: P01



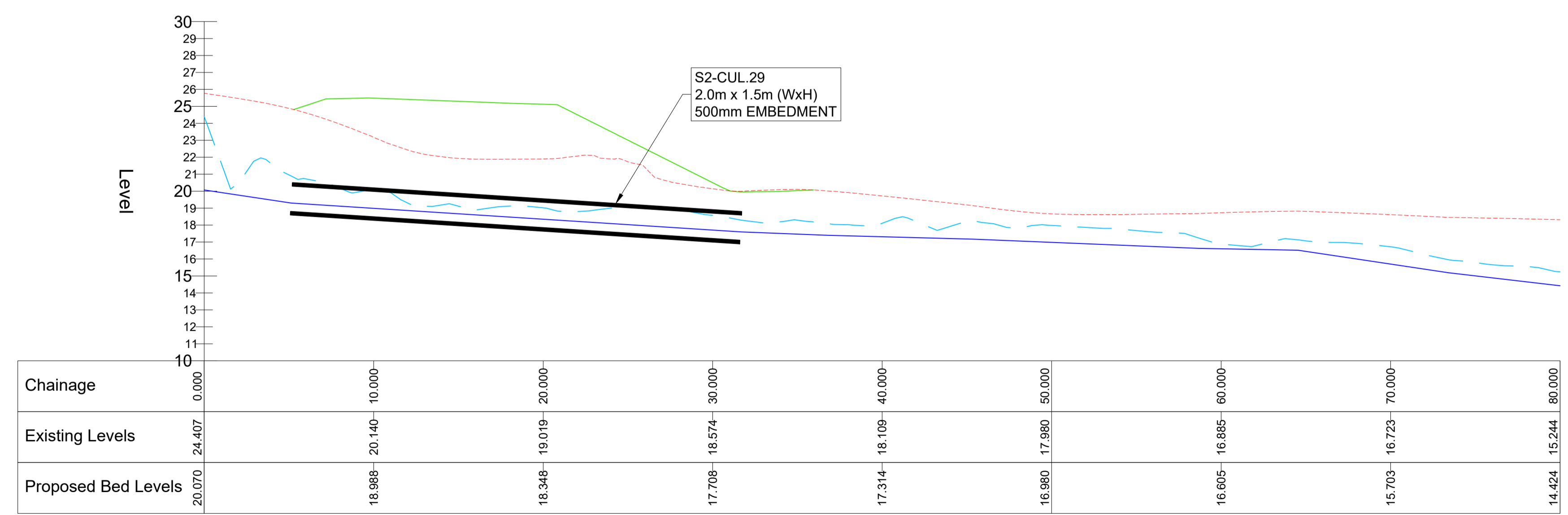
S2-CUL.26  
SCALE: H 1:200, V 1:200. DATUM: -5.000



S2-CUL.27  
SCALE: H 1:200, V 1:200. DATUM: 0.000



S2-CUL.28  
SCALE: H 1:200, V 1:200. DATUM: 10.000



S2-CUL.29 TO S2-CUL.32 (1 OF 4)  
SCALE: H 1:200, V 1:200. DATUM: 10.000

**LEGEND:**

- EXISTING GROUND LEVEL
- PROPOSED GROUND LEVEL
- EXISTING WATERCOURSE INVERT LEVEL
- PROPOSED WATERCOURSE DIVERSION INVERT LEVEL
- FLOOD COMPENSATION AREA INVERT LEVEL
- CULVERT EMBEDMENT LEVEL

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham

Drawing Title: Section 2 Culvert Long Sections

Status: S3

Designed: É. McKeon Date: FEB. 2021 Model File Identifier: TT\_MGT0337-RPS-P3-S2-M3-C-DR1001

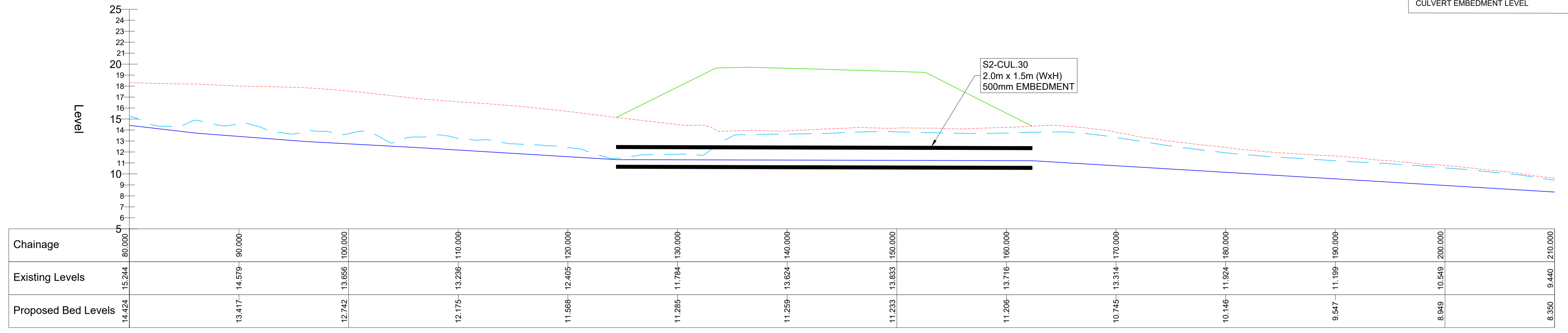
Drawn: É. McKeon Scale @ A1: 1:200

Approved: B. Lyons @ A3: 1:400 File Identifier: TT\_MGT0337-RPS-P3-S2-DR-C-DR1003

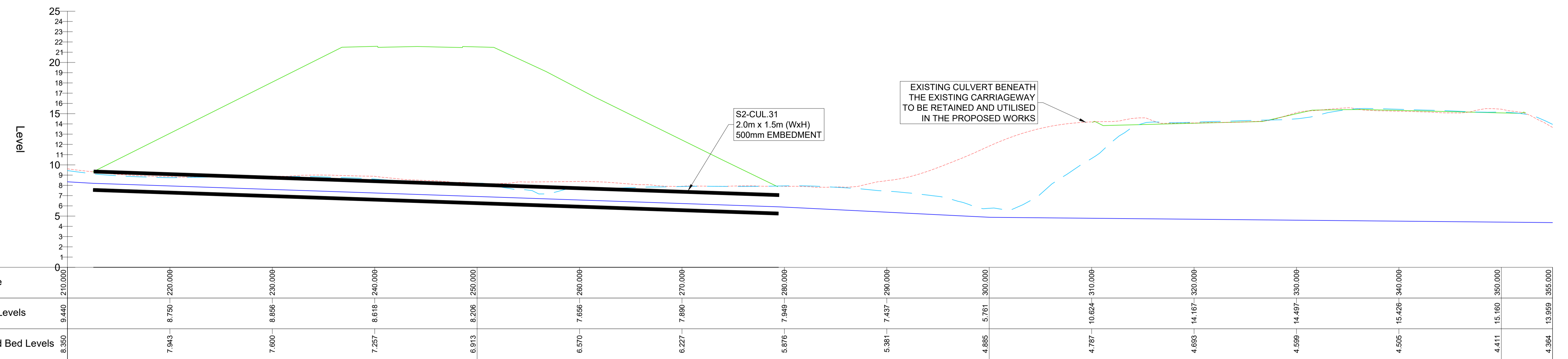
Checked: B. Lyons Sheet: 08 of 10

**LEGEND:**

EXISTING GROUND LEVEL	-----
PROPOSED GROUND LEVEL	-----
EXISTING WATERCOURSE INVERT LEVEL	-----
PROPOSED WATERCOURSE DIVERSION INVERT LEVEL	-----
FLOOD COMPENSATION AREA INVERT LEVEL	-----
CULVERT EMBEDMENT LEVEL	-----



S2-CUL.29 TO S2-CUL.32 (2 OF 4)  
SCALE: H 1:200,V 1:200. DATUM: 5.000



S2-CUL.29 TO S2-CUL.32 (3 OF 4)  
SCALE: H 1:200,V 1:200. DATUM: 0.000

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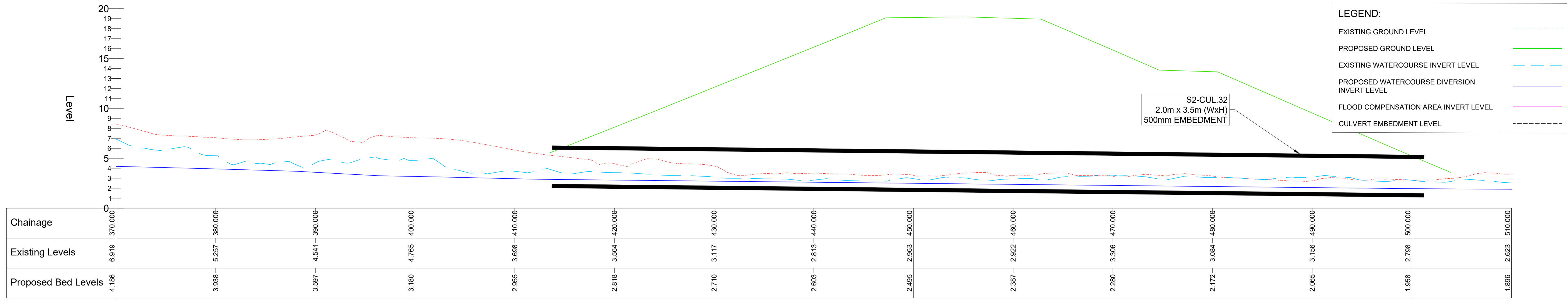
NRA  
Oifis Boicénaíochta  
Dhún na nGall

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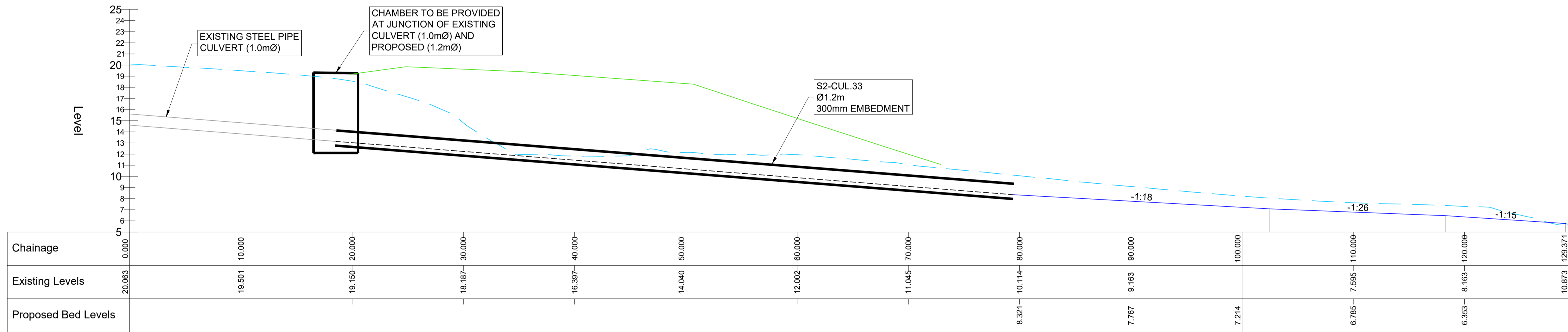
**NOTES**  
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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

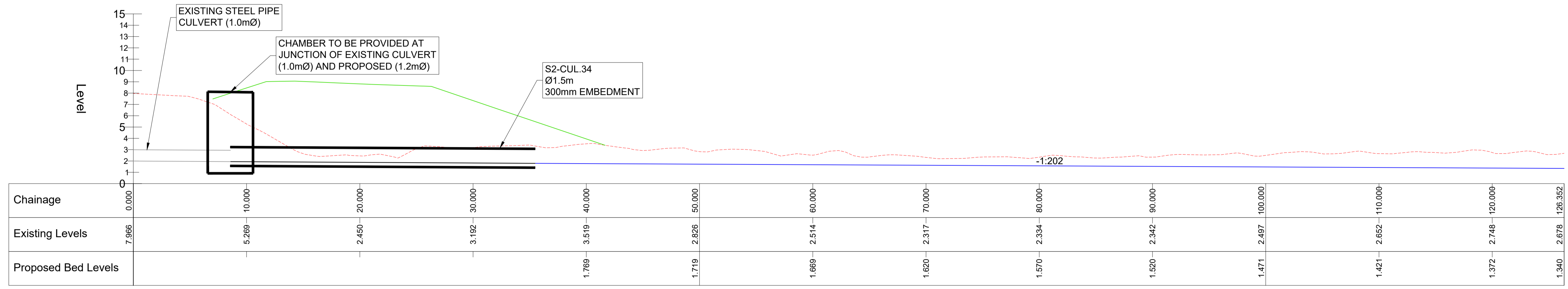
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culvert Long Sections		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:200	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1003
Approved: B. Lyons	@ A3: 1:400	
Checked: B. Lyons	Sheet: 09 of 10	



S2-CUL.29 TO S2-CUL.32 (4 OF 4)  
SCALE: H 1:200,V 1:200. DATUM: 0.000



S2-CUL.33  
SCALE: H 1:200,V 1:200. DATUM: 5.000



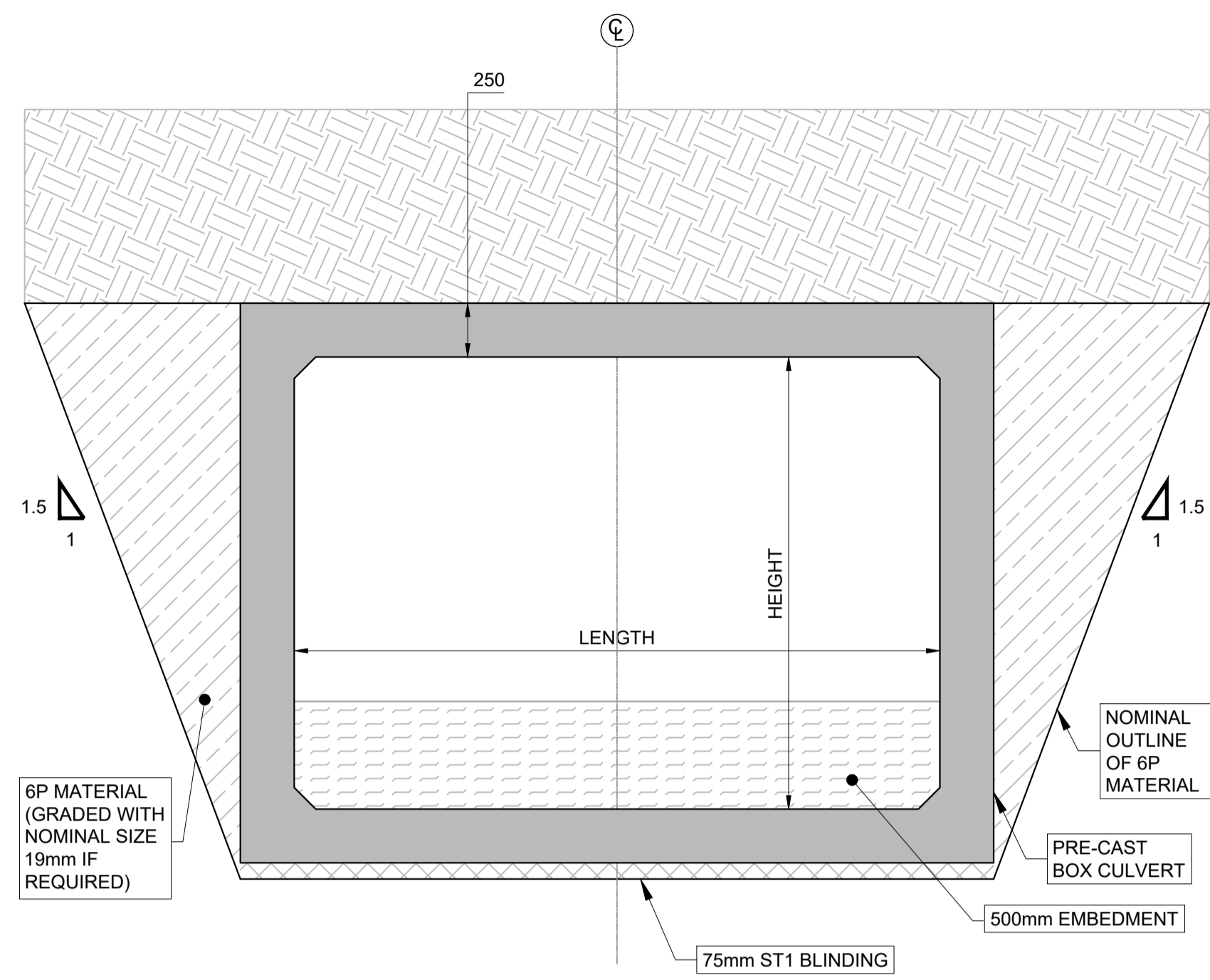
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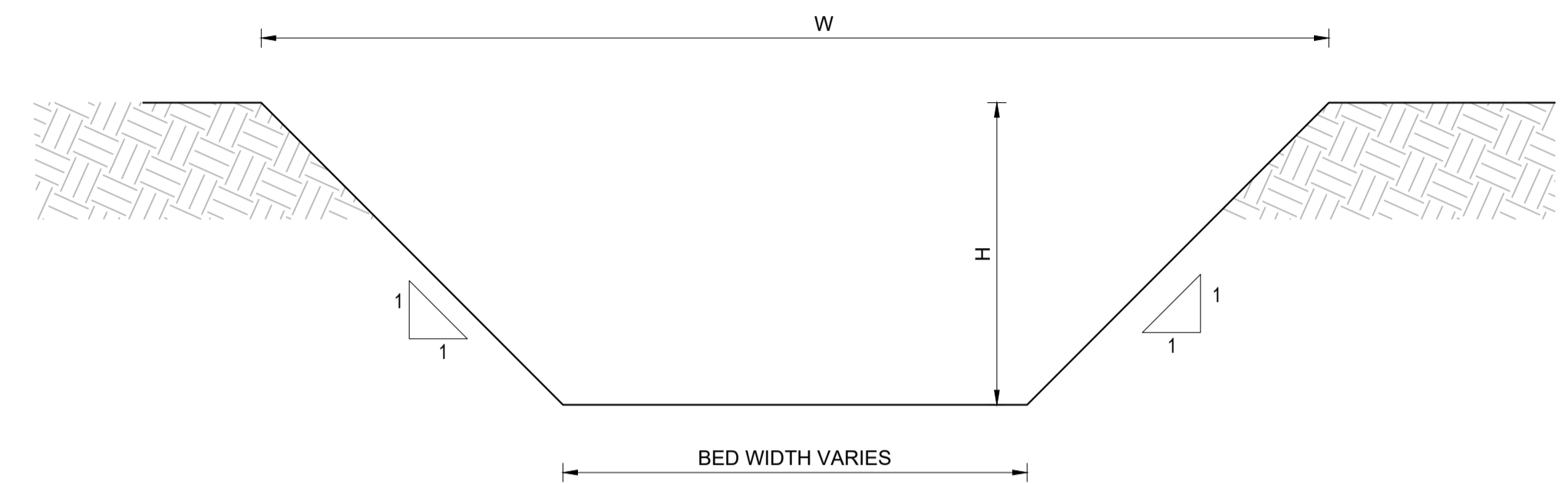
**NOTES**  
DO NOT SCALE, use figured dimensions only.  
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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

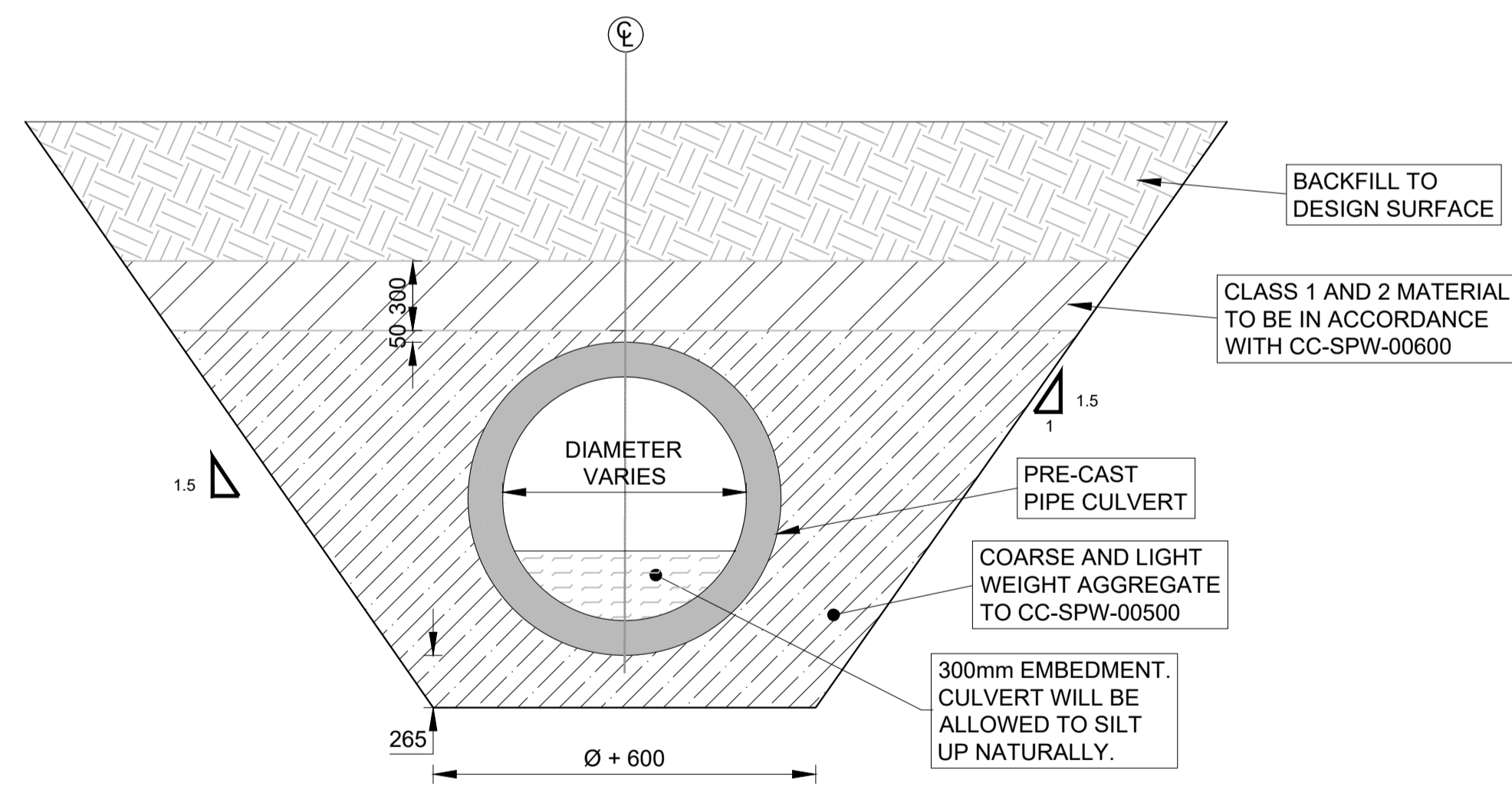
Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Drawing Title: Section 2 Culvert Long Sections	Status: S3
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001	Rev: P01
Drawn: É. McKeon	Scale @ A1: 1:200	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1003	
Approved: B. Lyons	@ A3: 1:400		
Checked: B. Lyons	Sheet: 10 of 10		



**BOX CULVERT**  
TYPICAL CROSS SECTION SCALE 1:25 @A1 ; 1:50 @A3



**WATERCOURSE DIVERSION**  
TYPICAL CROSS SECTION SCALE 1:25 @A1 ; 1:50 @A3



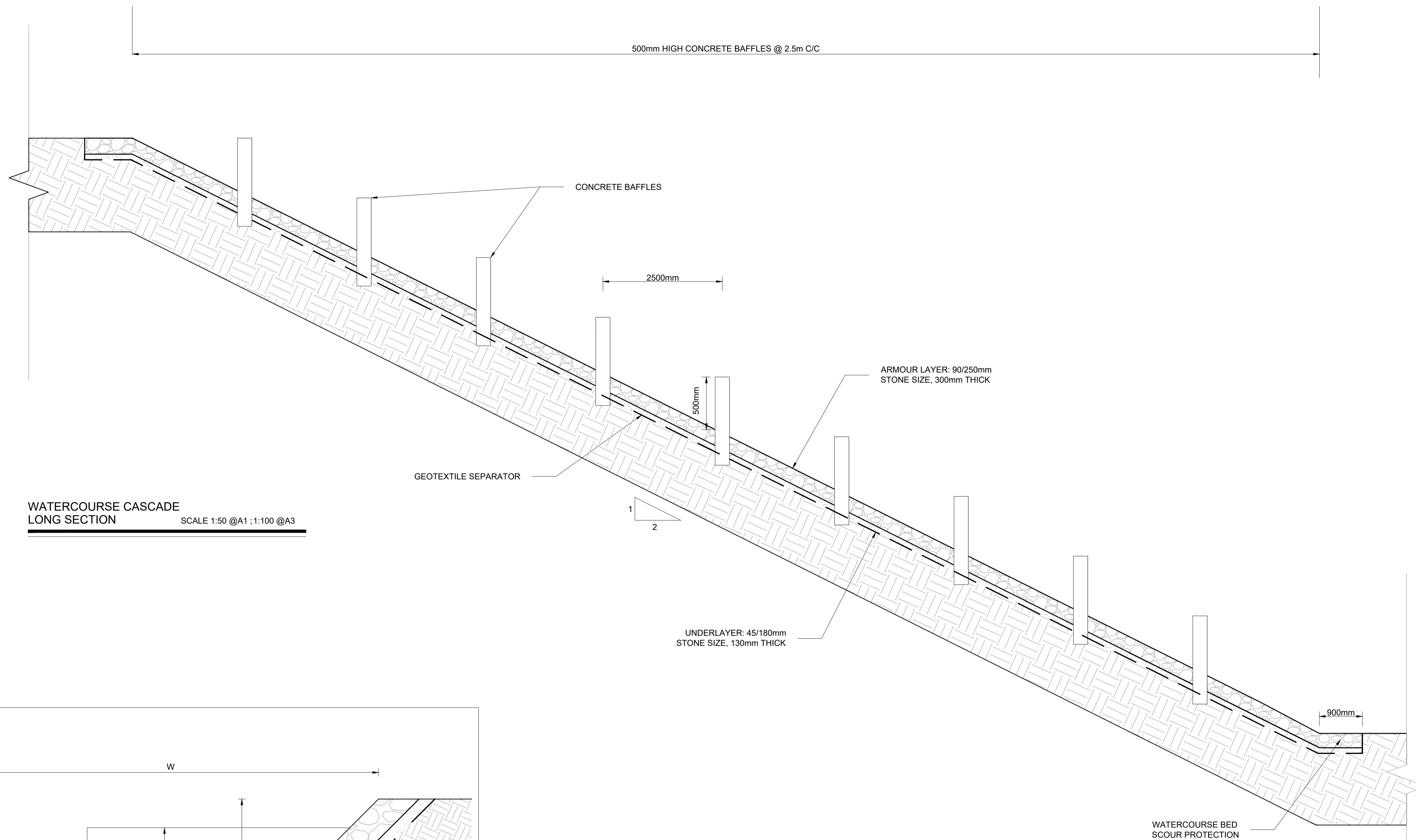
**PIPE CULVERT**  
TYPICAL CROSS SECTION SCALE 1:25 @A1 ; 1:50 @A3

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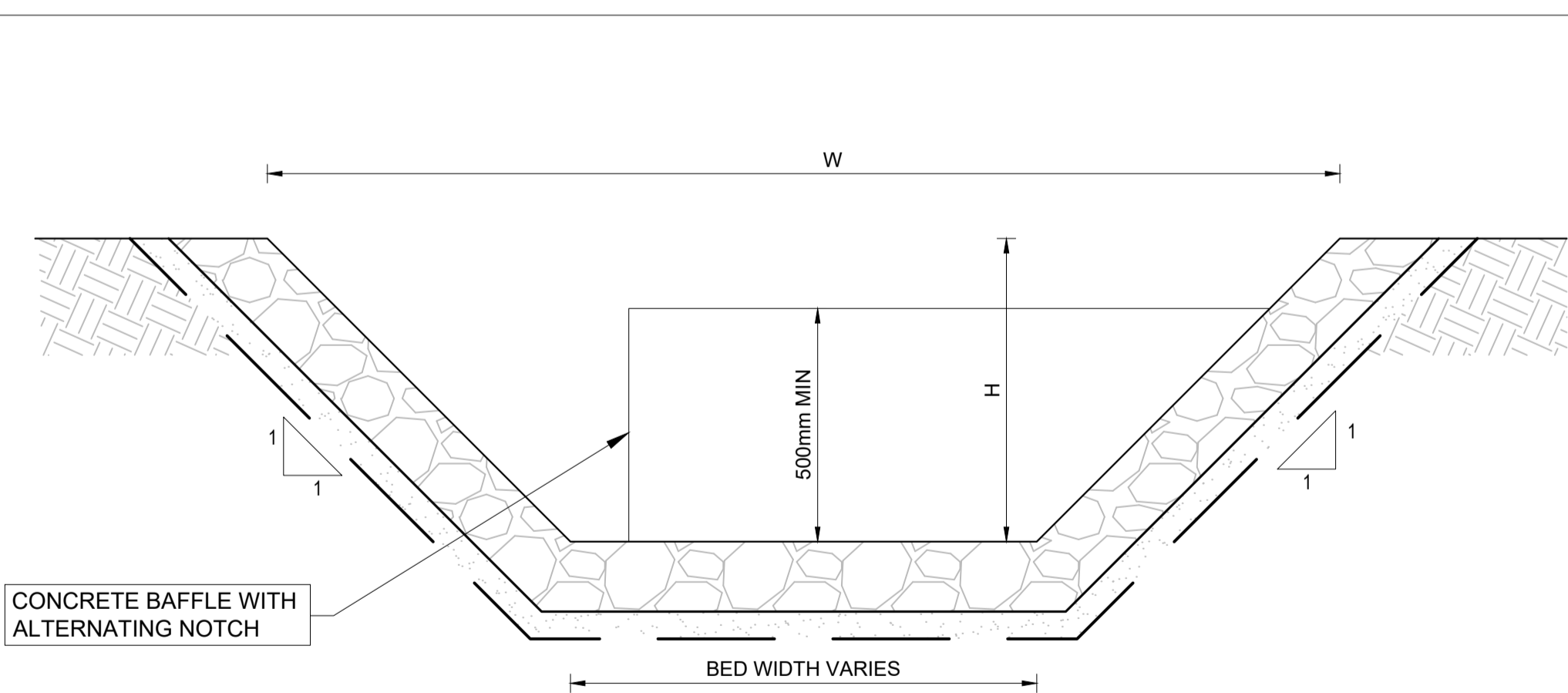
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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Status: S3
Drawing Title: Section 2 Culvert Typical Details		Rev: P01
Designed: É. McKeon	Date: FEB. 2021	Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001
Drawn: É. McKeon	Scale @ A1: 1:25	File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1004
Approved: B. Lyons	@ A3: 1:50	
Checked: B. Lyons	Sheet: 01 of 02	



**WATERCOURSE CASCADE  
LONG SECTION**  
SCALE 1:50 @A1 ; 1:100 @A3



**WATERCOURSE WITH CONCRETE BAFFLE  
TYPICAL CROSS SECTION**  
SCALE 1:25 @A1 ; 1:50 @A3

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Rev.	Date	Drawn	Description	Chk'd	Appr.
P01	07.09.21	EMcK	FOR REVIEW & COMMENTS	BL	BL

Project Title: TEN-T Priority Route Improvement Project, Donegal Section 2 - N56/N13 Letterkenny to Manorcunningham		Model File Identifier: TT_MGT0337-RPS-P3-S2-M3-C-DR1001	
Drawing Title: Section 2 Culvert Typical Details		File Identifier: TT_MGT0337-RPS-P3-S2-DR-C-DR1004	
Designed: É. McKeon	Date: FEB. 2021	Scale @ A1: VARIES	Rev: P01
Drawn: É. McKeon	Scale @ A3: VARIES	Sheet: 02 of 02	
Approved: B. Lyons			
Checked: B. Lyons			