CORK LINE

LEVEL CROSSINGS PROJECT

Preliminary Design Report

CIE

Iarnród Éireann Infrastructure

Contents

Executive Summary

There are 7 remaining manned public road level crossings in operation on the Dublin to Cork line between Limerick Junction and Mallow stations (XC187, XC201, XC209, XC211, XC212, XC215 and XC219).

In 2010/2011, concept stage schemes were developed for alternative routes to eliminate each of the level crossings. It was proposed to progress the seven level crossing closures as individual schemes. None of the schemes were progressed due to a lack of funding.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 level crossings. Feasibility study proposals are shown in the below table.

Level Crossing	Solution
XC187 – Fantstown	Close - Divert traffic to existing bridge via existing roads
XC201 – Thomastown	Close – New road alignment with new Road-over-Rail bridge
XC209 – Ballyhay	Upgrade – 4-Barrier CCTV Level Crossing
XC211 – Newtown	Close – Divert traffic via New road alignment
XC212 – Ballycoskery	Close – New road alignment with new Road-over-Rail bridge
XC215 – Shinanagh	Close – New road alignment to existing bridge
XC219 - Buttevant	Close – New road alignment with new Road-over-Rail bridge

As part of this feasibility study, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended this would be best achieved through the application to An Bord Pleanála for a Railway Order.

In August 2019 a Route Options Report was developed to determine the Emerging Preferred Route at each of the applicable locations. This report can be found in Appendix D herein, and further details on the options considered at each location are contained in Chapters 4 to 10.

This Preliminary Design Report now aims to develop the preferred route option for each location to preliminary design stage, in order to apply for a Railway Order from An Bórd Pleanála for the combined locations.

This is an update to the Preliminary design Report which was published for consultation in November 2019. For clarity the new/amended text is highlighted in Blue. The purpose of this update is to consider further the Blue Route Option at XC211 Newtown. This is a direct result of feedback received during the public consultation which took place November 2019 to January 2020, regarding the proposed ‘Green Route’ which would tie into Beechwood Grove at Ballyhea; local residents raised concerns about potential issues concerning traffic and anti-social behaviour.

1. Introduction

There are 7 manned public road level crossings in operation on the Dublin to Cork line between Limerick Junction and Mallow stations. The crossings are located within a 15 mile/24 km section of the line between 122 miles 808 yards and 137 miles 315 yards, which straddles the Cork/Limerick county boundary.

Details of the level crossings are provided in Table 1.1 below.

Table 1.1 – Level Crossing Details

Level Crossing	Mileage	Crossing Type	Road Type	Local Authority
XC187 – Fantstown	122mi 808yds	C – Type	Local	Limerick City & County
XC201 – Thomastown	127mi 70yds	C – Type	Local	Limerick City & County
XC209 – Ballyhay	130mi 878yds	CD – Type	Local	Cork County Council
XC211 – Newtown	131mi 1385yds	CD – Type	Local	Cork County Council
XC212 – Ballycoskery	131mi 1759yds	CD – Type*	Local	Cork County Council
XC215 – Shinanagh	134mi 260yds	CD – Type*	Local	Cork County Council
XC219 – Buttevant	137mi 315yds	CX - Type	Regional	Cork County Council

* Operated on a 24-hour basis as a CX – Type level crossing

The Iarnród Éireann designations for Gated Manned Level Crossing are as follows:

- C Type – Gates normally CLOSED to road traffic;
- CX Type – Gates normally OPEN to road traffic;
- CD Type – Gates normally OPEN to road traffic by DAY and normally closed at other times;
- CN Type – Gates normally OPEN to road traffic by NIGHT and normally closed at other times.

The locations of the 7 no. level crossings are indicated on Figures 1.1, 1.2 & 1.3 below.

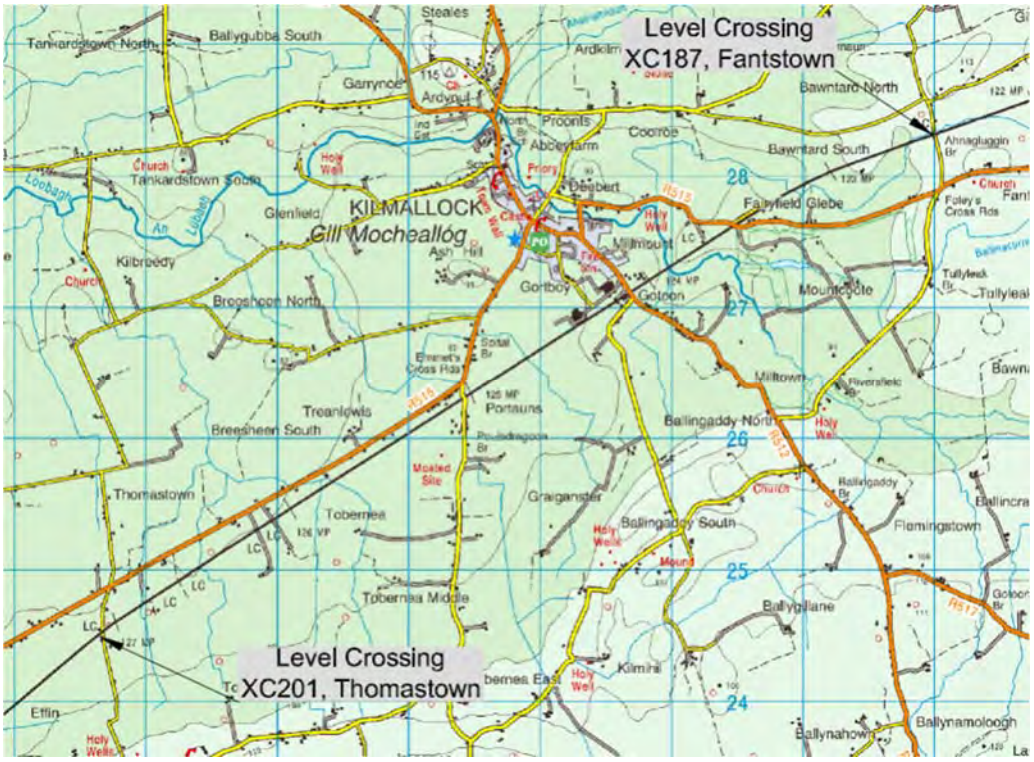


Figure 1.1 – Level Crossing Locations (XC187 & XC201)

Figure 1.2 – Level Crossing Locations (XC209, XC211 & XC212)

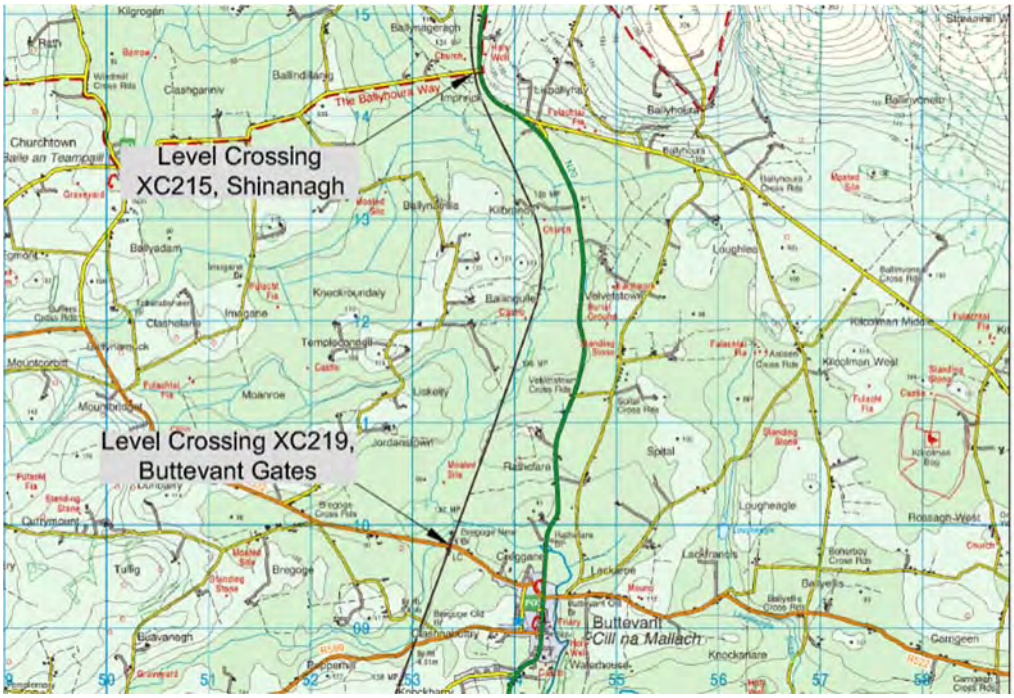


Figure 1.3 – Level Crossing Locations (XC215 & XC219)

The permitted line speed of trains at the level crossing locations varies between 90-100mph and the level crossings are located mid-section between stations, so trains are travelling at their full line speed when they pass through. There are 30 to 35 scheduled trains daily (combined directions) passing over the crossings daily. The majority of these trains are locomotive hauled express services to / from Cork each weighing 440 tonnes and capable of carrying up to 420 passengers. In addition, there can be up to 10 unscheduled train movements, which could be engineering trains, freight trains, or other track recording vehicles.

2. Need for the Scheme

The National Development Plan aims to improve connectivity between regions "through improvements to the infrastructure and rail fleet". The removal of level crossings is included in Iarnród Éireann's Strategic Rail Development Plan under a safety programme of closures across the network, including the elimination and de-manning of seven manned level crossings on the Dublin-Cork line.

In the first six months of 2019, Iarnród Éireann reported 51 incidents at level crossings across the network, an increase of 82% on the same period in 2018. This figure includes cars and HGVs colliding with barriers and near-misses between vehicles and trains.

The proposed Project is an improvement to Ireland's railway network infrastructure and is principally driven by the need to improve safety. These level crossings are being removed to provide a safer environment for those living near the rail line and a more efficient service for all Iarnród Éireann customers.

In accordance with the Department of Transport, Tourism and Sports' "Guidelines on a Common Appraisal Framework for Transport Projects and Programmes" the provision of and need for improved transport systems is based on the following criteria:

- Economy
- Safety
- Physical Activity
- Environment
- Accessibility and Social Inclusion
- Integration

These guidelines and requirements are themselves in compliance and in accordance with the Department of Finance's "Guidelines on the Appraisal and Management of Capital Expenditure Proposals in the Public Sector". The development and appraisal of this scheme is being undertaken in accordance with the National Transport Authority (the NTA) 'Project Management Guidelines'.

2.1 Economy

The impacts of a transport investment on economic growth and competitiveness are assessed under the Economy criterion. Both the estimated capital costs and the operational/maintenance costs of each route option were considered in the route options assessment.

Initial capital cost estimates, based upon the Preliminary Designs, have been developed and considered in the options assessment. These estimates included the costs of all infrastructure and accommodation works. Land acquisition costs were taken into consideration for options requiring third party land.

The proposed schemes have the potential to increase transport efficiency on both the rail and road networks. The elimination of the level crossings would remove a major constraint to the increase of line speeds and associated reduction in journey times on the rail line while providing reductions in journey times on the road network by removing delays. The improvements in journey times and transport efficiency will have an overall economic benefit.

2.2 Safety

2.2.1 Site Specific Safety Issues

The Buttevant Rail Disaster occurred at Buttevant Railway Station on 1st August 1980. The disaster resulted in the deaths of 18 people with more than 70 injured. Although the disaster was not attributed to the level crossing function it does highlight the potential safety issues associated with high speed rail traffic. Table 2.1 below highlights accidents/incidents recorded by IE over a 3.5-year period for each of the seven level crossings associated with the proposed Project.

Table 2.1 Accidents/Incidents January 2016 – June 2019

Site & Incident Type	XC187	XC201	XC209	XC211	XC212	XC215	XC219
Crossing Equipment Failure	1		1		1	1	4
Level Crossing Equipment RSF					1	1	1
Level Crossing Incident	1						
MoP Tresspass onto cleared LX			1				
Other LX Incident				1			
Road Vehicle strikes LX gate or barrier		1	2		1		1
Total	**2**	**1**	**4**	**1**	**3**	**2**	**6**

In the context of the above, it is clear that the removal of level crossings is at the core of IÉ's approach to building a safe and robust railway network. There is a significant volume of existing railway traffic along the line carrying passengers at high speed. Given the inherent health and safety implications associated with the current level crossings, Córas Iompair Éireann (CIÉ) and IÉ is progressing the proposed Project to identify preferred options for each of the seven current level crossing points. The objective of the proposed Project is to remove the manned level crossings and to provide a safer environment for those using the crossing points.

At any location where there is an interface between rail and road traffic the potential for a catastrophic accident exists. It is Iarnród Éireann's policy to close level crossings where possible and practicable. The removal of the level crossings in conjunction with providing alternative routes for vehicles, pedestrians and cyclists will remove the potential for accidents. The removal of potential accident locations will have economic benefits and most importantly reduce the potential for the loss of life.

Iarnród Éireann uses the Level Crossing Risk Model (LCRM) to assist in the identification and management of risk at level crossings. This is done through the calculation of both individual and collective risk at each level crossing. Risk measurements included in the LCRM are:

- From crossings on running lines with train movements, i.e. active running lines, not closed lines;
- From active crossings, i.e. not those that have been closed;
- From the following types of accident:

  - Collision between a train and a road vehicle;
  - Collision between a train and a pedestrian;
  - Collision between a train and an animal where the animal gained access to the line at a level crossing;
  - Collision between a train or road vehicle and a crossing keeper;
- To crossing users, crossing keepers, passengers and staff on board trains;
- From causes related to user errors or acts, railway equipment failures, vandalism and railway staff errors.

There are two measures of risk which are computed by the LCRM:

- Collective Risk is the totality of risk to all exposed groups from one or more hazardous events. It is measured in units of safety loss per year, referred to as the risk factor. Collective risk is used as the basis for cost-benefit calculations as it is possible to assign a monetary value to safety loss.
- Individual Risk is the risk to a typical person exposed to one or more hazardous events. It is measured in units of loss per person per year. Individual Risk is used to assess the tolerability of risk as it is possible to assign levels of individual risk that correspond to other everyday activities or occupations.

The Collective Risk Factor was assessed for each option for elimination/de-manning of the level crossings by comparing the current risk ranking to the resulting risk ranking following the implementation of each option. The LCRM was used to determine the resulting risk ranking for each option. Several of the seven crossings are identified as high-risk on this scale. The level crossing at Shinanagh for example is ranked 18 of 970 level crossings on the Iarnród Éireann network on the LCRM risk rankings.

2.3 Physical Activity

This criterion relates to the health benefits derived from using different transport modes. This criterion is not considered relevant for differentiating between route options for this project because all options would be expected to have a broadly similar impact on physical activity.

2.4 Environment

Decarbonising transport is widely acknowledged as a key action in climate change prevention. Improving Ireland's rail lines and the efficiency of the public transport network forms part of Ireland's decarbonising efforts within the transport sector whilst also improving journey times and opening up areas for investment. Transport efficiency has an overall economic and environmental benefit, and improves the service provided to the passengers who use rail services.

The proposal to de-man and remove the level crossings across seven locations has the potential to increase transport efficiency on the Cork to Dublin rail line as well as on local road networks by removing a major constraint on both networks. Removing the level crossings provides a potential reduction in journey time by removing delays, such as a delay due to an incident at a level crossing or because trains must slow down to pass through a level crossing or to wait for the gates to close. Into the future, removing the level crossings removes a barrier to increases of line speeds and the associated reduction in journey times.

The impact of the proposed scheme options on the receiving environment were assessed under each of the following sub-criteria:

- Air Quality;
- Noise & Vibration;
- Landscape & Visual Quality;

- Biodiversity;
- Cultural, Archaeological & Architectural Heritage;
- Land Use, Soils & Geology;
- Water Resources.

The environmental impacts of each of the route options is discussed within the Route Options Report in Appendix D. The environmental impacts and mitigation measures for the Emerging Preferred Options is discussed in the relevant scheme location sections within this report.

2.5 Accessibility and Social Inclusion

This criterion relates to the potential benefits that accrue to those suffering from social deprivation, geographic isolation and mobility and sensory deprivation from the proposed project. This criterion is not considered relevant for differentiating between options for this project because all options would be expected to have a broadly similar impact.

2.6 Integration

This criterion relates to the extent to which the project promotes integration of transport networks and is compatible with a range of Government policies, including national spatial and planning policy. This criterion was not considered as part of the Route Options Report as all options would be expected to have a broadly similar impact.

2.7 Efficiency of the Dublin-Cork Railway Line

The 2030 Rail Network Strategy Review outlines under 'Phase 3: 2020-2025 Electrification of the Core Rail Network' the planned electrification of the Dublin - Cork railway line. Whilst it is not part of this project the eventual electrification of the Dublin-Cork Railway line will allow for quicker train acceleration speeds, lower fuel costs and fewer CO_2 emissions.

In 2018 alone, the nature of each of the seven level crossings and their operation directly led to thirteen separate delays resulting in a total delay of 231 minutes to the Dublin – Cork Railway Line during this period.

In particular, XC187 – Fantstown and XC201 – Thomastown are closed to road traffic and only opened to road traffic as required and subject to train movements (see Table 4.1 further below). The waiting time for road and pedestrian traffic could be anything up to 20 minutes depending on train movements. With regard to the remining five level crossings, these are typically closed for around 6 minutes for the passage of a single train. However, trains do cross at these locations and in these circumstances the level crossings could be closed for around 6 – 10 minutes.

The closure of a level crossing and replacement with a bridge not only creates a much safer environment for both rail users and those road/pedestrian users using the level crossing; it allows 24/7 unfettered movement for both the railway line and for those using the crossing.

3. Scheme Delivery

3.1 Background

In 2010/2011, concept stage schemes were developed for alternative routes to eliminate each of the level crossings. None of the schemes were progressed due to a lack of funding.

When the concept stage scheme options were being developed in 2010 and 2011, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners. The schemes for the closures of level crossings XC187, XC211 and XC212, which were progressed to statutory approval stage in 2009 and 2011, were frustrated and eventually failed due to local objections.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings (XC187, XC201, XC209, XC211, XC212, XC215 and XC219) on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project bearing in mind the land acquisition, extinguishment of public rights of way, planning and environmental considerations. The resulting Senior Counsel legal opinion recommended that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solutions would be best achieved through the application to An Bord Pleanála for a Railway Order.

3.2 Feasibility Study

The objective of the feasibility study was to investigate and appraise options for the elimination/de-manning of the level crossings, including property requirements, legal/planning strategy, safety approvals strategy, capital costs, operational costs, programme requirements and risk profile of proposed solutions.

The purpose of the feasibility study proposed was to identify the optimum strategy to eliminate/de-man these manned crossings.

3.2.1 Feasibility Study Options Appraisal

In April 2018, a workshop was held in Limerick Junction to appraise the various options to eliminate/de-man each of the 7 level crossings. Representatives from New Works, CCE, IMO, SET and CIÉ Group Property attended the workshop and provided input on each of the potential options for the elimination/de-manning of the crossings.

The following scoring system was applied to each of the criteria in the appraisal process:

Significant advantages over other options	**5**
Some advantages over other options	**4**
Comparable to other options	**3**
Some disadvantages over other options	**2**
Significant disadvantages over other options	**1**

The Straight Closure option was not assessed for level crossings XC209, XC212, XC215 and XC219 due to the volume of road traffic using these level crossings and length of the existing alternative routes.

The following tables provides a summary of the results of the appraisal for each level crossing.

Table 3.1 – XC187 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	5	5	3	3
Whole Life Cost	Operating & Maintenance Costs	50	1	5	5	4
			3	5	4	4
Safety			3	5	5	4
Physical Activity			-	-	-	-
Environment			3	3	1	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	1	3	2
TOTAL SCORE			11	14	13	13

Table 3.2 – XC201 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	5	5	4	3
Whole Life Cost	Operating & Maintenance Costs	50	1	5	5	4
			3	5	5	4
Safety			3	5	5	4
Physical Activity			-	-	-	-
Environment			3	3	2	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	1	4	2
TOTAL SCORE			11	14	16	13

Table 3.3 – XC209 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	5	N/A	2	3
Whole Life Cost	Operating & Maintenance Costs	50	1	N/A	5	4
			3	N/A	4	4
Safety			1	N/A	5	3
Physical Activity			-	-	-	-
Environment			3	N/A	1	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	N/A	3	3
TOTAL SCORE			9	N/A	13	13

Table 3.4 – XC211 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	4	5	5	3
Whole Life Cost	Operating & Maintenance Costs	50	4	5	5	5
			4	5	5	4
Safety			2	5	5	4
Physical Activity			-	-	-	-
Environment			3	1	2	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	1	3	2
TOTAL SCORE			11	12	15	13

Table 3.5 – XC212 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	4	N/A	5	3
Whole Life Cost	Operating & Maintenance Costs	50	4	N/A	5	5
			4	N/A	5	4
Safety			1	N/A	5	2
Physical Activity			-	-	-	-
Environment			3	N/A	2	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	-	4	2
TOTAL SCORE			10	N/A	16	11

Table 3.6 – XC215 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	4	N/A	2	3
Whole Life Cost	Operating & Maintenance Costs	50	4	N/A	5	5
			4	N/A	4	4
Safety			1	N/A	5	2
Physical Activity			-	-	-	-
Environment			3	N/A	2	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	-	4	2
TOTAL SCORE			10	N/A	15	11

Table 3.7 – XC219 Options Appraisal

Appraisal Criteria	Appraisal Sub-Criteria	Weighting (Total 100 marks)	Do Nothing	Straight Closure	Alternative Access /Overbridge	Upgrade to 4 Barrier CCTV
Economy						
Capital Cost	Construction Costs	50	5	N/A	3	3
Whole Life Cost	Operating & Maintenance Costs	50	1	N/A	5	5
			3	N/A	4	4
Safety			1	N/A	5	2
Physical Activity			-	-	-	-
Environment			3	N/A	2	3
Accessibility & Social Inclusion			-	-	-	-
Integration			2	-	4	2
TOTAL SCORE			9	N/A	15	11

3.3 Preliminary Design

Following the completion of the Feasibility Report, the Preliminary Design commenced in June 2019. The purpose of the preliminary design is to identify route options, where alternative routes are proposed, and to progress the preliminary design for the preferred option to Rail Order Stage.

3.3.1 Preliminary Design Route Options

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated to determine the preferred options for each location. The route options were evaluated under a three tier multi-criteria assessment

- Economy,
- Engineering/Technical Assessment, and
- Environmental Constraints

A Route Options Report was developed and has been included in Appendix D. Further details on the options considered at each location are contained in Chapters 4 to 10.

3.3.2 Public Consultation

Drawings to be displayed at the non-statutory public consultation open days are included in Appendix F.

3.4 Programme Summary

Due to the significant interface between the construction works and operational railway, it is proposed to use a traditional employer designed contract to deliver the scheme.

Refer to Table 3.8 below for a summary of the key project milestones.

Table 3.8 – Programme Summary

1 Key Milestones	849 days	Mon 10/06/19	Fri 09/09/22
1.1 Contract Award / Start Prelim Design	0 days	Mon 10/06/19	Mon 10/06/19
1.2 Complete Preliminary Design	0 days	Fri 13/09/19	Fri 13/09/19
1.3 Lodge Railway Order	0 days	Mon 13/01/20	Mon 13/01/20
1.4 Railway Order Granted	0 days	Fri 11/09/20	Fri 11/09/20
1.5 Complete Detailed Design	0 days	Thu 06/08/20	Thu 06/08/20
1.6 Main Works ITT	0 days	Fri 09/10/20	Fri 09/10/20
1.7 Appoint Main Works Contractor	0 days	Fri 26/02/21	Fri 26/02/21
1.8 Contract Completion	0 days	Fri 09/09/22	Fri 09/09/22

4. XC187 Fantstown

4.1 Introduction

Level Crossing XC187, Fantstown is a ‘C-Type’ manually operated gated level crossing located at 122 miles 808 yards on the Dublin to Cork. The level crossing is located on local road LS 8514, 3km to the east of Kilmallock in the townland of Fantstown in County Limerick.

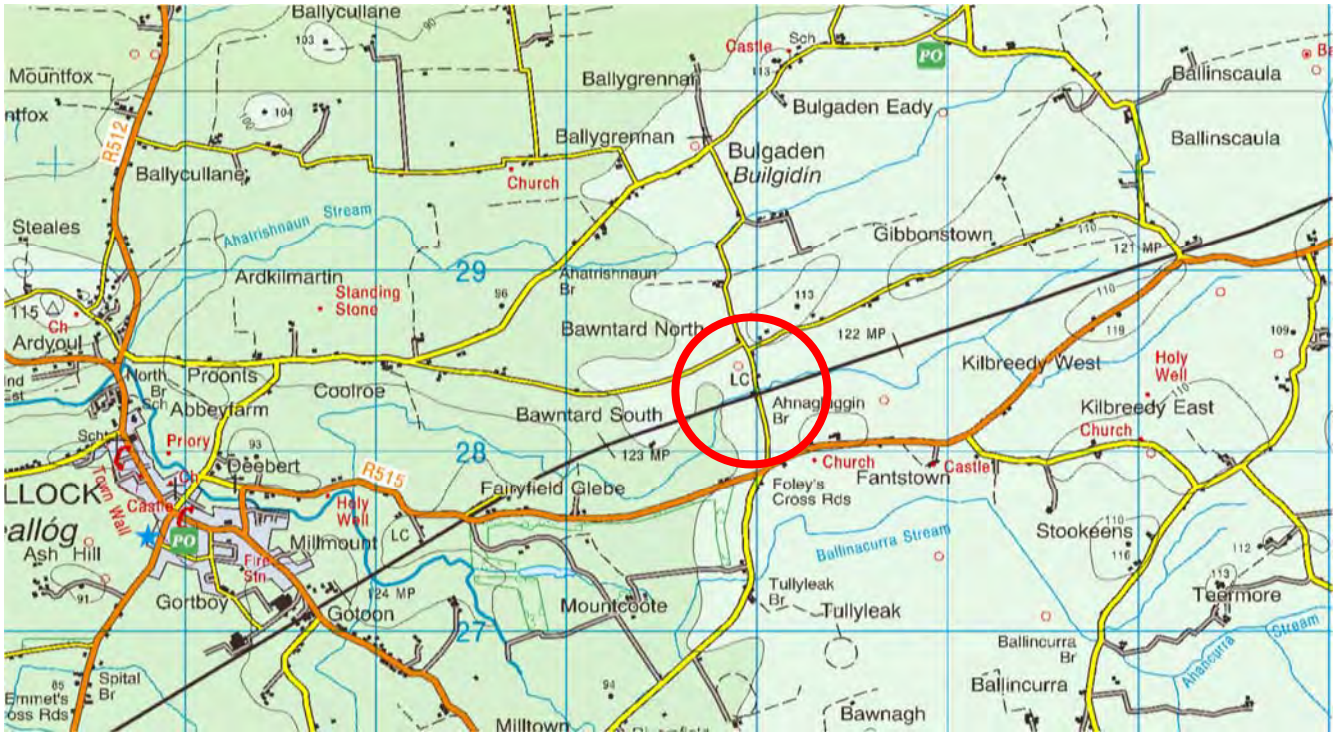


Figure 4.1 – XC187 Scheme Location

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gate keeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to road traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The level crossing is located in a rural area with low density individual housing in the vicinity. There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E. The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 15 following a 24 hour traffic count in June 2011. The level crossing has a Collective Risk Factor of 1.00x10-4 and is currently ranked 287 of 970 level crossings on the IÉ network in the LCRM. Refer to Table 4.1 below for 2011 traffic count summary.

Table 4.1 – XC187 2011 Traffic Counts

	Description	Northbound	Southbound	Total / Average
Pedestrians	Adult	2	0	2
	Children	0	0	0
	Total	2	0	2
Vehicles	PCL/MCL	0	2	2
	Cars and LGV's	7	6	13
	HGV's	0	0	0
	Buses	0	0	0
	Total AADT	7	8	15
Speeds	Max	30.6	35.8	33.2
	Min	8.2	11.5	9.85
	Mean	22	24.3	23.15
	85% Speed	0	0	0

Figure 4.1 – Level Crossing XC187

4.2 History

A prior attempt was made to close this level crossing in 2006 when CIÉ requested Limerick County Council to extinguish the public Right of Way across the level crossing using the procedures set out in Section 73 of the Roads Act, 1993.

An Oral Hearing was held on 10 November 2009 and the Inspector recommended the extinguishment of the public right of way and the consequent closure of the crossing but highlighted that improvements needed to be undertaken to the alternative route in the interest of road safety.

These improvements were estimated at €250,000 at the time and Iarnród Éireann gave a commitment to meet this cost contingent upon the extinguishment of the right of way and consequent closure of the crossing.

However, the extinguishment failed to gain the necessary support of the elected members of the Council due to local concerns over the proposal. The making of an Extinguishment Order and the consideration of objections/representations thereto are reserved functions of the Elected Members. The matter was not put to a vote of the elected members and the closure did not progress.

In 2010, Iarnród Éireann commissioned Roughan & O'Donovan Consulting Engineers to develop concept stage options for the closure of the level crossing XC187. The provision of alternative access via a new road-over-rail bridge was developed to close XC187.

Neither the extinguishment of the right of way nor the alternative access proposals were progressed due to funding constraints.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

4.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC187 is a Straight Closure and diversion of traffic along existing roads. No alternative Route Options were considered at Preliminary Stage.

4.4 Proposed Solution

The preferred solution for the elimination/de-manning of the level crossing XC187, Fantstown is through the extinguishment of the public right of way across the level crossing and the possible upgrade of the existing alternative access route across the existing rail bridge to the north east, refer to Figure 4.3 for diversion route. It is proposed that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the remaining manned public road level crossings on the Cork Line.

As per the Inspectors recommendation from the 2009 Oral Hearing, highlighting the improvements needed to be undertaken to the existing alternative route, Iarnród Éireann gave a commitment to meet this cost contingent upon the extinguishment of the right of way and consequent closure of the crossing. These improvements were estimated at €250,000.

Figure 4.3 – XC187 Diversion Route

4.5 Environmental Input

The proposed solution for XC187, to close the existing crossing and divert road users across the existing rail bridge to the north east would have minimal impacts on the environment, either beneficial or adverse. Beneficial effects to local communities during operation are likely as a result of the removal of the crossing in terms of improved safety and reduced noise and air quality effects from idling traffic. There would be some adverse effects, especially during the construction works to improve the existing alternative route. Whilst the alternative route is distant from sensitive ecological receptors, there are a number of properties along the road which could be affected during the construction phase. Noise, dust and traffic mitigation measures will be necessary to minimise disruption and effects on amenity.

5. XC201 Thomastown

5.1 Introduction

Level Crossing XC201, Thomastown is a 'C-Type' manually operated gated level crossing located at 127 miles 70 yards on the Dublin to Cork. The level crossing is located on a local road, 5km to the east of Charleville in the townland of Thomastown in County Limerick.

Figure 5.1 –XC201 Scheme Location

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gate keeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to road traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The level crossing is located in a rural area with low density individual housing in the vicinity. There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 31 following a 24 hour traffic count in June 2011. The level crossing has a Collective Risk Factor of 1.20x10-4 and is currently ranked 268 of 970 level crossings on the IÉ network in the LCRM.

Figure 5.2 – Level Crossing XC201

5.2 History

In 2010, Iarnród Éireann commissioned Roughan & O'Donovan Consulting Engineers to develop concept stage options for the closure of the level crossing XC201. 2 no. options for the provision of alternative access via a new road-over-rail bridge were developed to close XC201.

When the concept stage options were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners. Initial discussions were held in 2011 with the owner of the bulk of the lands required for the road-over-rail bridge options, but they were unwilling to dispose of the required lands.

Subsequent to the development of concept designs in 2011, the alternative access proposals were not progressed due to funding constraints.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

5.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC201 is closure and alternative route via new road alignment and new road-over-rail bridge.

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 5.3 below shows the 4no. alternative route options that were considered.

- Green Option – New road-over-rail bridge to SW of level crossing. New junction on R515.
- Cyan Option – New road-over-rail bridge to NE to level crossing. Upgrade existing junction on R515.
- Red Option – New road-over-rail bridge to NE to level crossing. Upgrade existing junction on R515.
- Blue Option – New road-over-rail bridge to NE of level crossing.

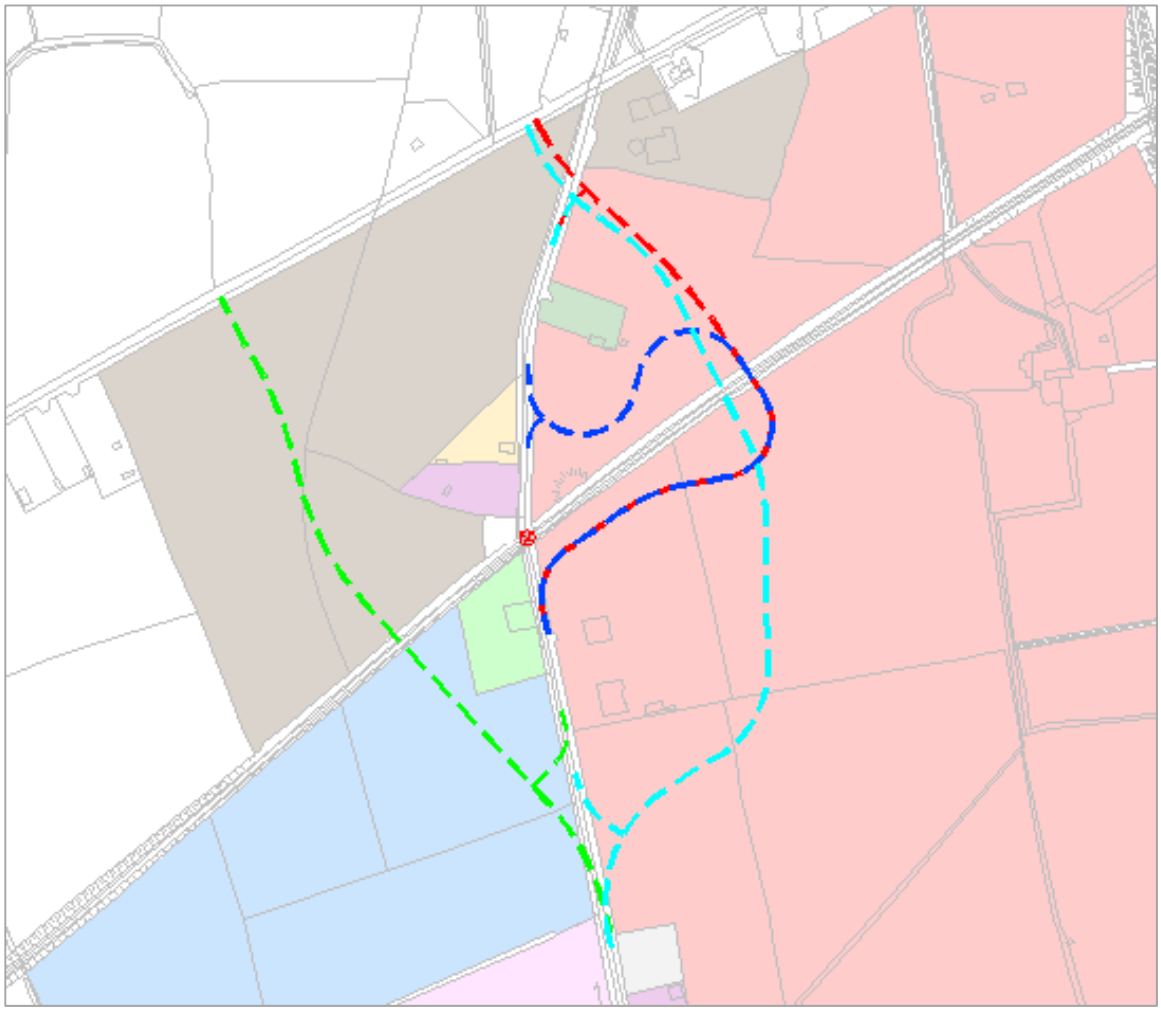


Figure 5.3 –XC201 Route Options

A Route Options Report was developed and has been included in Appendix D. The Green Route was identified as the preferred route. The preferred route was then progressed to preliminary design stage.

5.4 Proposed Solution

The preferred solution for the elimination/de-manning of the level crossing XC201, Thomastown is through provision of alternative access across the railway line via a new road-over-rail bridge to the West of the existing Level Crossing. It is proposed that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the remaining manned public road level crossings on the Cork Line. Refer to Figure 5.4 below for the preferred route alignment.

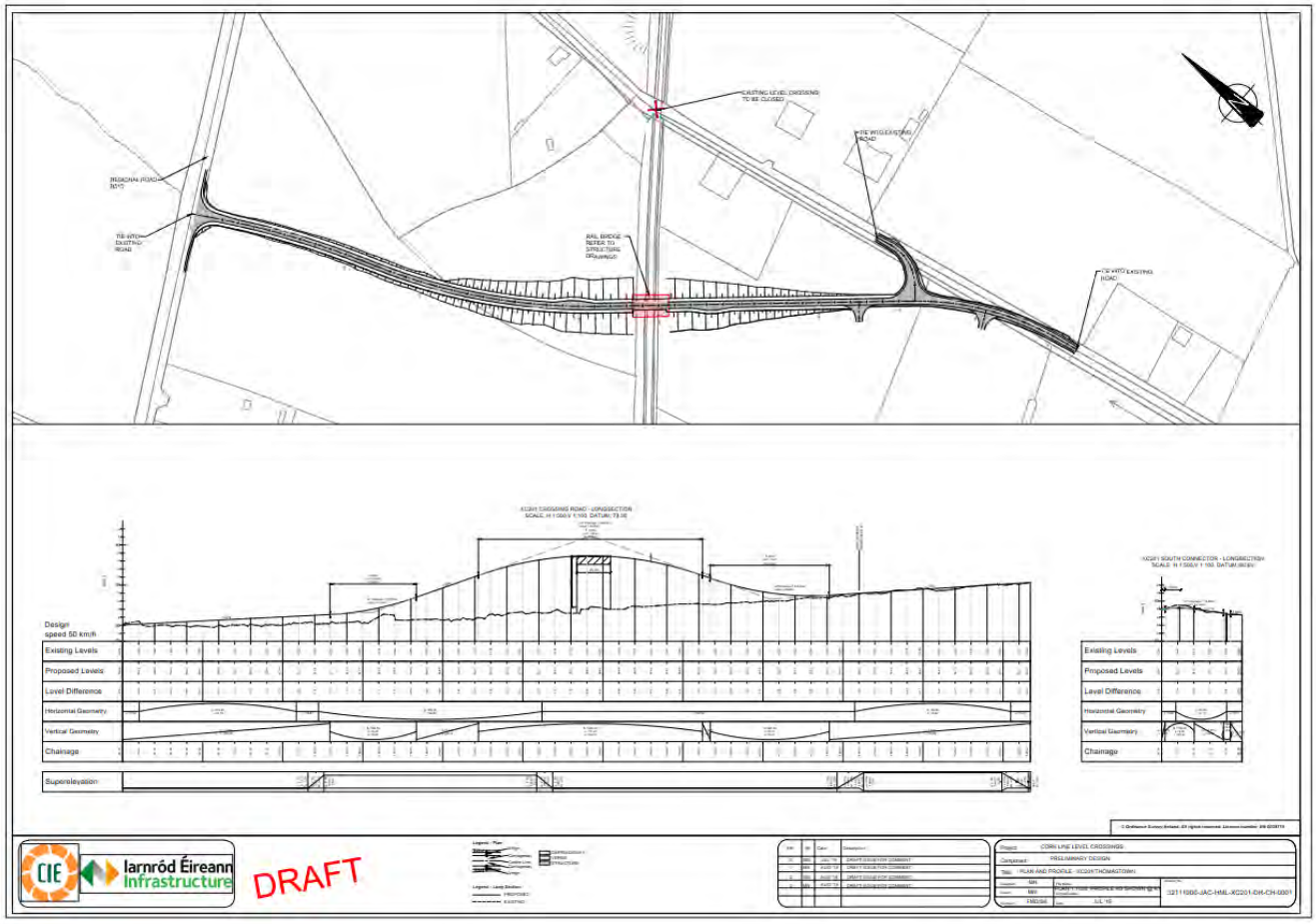


Figure 5.4 –XC201 Preferred Route Alignment

5.5 Alignment Design

It is proposed to close the existing XC201 level crossing, on local road L8572, and realign the local road. The proposed realignment will have a new road-over-rail bridge to the south west of the closed level crossing, and a new junction onto the Regional Road R515, to the west of the existing junction. The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC201.

5.5.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

5.5.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 31 (0% HGV's)
- Current 85% Speed: 24.3km/h
- Proposed Design Speed: 50km/h

5.5.3 Road Cross Section

The current carriageway cross section is approximately 4m wide with 1m verges. It is proposed to provide a 4m wide carriageway with 1m verges, to tie-in with existing cross section. Verges will be widened as required for safety barrier set-back and working width. Passing bays will also be provided, as per Section 10.9 of DN-GEO-03031.

5.5.4 Gradients

The maximum gradient will be up to 7% on the north and south approach to the new rail bridge. The minimum gradient will be 1% to prevent any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

5.5.5 Vertical Curves

The Crest and Sag K values proposed meet the desirable minimum values for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

5.5.6 Horizontal Curves

There are three proposed horizontal curves

- Ch. 0+010 to 0+110: 510m radius – minimum R without elimination of adverse camber and transitions.
- Ch. 0+120 to 0+260: 360m radius – minimum R with superelevation of 2.5%.
- Ch. 0+455 to 0+555: 180m radius – desirable minimum R with superelevation of 3.5%.

5.5.7 Visibility

Desirable Minimum Stopping Sight Distance of 70m is achieved over the full length of the mainline.

5.5.8 Traffic

Data shown in Table 5.1 below from 24 hour traffic count carried out in June 2011.

Table 5.1 – XC201 2011 Traffic Counts

	Description	Northbound	Southbound	Total / Average
Pedestrians	Adult	6	9	15
	Children	0	1	1
	Total	6	10	16
Vehicles	PCL/MCL	1	0	1
	Cars and LGV's	16	14	30
	HGV's	0	0	0
	Buses	0	0	0
	Total AADT	17	14	31
Speeds	Max	31.2	26.9	29.0
	Min	7.7	3.9	5.8
	Mean	17.7	18.2	17.9
	85% Speed	25.6	23.0	24.3

5.6 General Arrangement Drawings

Proposed traffic signs, road markings, safety barriers, drainage design and utilities diversions are shown on the General Arrangement drawing for XC201, included in Appendix B.

5.6.1 Drainage Design

There will be two catchments, separated by the railway line. The majority of the road carriageway will be over the edge drainage to interceptor ditches running along the base of the embankments. For the bridge deck, and the section of road alignment with embankments above 6m, kerb and gully drainage will be used, with a pipe connection down to the interceptor ditch. It is assumed that there will be capacity within the proposed drainage system for any attenuation requirement. There is no additional treatment of runoff proposed at this stage.

Refer to Appendix B for drainage plans and outfall details on the General Arrangement drawings. Topographical survey information will be required to confirm the drainage outfall locations before detailed design stage.

5.7 Structures

1no. Road-over-Rail bridge required.

Refer to Structural Design in Appendix C for structural drawings.

5.8 Environmental Input

The proposed solution for XC201 is to close the existing crossing and provide a new road-over-rail bridge to the west of the existing level crossing. The location of the junction onto the new bridge is proposed to be located between two dwellings on the current access road, then travelling in a north westerly direction to join the R515 north of the railway line. The new access is likely to have some environmental impacts, both beneficial and adverse. As with XC187, beneficial effects are likely from the removal of the level crossing and the reduction of noise, air quality and safety issues associated with it. The movement of the access is within a short distance of the existing access road and so there is unlikely to be an issue with severance or inconvenience to the local community during its operation, although the route would divides a field, with potentially adverse effects on the

landowner in terms of future use and/or development of the land. There would also be a visual impact during operation, of a new structure in a flat landscape. There are also potential effects on the water environment as a result of connections into the local ditch system from the new road and bridge; the design proposes an interceptor prior to the outfall into the Gortacrank River (Loobagh_030). The outfall structure and the water to be discharged have the potential to adversely affect the water body, which is of Good WFD Status. The Loobagh is hydrologically connected to the Lower Shannon SAC, which is 26km north (as the crow flies). The outfall to the ditch will be designed to be sympathetic to the receiving water body both in terms of physical structure and flows so as to ensure no significant effect. Ecological effects would arise from a permanent loss of habitat, including bird nesting habitat.

There would be effects on soil and water during construction; the works will require the excavation of topsoil and subsoil deposits, and potentially bedrock. Dewatering of the construction site and silty water runoff may have an impact on the local ditch system and through this enter the Loobagh_030. This would have secondary effects on biodiversity. This is a common effect during construction and mitigation will be designed and implemented to prevent a significant effect on the water body. Other potential effects during construction would be noise, dust and traffic delays as a result of construction traffic. These and the visual effects of plant and machinery could combine to create an amenity or health effect. Mitigation measures will be designed and implemented to reduce the individual effects, so they are not significant and this would prevent a significant amenity or health effect. Ecological effects would arise from a temporary loss of habitat, including bird nesting habitat.

6. XC209 Ballyhay

6.1 Introduction

Level Crossing XC209, Ballyhay is a 'CD-Type' manually operated gated level crossing located at 130 miles 878 yards on the Dublin to Cork. The level crossing is located on a local road in the townland of Ballyhay, County Cork.

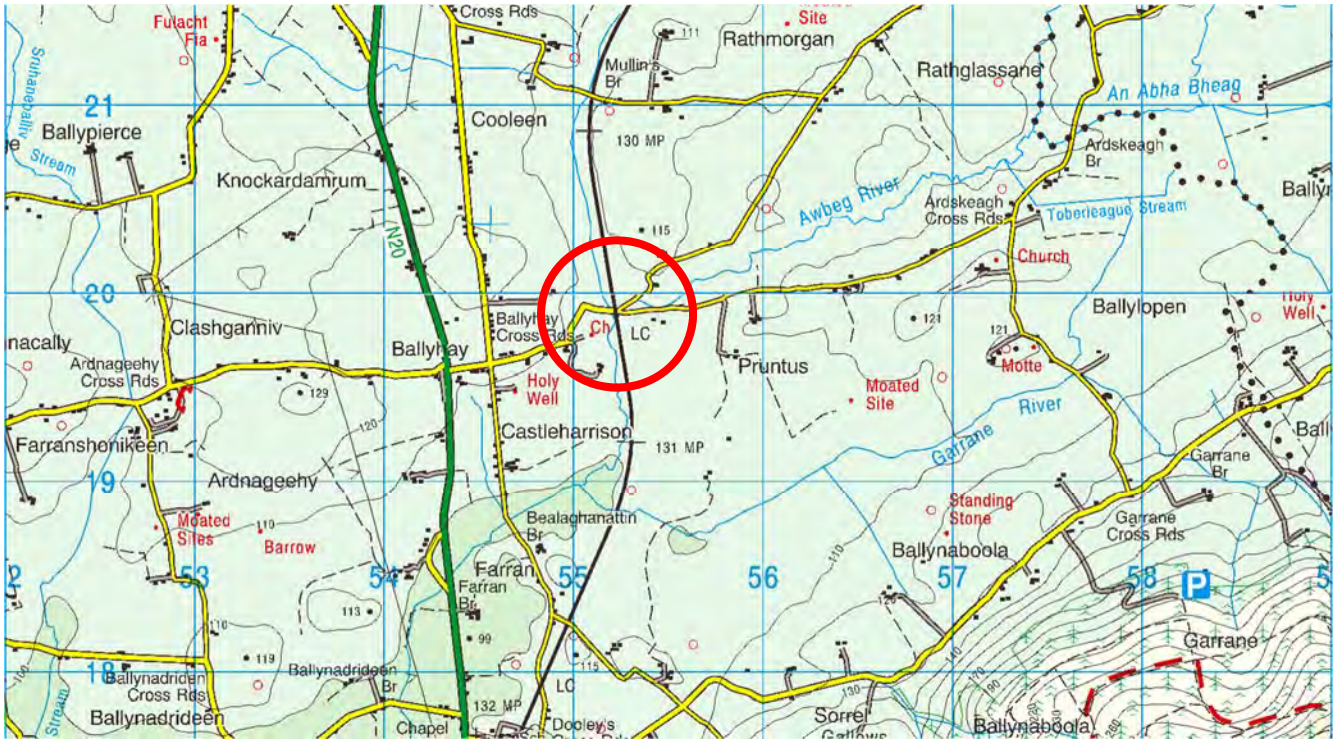


Figure 6.1 – XC209 Scheme Location

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gate keeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to road traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The level crossing is located in a rural area with low density individual housing in the vicinity. The level crossing is immediately to the north of a railway underbridge (UBC 296) on the Awbeg River, which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). There is also a junction on the road and a river bridge (Awbeg River) immediately to the east of the level crossing. There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 326 following a 24 hour traffic count in June 2011. The level crossing has a Collective Risk Factor of 9.40x10-4 and is currently ranked 78 of 970 level crossings on the IÉ network in the LCRM.

Figure 6.2 – Level Crossing XC209

6.2 History

In 2010, Iarnród Éireann commissioned Roughan & O'Donovan Consulting Engineers to develop concept stage options for the closure of the level crossing XC209. The provision of alternative access via a new road-over-rail bridge was developed to close XC209.

When the concept stage options were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners. Initial discussions were held in 2011 with the affected landowners but one landowner was unwilling to consider the disposal of the required lands or even provide access for surveys.

Subsequent to the development of concept designs in 2011, the alternative access proposal was not progressed due to funding constraints.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

6.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC209 is to either convert to 4-barrrier CCTV level crossing or closure of the crossing and alternative route via new road alignment and new road-over-rail bridge.

Prior to progressing the preliminary design, alternative route options for the possible closure of the level crossing were reviewed. A number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 5.3 below shows the 3no. alternative mainline route options and 3no. link options that were considered.

- Green Option – New road-over-rail bridge to North of level crossing. Requires Red/Pink/Orange Link.
- Blue Option – New road-over-rail bridge to South of level crossing. Requires Red/Pink/Orange Link.
- Cyan Option – New road-over-rail bridge to North of level crossing.

- Red Link Option – Widen existing junction.
- Pink Link Option – New road alignment with river bridge.
- Orange Link Option – New road alignment with river bridge

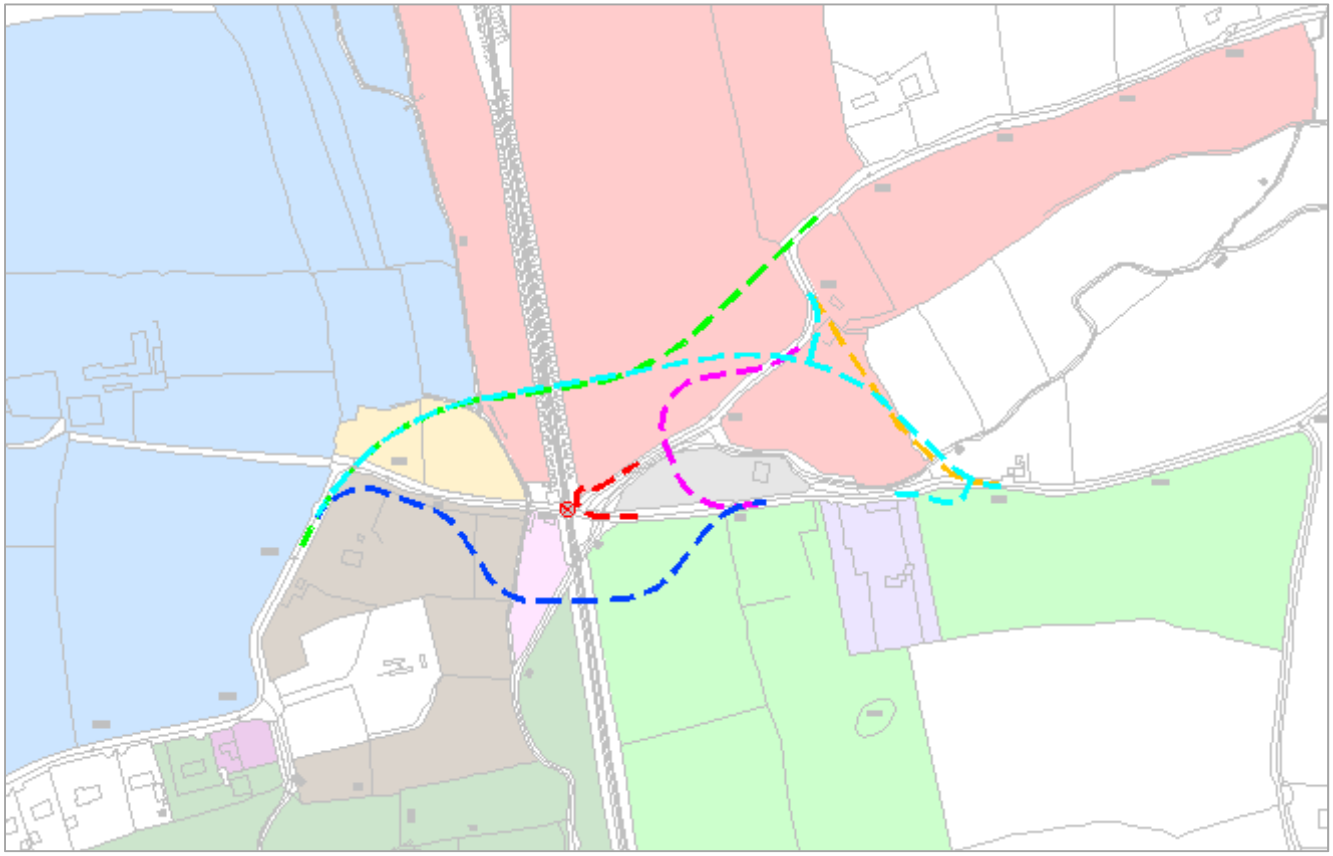


Figure 6.3 –XC209 Route Options

A Route Options Report was developed and has been included in Appendix D. A combination of the Green mainline route and Pink Link route was identified as the preferred route, if the level crossing was to be closed.

6.4 Proposed Solution

As per the recommendations within the February 2019 Feasibility Report, the preferred solution for the level crossing at XC209 is to upgrade the existing crossing to a 4-barrier CCTV level crossing. The design solution for this upgrade is still in process.

7. XC211 Newtown

7.1 Introduction

Level Crossing XC211, Newtown is a 'CD-Type' manually operated gated level crossing located at 131 miles 1385 yards on the Dublin to Cork. The level crossing is located on a local road, 0.5km to the north of Ballyhea village in the townland of Newtown, County Cork.

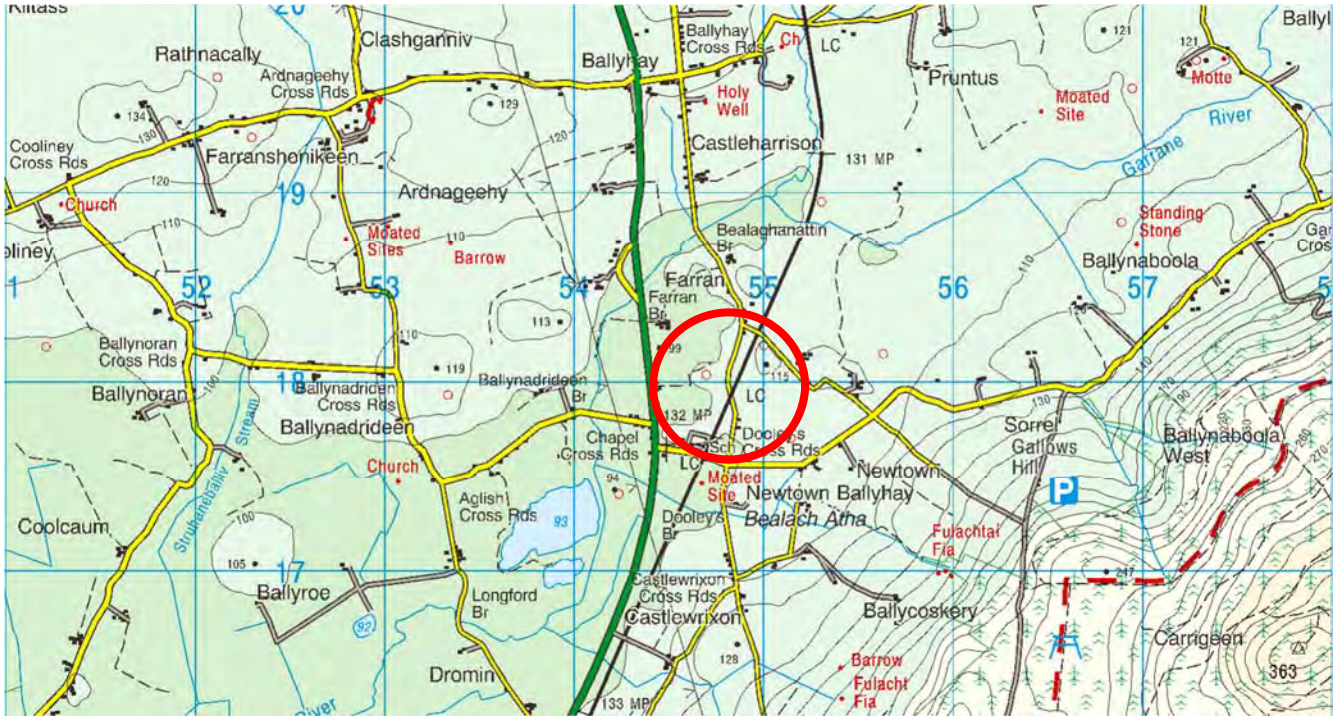


Figure 7.1 – XC211 Scheme Location

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gate keeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to road traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The level crossing is located in a rural area with low density individual housing in the vicinity. The level crossing is proximate to the Awbeg River which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 93 following a 24 hour traffic count in October 2010. The level crossing has a Collective Risk Factor of 3.50x10-4 and is currently ranked 158 of 977 level crossings on the IÉ network in the LCRM.

Figure 7.2 – Level Crossing XC211

7.2 History

In the period from 2005 to 2007, Iarnród Éireann and CIÉ investigated various options for the closure of level crossings XC211 and XC212. Discussions were held with Cork County Council, local resident groups and affected landowners on possible solutions to eliminate the level crossings. Initial scheme options for road-over-rail and rail over road bridges at XC212 were developed but there was no consensus on a preferred scheme option.

A further attempt was made to close this level crossing in 2011 as part of a joint scheme to close level crossing XC212 when Iarnród Éireann and CIÉ, in conjunction with Cork County Council sought the extinguishment of the public Right of Way across the level crossing and the diversion of traffic over a new road-over-rail bridge at Level Crossing XC212. There was strong local opposition to the closure and the proposal was withdrawn.

When these schemes were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners.

Subsequent to the closure attempt in 2011, the alternative access proposal was not progressed due to funding constraints.

Refer to Section 8.2 below for further details of the 2011 proposal to close level crossing XC211.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal

opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

7.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC211 is closure and alternative diversion route via new road alignment.

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 5.3 below shows the 4no. alternative route options that were considered.

- Green Option – New road alignment to west of level crossing.
- Blue Option – New road alignment to east of level crossing.

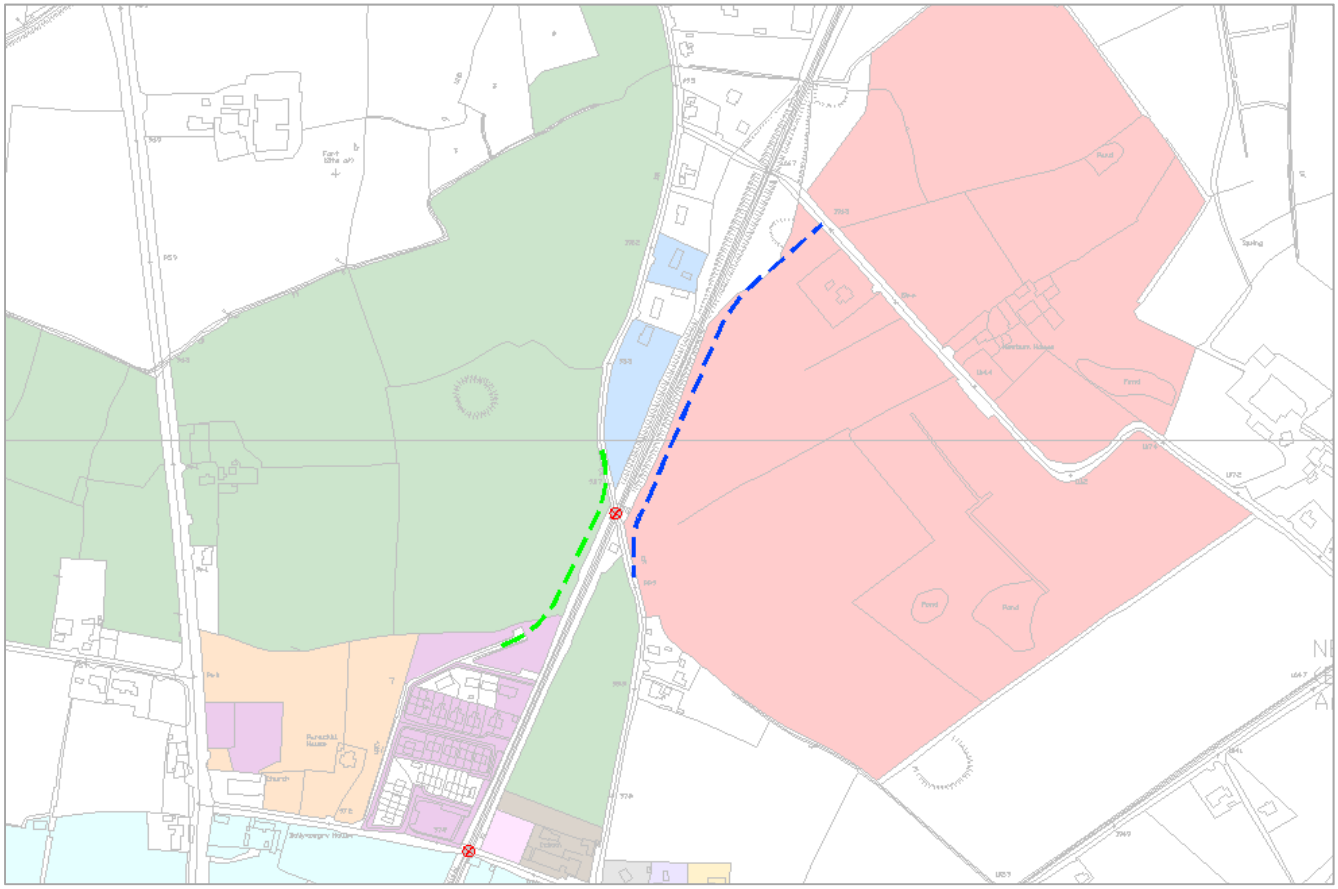


Figure 7.3 –XC211 Route Options

A Route Options Report was developed and has been included in Appendix D. The Green Route was identified as the preferred route. The preferred route was then progressed to preliminary design stage.

During Public Consultation between November 2019 and January 2020 feedback was received regarding the proposed 'Green Route' which would tie into Beechwood Grove at Ballyhea; local residents raised concerns about potential issues concerning traffic and anti-social behaviour. In January 2020 the Blue Route was progressed to preliminary Design stage.

7.4 Proposed Solution

The proposed solution for the elimination/de-manning of the level crossing XC211, Newtown is the Blue Route. The Green Route provides a new link road to the west of the railway corridor to connect the local road at the west side of level crossing XC211 with Beechwood Grove and on to the proposed new road-over-rail bridge at level crossing XC212. The Blue Route provides a new link road to the east of the railway corridor to connect the local road at the east side of level crossing XC211 with the local road to the north east of the level crossing XC211.

Design information on the Green Route has been shown in this report for clarity.

It is proposed that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the remaining manned public road level crossings on the Cork Line. Refer to Figure 7.4 below for the preferred route alignment.

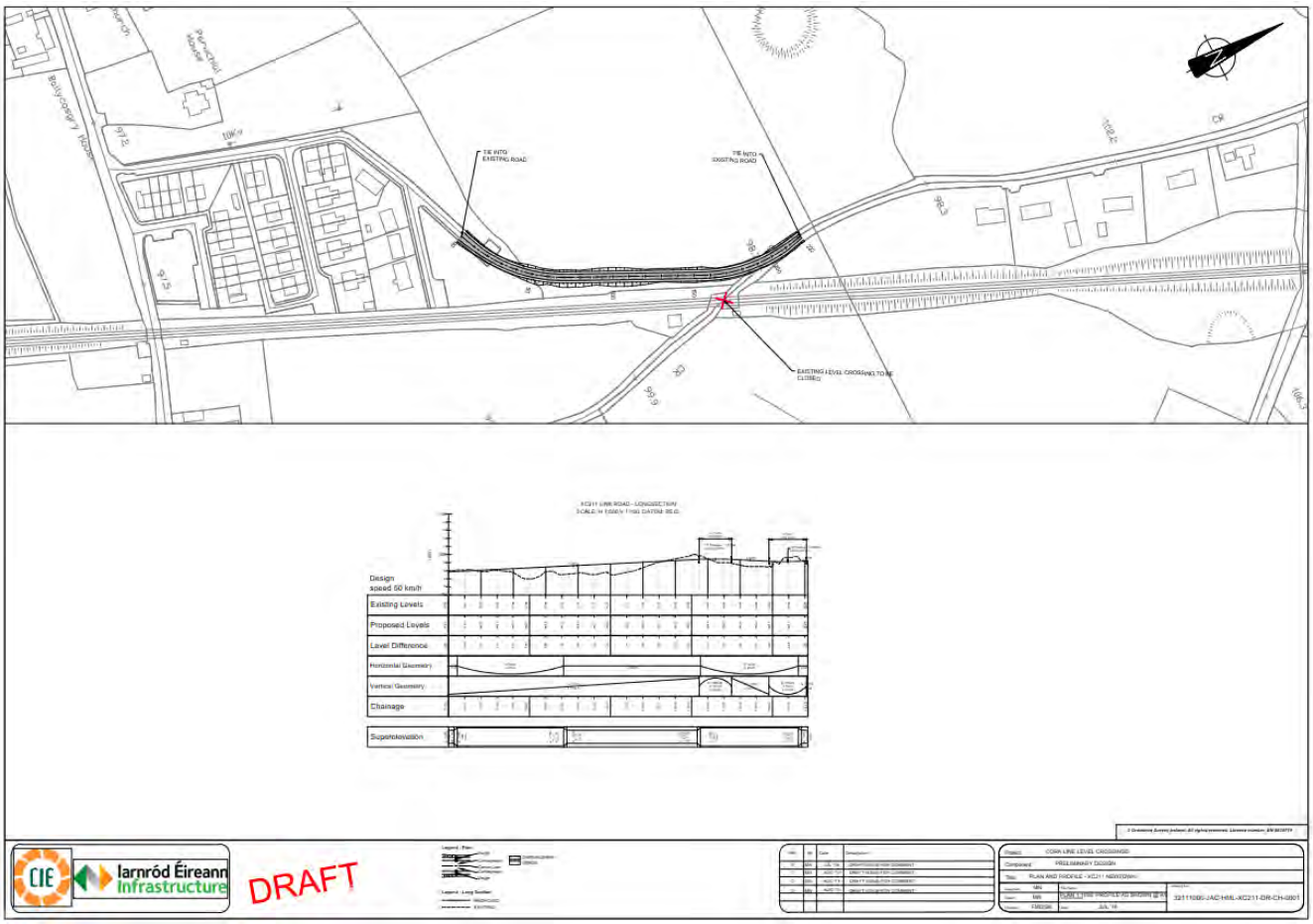


Figure 7.4 –XC211 Green Route Alignment

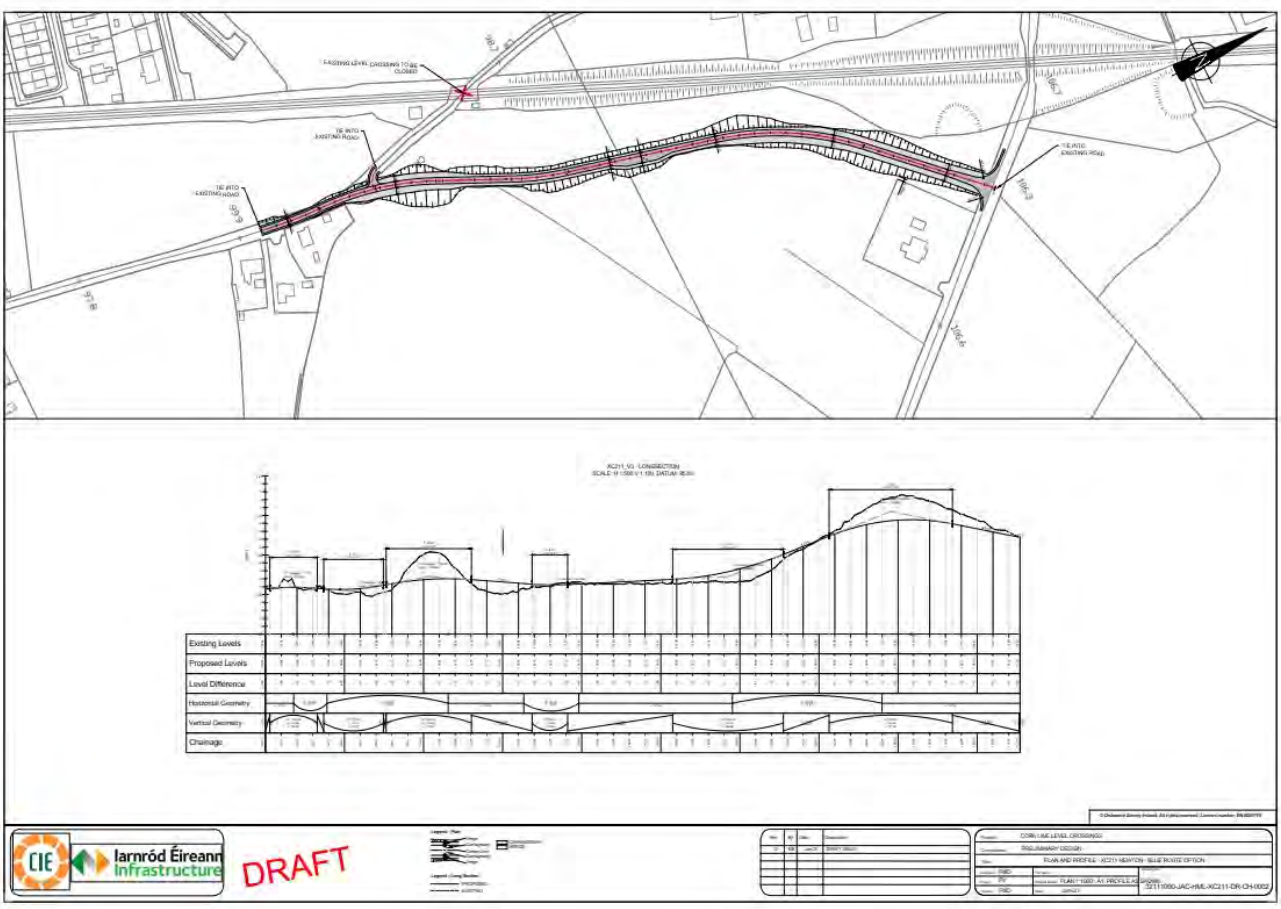


Figure 7.5 –XC211 Blue Route Alignment

7.5 Alignment Design: Green Route

This alignment proposes the closure of the existing XC211 level crossing and to realign the local road to connect into the back of Beechwood Grove housing estate to the South (which is immediately West of the XC212 level crossing). The proposed realignment will not require any structures. The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC211 Green Route.

7.5.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

7.5.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 90 (0% HGV's)
- Current 85% Speed: 49.5km/h
- Proposed Design Speed: 50km/h

7.5.3 Road Cross Section

The current carriageway cross section is approximately 3m wide at the northern tie-in and approx. 5.5m wide at the southern tie-in. It is proposed to provide a 4m wide carriageway with 1.5m verges, tapering to 3m at the northern tie-in and tapering to 5.5m at the southern tie-in. Passing bays will also be provided, as per Section 10.9 of DN-GEO-03031.

7.5.4 Gradients

The maximum gradient will be up to 1.6% on the northern tie-in. The minimum gradient will be 1% to prevent any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

7.5.5 Vertical Curves

The Crest and Sag K values proposed meet the desirable minimum values for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

7.5.6 Horizontal Curves

There are two proposed horizontal curves

- Ch. 0+005 to 0+070: 90m radius – 1 step relaxation below desirable minimum with superlevation of 3.5%.
- Ch. 0+155 to 0+215: 90m radius – 1 step relaxation below desirable minimum with superlevation of 3.5%.

7.5.7 Visibility

Stopping Sight Distance of 50m (1 Step Relaxation below Desirable Minimum) can be achieved between Ch 0+130 and the southern tie-in. Desirable Minimum Stopping Sight Distance of 70m can be achieved over the rest of the alignment.

7.5.8 Traffic

Data shown in Table 7.1 below from 24 hour traffic count carried out in June 2011.

7.6 Alignment Design: Blue Route

This alignment proposes the closure of the existing XC211 and provides a new link road to the east of the railway corridor to connect the local road at the east side of level crossing XC211 with the local road to the north east of the level crossing. The proposed realignment will not require any structures. The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC211 Blue Route.

7.6.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

7.6.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 90 (0% HGV's)

- Current 85% Speed: 49.5km/h
- Proposed Design Speed: 50km/h

7.6.3 Road Cross Section

The current carriageway cross section is approximately 3.5m wide at the southern tie-in. It is proposed to provide a 4m wide carriageway with 1m verges, tapering to 5.5m at the dwell area for the new junction at the northern tie-in. Passing bays will also be provided, as per Section 10.9 of DN-GEO-03031.

7.6.4 Gradients

The maximum gradient will be up to 8% (a relaxation from 7%) for approximately 30m on approach to the crest curve before the northern tie-in This is a necessary relaxation in order to tie-in to the hilly terrain. The dwell area at the new junction at the northern tie-in has a relaxation of 4% on the gradient but is over 40m in length. For the remainder of the alignment, the maximum gradient is 4%. The minimum gradient will be 1% to prevent any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

7.6.5 Vertical Curves

There is one Sag K value of 7, which is a relaxation of 1 step below the desirable minimum value of 9 for a 50km/h design speed. This is located at the tie-in to the existing road to the south and is required to minimize the impact adjacent to an existing property. The other two Sag K values are at desirable minimum values for 50km/h, as per Table 9.3 of DN-GEO-03031.

There is one Crest K value of 6.5 at approximate Ch 0+400, which is a relaxation of one step below the desirable minimum value of 10 for 50km/h design speed. This was necessary in order to tie-in with the surrounding hilly terrain. The other two Crest K values are at desirable minimum values for 50km/h, as per Table 9.3 of DN-GEO-03031.

7.6.6 Horizontal Curves

There are four proposed horizontal curves, all are desirable minimum radius of 180 with a 3.5% superelevation (maximum superelevation for 50km/h design speed).

7.6.7 Visibility

Stopping Sight Distance between 55m and 70m (1 Step Relaxation below Desirable Minimum) can be achieved between Ch 0+330 and Ch 0+390 in a northerly direction, and between Ch 0+477 and Ch 0+410 in a southerly direction, this is due to the one step relaxation in the Crest curve at this location.

The 1 Step relaxation in the northerly direction, however, would be a departure from standards as it is on approach to (between 87m and 147m) the new t-junction at the northern tie-in. This departure was necessary in order to tie-in with the hilly terrain.

Desirable Minimum Stopping Sight Distance of 70m can be achieved over the rest of the alignment.

7.6.8 Traffic

Data shown in Table 7.1 below from 24 hour traffic count carried out in June 2011.

Table 7.1 – XC211 2011 Traffic Counts

	Description	Northbound	Southbound	Total / Average
Pedestrians	Adult	7	7	14
	Children	0	9	9
	Total	7	16	23
Vehicles	PCL/MCL	0	1	1
	Cars and LGV's	45	42	87
	HGV's	0	0	0
	Buses	1	2	3
	Total AADT	46	44	90
Speeds	Max	55.0	60.0	57.5
	Min	10.0	15.0	12.5
	Mean	41.1	43.5	42.3
	85% Speed	47.5	51.5	49.5

7.7 General Arrangement Drawings

Proposed traffic signs, road markings, safety barriers, drainage design and utilities diversions are shown on the General Arrangement drawings for XC211 Green Route and XC211 Blue Route, included in Appendix B.

7.7.1 Drainage Design:

The road carriageway will be over the edge drainage to interceptor ditches running along the base of the embankments. It is assumed that there will be capacity within the proposed drainage system for any attenuation requirement. There is no additional treatment of runoff proposed at this stage.

Refer to Appendix B for drainage plans and outfall details on the General Arrangement drawings. Topographical survey information will be required to confirm the drainage outfall locations before detailed design stage.

7.8 Structures

No structures are required at either of these locations.

7.9 Environmental Constraints: Green Route

The Green Route solution for XC211 is the removal of the existing crossing and the direction of traffic to the new road-over-rail bridge proposed for XC212. Local traffic in the Beechwood Road area would be connected to the Balllycoskery road via a new connecting road to the west of the rail corridor.

There would be few environmental benefits from the proposed Project at this site; there are no dwellings in the immediate vicinity of the site to benefit from reduced noise and improved air quality, however there would still be a benefit from improved safety. During operation, there are potential adverse effects as a result of inconvenience to local people having to travel further to cross the railway, although this would be limited and unlikely to be significant. A small loss of land to provide for the new linking road would also be anticipated, however this would not be significant. Potential effects may occur to ditches in the vicinity as a result of contaminated surface water runoff. Mitigation by design, in terms of interceptors and carefully designed outfalls to the ditches would reduce the effects. The nearest river is the Awbeg and it is over 600m from the site;

connection to it would be via the local ditch system and the assumed surface water drainage system on the Beechwood Road estate. Whilst there is a hydrological connection to the SAC, it is unlikely that effects would be significant through the route anticipated and with mitigation in place.

There would be effects on soil and water during construction of the connecting road; the works will require the excavation of topsoil and subsoil deposits, and potentially bedrock. Dewatering of the construction site and silty water runoff may have an impact on local ditches. This would have secondary effects on biodiversity, and potentially, protected features of the SAC. Silty water runoff is a common occurrence during construction and mitigation will be designed and implemented to prevent a significant effect on the water body. Other potential effects during construction would be noise, dust and traffic delays as a result of construction traffic. There are a number of noise sensitive receptors within 300m of the proposed works; construction traffic could most likely reach the site via the Beechwood Road estate. These and the visual effects of plant and machinery could combine to create an amenity or health effect. Mitigation measures will be designed and implemented to reduce the individual effects, so they are not significant, and this would prevent a significant amenity or health effect. Ecological effects would arise from a temporary loss of habitat, including bird nesting habitat.

7.10 Environmental Constraints: Blue Route

The Blue Route solution for XC211 is the removal of the existing crossing and the direction of traffic to the new road-over-rail bridge proposed for XC212. Local traffic from the Sorrell and Newtown areas would be connected to the Ballycoskery road via a new connecting road to the east of the rail corridor.

There would be few environmental benefits from the proposed Project at this site. During operation, there are potential adverse effects as a result of inconvenience to local people having to travel further to cross the railway, although this would be limited and unlikely to be significant. A small loss of agricultural land to provide for the new linking road would also be anticipated, however it is not predicted that this would be significant. The proposed route is close to an area of pluvial flooding; careful design of the alignment will reduce effects on or from the new link road on flood risk locally. Potential effects may occur to ditches in the vicinity as a result of contaminated surface water runoff; mitigation by design, in terms of interceptors and carefully designed outfalls to the ditches would reduce the effects. The nearest river is the Awbeg and it is over 600m from the site; connection to it would be via the local ditch system. Whilst there is a hydrological connection to the SAC, the design of the drainage system would ensure no significant effects occur. Landscape and visual impacts would arise from any potential loss of mature sections of hedgerow along the north and south end of the proposed alignment and to the west of the proposed alignment where a dense area of hedgerow and scrub occurs.

There would be effects on soil and geology during construction of the connecting road; the works will require the excavation of topsoil and subsoil deposits, and potentially bedrock. There may be effects on local surface water bodies, in the absence of control measures or mitigation as a result of dewatering of the construction site and silty water runoff. This would have secondary effects on biodiversity, and potentially, protected features of the SAC. Silty water runoff is a common occurrence during construction and mitigation will be designed and implemented to prevent a significant effect on the water body. Other potential effects during construction would be noise, dust and traffic delays as a result of construction traffic. There are a number of noise sensitive receptors within 300m of the proposed works. These and the visual effects of plant and machinery could combine to create an amenity or health effect. Mitigation measures will be designed and implemented to reduce the individual effects, so they are not significant either in isolation or combination, and this would prevent a significant amenity or health effect. Ecological effects would arise from a temporary loss of habitat, including bird nesting habitat.

8. XC212 Ballycoskery

8.1 Introduction

Level Crossing XC212, Ballycoskery is a 'CD-Type' manually operated gated level crossing located at 131 miles 1759 yards on the Dublin to Cork. The level crossing is located in Ballyhea village on local road L1533 in the townland of Ballycoskery, County Cork.

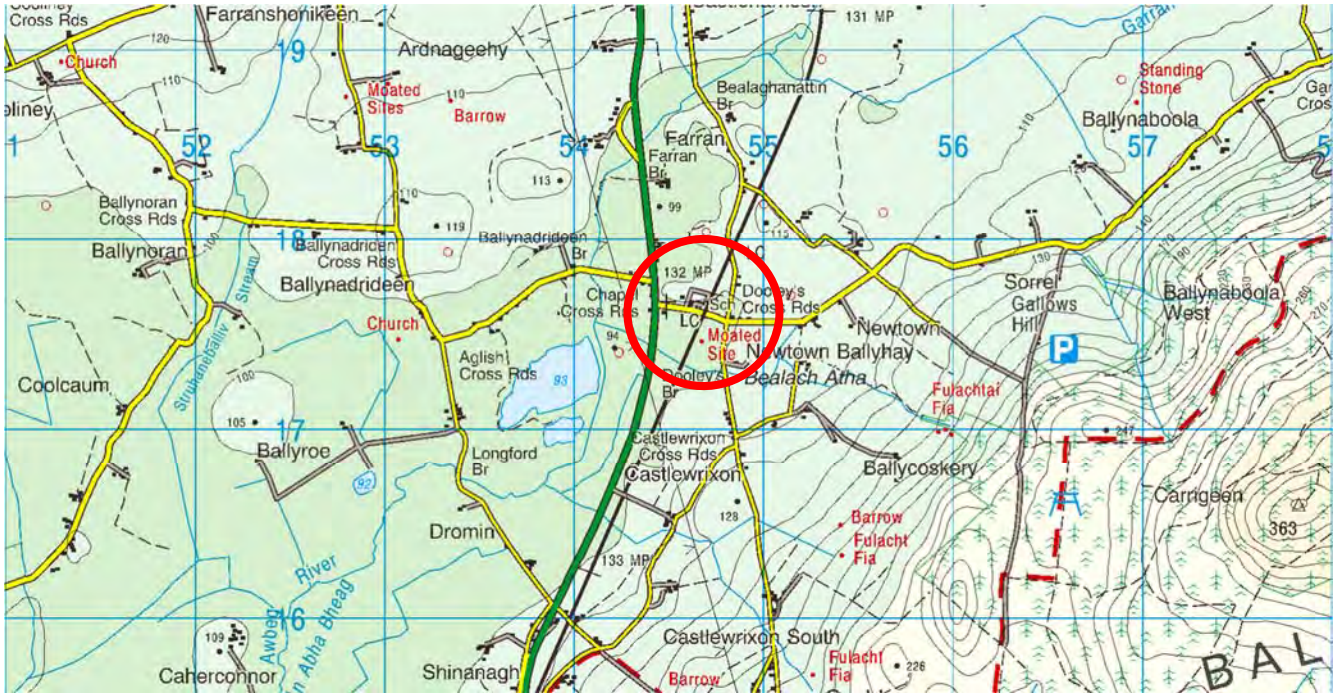


Figure 8.1 – XC212 Scheme Location

XC212 is designated a 'CD-Type' level crossing but it is operated as a 'CX-Type' level crossing and is manned on a 24 hour basis. Its operation as a 'CX-Type' crossing results in the gates being normally open to road traffic with the gate keeper closing the gates as required for rail traffic. There are also pedestrian wicket gates at the crossing but these are permanently locked.

The level crossing is located in the village of Ballyhea. The local Primary School (east side) and the Beechwood housing estate (west side) are directly adjacent to the level crossing. The level crossing is proximate to the Awbeg River which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 1054 following a 24 hour traffic count in October 2010. The level crossing has a Collective Risk Factor of 2.30x10-3 and is currently ranked 36 of 977 level crossings on the IÉ network in the LCRM.

Figure 8.2 – Level Crossing XC212

8.2 History

In the period from 2005 to 2007, Iarnród Éireann and CIÉ investigated various options for the closure of level crossings XC211 and XC212. Discussions were held with Cork County Council, local resident groups and affected landowners on possible solutions to eliminate the level crossings. Initial scheme options for road-over-rail and rail-over-road bridges at XC212 were developed but there was no consensus on a preferred scheme option.

In 2008, following an incident in 2007 relating to access across the level crossing for emergency services, the operating hours of the level crossing gates were extended from 07.30hrs until 23.30hrs to a 24 hour basis.

A further attempt was made to close this level crossing in 2011 as part of a joint scheme to close level crossing XC211 when Iarnród Éireann and CIÉ, in conjunction with Cork County Council sought to construct a new road-over-rail bridge to the South of the XC212 level crossing thereby providing alternative access across the railway line.

In March 2011, Cork County Council sought planning permission under Section 179 of the Planning and Development Act, 2000 and Part 8 of the Planning and Development Regulations, 2001. The scheme included significant improvement works in the vicinity of the existing school (access, turning and parking facilities for school buses and access for school drop offs and collections). A number of objections were made to the scheme following publication of the planning application, these primarily related to the proximity of the road-over-rail bridge to the Beechwood housing estate and the school. Further objections were raised by local residents during a public meeting in April 2011, again these related to the proximity of the road-over-rail bridge to the Beechwood housing estate and the school. The planning application for the scheme was withdrawn in May 2011. The local residents produced alternative proposals for the closure of the level crossing in late 2011, these proposals significantly extended the scheme and substantially increased the land take requirements.

When these schemes were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners.

Subsequent to the closure attempt in 2011, the alternative access proposal was not progressed due to funding constraints.

Cork County Council's 2017 Local Area Plan for the Fermoy Municipal District includes a reservation for the possible construction of a new road realignment as detailed on Figure 8.3 below.

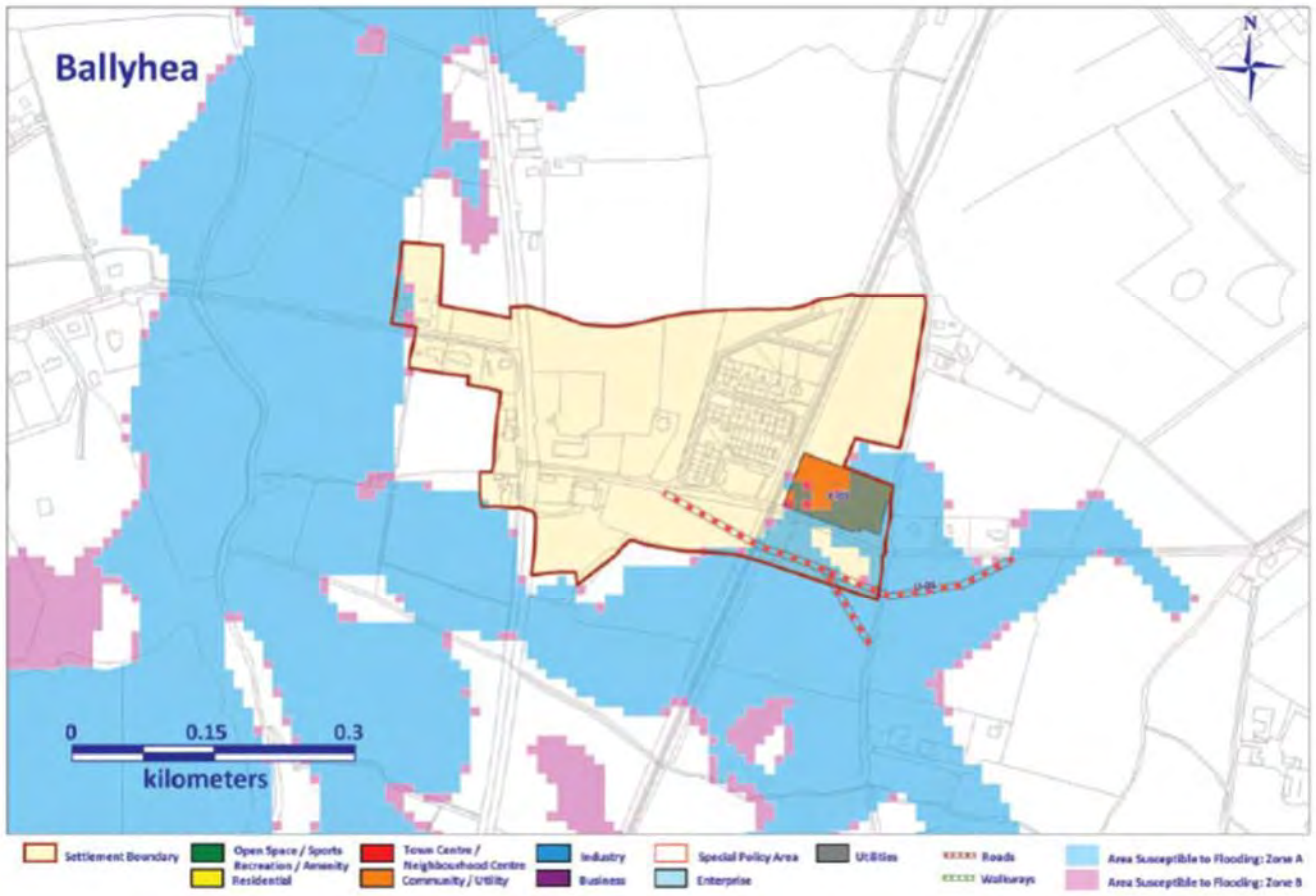


Figure 8.3 – Extract from Cork County Council LAP for Ballyhea

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

8.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC212 is closure and alternative route via new road alignment and new rail bridge.

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 8.4 below shows the 4no. alternative route options that were considered.

- Green Option – New road-over-rail bridge to South of level crossing.
- Blue Option – New road-over-rail bridge to South of level crossing. New junction on the N20.
- Red Option – New rail-over-road bridge to South of level crossing.

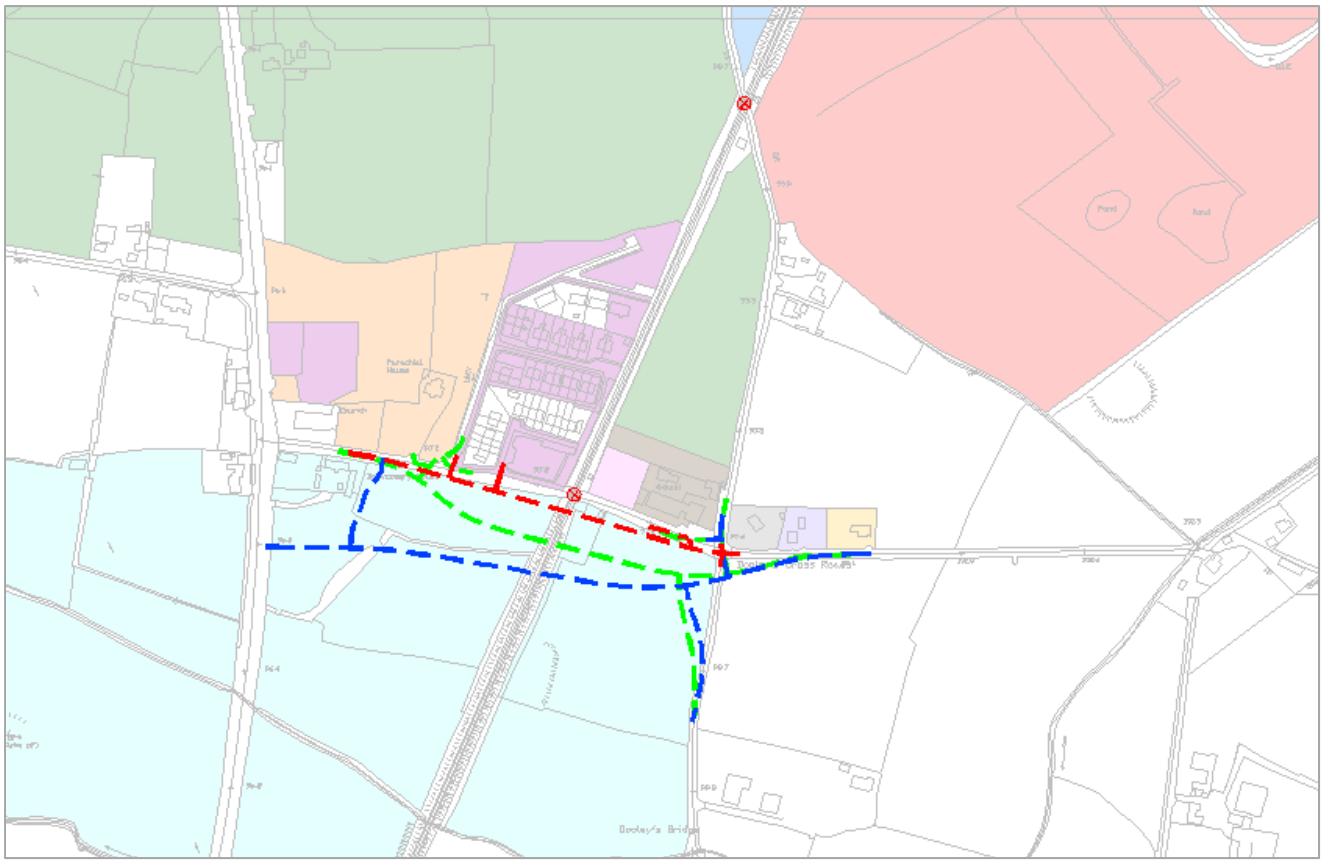


Figure 8.4 –XC212 Route Options

A Route Options Report was developed and has been included in Appendix D. The Green Route was identified as the preferred route. The preferred route was then progressed to preliminary design stage.

8.4 Proposed Solution

The preferred solution for the elimination/de-manning of the level crossing XC212, Ballycoskery is through the provision of alternative access across the railway line via a new road-over-rail bridge. It is proposed that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the

remaining manned public road level crossings on the Cork Line. Refer to Figure 8.4 below for the preferred route alignment.

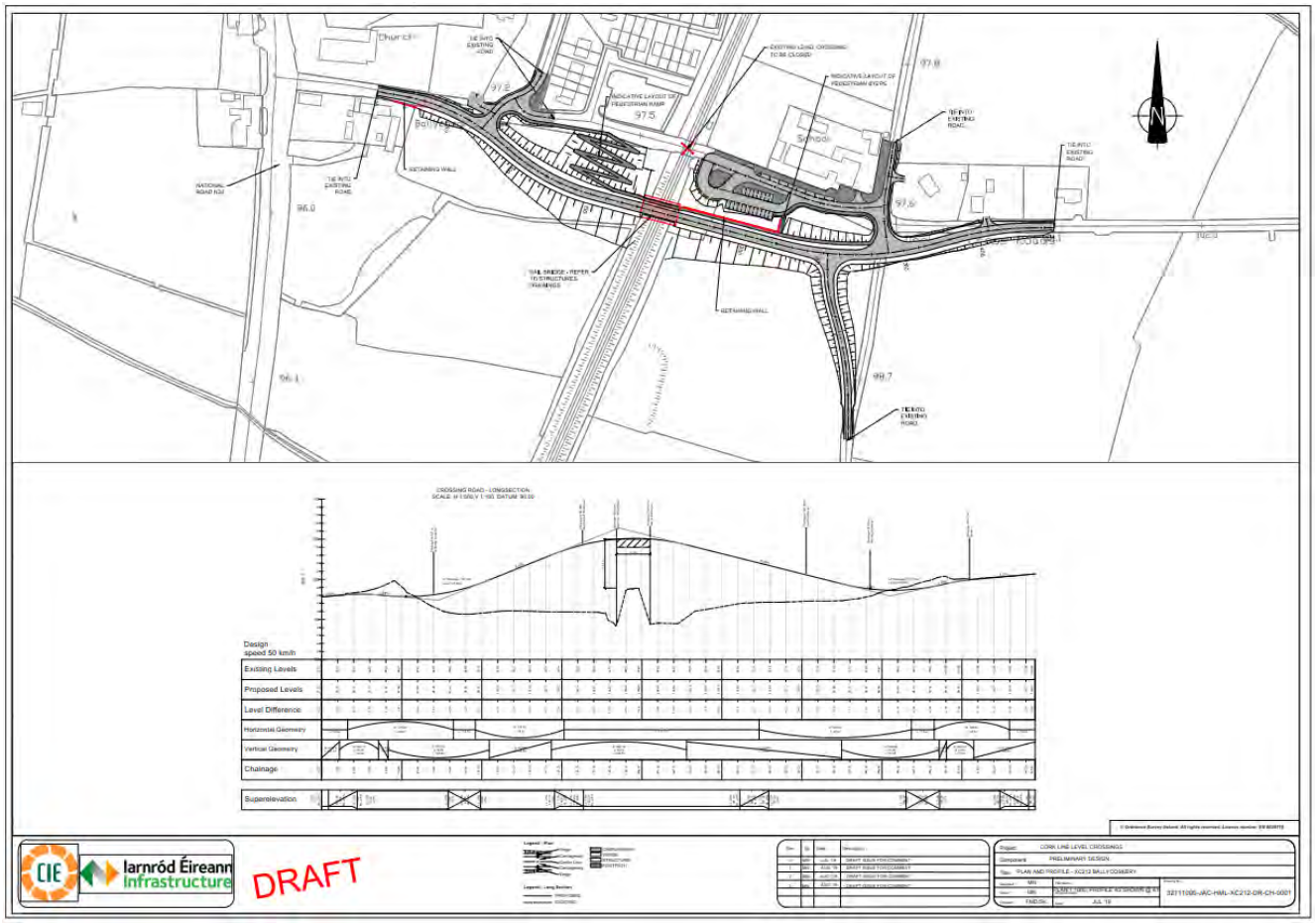


Figure 8.4 –XC212 Preferred Route Alignment

8.5 Alignment Design

It is proposed to close the existing XC212 level crossing and realign the L1533 local road. The proposed realignment will have a new road-over-rail bridge to the South of the closed level crossing, tying in before the N20 national road junction to the west and tying in after the existing school and crossroads to the east. It is proposed to change the existing crossroads to the east of the level crossing to a right-left stagger junction to improve safety, as per DN-GEO-03060. The stagger length would be 40m rather than the desirable minimum 50m, which is a departure from standard but would still deemed to be an improvement on the existing crossroad arrangement. A car park and turning area is proposed adjacent to the school to improve safety by preventing parking on the mainline for school drop off. The remaining sections of the existing local road pavement to the west of the closed level crossing will be broken up and removed as no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC209.

8.5.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

8.5.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 1058 (2.5% HGV's)
- Current 85% Speed: 53.3km/h
- Proposed Design Speed: 50km/h (currently sign posted at 50km/h).

8.5.3 Road Cross Section

The current carriageway cross sections at mainline tie-in points are 5m carriageway with 1m footpath to the west and 4.5m carriageway to the east. The local road to the south currently has a 3m carriageway. It is proposed to provide a 6m wide carriageway for the mainline (as per previous comments from Cork County Council), tapering down to the existing cross sections at tie-in points. It is proposed to provide a 4m carriageway with 1m verge on the local road to the south, tapering down to 3m at the tie-in. A 2m wide footpath is proposed along the north side of the bridge. This footpath will be online to the east of the bridge and taken offline to the west of the bridge in order to provide compliant gradient of 5% along the footpath. Verges will be widened as required for safety barrier set-back and working width.

8.5.4 Gradients

A relaxation in the vertical gradient to 8% is required on the western approach to the bridge tie back into the existing housing estate entrance. The maximum gradient for the rest of the scheme is 5% on the eastern approach (to accommodate the online footpath). The minimum gradient will be 1.7% to prevent any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

8.5.5 Vertical Curves

The two Sag K values of 6.5 are relaxations of 1 step below the desirable minimum value of 9 for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

The three Crest K values of 6.5 are relaxations of 1 step below the desirable minimum value of 10 for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031. Crest K at Ch 0+020 is required to tie-in to existing footpath and retaining wall to the north.

8.5.6 Horizontal Curves

For the mainline alignment, there are four proposed horizontal curves

- Ch. 0+015 to 0+080: 127m radius – 1 step relaxation below desirable minimum with superlevation of 3.5%.
- Ch. 0+095 to 0+155: 127m radius – 1 step relaxation below desirable minimum with superlevation of 3.5%.
- Ch. 0+275 to 0+370: 180m radius – desirable minimum R with superelevation of 3.5%.
- Ch. 0+385 to 0+430: 180m radius – desirable minimum R with superelevation of 3.5%.

8.5.7 Visibility

There is a 1 step reduction in Stopping Sight Distance over the rail bridge due to the 1 step reduction in vertical crest curve. This is within the 105m (1.5*SSD for 50km/h Design Speed) approach to the junction at Ch 0+305 and is therefore a departure from standards. It is proposed to mitigate this by have additional warning signs at the crest curve.

For the rest of the mainline alignment, verges have been widened where required to allow for Desirable Minimum Stopping Sight Distance of 70m over the full length of the proposed road.

8.5.8 Traffic

Data shown in Table 8.1 below from 24 hour traffic count carried out in June 2011.

Table 8.1 – XC212 2011 Traffic Counts

	Description	Eastbound	Westbound	Total / Average
Pedestrians	Adult	23	16	39
	Children	45	1	46
	Total	68	17	85
Vehicles	PCL/MCL	4	4	12
	Cars and LGV's	478	458	936
	HGV's	17	10	27
	Buses	43	40	83
	Total AADT	542	512	1058
Speeds	Max	65	80	72.5
	Min	5	5	5
	Mean	36.5	39.5	38.0
	85% Speed	48.6	56.5	53.3

8.6 General Arrangement Drawings

Proposed traffic signs, road markings, safety barriers, drainage design and utilities diversions are shown on the General Arrangement drawing for XC212, included in Appendix B.

8.6.1 Drainage Design

There will be two catchments, separated by the railway line. The drainage will be a combination of kerb and gully to carrier drains for the paved areas (including the structure), and interceptor ditches at the base of embankments. It is assumed that there will be capacity within the proposed drainage system for any attenuation requirement. There is no additional treatment of runoff proposed at this stage.

Refer to Appendix B for drainage plans and outfall details on the General Arrangement drawings. Topographical survey information will be required to confirm the drainage outfall locations before detailed design stage.

8.7 Structures

1no. Road-over-Rail bridge and 1no. Retaining Wall and adjacent steps required.

Refer to Structural Design in Appendix C for more detail.

8.8 Environmental Constraints

The proposed solution for the XC212 is to close the existing crossing and provide a new road-over-rail bridge to the south west of the existing crossing.

There would be environmental benefits from this change as a result of reduced numbers of idling traffic and the resultant noise and air quality effects. The movement of the crossing is very short so disruption to local communities form the change would be minimal in operation. There would be the visual impact of a new bridge

close to the community and the loss of greenfield space across from the Beechwood Road estate, however. There has been opposition to the proposal for a bridge here in the past, as it was too close to the community.

During construction, there is potential for significant disruption to the local community from the building of the bridge. It is very close to the small estate of Beechwood Road and access to the site for construction traffic would be limited to use of local roads. Noise, dust and construction traffic are likely to be the biggest issues at this site. Generic construction effects would also apply here in terms of soil and water and visual effects. Silty water runoff and dewatering in particular may be an issue as there is potential for the discharge of such water into ditches and surface water systems which are hydrologically connected to the Awbeg River and the Blackwater (Cork/Waterford) SAC. Other ecological effects would be from loss of habitat for birds and bats.

9. XC215 Shinanagh

9.1 Introduction

Level Crossing XC215, Shinanagh is a ‘CD-Type’ manually operated gated level crossing located at 134 miles 260 yards on the Dublin to Cork. The level crossing is located on local road L1320 in the townland of Imphrick, County Cork.

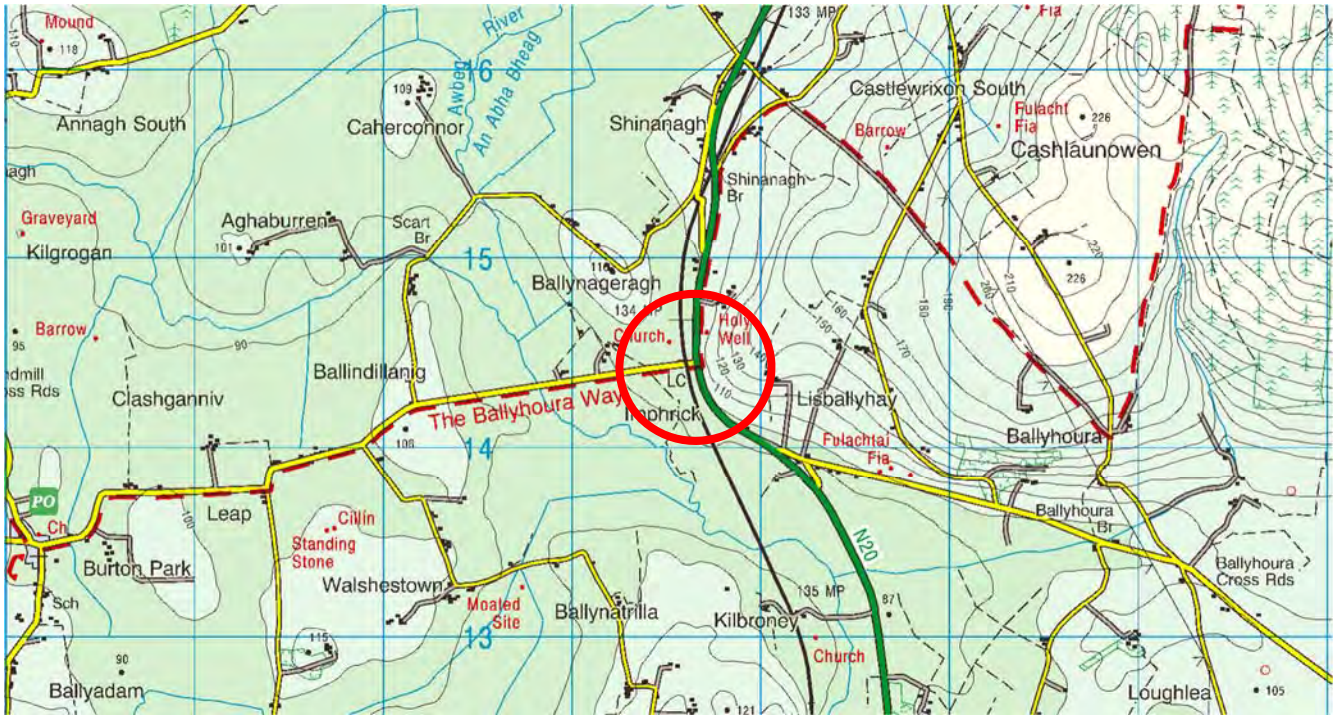


Figure 9.1 – XC215 Scheme Location

XC215 is designated a ‘CD-Type’ level crossing but it has been operated as a ‘CX-Type’ level crossing for over 25 years and is manned on a 24 hour basis. Its operation as a ‘CX-Type’ crossing results in the gates being normally open to road traffic with the gate keeper closing the gates as required for rail traffic.

The level crossing is located in a rural area with low density individual housing in the vicinity. The level crossing is immediately adjacent to the junction between the N20 National Primary Route and the L1320 local road. The N20 national Primary route is due to be downgraded on the completion of the M20. The level crossing is proximate to the Awbeg River which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 1053 following a 24 hour traffic count in June 2011. The level crossing has a Collective Risk Factor of 4.80x10-3 and is currently ranked 18 of 970 level crossings on the IÉ network in the LCRM.

Figure 9.2 – Level Crossing XC215

9.2 History

In 2010, Iarnród Éireann commissioned Roughan & O'Donovan Consulting Engineers to develop concept stage options for the closure of the level crossing XC215. 2 no. options for the provision of alternative access via a new road-over-rail bridge to the south of the level crossing or via an existing road-over-rail bridge (OBC306) to the north of the level crossing were developed.

When the concept stage options were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners. No discussions were held with the affected landowners.

Subsequent to the development of concept designs in 2011, the alternative access proposal was not progressed due to funding constraints.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

9.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC215 is closure and alternative route via new road alignment and new/existing road-over-rail bridge.

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 5.3 below shows the 4no. alternative route options that were considered.

- Green Option – New road alignment to East of level crossing. Requires Pink or Orange tie-in Option.
- Blue Option – New road alignment to North of level crossing. Requires Pink or Orange tie-in Option.
- Red Option – New road-over-rail bridge to West to level crossing. New junction on N20.

- Pink Tie-in Option – Extend diversion to existing junction on N20 with some traffic restrictions required at existing bridge junction.
- Orange Tie-in Option – Upgrade existing junction on N20.

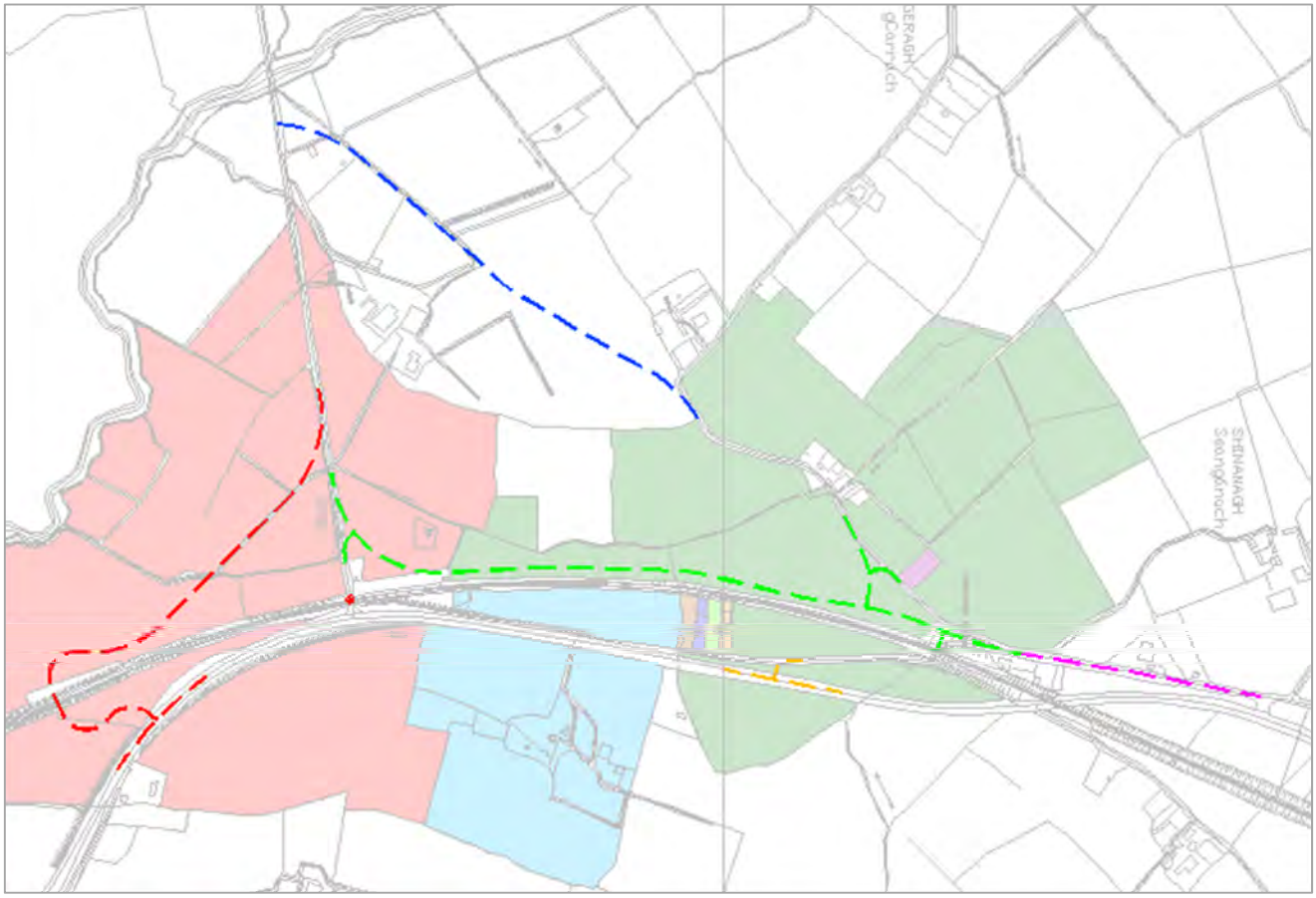


Figure 9.3 –XC215 Route Options

A Route Options Report was developed and has been included in Appendix D. The Green Route, combined with the Orange Tie-in option was identified as the preferred route. The preferred route was then progressed to preliminary design stage.

9.4 Proposed Solution

The preferred solution for the elimination/de-manning of the level crossing XC215, Shinanagh is through provision of a new road alignment diverting traffic to an existing road-over-rail bridge, it also involves the upgrade of the existing junction onto the N20. It is proposed that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the remaining manned public road level crossings on the Cork Line. Refer to Figure 9.4 below for the preferred route alignment.

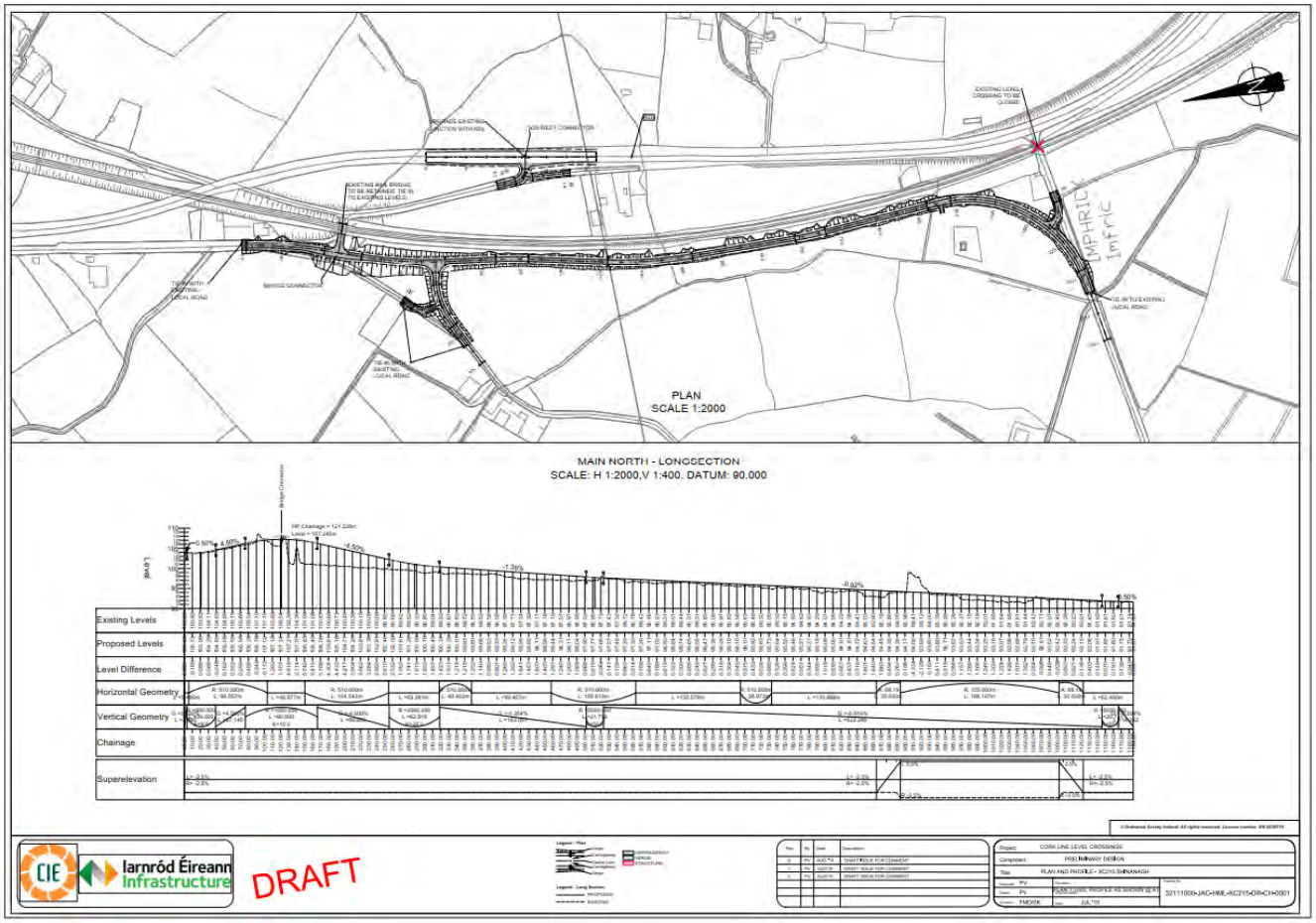


Figure 9.4 –XC215 Preferred Route Alignment

9.5 Alignment Design

It is proposed to close the existing XC215 level crossing and divert the traffic, along a new section of local road, to an existing road-over-rail bridge to the north. The existing tie-in to this bridge will be improved, it is also proposed to upgrade the existing junction onto N20 national road at this location, to accommodate the increase in traffic numbers. The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC209.

9.5.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

9.5.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 1053 (4.9% HGV's)
- Current 85% Speed: 50.1km/h
- Proposed Design Speed: 50km/h.

9.5.3 Road Cross Section

The current carriageway cross sections at mainline are approximately 6m wide at the southern tie-in, 5m wide at the northern tie-in and 4m wide at the side road tie-in. It is proposed to provide a 5.5m wide carriageway with 3m verges, tapering back to existing carriageway widths at tie-ins.

9.5.4 Gradients

The maximum gradient will be up to 4.5% on the approach to the existing rail bridge. The minimum gradient will be 0.92%, this will have a normal camber throughout, preventing any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

9.5.5 Vertical Curves

The sole Crest K value is at the desirable minimum value for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

The maximum Sag K value is 50, the minimum Sag K value proposed meets the desirable minimum values for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

9.5.6 Horizontal Curves

For the mainline alignment, there are 6 proposed horizontal curves

- Ch. 0+010 to 0+100: 510m radius – Minimum R without elimination of Adverse Camber and Transitions.
- Ch. 0+150 to 0+255: 510m radius – Minimum R without elimination of Adverse Camber and Transitions.
- Ch. 0+320 to 0+360: 510m radius – Minimum R without elimination of Adverse Camber and Transitions.
- Ch. 0+460 to 0+560: 510m radius – Minimum R without elimination of Adverse Camber and Transitions.
- Ch. 0+695 to 0+735: 510m radius – Minimum R without elimination of Adverse Camber and Transitions.
- Ch. 0+895 to 1+090: 180m radius – 1 step below Desirable Minimum with superelevation of 3.5%.

9.5.7 Visibility

Desirable Minimum Stopping Sight Distance of 70m is achieved over the full length of the proposed road.

9.5.8 Traffic

Data shown in Table 9.1 below from 24 hour traffic count carried out in June 2011.

Table 9.1 – XC215 2011 Traffic Counts

	Description	Eastbound	Westbound	Total / Average
Pedestrians	Adult	0	1	1
	Children	0	0	0
	Total	0	1	1
Vehicles	PCL/MCL	12	7	19
	Cars and LGV's	478	503	981
	HGV's	32	20	52
	Buses	0	1	1
	Total AADT	522	531	1053
Speeds	Max	68.3	62.3	65.3
	Min	7.9	0.9	4.4
	Mean	43.4	37.6	40.5
	85% Speed	54.0	46.1	50.1

9.6 General Arrangement Drawings

Proposed traffic signs, road markings, safety barriers, drainage design and utilities diversions are shown on the General Arrangement drawing for XC215, included in Appendix B.

9.6.1 Drainage Design

The road carriageway will be over the edge drainage to interceptor ditches running along the base of the embankments. It is assumed that there will be capacity within the proposed drainage system for any attenuation requirement. There is no additional treatment of runoff proposed at this stage.

Refer to Appendix B for drainage plans and outfall details on the General Arrangement drawings. Topographical survey information will be required to confirm the drainage outfall locations before detailed design stage.

9.7 Structures

No structures are required at this location.

9.8 Environmental Constraints

The proposed solution for the XC215 is for a diversion to an existing road-over-rail bridge further north. The diversion would require a new connecting road to run alongside the railway.

As with the other sites, there would be environmental benefits from this change as a result of reduced numbers of idling traffic and the resultant noise and air quality effects at the crossing. Here again, the movement of the crossing is very short so disruption to local communities from the change would be minimal in operation. There would be the visual impact of a new road, but this would be alongside the railway and there are few properties with views of it that might be affected. Drainage from the road is likely to be via local ditches, which are tributaries of the Awbeg River where it is within the Blackwater (Cork/Waterford) SAC. There is therefore a potentially significant effect on water quality and biodiversity during operation.

During construction, there is potential for disruption to the local community from the building of the road, however it is distant from most properties and so should not be a significant issue. Generic construction effects

would also apply here in terms of soil and water and visual effects. Silty water runoff and dewatering in particular may be an issue as there is potential for the discharge of such water into ditches and surface water systems which are hydrologically connected to the Awbeg River and the Blackwater (Cork/Waterford) SAC. Other ecological effects would be from loss of habitat for birds and bats.

10. XC219 Buttevant

10.1 Introduction

Level Crossing XC219, Shinanagh is a 'CX-Type' manually operated gated level crossing located at 137 miles 315 yards on the Dublin to Cork. The level crossing is located on regional road R522 just on the outskirts of Buttevant in the townland of Greggane, County Cork.

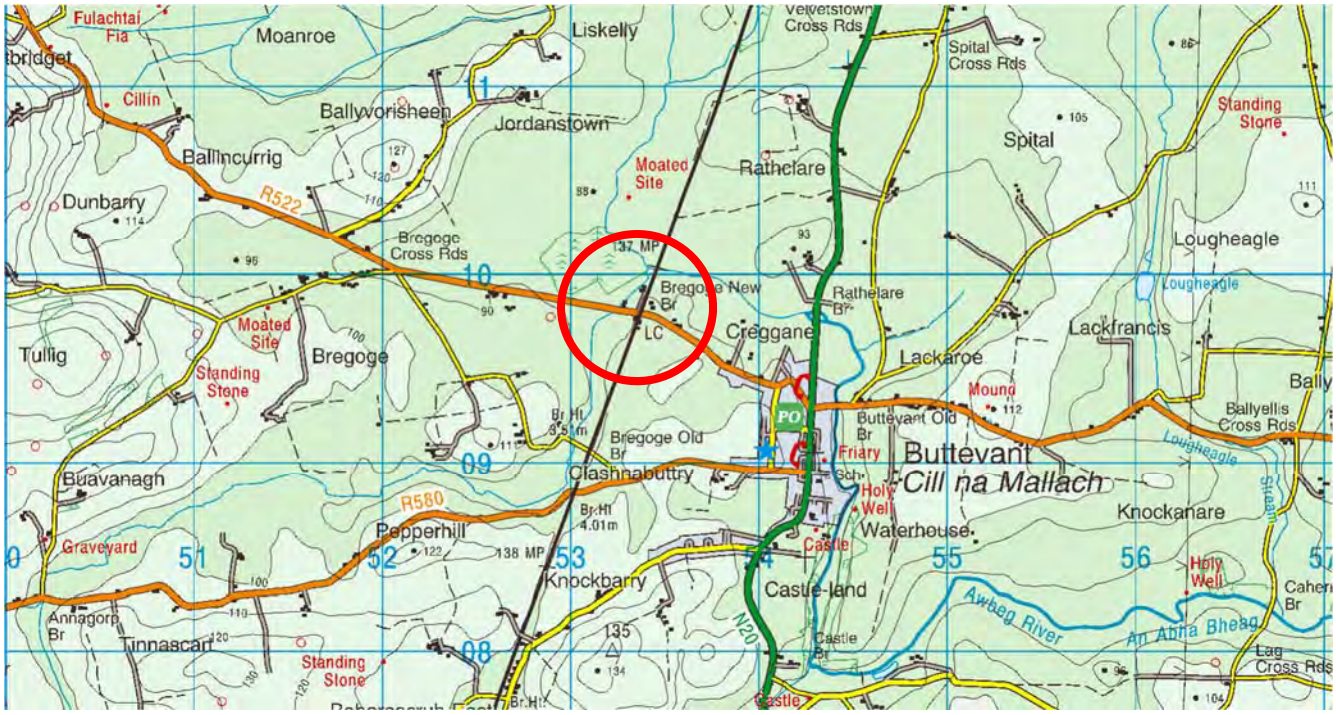


Figure 10.1 – XC219 Scheme Location

The level crossing is manned on a 24 hour basis and the gates are normally open to road traffic with the gate keeper closing the gates as required for rail traffic.

The level crossing is located in a rural area with low density individual housing in the vicinity. The level crossing is directly adjacent to the former Buttevant Station, the site of the former station is currently in use by Iarnród Éireann as a maintenance yard and contains a number of derelict buildings. The level crossing is proximate to the Awbeg River which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). There are known archaeological monuments in the vicinity of the level crossing, refer to the Archaeological Assessment Reports in Appendix E.

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 2185 following a 24 hour traffic count in June 2011. The level crossing has a Collective Risk Factor of 2.10x10-3 and is currently ranked 38 of 970 level crossings on the IÉ network.

Figure 10.2 – Level Crossing XC219

10.2 History

In 2010, Iarnród Éireann commissioned Roughan & O'Donovan Consulting Engineers to develop concept stage options for the closure of the level crossing XC219. The provision of alternative access via a new road-over-rail bridge was developed to close XC219.

When the concept stage options were being developed, it was proposed to progress the seven level crossing closures as individual schemes. Planning permission was to be sought from the relevant local authority and any lands required for the scheme were to be acquired by agreement from landowners.

Initial discussions were held with the affected landowners and their solicitors/engineers, to whom the scheme was broadly acceptable. The concept design was further developed in conjunction with Cork County Council with the intention of seeking planning permission for the scheme, however no further progress was made due to funding constraints.

In March 2018, the board of Iarnród Éireann approved the preparation of a feasibility study into the elimination/de-manning of the 7 remaining manned public road level crossings on the Dublin to Cork line. As part of this feasibility study into the elimination/de-manning of the 7 level crossings, legal advice was sought from CIÉ Solicitors on the most appropriate mechanism to deliver the project. The resulting Senior Counsel legal opinion recommended that this would be best achieved through the application to An Bord Pleanála for a Railway Order.

10.3 Options Considered

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC219 is closure and alternative route via new road alignment and new road-over-rail bridge.

Prior to progressing the preliminary design, a number of alternative route options were reviewed and evaluated under a three tier multi-criteria assessment (Economy, Engineering/Technical Assessment, and Environmental Constraints). Figure 5.3 below shows the 4no. alternative route options that were considered.

- Green Option – New road-over-rail bridge to South of level crossing.
- Blue Option – New road-over-rail bridge to South to level crossing.
- Red Option – New road-over-rail bridge to North to level crossing.

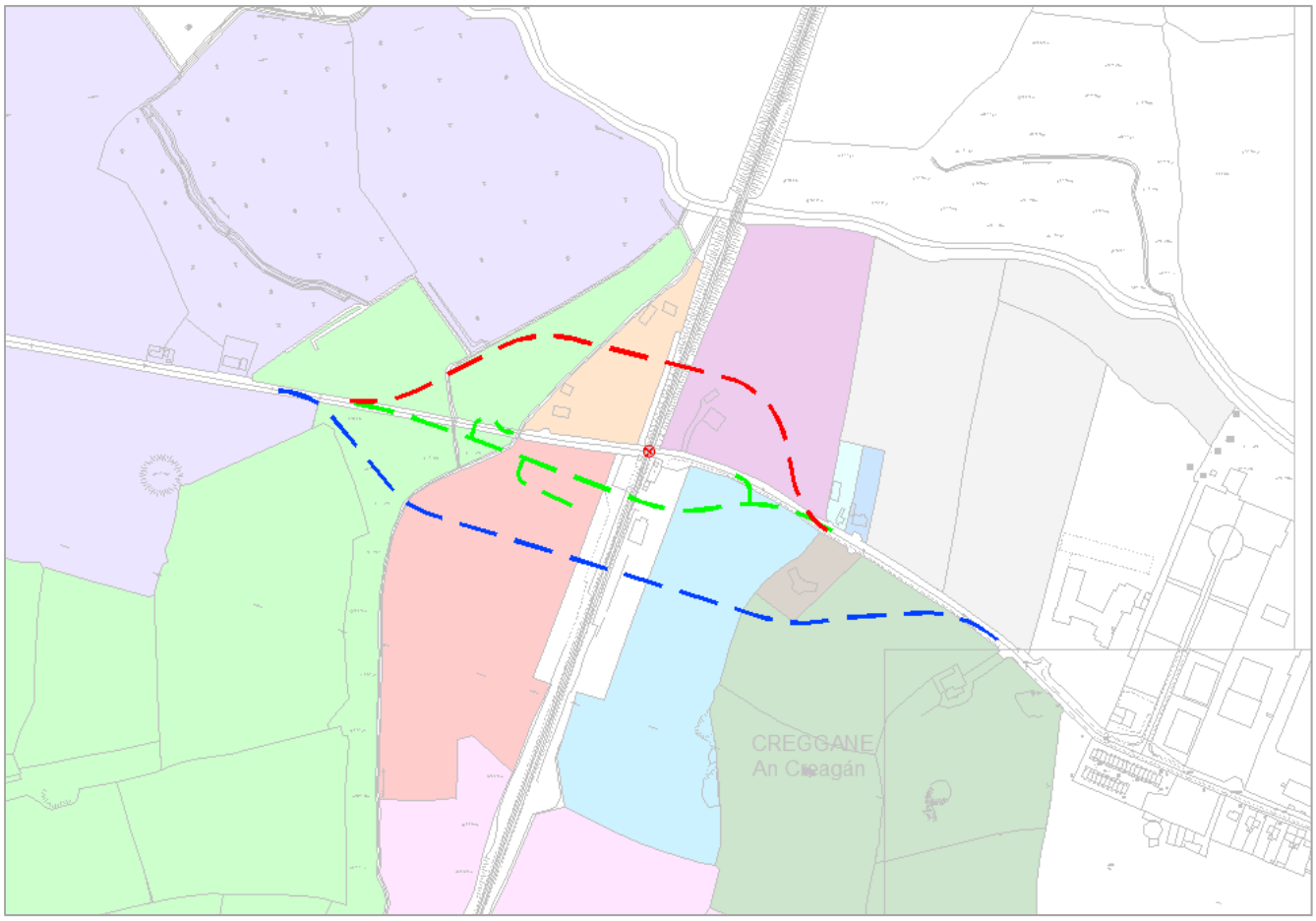


Figure 10.3 –XC219 Route Options

A Route Options Report was developed and has been included in Appendix D. The Green Route was identified as the preferred route. The preferred route was then progressed to preliminary design stage.

10.4 Proposed Solution

The preferred solution for the elimination/de-manning of the level crossing XC219, Buttevant is through the provision of alternative access across the railway line via a new road-over-rail bridge. It is proposed that the

necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order to eliminate/de-man the remaining manned public road level crossings on the Cork Line. Refer to Figure 10.4 below for the preferred route alignment.

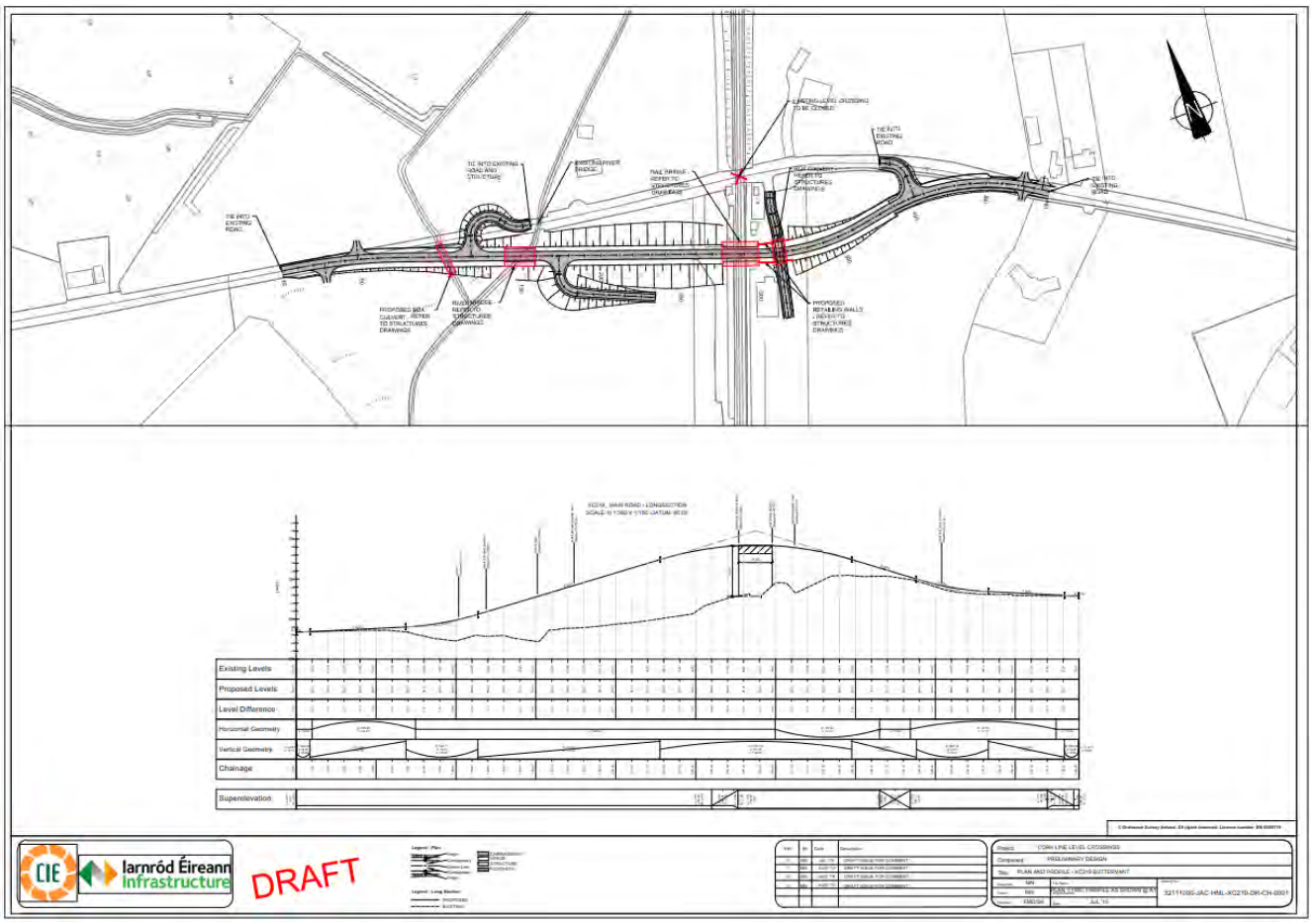


Figure 10.4 –XC219 Preferred Route Alignment

10.5 Alignment Design

It is proposed to close the existing XC219 level crossing and realign the R522 regional road. The proposed realignment will have a new road-over-rail bridge to the South of the closed level crossing, tying back into the existing regional road to the east and west of the crossing. The new alignment is also crossing an existing stream and a proposed river bridge structure is proposed at this location. The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required. Refer to Appendix A for the Alignment Plan and Profile drawing for XC209.

10.5.1 Design Standards

It is proposed to adopt the design standards within the TII Rural Road Link Design, DN-GEO-03031, for the design of this scheme.

10.5.2 Design Speed

The design speed was proposed to be consistent with anticipated vehicle speeds and existing road alignment.

- Current AADT: 2185 (9.6% HGV's)
- Current 85% Speed: 72.6km/h
- Proposed Design Speed: 50km/h

As part of the alignment design it would be advised that the 50km/h speed limit in Buttevant would be extended over the proposed alignment. Consultation would be required with the relevant department of Cork County Council to progress this separately to the Rail Order process.

10.5.3 Road Cross Section

The current carriageway cross sections are approximately 6m wide. It is proposed to provide a 6m wide carriageway. There is a footpath on the southern side of the eastern tie-in which joins the town with a memorial site on the southern side of the level crossing, a short section of footpath is proposed, to keep this link between the town and the memorial site. Verges will be widened as required for safety barrier set-back and working width or tie back into existing widths.

10.5.4 Gradients

The maximum gradient will be up to 6% on the approach to the new rail bridge. The minimum gradient will be 1% to prevent any water ponding on the proposed pavement. These are within the desirable maximum and minimum gradients permitted under Section 4.1 of DN-GEO-03031.

10.5.5 Vertical Curves

Crest and Sag K values proposed meet the desirable minimum values for a 50km/h design speed, as per Table 9.3 of DN-GEO-03031.

10.5.6 Horizontal Curves

For the mainline alignment, there are three proposed horizontal curves

- Ch. 0+010 to 0+075: 360m radius – Minimum R with superelevation of 2.5%.
- Ch. 0+300 to 0+365: 127m radius – 1 step below desirable minimum R with superelevation of 3.5%.
- Ch. 0+385 to 0+475: 127m radius – 1 step below desirable minimum R with superelevation of 3.5%.

10.5.7 Visibility

Desirable Minimum Stopping Sight Distance of 70m is achieved over the full length of the proposed road.

10.5.8 Traffic

Data shown in Table 10.1 below from 24 hour traffic count carried out in June 2011.

Table 10.1 – XC219 2011 Traffic Counts

	Description	Eastbound	Westbound	Total / Average
Pedestrians	Adult	0	0	0
	Children	0	0	0
	Total	0	0	0
Vehicles	PCL/MCL	10	8	18
	Cars and LGV's	956	1002	1958
	HGV's	101	98	199
	Buses	5	5	10
	Total AADT	1072	1113	2185
Speeds	Max	109.7	84.7	97.2
	Min	8.5	12.5	10.5
	Mean	63.0	56.6	59.8
	85% Speed	78.1	67.0	72.6

10.6 General Arrangement Drawings

Proposed traffic signs, road markings, safety barriers, drainage design and utilities diversions are shown on the General Arrangement drawing for XC219, included in Appendix B.

10.6.1 Drainage Design

There will be two catchments, separated by the railway line. The majority of the road carriageway will be over the edge drainage to interceptor ditches running along the base of the embankments. For the bridge deck, and the section of road alignment with embankments above 6m, kerb and gully drainage will be used, with a pipe connection down to the interceptor ditch. It is assumed that there will be capacity within the proposed drainage system for any attenuation requirement. There is no additional treatment of runoff proposed at this stage.

A flood modelling assessment will be carried out at the next stage to confirm maximum flood levels at the river bridge and extent of flood compensation required.

Refer to Appendix B for drainage plans and outfall details on the General Arrangement drawings. Topographical survey information will be required to confirm the drainage outfall locations before detailed design stage.

10.7 Structures

1no. Road-over-Rail bridge, 1no. River Bridge, 2no. Retaining Walls and 2no. Box Culverts required.

Refer to Structural Design in Appendix C for more detail.

10.8 Environmental Constraints

The proposed solution for the XC219 is for a new road-over-rail bridge to the south west of the existing crossing.

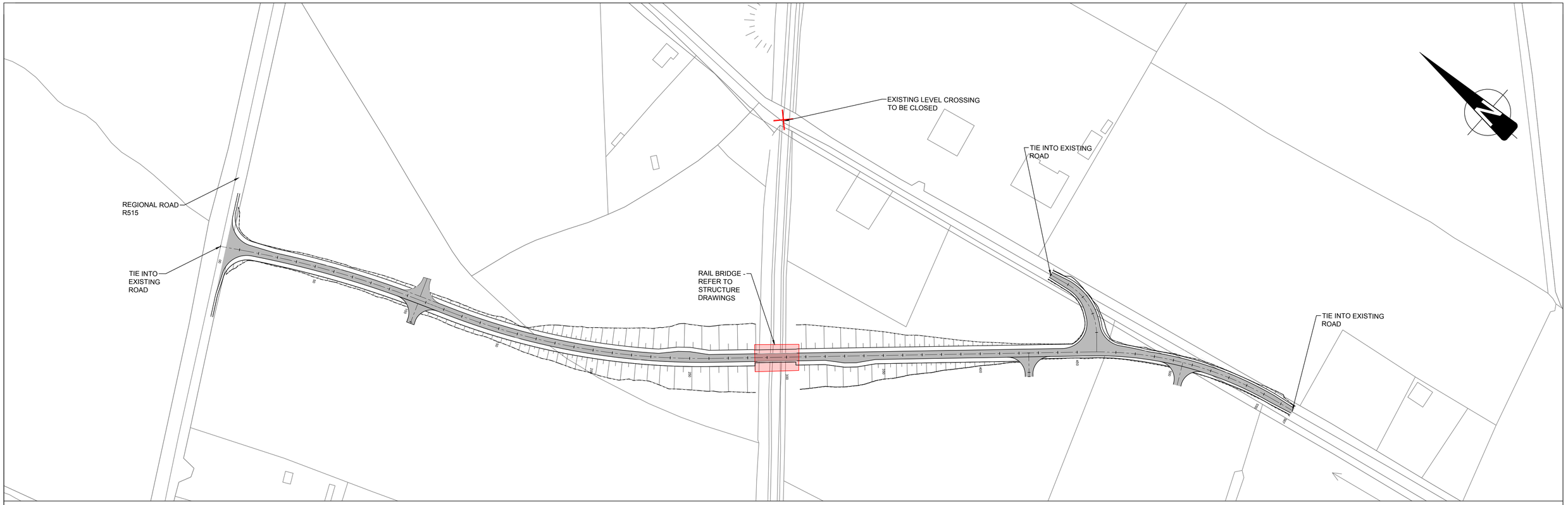
As with the other sites, there would be environmental benefits from this change as a result of reduced numbers of idling traffic and the resultant noise and air quality effects at the crossing, although this would be limited as there are few properties in close proximity to the existing crossing. Here again, the movement of the crossing is very short so disruption to local communities from the change would be minimal in operation. There would be

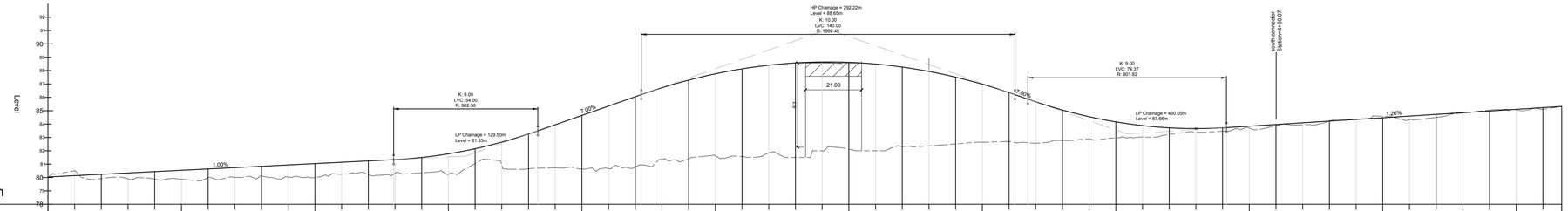
the visual impact of a new bridge. The north western access road to the bridge would cross the Awbeg River approximately 300m upstream of the Blackwater (Cork/Waterford) SAC. Drainage from the bridge and connecting roads is likely to be via local ditches, which are tributaries of the Awbeg River where it is within the Blackwater (Cork/Waterford) SAC. There is therefore a potentially significant effect on water quality and biodiversity during operation.

During construction, there is potential for disruption to the local community from the building of the bridge, however there are few properties nearby and so should not be a significant effect. Generic construction effects would also apply here in terms of noise, dust, soil and water and visual effects. Silty water runoff and dewatering in particular may be an issue as there is potential for the discharge of such water into ditches and surface water systems which are hydrologically connected to the Awbeg River and the Blackwater (Cork/Waterford) SAC. Other ecological effects would be from loss of habitat for birds and bats.

Appendix A. Preliminary Alignment Plan & Profile Drawings

Drawing Title	Drawing Ref No.	Revision
PLAN AND PROFILE – XC201 THOMASTOWN	32111000-JAC-HML-XC201-DR-CH-001	0
PLAN AND PROFILE – XC211 NEWTOWN	32111000-JAC-HML-XC211-DR-CH-001	0
PLAN AND PROFILE – XC211 NEWTOWN - BLUE ROUTE OPTION	32111000-JAC-HML-XC211-DR-CH-002	
PLAN AND PROFILE – XC212 BALLYCOSKERY	32111000-JAC-HML-XC212-DR-CH-001	0
PLAN AND PROFILE – XC212 BALLYCOSKERY	32111000-JAC-HML-XC212-DR-CH-002	0
PLAN AND PROFILE – XC215 SHINANAGH	32111000-JAC-HML-XC215-DR-CH-001	0
PLAN AND PROFILE – XC219 BUTTEVANT	32111000-JAC-HML-XC219-DR-CH-001	0





XC201 CROSSING ROAD - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 78.00

XC201 SOUTH CONNECTOR - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 80.00

Iarnród Éireann
Infrastructure

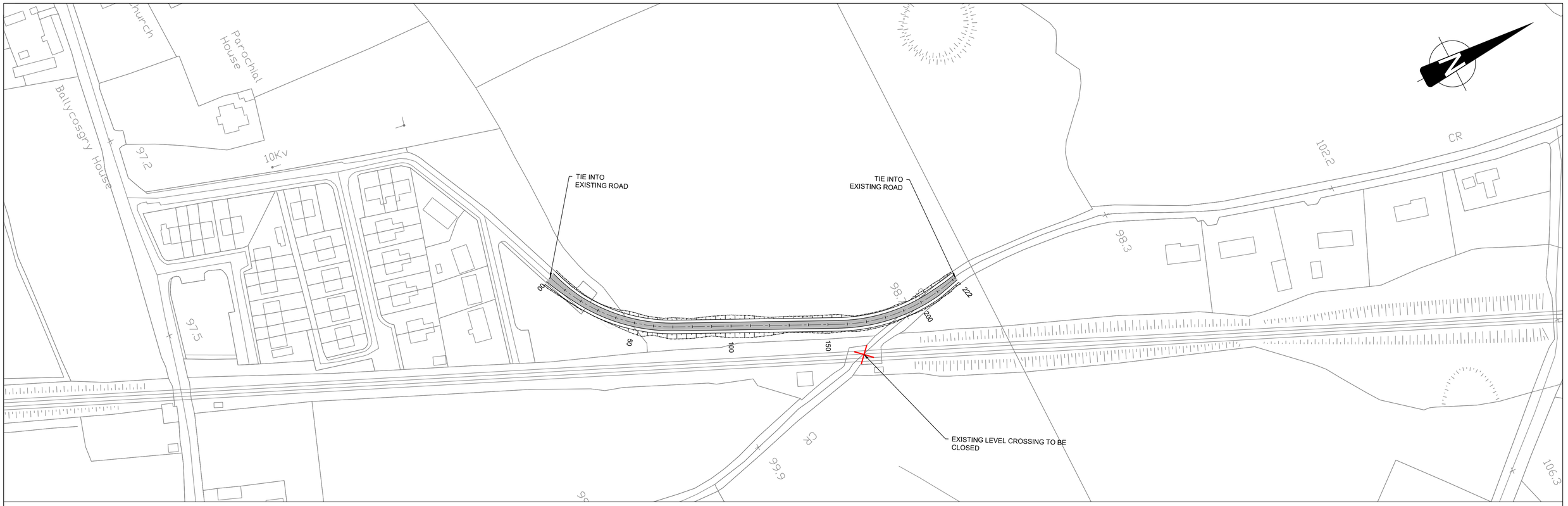
Legend - Plan
Verge
Carriageway
Centre Line
Carriageway
Verge

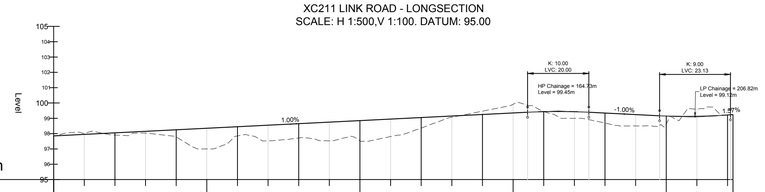
▨ CARRIAGEWAY
☐ VERGE
🟥 STRUCTURE

Legend - Long Section
—— PROPOSED
- - - EXISTING

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN AND PROFILE - XC201 THOMASTOWN
Designed: MN
Drawn: MN
Checked: FMD
File Name: -
Original scales: PLAN 1:1000, PROFILE AS SHOWN @ A1
Date: JUL '19
Drawing No. 32111000-JAC-HML-XC201-DR-CH-0001





XC211 LINK ROAD - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 95.00

Design
speed 50 km/h

Existing Levels	97.85	98.01	97.91	98.03	97.78	97.00	97.85	97.52	97.72	97.53	97.52	97.81	98.36
Proposed Levels	97.85	97.95	98.05	98.15	98.25	98.35	98.45	98.55	98.65	98.75	98.85	98.95	99.05
Level Difference	0.00	-0.06	0.14	0.12	0.47	1.35	0.60	1.02	0.93	1.22	1.33	1.14	0.69
Chainage	00.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00

Existing Levels	99.07	99.47	99.92	99.45	99.00	98.69	98.50	98.62	99.60	99.24	99.21
Proposed Levels	99.15	99.25	99.35	99.44	99.43	99.34	99.24	99.15	99.13	99.24	99.22
Level Difference	0.08	-0.22	-0.57	-0.02	0.43	0.65	0.74	0.53	-0.48	0.00	0.01
Chainage	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	221.79	220.00

Horizontal Geometry	L =5.39	R: 90.00 L: 65.62	L =84.55	R: 90.00 L: 60.37	L =5.87
Vertical Geometry	G =1.00% L =154.73	R =1000.05 K =10.00 L =20.00	G =-1.00% L =23.10	R =900.09 K =9.00 L =23.13	G =1.57% L =0.84

Superelevation	LL -2.5% 3.39 RL 2.5%	LL -3.5% 5.39 3.5%	LL -2.5% 73.01 RL 2.5%	LL -3.5% 71.01 3.5%	LL -2.5% 153.55 RL 2.5%	LL -3.5% 155.55 3.5%	LL -2.5% 217.92 RL 2.5%	LL -3.5% 215.92 3.5%

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Legend - Plan

- Verge
- Carriageway
- Centre Line
- Carriageway
- Verge

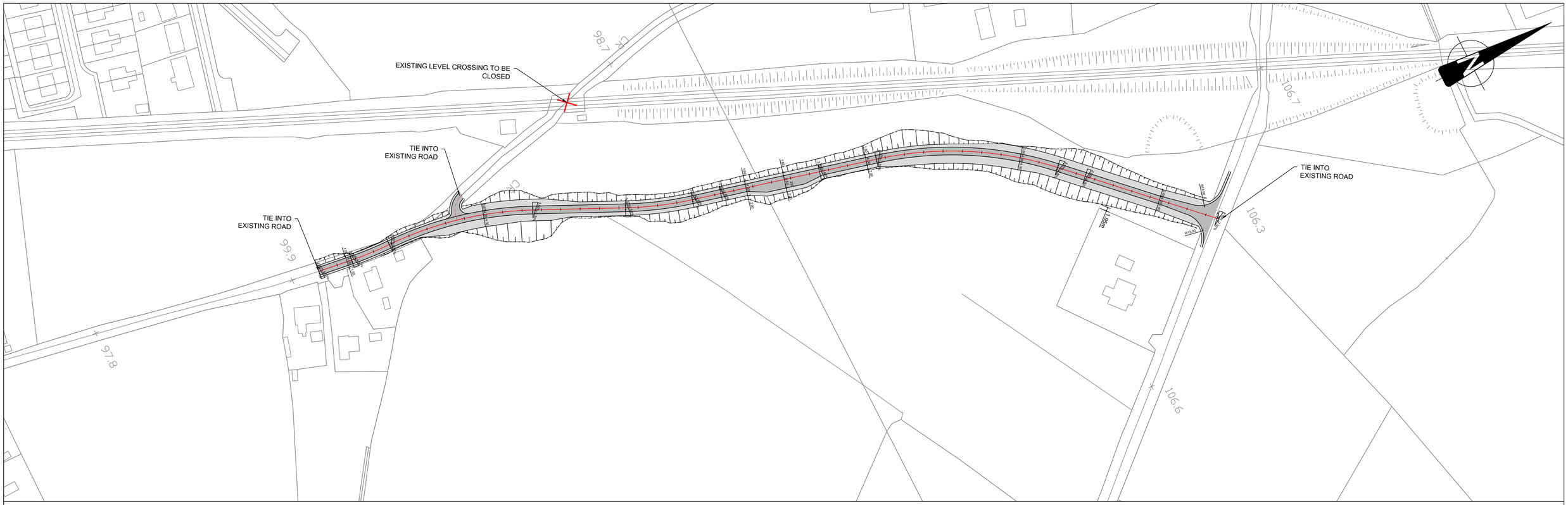
▨	CARRIAGEWAY
☐	VERGE

Legend - Long Section

━━━━	PROPOSED
– – – –	EXISTING

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN AND PROFILE - XC211 NEWTOWN
Designed: MN
Drawn: MN
Checked: FMD
File Name: -
Original scales: PLAN 1:1000, PROFILE AS SHOWN @ A1
Date: JUL '19
Drawing No. 32111000-JAC-HML-XC211-DR-CH-0001



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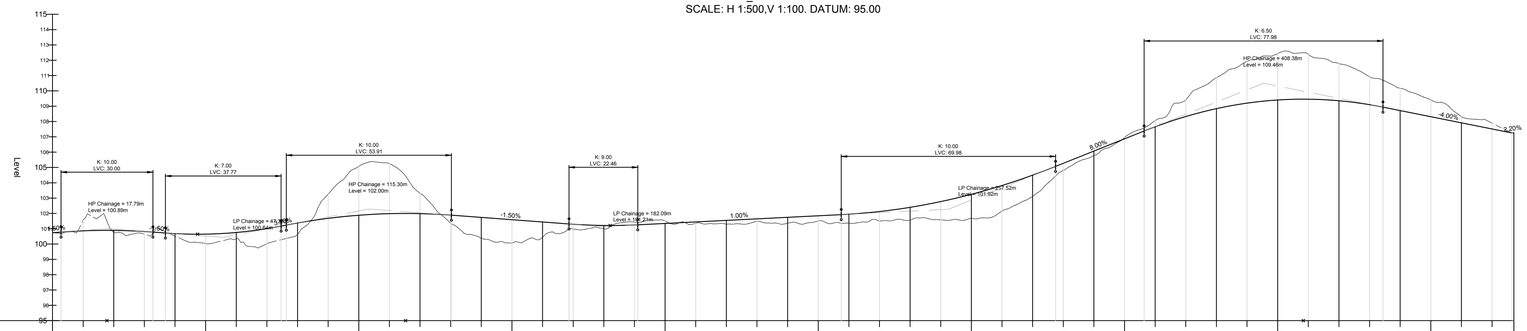

Existing Levels	100.74	101.54	100.77	100.64	100.52	100.03	100.35	100.02	100.63	103.26	105.07
Proposed Levels	100.74	100.86	100.89	100.82	100.68	100.65	100.75	101.01	101.37	101.68	101.88
Level Difference	0.00	-0.68	0.12	0.18	0.16	0.62	0.41	0.99	0.74	-1.58	-3.19
Chainage	00.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00

Existing Levels	105.25	103.31	101.36	100.37	100.07	100.44	100.99	101.00	101.42	101.51
Proposed Levels	101.98	101.99	101.89	101.74	101.59	101.44	101.29	101.21	101.25	101.35
Level Difference	-3.27	-1.32	0.53	1.37	1.52	1.00	0.30	0.21	-0.18	-0.16
Chainage	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00

Existing Levels	101.35	101.29	101.49	101.36	101.51	101.36	101.51	101.54	101.58	101.68
Proposed Levels	101.45	101.55	101.65	101.75	101.85	101.95	102.12	102.40	102.77	103.25
Level Difference	0.09	0.25	0.16	0.39	0.34	0.59	0.61	0.85	1.19	1.57
Chainage	210.00	220.00	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00

Existing Levels	102.17	103.10	104.81	105.77	106.96	108.06	109.41	110.86	111.93	112.43
Proposed Levels	103.82	104.50	105.27	106.07	106.87	107.66	108.33	108.84	109.20	109.40
Level Difference	1.66	1.39	0.46	0.30	-0.09	-0.40	-1.09	-2.02	-2.73	-3.03
Chainage	310.00	320.00	330.00	340.00	350.00	360.00	370.00	380.00	390.00	400.00

Existing Levels	112.39	111.79	110.92	110.17	109.41	108.32	107.89	107.26
Proposed Levels	109.46	109.36	109.10	108.71	108.31	107.91	107.51	107.26
Level Difference	-2.93	-2.43	-1.82	-1.46	-1.10	-0.40	-0.37	0.00
Chainage	410.00	420.00	430.00	440.00	450.00	460.00	470.00	477.11

Horizontal Geometry								
	L =17.87	R: 180.00 L: 21.07	R: 180.00 L: 76.59	L =47.83	R: 180.00 L: 34.80	L =97.09	R: 180.00 L: 94.61	L =87.25

Vertical Geometry							
	G =1.50% L =2.79	R =1000.00 K =10.00 L =30.00	G =-1.50% L =4.08	R =700.00 K =7.00 L =37.77	G =3.90% L =1.70	R =1000.00 K =10.00 L =53.91	G =-1.50% L =38.38
	R =900.00 K =9.00 L =22.46	G =1.00% L =66.43	R =1000.00 K =10.00 L =69.98	G =8.00% L =28.91	R =650.00 K =6.50 L =77.98	G =-4.00% L =42.18	G =2.20% L =0.55

Superelevation
LL -2.5% 0.00 RL 2.5%
LL -3.5% 17.87 3.5%
LL 3.5% 38.94 -3.5%
LL 3.5% 115.54 -3.5%
LL -3.5% 163.37 3.5%
LL -2.5% LL -3.5% 213.17 198.17 RL 2.5% 3.5%
LL -2.5% 265.26 RL 2.5%
LL 3.5% 295.26 -3.5%
LL 2.5% LL 3.5% 404.86 389.86 RL -2.5% -3.5%
LL 2.5% 476.16 RL -2.5%

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Legend - Plan
Verge
Carriageway
Centre Line
Carriageway
Verge
▨ CARRIAGEWAY
☐ VERGE

Legend - Long Section
PROPOSED
EXISTING

Rev	By	Date	Description
0	EB	Jan-20	DRAFT ISSUE

Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN AND PROFILE - XC211 NEWTON - BLUE ROUTE OPTION
Designed: FMD
Drawn: PV
Checked: FMD
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Date: Jan-20
Drawing No.
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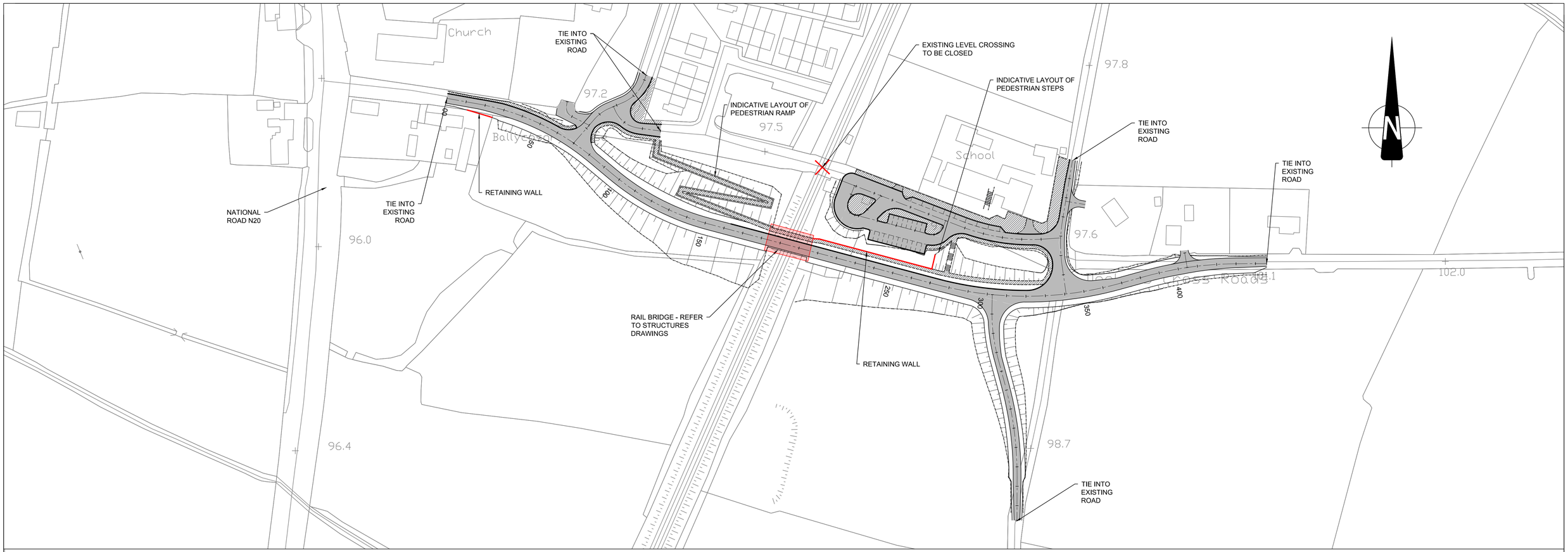

CROSSING ROAD - LONGSECTION
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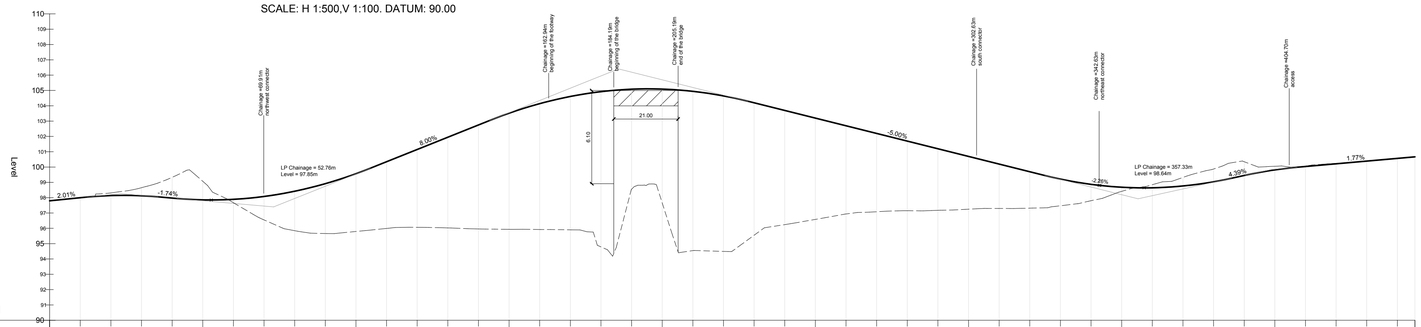

Design
speed 50 km/h

Existing Levels	97.80	98.00	98.31	98.65	99.33	99.07	97.67	96.55	95.84	95.66	95.79	95.99	96.07	96.03	95.96	95.94	95.92	95.90	94.79	98.55	97.65	94.55	94.49
Proposed Levels	97.80	98.00	98.14	98.13	97.97	97.86	97.89	98.08	98.42	98.92	99.57	100.35	101.15	101.95	102.75	103.52	104.14	104.61	104.92	105.08	105.09	104.94	104.64
Level Difference	0.00	0.00	-0.17	-0.53	-1.35	-1.21	0.22	1.53	2.58	3.25	3.77	4.36	5.08	5.92	6.79	7.58	8.21	8.70	10.13	6.53	7.44	10.40	10.15
Chainage	00.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	120.00	130.00	140.00	150.00	160.00	170.00	180.00	190.00	200.00	210.00	220.00

Existing Levels	95.55	96.24	96.58	96.94	97.08	97.15	97.18	97.25	97.30	97.32	97.47	97.80	98.41	98.85	99.32	99.87	100.35	100.05	100.06	100.24	100.40	100.58	100.67
Proposed Levels	104.19	103.69	103.19	102.69	102.19	101.69	101.19	100.69	100.19	99.69	99.22	98.87	98.68	98.65	98.76	99.04	99.45	99.82	100.03	100.21	100.39	100.57	100.67
Level Difference	8.65	7.45	6.61	5.76	5.11	4.55	4.02	3.45	2.90	2.38	1.74	1.07	0.27	-0.20	-0.56	-0.84	-0.90	-0.24	-0.03	-0.03	-0.02	-0.01	0.00
Chainage	230.00	240.00	250.00	260.00	270.00	280.00	290.00	300.00	310.00	320.00	330.00	340.00	350.00	360.00	370.00	380.00	390.00	400.00	410.00	420.00	430.00	440.00	445.74

Horizontal Geometry
L =16.22 | R: 127.00 L: 66.03 | L =13.79 | R: 127.00 L: 55.45 | L =121.79 | R: 180.00 L: 95.19 | L =14.22 | R: 180.00 L: 47.01 | L =16.04

Vertical Geometry
G =2.01% L =11.12 | R =650.17 K =6.50 L =24.34 | G =-1.74% L =5.97 | R =651.64 K =6.50 L =63.29 | G =8.00% L =38.80 | R =651.59 K =6.50 L =84.50 | G =-5.00% L =96.81 | R =650.68 K =6.50 L =61.05 | G =4.39% L =4.44 | R =650.87 K =6.50 L =17.04 | G =1.77% L =38.38

Superelevation
LL -2.5% 4.22 RL -2.5% | LL 0.0% 11.72 RL -2.5% | LL 2.5% 19.22 RL -2.5% | LL 3.5% 22.22 -3.5% | LL 3.5% 79.00 -3.5% | LL 0.0% 89.50 RL 0.0% | LL -3.5% 99.29 3.5% | LL -3.5% 145.50 3.5% | LL -2.5% 148.50 RL 2.5% | LL -2.5% 156.00 RL 0.0% | LL -2.5% 163.50 RL -2.5% | LL -2.5% 261.28 RL -2.5% | LL -2.5% 268.78 RL 0.0% | LL -2.5% 276.28 RL 2.5% | LL -3.5% 279.28 3.5% | LL -3.5% 365.09 3.5% | LL 0.0% 375.59 RL 0.0% | LL 3.5% 386.09 -3.5% | LL 3.5% 423.70 -3.5% | LL 2.5% 426.70 RL -2.5% | LL 0.0% 434.20 RL -2.5% | LL -2.5% 441.70 RL -2.5%

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CIE
Iarnród Éireann
Infrastructure

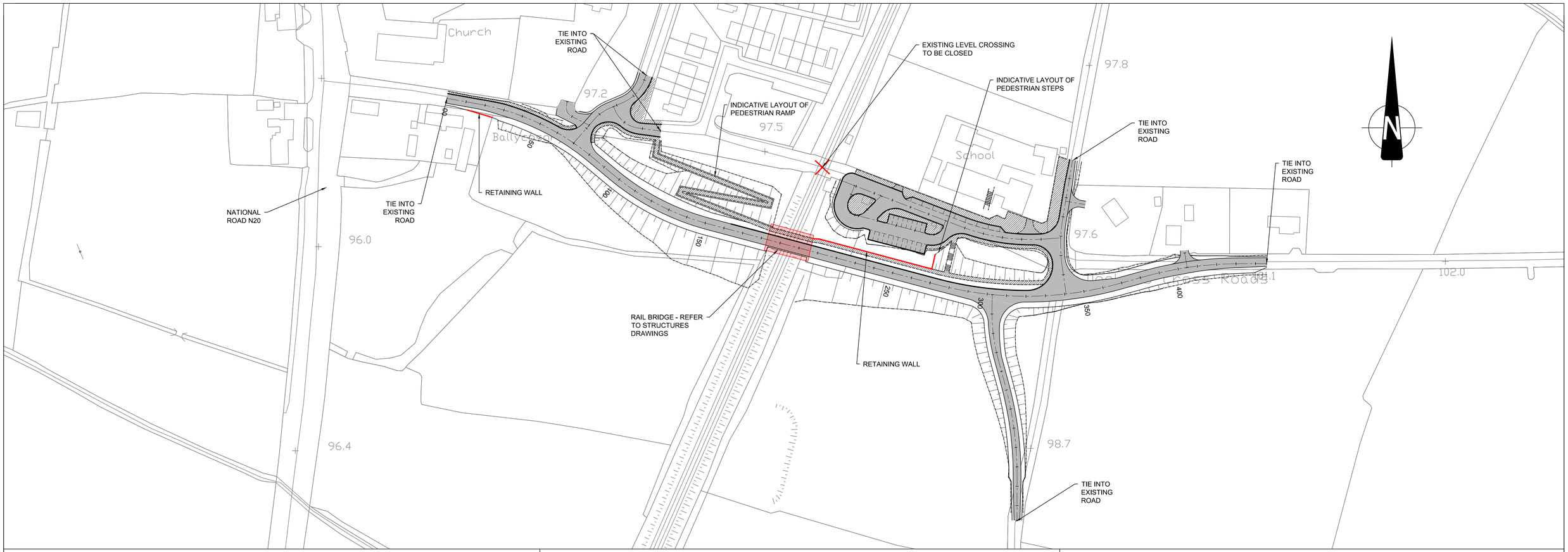
Legend - Plan
- Verge
- Carriageway
- Centre Line
- Carriageway
- Verge

▨	CARRIAGEWAY
☐	VERGE
🟥	STRUCTURE
▨	FOOTPATH

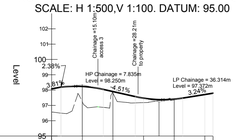
Legend - Long Section
- PROPOSED
- EXISTING

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN AND PROFILE - XC212 BALLYCOSKERY
Designed: MN
Drawn: MN
Checked: FMD
File Name: -
Original scales: PLAN 1:1000, PROFILE AS SHOWN @ A1
Date: JUL '19
Drawing No. 32111000-JAC-HML-XC212-DR-CH-0001

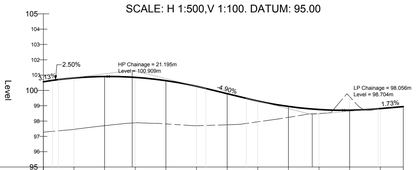


NORTHWEST CONNECTOR - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 95.00



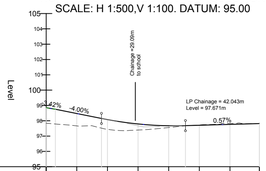
Existing Levels	96.56	97.24	97.81	97.16	97.36	97.71
Proposed Levels	98.08	98.24	97.91	97.47	97.41	97.71
Level Difference	1.52	1.00	0.09	0.29	0.05	0.00
Horizontal Geometry		L =16.63	R: 20.00 L: 8.99	L =7.98	R: 20.00 L: 16.48	L =2.58
Vertical Geometry		G =3.98% K =200.15 L =4.08	K =2.00 L =13.78	G =-6.51% L =10.42	R =200.15 K =2.00 L =15.51	G =3.26% L =6.86
Chainage	00.00	10.00	20.00	30.00	40.00	50.00 52.67

SOUTH CONNECTOR - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 95.00



Existing Levels	97.28	97.46	97.70	97.89	97.81	97.68	97.75	97.95	98.24	98.50	98.60	98.80	98.94
Proposed Levels		100.81	100.91	100.85	100.64	100.27	99.79	99.31	98.95	98.75	98.71	98.81	98.94
Level Difference		3.35	3.21	2.96	2.82	2.59	2.03	1.36	0.71	0.25	-0.89	0.01	0.00
Horizontal Geometry		L =7.26	R: 90.00 L: 25.65		L =14.39		R: 180.00 L: 47.94			L =22.26			
Vertical Geometry		G =3.50% L =7.26		R =650.63 K =6.50 L =48.12		G =-4.90% L =13.42		R =650.00 K =6.49 L =43.07			G =1.73% L =6.19		
Chainage	00.00	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	100.00	110.00	117.51

NORTHEAST CONNECTOR - LONGSECTION
SCALE: H 1:500,V 1:100. DATUM: 95.00



Existing Levels	98.84	98.41	98.08	97.79	97.67	97.71	97.76 97.82
Proposed Levels	98.86	98.47	98.08	97.79	97.67	97.71	97.76 97.82
Level Difference	1.02	0.61	0.63	0.40	0.12	-0.02	-0.07 -0.02
Horizontal Geometry		L =15.05	R: 75.00 L: 23.13			L =31.42	
Vertical Geometry		G =-4.42% L =11.00	G =-4.00% L =13.04	R =600.42 K =6.00 L =27.43		G =0.57% L =24.12	
Chainage	00.00	10.00	20.00	30.00	40.00	50.00	60.00 69.59

CIE Iarnród Éireann Infrastructure

Legend - Plan

Verge
Carriageway
Centre Line
Carriageway
Verge

CARRIAGEWAY
VERGE
STRUCTURE
FOOTPATH

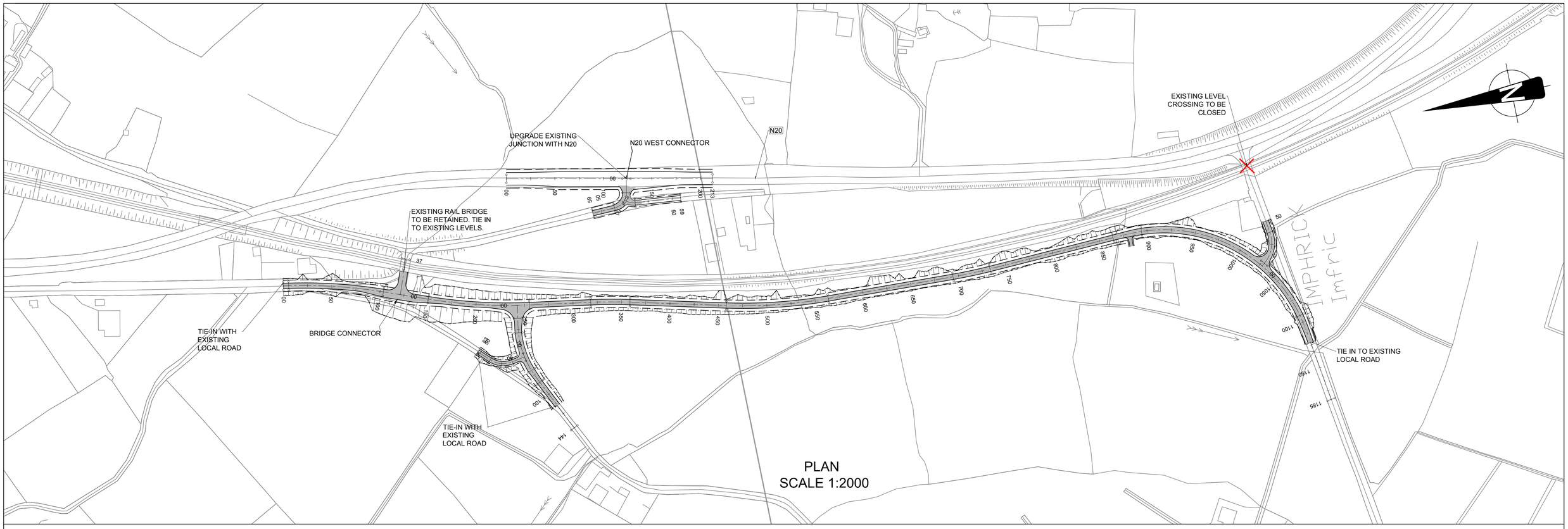
Legend - Long Section

PROPOSED
EXISTING

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

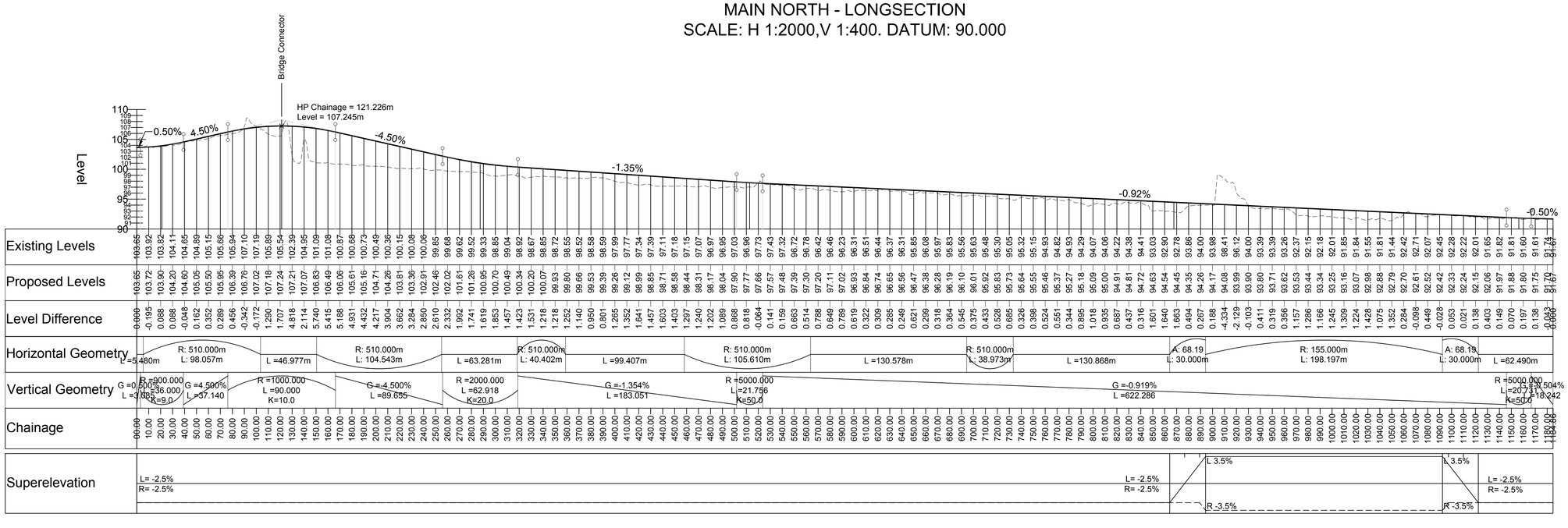
Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN AND PROFILE - XC212 BALLYCOSKERY

Designed:	MN	File Name: -	Drawing No.
Drawn:	MN	Original scales: PLAN 1:1000, PROFILE AS SHOWN @ A1	32111000-JAC-HML-XC212-DR-CH-0002
Checked:	FMD	Date: JUL '19	



PLAN
SCALE 1:2000

MAIN NORTH - LONGSECTION
SCALE: H 1:2000,V 1:400. DATUM: 90.000



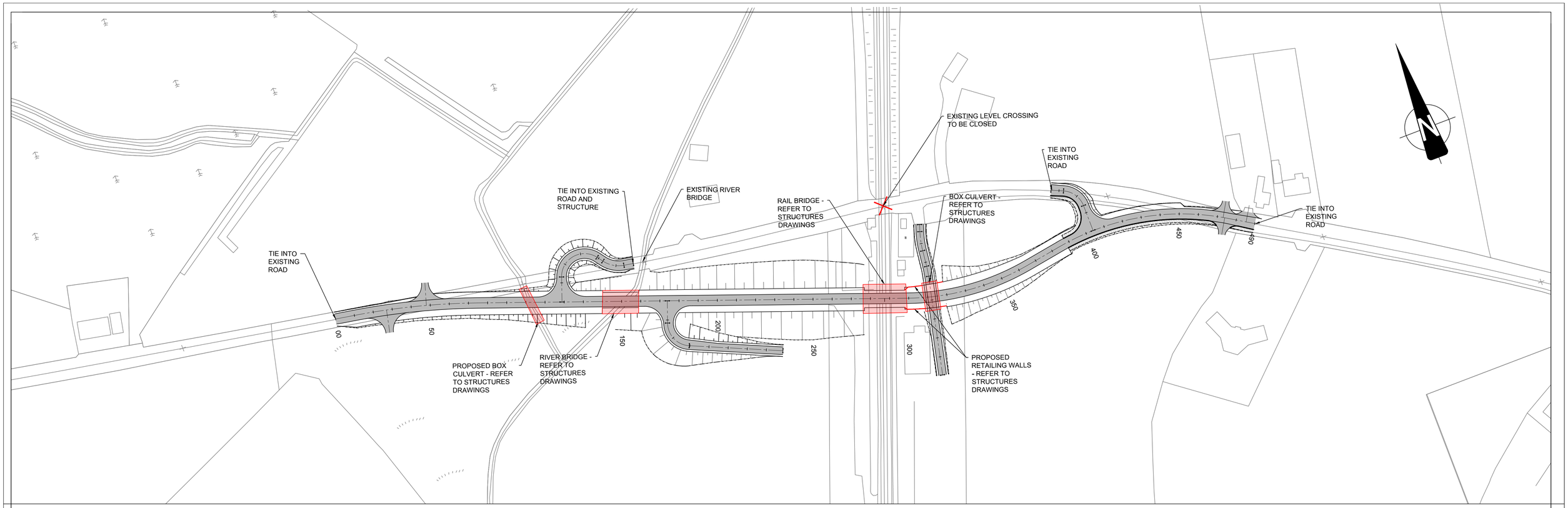
CIE Iarnród Éireann Infrastructure

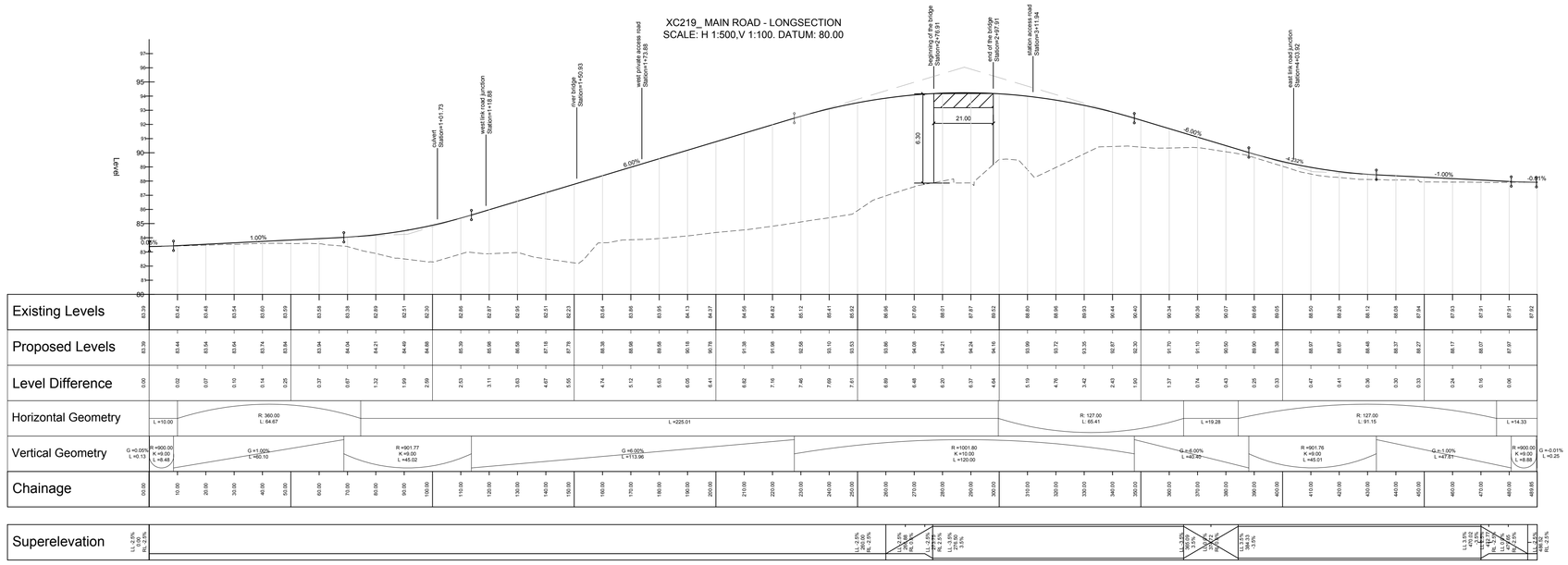
Legend - Plan
Verge, Carriageway, Centre Line Carriageway, Verge
CARRIAGEWAY, VERGE, STRUCTURE

Legend - Long Section
PROPOSED
EXISTING

Rev	By	Date	Description
0	PV	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	PLAN AND PROFILE - XC215 SHINANAGH
Designed: PV	File Name: -
Drawn: PV	Original scales: PLAN 1:2000, PROFILE AS SHOWN @ A1
Checked: FMD	Date: JUL '19
	Drawing No. 32111000-JAC-HML-XC215-DR-CH-0001





Legend - Plan

Verge
Carriageway
Centre Line
Carriageway
Verge

CARRIAGEWAY
VERGE
STRUCTURE
FOOTPATH

Legend - Long Section

PROPOSED
EXISTING

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	PLAN AND PROFILE - XC219 BUTTERVANT
Designed: MN	File Name: -
Drawn: MN	Original scales: PLAN 1:1000, PROFILE AS SHOWN @ A1
Checked: FMD/SK	Date: JUL '19
Drawing No.	32111000-JAC-HML-XC219-DR-CH-0001

Appendix B. Preliminary Design General Arrangement Drawings

Drawing Title	Drawing Ref No.	Revision
GENERAL ARRANGEMENT PLAN – XC201 THOMASTOWN	32111000-JAC-HGN-XC201-DR-CH-001	0
GENERAL ARRANGEMENT PLAN – XC211 NEWTOWN	32111000-JAC- HGN -XC211-DR-CH-001	0
GENERAL ARRANGEMENT PLAN – XC211 NEWTOWN – BLUE ROUTE OPTION	32111000-JAC- HGN -XC211-DR-CH-002	
GENERAL ARRANGEMENT PLAN – XC212 BALLYCOSKERY	32111000-JAC- HGN -XC212-DR-CH-001	0
GENERAL ARRANGEMENT PLAN – XC215 SHINANAGH	32111000-JAC- HGN -XC215-DR-CH-001	0
GENERAL ARRANGEMENT PLAN – XC219 BUTTEVANT	32111000-JAC- HGN -XC219-DR-CH-001	0

Insert A

Insert B

PROPOSED DITCH

PROPOSED ESB HV OH DIVERSION

TIE INTO EXISTING R515

EXISTING ESB HV OH TO BE DIVERTED

STOP

RUS 027

W 016

EXISITNG LEVEL
CROSSING TO BE CLOSED

RAIL BRIDGE - REFER TO
STRUCTURES DRAWINGS

W 002 L

DRAINAGE OUTFALL VIA
HEADWALL TO EXISTING
DITCH/STREAM

TIE INTO EXISTING LOCAL ROAD

SAFETY BARRIER, N2, A, W3

SAFETY BARRIER, H4a, B, W3

SAFETY BARRIER, N2, A, W3

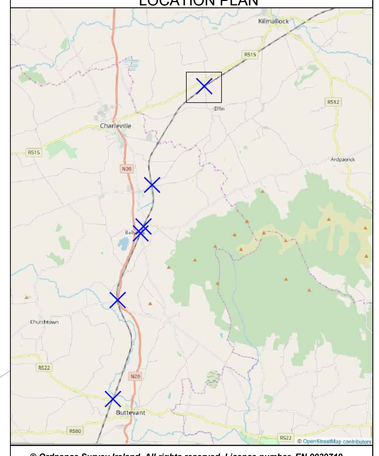
W 002 R

TIE INTO EXISTING LOCAL ROAD

Legend

- RRM 001 - CONTINUOUS CENTRE LINE, 100mm WIDE.
- RRM 002C - CENTRE LINE WARNING MARKING, 4000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 025 - BROKEN EDGE OF CARRIAGEWAY LINE, 2000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 017 - STOP LINE, 200mm WIDE.
- RRM 008 - DOUBLE EDGE OF CARRIAGEWAY LINE, 100mm WIDE, 100mm APART
- RRM 007 - EDGE OF CARRIAGEWAY LINE, 100mm WIDE
- RRM 021 - FIG.7.16a, 100mm WIDE BOUNDARY LINE, DIAGONAL LINE 150mm WIDE AT 3000mm CENTRES.
- M 114 - WORDED 'STOP' MARKING, 1600mm TALL.
- M 102 - BIFURCATION ARROW, 8000mm LONG.
- RRM 005/006 - LANE INDICATION ARROW
- RMM 004 - LANE INDICATION ARROW
- M 124/125 - LANE INDICATION ARROW
- PAVEMENT TYPE A
- PAVEMENT TYPE B
- PAVEMENT TYPE C
- FOOTPATH
- GRASSED VERGE
- CUT/EMBANKMENT LANDSCAPING
- GENERAL MIX
- STRUCTURE
- SAFETY BARRIER
- PEDESTRIAN GUARDRAIL
- FENCELINE
- CARRIER DRAIN
- FILTER DRAIN
- DITCH
- PROPOSED ESB
- ESB TO BE DECOMMISSIONED
- BI-DIRECTIONAL WHITE CENTRELINE OR YELLOW EDGE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL GREEN LANE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL WHITE LANE ROAD STUDS AS PER APPENDIX 12/3
- JUNCTION DEFINITION POST AS PER CC-SCD-01204
- MANHOLE
- CULVERT
- CATCH PIT

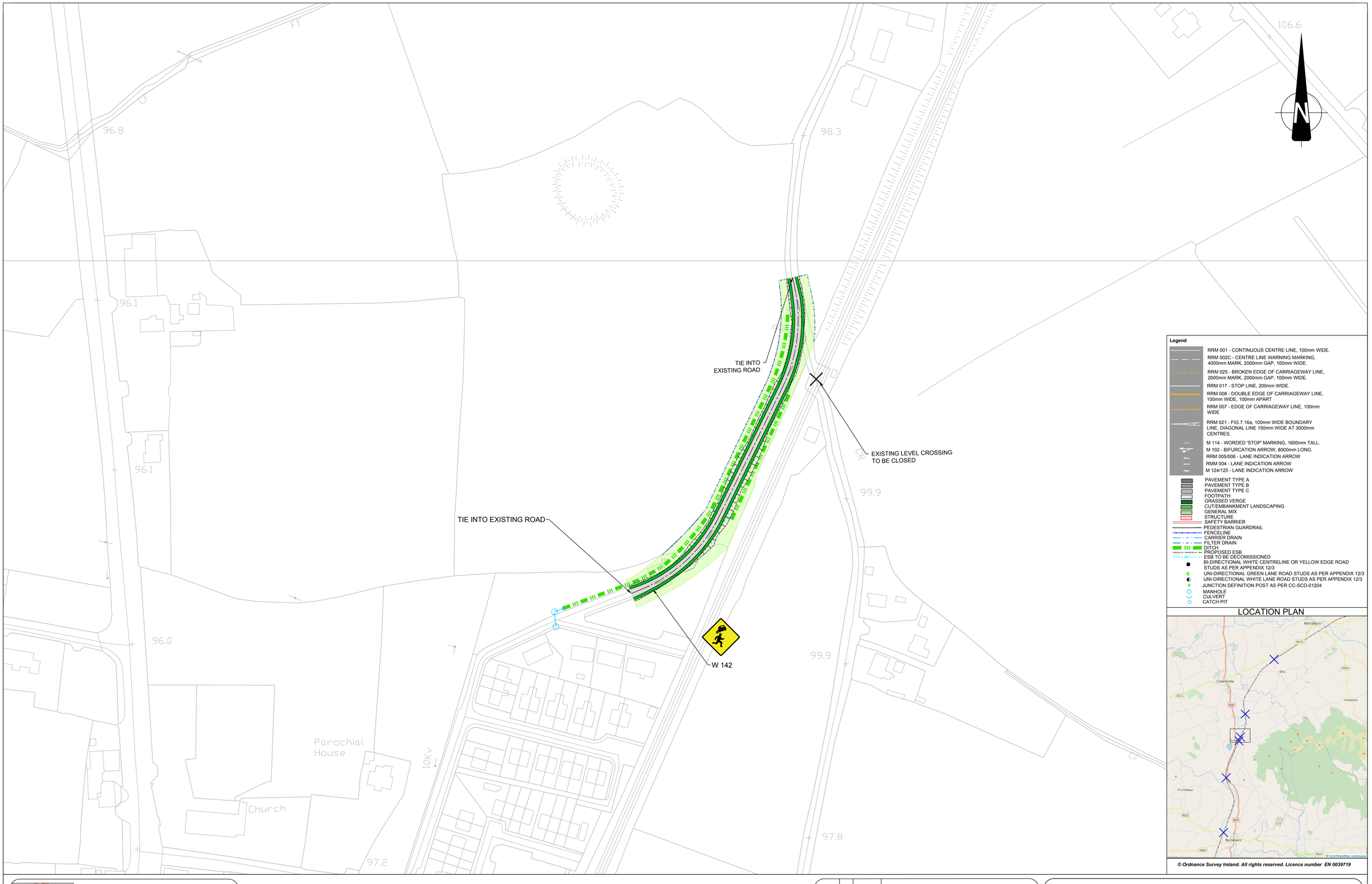
LOCATION PLAN



Iarnród Éireann
Infrastructure

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	GENERAL ARRANGEMENT PLAN - XC201 THOMASTOWN
Designed: SK	File Name: -
Drawn: MN	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: JUL '19
	Drawing No. 32111000-JAC-HGN-XC201-DR-CH-0001



Legend

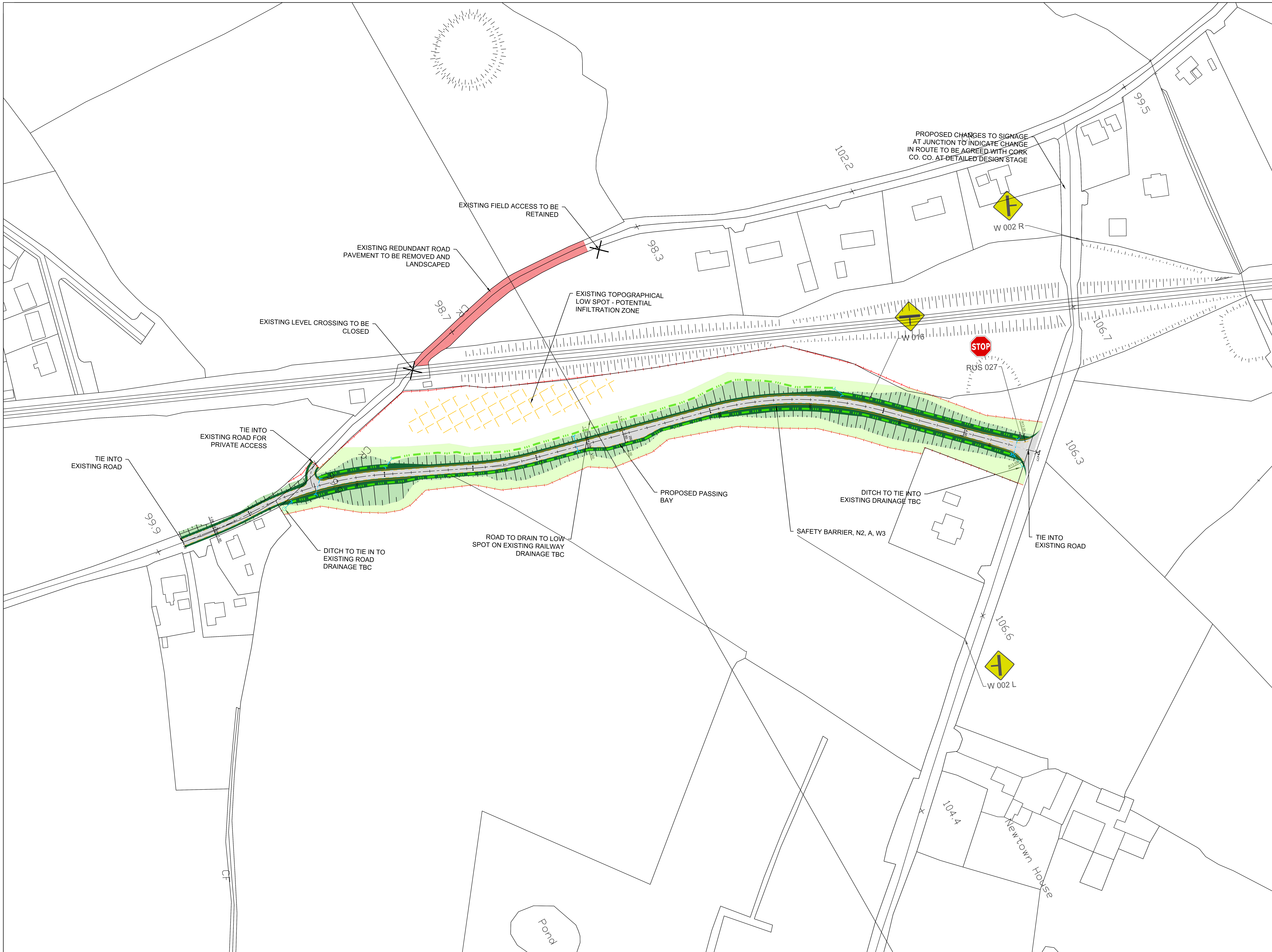
- RRM 001 - CONTINUOUS CENTRE LINE, 100mm WIDE.
- RRM 002C - CENTRE LINE WARNING MARKING, 4000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 025 - BROKEN EDGE OF CARRIAGEWAY LINE, 2000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 017 - STOP LINE, 200mm WIDE.
- RRM 008 - DOUBLE EDGE OF CARRIAGEWAY LINE, 100mm WIDE, 100mm APART
- RRM 007 - EDGE OF CARRIAGEWAY LINE, 100mm WIDE
- RRM 021 - FIG.7.16a, 100mm WIDE BOUNDARY LINE, DIAGONAL LINE 150mm WIDE AT 3000mm CENTRES.
- M 114 - WORDED 'STOP' MARKING, 1600mm TALL.
- M 102 - BIFURCATION ARROW, 8000mm LONG.
- RRM 005/006 - LANE INDICATION ARROW
- RMM 004 - LANE INDICATION ARROW
- M 124/125 - LANE INDICATION ARROW
- PAVEMENT TYPE A
- PAVEMENT TYPE B
- PAVEMENT TYPE C
- FOOTPATH
- GRASSED VERGE
- CUT/EMBANKMENT LANDSCAPING
- GENERAL MIX
- STRUCTURE
- SAFETY BARRIER
- PEDESTRIAN GUARDRAIL
- FENCELINE
- CARRIER DRAIN
- FILTER DRAIN
- DITCH
- PROPOSED ESB
- ESB TO BE DECOMMISSIONED
- BI-DIRECTIONAL WHITE CENTRELINE OR YELLOW EDGE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL GREEN LANE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL WHITE LANE ROAD STUDS AS PER APPENDIX 12/3
- JUNCTION DEFINITION POST AS PER CC-SCD-01204
- MANHOLE
- CULVERT
- CATCH PIT

LOCATION PLAN

Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	GENERAL ARRANGEMENT PLAN - XC211 NEWTOWN
Designed: SK	File Name: -
Drawn: MN	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: JUL '19
	Drawing No. 32111000-JAC-HGN-XC211-DR-CH-0001



Legend

RRM 001 - CONTINUOUS CENTRE LINE, 100mm WIDE.
RRM 002C - CENTRE LINE WARNING MARKING, 4000mm MARK, 2000mm GAP, 100mm WIDE.
RRM 025 - BROKEN EDGE OF CARRIAGEWAY LINE, 2000mm MARK, 2000mm GAP, 100mm WIDE.
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RRM 008 - DOUBLE EDGE OF CARRIAGEWAY LINE, 100mm WIDE, 100mm APART
RRM 007 - EDGE OF CARRIAGEWAY LINE, 100mm WIDE
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M 114 - WORDED 'STOP' MARKING, 1600mm TALL.
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RRM 005/006 - LANE INDICATION ARROW
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M 124/125 - LANE INDICATION ARROW
PAVEMENT TYPE A
PAVEMENT TYPE B
PAVEMENT TYPE C
FOOTPATH
GRASSED VERGE
CUT/EMBANKMENT LANDSCAPING
GENERAL MIX
STRUCTURE
SAFETY BARRIER
PEDESTRIAN GUARDRAIL
FENCELINE
CARRIER DRAIN
FILTER DRAIN
DITCH
PROPOSED ESB
ESB TO BE DECOMISSIONED
BI-DIRECTIONAL WHITE CENTRELINE OR YELLOW EDGE ROAD STUDS AS PER APPENDIX 12/3
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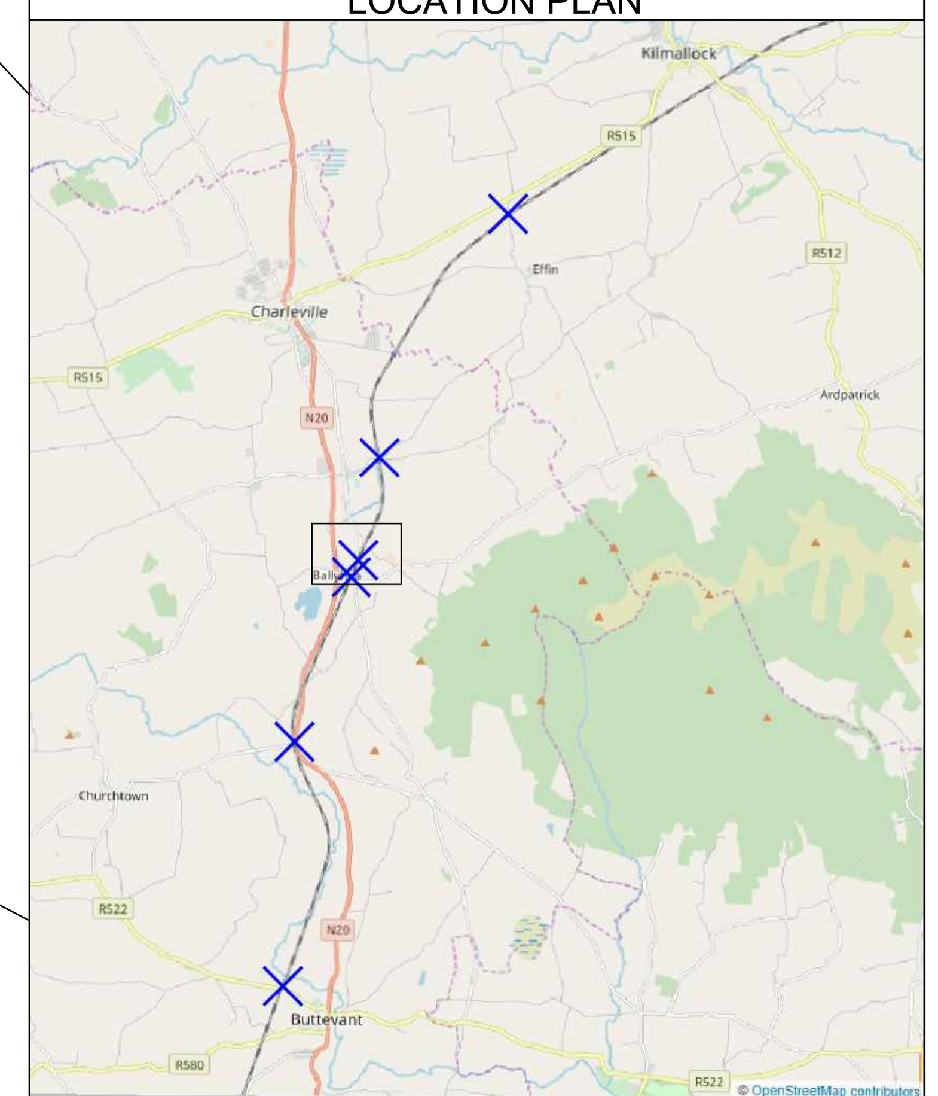
UNI-DIRECTIONAL WHITE LANE ROAD STUDS AS PER APPENDIX 12/3
JUNCTION DEFINITION POST AS PER CC-SCD-01204
MANHOLE
CULVERT
CATCH PIT

LOCATION PLAN



CIE | Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	EB	Jan-20	DRAFT ISSUE

Project: CORK LINE LEVEL CROSSINGS
Component: PRELIMINARY DESIGN
Title: PLAN - XC211 NEWTON - BLUE ROUTE OPTION
Designed: FMD | File Name: - | Drawing No. 32111000-JAC-HGN-XC211-DR-CH-0002
Drawn: EB | Original scales: PLAN 1:1000 : A1
Checked: FMD | Date: Jan-20

NATIONAL ROAD N20

TIE INTO EXISTING ROAD

W 016

RUS 027

TIE INTO EXISTING ROAD

PROPOSED PEDESTRIAN RAMP

EXISTING LEVEL CROSSING TO BE CLOSED

PROPOSED STAIRS

CUL-DE-SAC SIGN F350

TIE INTO EXISTING ROAD

RUS 027

RUS 027

TIE INTO EXISTING ROAD

W 002R

W 142

RAIL BRIDGE - REFER TO STRUCTURES DRAWINGS

DITCH TO RUN ALONG THE RAILWAY AND RELEASE INTO THE STREAM

SAFETY BARRIER H4a, B, W3

W 007LR

SAFETY BARRIER N2, A, W3

RUS 027

W 016

W 007LR

W 142

TIE INTO EXISTING ROAD

Parochial House

Church

School

Dooley's Bridge

10Kv

96.0

97.2

97.5

97.8

97.6

96.0

96.4

96.5

98.7

99.8

99.9

102.1

Legend

- RRM 001 - CONTINUOUS CENTRE LINE, 100mm WIDE.
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- RRM 017 - STOP LINE, 200mm WIDE.
- RRM 008 - DOUBLE EDGE OF CARRIAGEWAY LINE, 100mm WIDE, 100mm APART
- RRM 007 - EDGE OF CARRIAGEWAY LINE, 100mm WIDE
- RRM 021 - FIG.7.16a, 100mm WIDE BOUNDARY LINE, DIAGONAL LINE 150mm WIDE AT 3000mm CENTRES.
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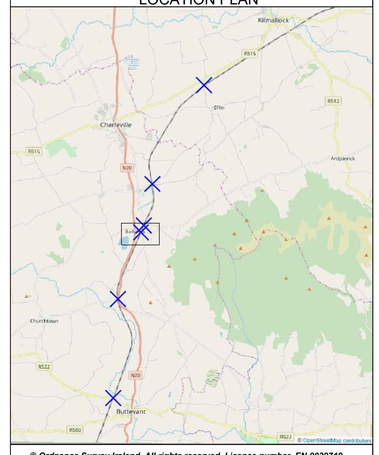
- UNI-DIRECTIONAL WHITE LANE ROAD STUDS AS PER APPENDIX 12/3
- JUNCTION DEFINITION POST AS PER CC-SCD-01204
- MANHOLE
- CULVERT
- CATCH PIT

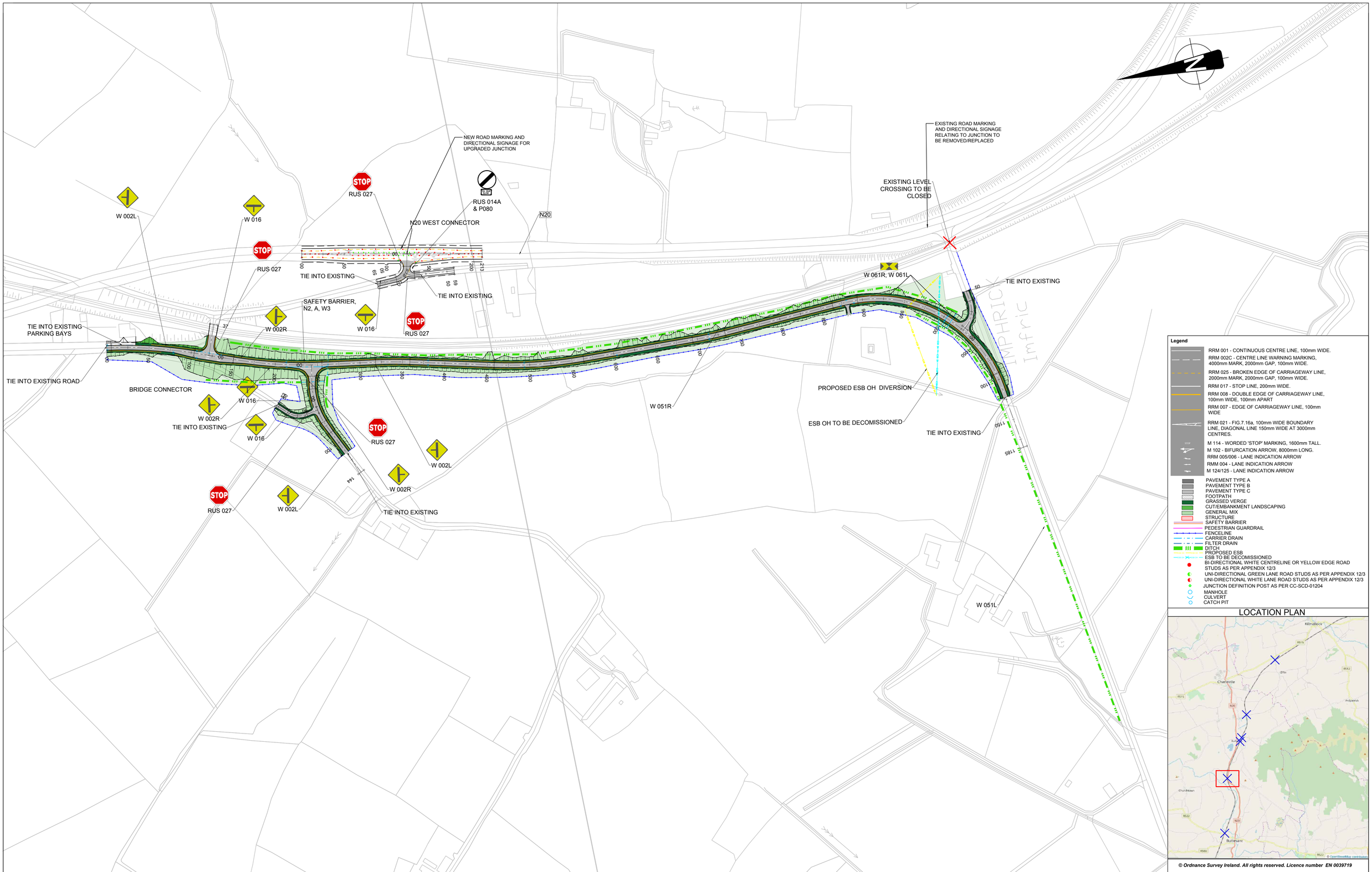
LOCATION PLAN



Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	GENERAL ARRANGEMENT PLAN - XC212 BALLYCOSKERY
Designed: SK	File Name: -
Drawn: MN	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: JUL '19
	Drawing No. 32111000-JAC-HGN-XC212-DR-CH-0001



LOCATION PLAN

CIE

Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	PV	NOV '19	FIRST ISSUE

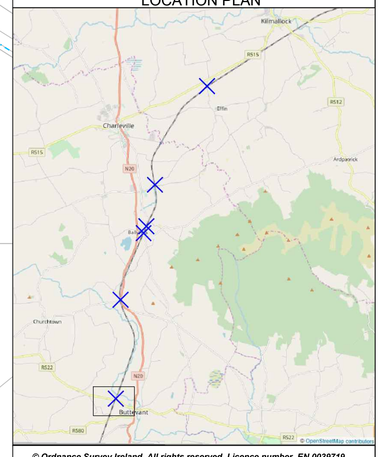
Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	GENERAL ARRANGEMENT PLAN - XC215 SHINANAGH
Designed: SK	File Name: -
Drawn: PV	Original scales: PLAN 1:2000 @ A1
Checked: FMD	Date: JUL '19
	Drawing No. 32111000-JAC-HGN-XC215-DR-CH-0001

50 km/h
RUS 043
TIE INTO EXISTING ROAD
W 002L
STOP
RUS 027
W 016
TIE INTO EXISTING ROAD
SAFETY BARRIER N2, A, W3
ROAD-OVER-RAIL BRIDGE - REFER TO STRUCTURES DRAWINGS
EXISTING LEVEL CROSSING TO BE CLOSED
PROPOSED BOX CULVERT FOR ACCESS ROAD
W 016
80 km/h
RUS 041
PROPOSED BOX CULVERT
PROPOSED RIVER BRIDGE
W 140
W 002L
TIE INTO EXISTING ROAD AND FOOTPATH
STOP
RUS 027
W 002R
SAFETY BARRIER N2, A, W3
W 140
TIE INTO EXISTING ROAD AND FOOTPATH
DISHED KERBS WITH TACTILE PAVING TO DENOTE UNCONTROLLED CROSSING
PROPOSED RETAILING WALLS
W 002R
EXISTING ESB O/H TO BE DECOMISSIONED
SAFETY BARRIER H4a, B, W3
SAFETY BARRIER H4a, B, W3
N

Legend

- RRM 001 - CONTINUOUS CENTRE LINE, 100mm WIDE.
- RRM 002C - CENTRE LINE WARNING MARKING, 4000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 025 - BROKEN EDGE OF CARRIAGEWAY LINE, 2000mm MARK, 2000mm GAP, 100mm WIDE.
- RRM 017 - STOP LINE, 200mm WIDE.
- RRM 008 - DOUBLE EDGE OF CARRIAGEWAY LINE, 100mm WIDE, 100mm APART
- RRM 007 - EDGE OF CARRIAGEWAY LINE, 100mm WIDE
- RRM 021 - FIG.7.16a, 100mm WIDE BOUNDARY LINE, DIAGONAL LINE 150mm WIDE AT 3000mm CENTRES.
- M 114 - WORDED 'STOP' MARKING, 1600mm TALL.
- M 102 - BIFURCATION ARROW, 8000mm LONG.
- RRM 005/006 - LANE INDICATION ARROW
- RMM 004 - LANE INDICATION ARROW
- M 124/125 - LANE INDICATION ARROW
- PAVEMENT TYPE A
- PAVEMENT TYPE B
- PAVEMENT TYPE C
- FOOTPATH
- GRASSED VERGE
- CUT/EMBANKMENT LANDSCAPING
- GENERAL MIX
- STRUCTURE
- SAFETY BARRIER
- PEDESTRIAN GUARDRAIL
- FENCELINE
- CARRIER DRAIN
- FILTER DRAIN
- DITCH
- PROPOSED ESB
- ESB TO BE DECOMISSIONED
- BI-DIRECTIONAL WHITE CENTRELINE OR YELLOW EDGE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL GREEN LANE ROAD STUDS AS PER APPENDIX 12/3
- UNI-DIRECTIONAL WHITE LANE ROAD STUDS AS PER APPENDIX 12/3
- JUNCTION DEFINITION POST AS PER CC-SCD-01204
- MANHOLE
- CULVERT
- CATCH PIT

LOCATION PLAN



CIE
Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	MN	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PRELIMINARY DESIGN
Title:	GENERAL ARRANGEMENT PLAN - XC219 BUTTERVANT
Designed: SK	File Name: -
Drawn: MN	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: JUL '19
Drawing No.	32111000-JAC-HGN-XC219-DR-CH-0001

Appendix C. Structural Design

Document Title	Drawing Ref No.	Revision
XC201 THOMASTOWN – BRIDGE XC201 OB	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC201-STR-001	P01
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC201-STR-002	P01
XC212 BALLYCOSKERY – BRIDGE XC212 OB	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC212-STR-001	P01
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC212-STR-002	P01
XC219 BUTTEVANT – BRIDGE XC219 OB	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC219-STR-001	P01
GENERAL ARRANGEMENT SHEET 1 OF 2	32111000- XC219-STR-002	P01
XC219 BUTTEVANT – BRIDGE XC219 AWBEG RIVER CULVERT	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
GENERAL ARRANGEMENT River Awbeg Culvert	32111000- XC219-STR-003	P01
RELEVANT DOCUMENTS	SCHEDULE OF DOCUMENTS RELATING TO DESIGN OF HIGHWAYS BRIDGES AND STRUCTURES	

Approval in Principle and General Arrangement Drawings: XC201 – Thomastown

- BRIDGE XC201 OB

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

1.0 Brief/ Background

Following a feasibility study undertaken by Iarnród Éireann (IÉ) to investigate and appraise options for the elimination/de-manning of level crossing XC201 Thomastown, Level crossing XC201 is to be closed (with extinguishment of the public right of way across the level crossing) and an alternative access constructed by way of a new offline highway route with the inclusion of a new overbridge. The new overbridge will cross the Dublin to Cork line at approximately 127 miles 200 yards.

2.0 Site Description, Crossing Details

2.1 Existing Level Crossing

Level Crossing XC201, Thomastown is a 'C-Type' manually operated gated level crossing located at 127 miles 70 yards on the Dublin to Cork line. The level crossing is located on a local road, 5km to the east of Charleville in the townland of Thomastown in County Limerick.

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gatekeeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The crossing is located in a rural area with low density individual housing in the vicinity.

2.2 Proposed Bridge Location

The proposed structure will replace Level Crossing XC201 and will be located over the Dublin to Cork line at approximately 127 miles 200 yards. The existing topography comprises open fields with the existing railway approximately level with the surrounding area.

The proposed new bridge accommodates a new highway alignment that will cross the railway at a level of approximately 88.7AOD, providing a minimum of 5.3m clearance from top of rail, taking construction depth into account. There will be 6.5m high embankments to the north west and south east of the proposed structure, tapering at a gradient of 3:1.

3.0 Structure Description

The proposed structure is a single span bridge with a 0° skew and square span of 18.3m between faces of supports. The bridge deck is parallel to the carriageway and square to the bankseat abutments. The reinforced earth walls are parallel to the railway track and are therefore at a 2.7° skew to the carriageway and bridge structure.

The deck will be constructed from precast, prestressed TY-type concrete beams with concrete infill and topping. End supports will be in-situ reinforced concrete bankseats, integral with the deck and seated on reinforced earth wall abutments which are supported on sleeved concrete piles. The reinforced earth walls are parallel to the railway track and will be extended to form wingwalls which are also parallel to the track.

The structure will be fully integral at end supports with a monolithic connection between the substructure and superstructure. Saw cut joints in the highway surfacing, sealed with bitumen will

be used between the structure and the embankment.

The structure will have 1.8m high precast concrete parapets with H4a containment. The parapets will be structurally tied to the deck through an in-situ concrete outstand.

4.0 Alignment Details

The cross-section details for the Cork to Dublin line at the proposed structure location are shown in Table 1 below:

Table 1

Item	Width (mm)
Upside clearance	4500 (to wall coping)
Existing Up Track Gauge	1600
Track Spacing	2200
Existing Down Track Gauge	1600
Downside Clearance	4500 (to wall coping)

The maximum gradient of the proposed highway will be up to 6% on either approach or departure to the new rail bridge. This is within the desirable minimum gradient permitted under Section 4.1 of DN-GEO-03031. The highway at the proposed bridge location will be on a 0.5% gradient, falling towards the North West Abutment.

At the proposed bridge location, the highway profile crowns at the centre of the carriageway, and falls at a 2.5% gradient to the kerbline. Road cross-sections are shown in Table 2 below.

Table 2

Item	Width (mm)
Parapet Upstand	350
North Raised Verge	2000
Carriageway	4000
South Raised Verge	600
Parapet Upstand	350

The bridge deck is parallel to the carriageway, and square to the bankseat abutments, but the reinforced earth walls are parallel to the railway track and are therefore at a 2.7° skew to the carriageway and bridge structure.

5.0 Geotechnical Summary

A high-level review of existing published information has been undertaken to inform preliminary foundation design for the proposed overbridge structure. The review of the available data obtained from the Geological Survey of Ireland database has led to the following preliminary assumptions being made with regards to typical ground conditions at the structure location:

- Glacial Till of sandy gravelly clay overlying gravels, cobbles and boulders, overlying bedrock of Limestone.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

- Top soil expected at surface, with the available information on site history indicating a low probability of Made Ground.
- Groundwater is assumed to be encountered between 1m and 5m below existing ground level. Groundwater may be confined in granular strata at shallow depths.
- Sulphate/ pH ground and groundwater conditions unknown, assumed DS-1/ ACEC-1 at this stage.

The current level of ground related information is considered to be insufficient to adequately manage the ground risk during the detailed design process for the foundations of this structure. The key geotechnical constraints considered to be present at XC201, which will be addressed by the proposed ground investigation and detailed design process are bulleted below:

- Unclear and variable depth of bedrock below proposed foundations;
- Variability of glacial deposits below proposed foundations;
- Little specifically known about relevant material properties at this location;
- Long term variability in groundwater levels;
- Potential for contamination and wide scale variability within any made ground;
- Unclear sulphate/ pH ground and groundwater conditions;
- Close proximity to live existing railway and highway.

A ground investigation is proposed to be undertaken during Autumn 2019, to help facilitate the management of ground risks, specific to this structure and provide a sufficient level of information to facilitate detailed design and management. The proposals currently include:

- 4 Cable percussive, 2 with rotary follow-on;
- 4 Trials pits;
- Installation of groundwater standpipes; and
- Geotechnical and geo-environmental laboratory testing.

6.0 Hydrology and Hydraulic Summary

A hydraulic model has not been undertaken at this stage.

There is no risk of fluvial flooding and standard road drainage is anticipated.

7.0 Services Details

There are no services identified in the vicinity of the proposed structure. Existing services in the vicinity of the existing level crossing will be maintained on their current alignment. 2 No. 100mm diameter steel ducts will be provided in the South verge for future use.

8.0 Corrosion Protection, Waterproofing, Impregnation

8.1 Waterproofing

Deck Surface: NRA approved sprayed deck membrane satisfying the requirements of NRA BD47 will be provided.

Walls and base: Two coats of epoxy resin waterproofing paint to buried surfaces in accordance with NRA Specification for Roadworks Series 2000.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

8.2 Concrete Materials and Finishes

All in situ concrete structural elements outside the splash zone of the bridge shall be constructed from C40/50 concrete.

All exposed concrete faces within the splash zone shall be treated as follows:

- All precast concrete elements shall be C50/60
- All in situ concrete elements shall be grade C40/50 concrete with a minimum 50 percent ground granulated blast furnace slag and impregnated with a hydrophobic pore liner.

Precast concrete parapets will include a feature finish to both faces.

9.0 Drainage

The bridge deck has a longitudinal gradient of 0.5%. The surfacing crowns at the centreline of the carriageway and falls at a gradient of 2.5% to the kerbline at each side. The surfacing fall, together with the longitudinal fall will prevent any water from ponding on the carriageway.

Substructure drainage: A perforated pipe situated at the rear of each bankseat will provide backfill drainage. The pipe will be surrounded by porous no fines concrete and connect into the highway drainage.

10.0 Containment

The structure will have 1.8m high precast concrete parapets of H4a containment level in accordance with DN-STR-03011 (Historic NRA BD 52), DN-REQ-03034 (Historic NRA TD 19), and EN 1317. H4a W5 safety barriers will extend for the appropriate distance on approach and departure from the structure as necessary in accordance with DN-STR-03011 (Historic NRA BD 52), DN-REQ-03034 (Historic NRA TD 19), and EN 1317. The H4a W5 barrier will tie into N2 containment safety barriers on the bridge approaches.

11.0 Construction Proposals

It is envisaged that the construction sequence will be as follows:

1. Vegetation Clearance and site preparation – re-establish location of services and establish work zones
2. Construct base for reinforced earth wall and erect precast panels, all in accordance with manufacturer instructions
3. Install sleeves and piles
4. Place bankseats
5. Erect precast beams & fix deck reinforcing
6. Pour concrete deck to create integral deck and bankseats
7. Place precast parapet walls
8. Cast in situ parapet outstand
9. Backfill abutments to final levels
10. Position service ducts, construct kerbs, complete earthworks and drainage, lay surfacing.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

The bridge will be constructed with precast prestressed concrete beams and an in situ concrete infill and topping. This form of construction is widely used both within Eire and the UK and there is expertise available in the use of concrete in bridge construction.

The prestressed precast concrete beams are stable in the temporary condition. Erection of precast beams, precast parapets and concrete pour of the deck will be undertaken during railway possession.

During construction works the track will require monitoring in accordance with CCE-TRK-SPN-010.

12.0 Inspection and Maintenance Provisions

12.1 Superstructure

The proposed integral concrete structure eliminates the requirement for structural bearings and deck expansion joints and will therefore minimise maintenance requirements. The underside of the structure can be inspected during rail possession with use of a RRV MEWP.

12.2 Substructure

The substructure is in situ reinforced concrete and should not incur any significant maintenance costs. Formed concrete surfaces below ground will be waterproofed using a proprietary epoxy resin paint. The substructure, including reinforced earth panels, can be inspected under rail possession with use of a RRV MEWP where necessary.

13.0 Loading

The structure will be designed to Eurocodes. Actions relating to normal traffic will be considered through Load Model 1 and Load Model 2 in accordance with IS EN 1991-2:2003. No special vehicle (SV) types will be considered.

The verges will be loaded with footway loading in accordance with IS EN 1991-2:2003.

It is anticipated that the bridge will be designed for a maximum 25mm differential settlement, pending the results of ground investigation.

14.0 Surfacing Proposals

All surfacing will be designed in accordance with DN-PAV-03023 (Historic NRA HD 36), DN-PAV-03024 (Historic NRA HD 37), and NRA Specification for Road Works Series 700, 900 and 1000.

15.0 Authority Consultations

It is envisaged that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order.

16.0 Proposed Relaxations and Departures from Standard

None.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

17.0 Proposed Design Approach, Material Parameters

17.1 Bridge Deck and Bankseat Abutment Modelling

The temporary condition will be modelled using a line beam analysis of wet concrete and self-weight of the precast beams.

The distribution of forces and moments in the permanent stage will be determined from analysis of a 3D space frame model using a suitable and verified computer program. The deck ends will be connected to the substructure to allow forces to distribute into the bankseat abutments. Vertical and horizontal spring stiffnesses will be used to represent the soil/structure interaction.

A grillage mesh will be adopted for analysis of the deck, with longitudinal members representing precast prestressed beams and transverse members representing the topping and a diaphragm at each transverse reinforcement location. These elements will be connected into vertical and horizontal elements representing the abutment. Transverse members of the abutment will represent the bankseat behaviour in the transverse direction.

17.2 Earth retaining System Structural Analysis

The reinforced earth walls will be designed by the supplier.

17.3 Foundation Design

The foundation design to the soil reinforced abutment shall be developed by the company responsible for detailed design, based on loadings obtained from the structural analysis in accordance with IÉ requirements. The foundation design shall be undertaken following IS-EN-1997 and shall meet the requirements of differential settlement as set out in Section 13.

18.0 Foundation Design

The bridge is an integral structure with bank-seat type abutments on reinforced earth embankments. The abutments are supported by a single row of piles which are sleeved through the reinforced earth to allow them to flex without displacing the surrounding soil. Piles will be founded in the Glacial Till or in bedrock. Negative skin friction shall be considered in the design of piles where applicable. Following completion of the ground investigation a formal Ground Investigation Report will be prepared which will enable structure specific ground characterisation assessment and review of the proposed foundation solutions.

The reinforced soil embankment and wingwalls are fully independent of the bridge superstructure. The reinforced earth embankment, wingwalls and approach embankment are likely to be founded on stiff Glacial Till. It is assumed that the bearing capacity of the glacial till is sufficient to support the reinforced earth embankment. If Made Ground or other poor ground, such as pockets of soft clay (which have a cu not considered to represent stiff material), are identified during the ground investigation and are of a significant thickness that cannot be excavated and replaced alternative options will be considered.

Anticipated vertical and lateral ground movements due to embankment loading, will be assessed during detailed design with measures proposed to deal with these effects on the existing railway assets. Differential settlements between the structure and adjacent approach embankments shall be considered during design.

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Iarnród Éireann Infrastructure	**APPROVAL IN PRINCIPLE (DESIGN STATEMENT)**	
DEPARTMENT: Design & Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC201 OB	Line: GSW	Mileage: 127mls 200yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

19.0 Planning

The estimated total construction cost for this structure is €. Construction work on site is anticipated to commence February 2021.

PREPARED BY: Lisa Gough Signature: Date: 29/8/19	**APPROVED BY:** Nick Speight CEng. M.I.C.E. Signature: Date: 29/08/19

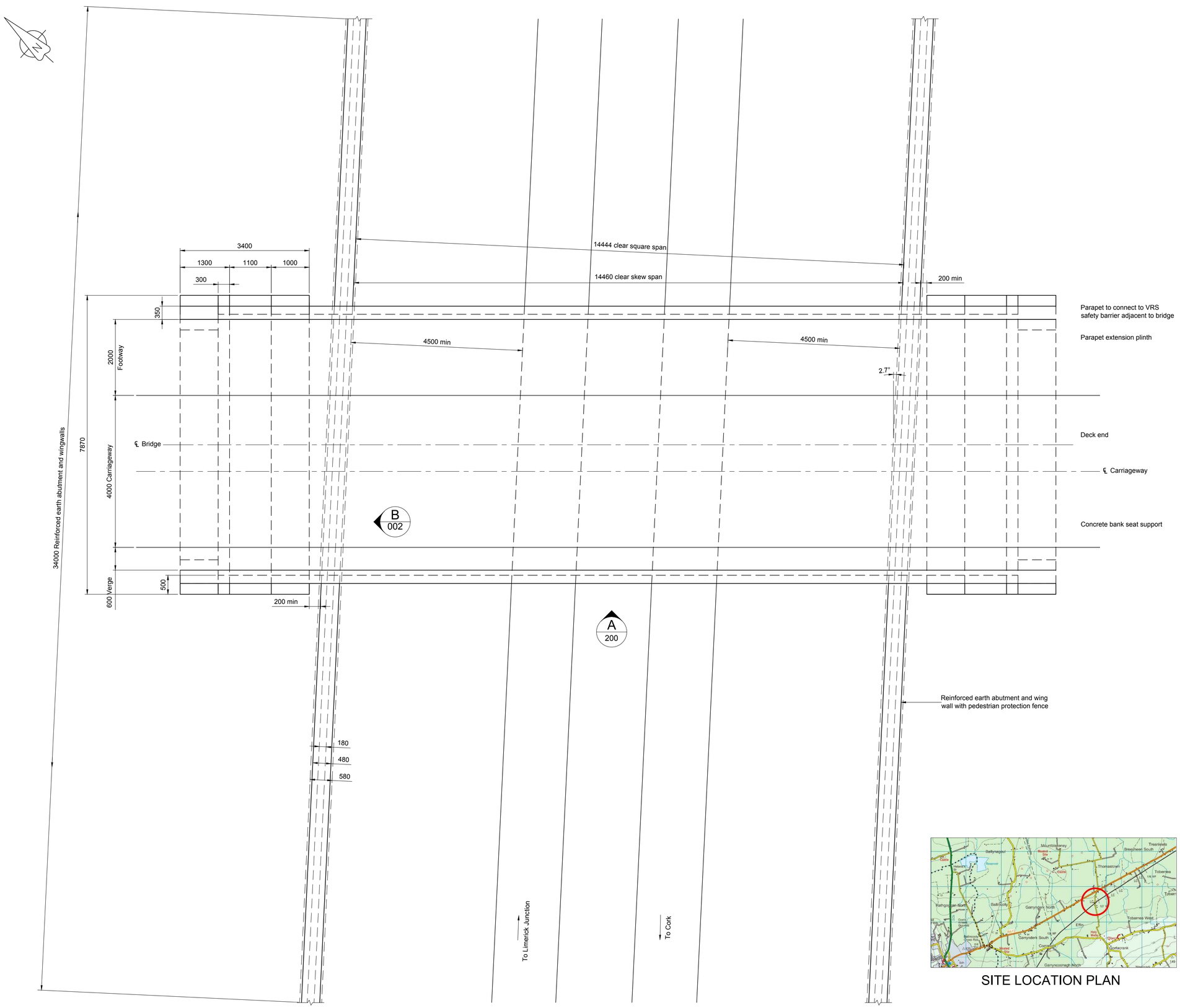
Amendments and Conditions

Annex A1 List of Relevant Standards

Annex A2 List of Drawings and Schedules

32111000-XC201-STR-001 General Arrangement Rail Overbridge Drawing 1 of 2

32111000-XC201-STR-001 General Arrangement Rail Overbridge Drawing 2 of 2



PLAN OF PROPOSED BRIDGE
(Scale 1:50)

SITE LOCATION PLAN

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. This drawing shows preliminary design only and is subject to detailed design.
5. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
6. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	DC	AB

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Client: Iarnród Éireann Irish Rail

Project: CORK LEVEL CROSSING REPLACEMENT XC201

Drawing title: GENERAL ARRANGEMENT SHEET 1 OF 2

Drawing status: FOR INFORMATION

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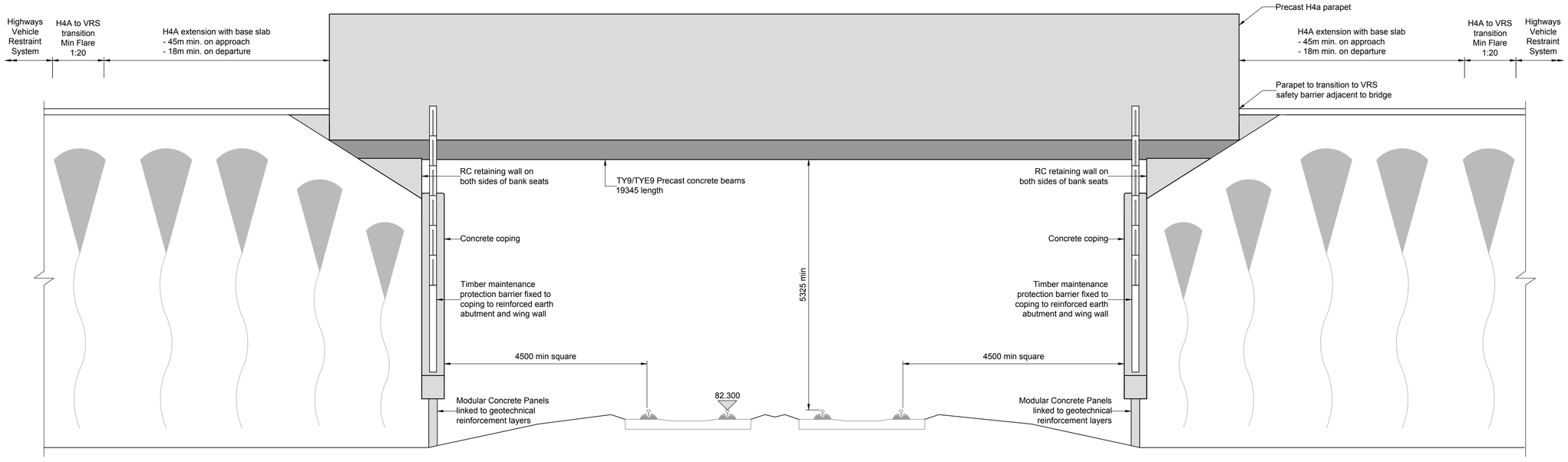
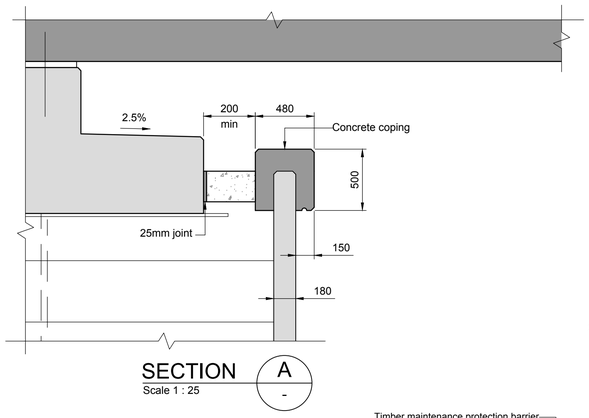
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number: 32111000-XC201-STR-001



ELEVATION A
Scale 1 : 50



SECTION A
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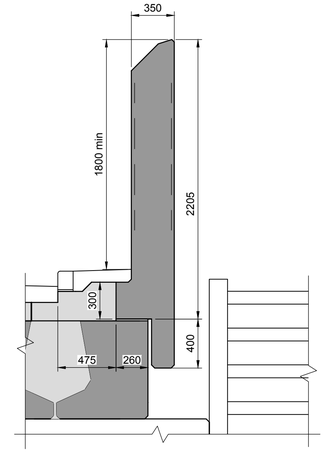
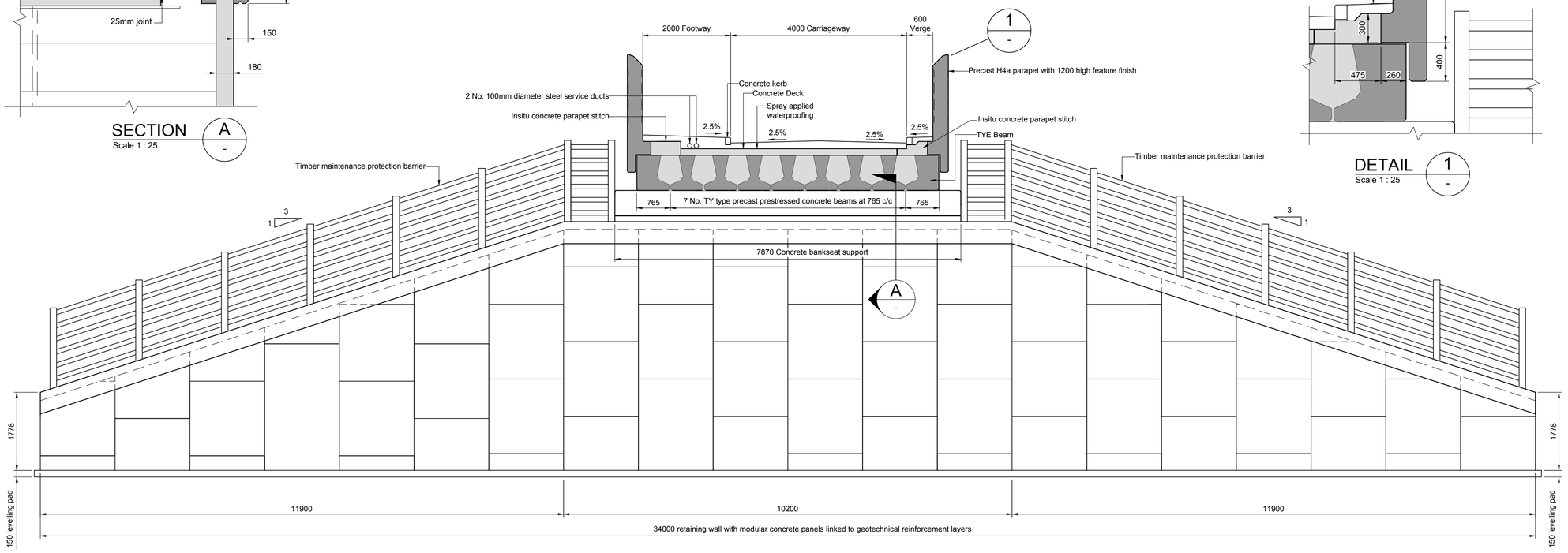


DETAIL 1
Scale 1 : 25



ELEVATION B
Scale 1 : 50

SCALE 1 : 50 (0 1 2 3 4 5 m)

SCALE 1 : 25 (0 0.5 1.0 1.5 2.0 2.5 m)

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. All levels are shown in metres A.O.D unless stated otherwise.
5. This drawing shows preliminary design only and is subject to detailed design.
6. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
7. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.
7. 6N/6P structural backfill is to have a Φ' peak of <45°.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	??	??

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Client: Iarnród Éireann Irish Rail

Project: CORK LEVEL CROSSING REPLACEMENT XC201

Drawing title: GENERAL ARRANGEMENT SHEET 2 OF 2

Drawing status: FOR INFORMATION

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number: 32111000-XC201-STR-002

Approval in Principle and General Arrangement Drawings: XC212 – Ballycoskery

- BRIDGE XC212 OB

Iarnród Éireann Infrastructure	**APPROVAL IN PRINCIPLE (DESIGN STATEMENT)**	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

1.0 Brief/ Background

Following a feasibility study undertaken by Iarnród Éireann (IÉ) to investigate and appraise options for the elimination/de-manning of level crossing XC211 Newport and XC212 Ballycoskery, Level crossings XC211 and XC212 are to be closed (with extinguishment of the public right of way across the level crossing) and an alternative access constructed by way of a new offline highway route with the inclusion of a new overbridge at XC212. The new overbridge will cross the Dublin to Cork line at approximately 132miles 46 yards.

2.0 Site Description, Crossing Details

2.1 Existing Level Crossings

Level Crossing XC212, Ballycoskery is a 'CD-Type' manually operated gated level crossing located at 131 miles 1759 yards on the Dublin to Cork line. The level crossing Is located in Ballyhea village on a local road, L1533, in the townland of Ballycoskery, County Cork. XC212 is a designated 'CD-Type' crossing but it is operated as a 'CX-Type' level crossing and is manned on a 24 hour basis. Its operation as a 'CX-Type' crossing results in the gates being normally open to road traffic with the gate keeper closing the gates as required for rail traffic. There are also pedestrian wicket gates at the crossing but these are kept permanently locked. The level crossing is located in the village of Ballyhea and the local primary school and Beechwood housing estate are located directly adjacent to the level crossing, to the east and west respectively.

The crossing to the Awbeg River, which is a tributary of the Blackwater Rover Special Area of Conservation.

2.2 Proposed Bridge Location

The proposed structure will replace Level Crossings XC212 and will be located over the Dublin to Cork line at approximately 132 miles 46 yards. The level crossing is located in the village of Ballyhea. The local primary school and Beechwood housing estate are directly adjacent to the existing level crossing and will be within close vicinity of the proposed bridge structure.

The proposed new bridge accommodates a new highway alignment that will cross the railway at a level of 105.2AOD, providing a minimum of 5.1m clearance from top of rail, taking construction depth into account. There will approximately 6.5m high embankments to the north west, south east and south west corners of the structure. The north east corner will have a reinforced earth wingwall which will turn back and tie into a reinforced earth retaining wall.

3.0 Structure Description

The proposed structure is a single span bridge with an 8.9° skew and skew span of 17.8m between faces of supports. The reinforced earth walls are parallel to the railway and also at an 8.9° skew to the carriageway.

The deck will be constructed from precast prestressed TY-type concrete beams with concrete infill and topping. End supports will be in-situ reinforced concrete bankseats, integral with the deck and supported on sleeved concrete piles behind on reinforced earth wall abutments.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

The structure will be fully integral at end supports, with a monolithic connection between the substructure and superstructure. Saw cut joints in the carriageway, sealed with bitumen will be used between the structure and the embankment.

The structure will have a 1.8m high precast concrete parapets with H4a containment to the southern elevation. The northern elevation of the structure, adjacent to the pedestrian footpath will have a 1.8m high steel sheeted pedestrian parapet. To provide H4a containment to the north of the structure a 1.5m high precast concrete containment barrier, with feature finish to both faces, will be located at the edge of the carriageway.

4.0 Alignment Details

The cross-section details for the Cork to Dublin line at the proposed structure location are shown in Table 1 below:

Table 1

Item	Width (mm)
Upside clearance	4500 (to wall coping)
Existing Up Track Gauge	1600
Track Spacing	1950
Existing Down Track Gauge	1600
Downside Clearance	4500 (to wall coping)

The maximum gradient of the proposed highway will be up to 8% on either approach or departure to the new rail bridge. This is within the relaxation maximum gradient of Section 4.1 of DN-GEO-03031. The vertical highway alignment at the proposed bridge location will be on a 651.6m radius falling towards both ends of the bridge deck.

At the proposed bridge location, the highway profile crowns at the centre of the carriageway, and falls at a 2.5% gradient to the kerbline. Road cross-sections are shown in Table 2 below.

Table 2

Item	Width (mm)
North Parapet Upstand	350
North Footway	2600
Concrete Barrier Upstand	350
North Raised Verge	600
Carriageway	6000
South Raised Verge	600
South Parapet Upstand	350

5.0 Geotechnical Summary

A high-level review of existing published information has been undertaken to inform preliminary foundation design for the proposed overbridge structure. The review of the available data obtained from the Geological Survey of Ireland database has led to the following preliminary assumptions being made with regards to typical ground conditions at the structure location:

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

- Glacial Till of silty sandy gravelly clay with cobbles and boulders, and gravels derived from limestones, overlying bedrock of limestone. Shallow bedrock anticipated.
- Topsoil expected at surface, with the available information on site history indicating a low probability of Made Ground.
- Groundwater is assumed to be encountered between 1m and 3m below existing ground level. Potential for shallow groundwater due to presence of a number of springs in vicinity.
- Sulphate/ pH ground and ground water conditions unknown, assumed DS-1/ ACEC-1 at this stage.

The current level of ground related information is considered to be insufficient to adequately manage the ground risk during the detailed design process for the foundations of this structure. The key geotechnical constraints considered to be present at XC212, which will be addressed by the proposed ground investigation and detailed design process are bulleted below:

- Unclear and variable depth of bedrock below proposed foundations;
- Variability of glacial deposits below proposed foundations;
- Little specifically known about relevant material properties at this location;
- Potential shallow groundwater and long-term variability in groundwater levels;
- Potential for soft areas;
- Potential for contamination and wide scale variability within any made ground;
- Unclear Sulphate/ pH ground and groundwater conditions;
- Close proximity to live existing railway and highway;

A ground investigation is proposed to be undertaken during Autumn 2019, to help facilitate the management of ground risks, specific to this structure and provide a sufficient level of information to facilitate detailed design and management. The proposals currently include:

- 6 Cable percussive boreholes, 4 with rotary coring follow-on;
- 7 Trials pits;
- Installation of groundwater standpipes; and
- Geotechnical and Geo-environmental laboratory testing.

6.0 Hydrology and Hydraulic Summary

A hydraulic model has not been undertaken at this stage.

There is potential for fluvial flooding but the risk is low and it is anticipated that standard road drainage will be sufficient. The bridge itself is at the highest point of the proposed highway alignment and it is not expected to be at risk from flood water.

7.0 Services Details

There are no services identified in the vicinity of the proposed structure. Existing services in the vicinity of the existing level crossing will be maintained on their current alignment. 2 No. 100mm diameter steel ducts will be provided in the north verge for future use.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

8.0 Corrosion Protection, Waterproofing, Impregnation

8.1 Waterproofing

Deck Surface: NRA approved sprayed deck membrane satisfying the requirements of NRA BD47 will be provided.

Walls and base: Two coats of epoxy resin waterproofing paint to buried surfaces in accordance with NRA Specification for Roadworks Series 2000.

8.2 Concrete Materials and Finishes

All in situ concrete structural elements outside the splash zone of the bridge shall be constructed from C40/50 concrete.

All exposed concrete faces within the splash zone shall be treated as follows:

- All precast concrete elements shall be C50/60
- All in situ concrete elements shall be grade C40/50 concrete with a minimum 50 percent ground granulated blast furnace slag and impregnated with a hydrophobic pore liner.

Precast concrete parapets will include a feature finish to both faces.

9.0 Drainage

In the longitudinal direction the bridge deck surfacing has a vertical radius of 651.6m. Transversely, the surfacing crowns at the centreline of the carriageway and falls at a gradient of 2.5% to the kerbline at each side. The transverse fall together with the longitudinal fall will prevent any water from ponding on the carriageway.

Substructure drainage: A perforated pipe situated at the rear of each bankseat will provide backfill drainage. The pipe will be surrounded by porous no fines concrete and connect to the highway drainage.

10.0 Containment

The structure will have a 1.8m high precast concrete parapets with H4a containment to the southern elevation. The northern elevation of the structure, adjacent to the pedestrian footpath, will have a 1.8m high steel sheeted pedestrian parapet. To enable H4a containment to the north of the structure a 1.5m high precast concrete containment barrier, with feature finish, will be located at the edge of the carriageway.

11.0 Construction Proposals

It is envisaged that the construction sequence will be as follows:

1. Vegetation Clearance and site preparation – re-establish location of services and establish work zones
2. Construct base for reinforced earth wall and erect precast, all in accordance with manufacturer instructions
3. Install concrete piles and sleeves
4. Cast bankseats

5. Erect precast beams & fix deck reinforcing
6. Pour concrete deck to create integral deck and bankseats
7. Place precast parapet walls
8. Cast in situ parapet outstand
9. Backfill abutments to final levels
10. Position services, construct kerbs, complete earthworks and drainage, lay surfacing.

The bridge will be constructed with precast prestressed TY-type concrete beams and an in situ concrete infill and topping. This form of construction is widely used both within Eire and the UK and there is expertise in the use of concrete in bridge construction.

The prestressed precast concrete beams are stable in the temporary condition. Erection of precast beams, precast parapets and concrete pour of the deck will be undertaken during railway possession.

During construction works the track will require monitoring in accordance with CCE-TRK-SPN-010.

12.0 Inspection and Maintenance Provisions

12.1 Superstructure

The proposed integral concrete structure eliminates the requirement for structural bearings and deck expansion joints and will therefore minimise maintenance requirements. The underside of the structure can be inspected during rail possession with use of a RRV MEWP.

12.2 Substructure

The substructure is in situ reinforced concrete and should not incur any significant maintenance costs. Formed concrete surfaces below ground will be waterproofed using a proprietary epoxy resin paint. The substructure, including reinforced earth panels, can be inspected under rail possession with use of a RRV MEWP where necessary.

13.0 Loading

The structure will be designed to Eurocodes. Actions relating to normal traffic will be considered through Load Model 1 and Load Model 2 in accordance with IS EN 1991-2:2003. No special vehicle (SV) types will be considered.

The verges will be loaded with footway loading in accordance with IS EN 1991-2:2003.

The bridge is to be designed for 25mm differential settlement.

14.0 Surfacing Proposals

All surfacing will be designed in accordance with DN-PAV-03023 (Historic NRA HD 36), DN-PAV-03024 (Historic NRA HD 37), and NRA Specification for Road Works Series 700, 900 and 1000.

15.0 Authority Consultations

It is envisaged that the necessary planning permission, land acquisition and extinguishments of

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order.

16.0 Proposed Relaxations and Departures from Standard

None.

17.0 Proposed Design Approach, Material Parameters

17.1 Bridge Deck and Bankseat Abutment Modelling

The temporary condition will be modelled using a line beam analysis of wet concrete and self-weight of the precast beams.

The distribution of forces and moments in the permanent stage will be determined from analysis of a 3D space frame model using a suitable and verified computer program. The deck ends will be connected to the substructure to allow forces to distribute into the bankseat abutments. Vertical and horizontal spring stiffnesses will be used to represent the soil/structure interaction.

A grillage mesh will be adopted for analysis of the deck, with longitudinal members representing precast prestressed beams and transverse members representing the topping and a diaphragm at each transverse reinforcement location. These elements will be connected into vertical and horizontal elements representing the abutment. Transverse members of the abutment will represent the bankseat behaviour in the transverse direction.

17.2 Earth retaining System Structural Analysis

The reinforced earth walls will be designed by the supplier.

17.3 Foundation Design

The foundation design to the soil reinforced abutment shall be developed by the company responsible for detailed design, based on loadings obtained from the structural analysis in accordance with IÉ requirements. The foundation design shall be undertaken following IS-EN-1997 and shall meet the requirements of differential settlement as set out in Section 13.

18.0 Foundation Design

The bridge is an integral structure, with bank-seat type abutments on reinforced earth embankments. The abutments are supported by a single row of piles which are sleeved through the reinforced earth to allow them to flex without displacing the surrounding soil. Piles will be founded in the Glacial Till or in bedrock. Negative skin friction shall be considered in the design of piles where applicable. Following completion of the ground investigation a formal Ground Investigation Report will be prepared which will enable structure specific ground characterisation assessment and review of the proposed foundation solutions.

The reinforced soil embankment and wingwalls are fully independent of the bridge superstructure. The reinforced earth embankment, wingwalls and approach embankment are likely to be founded on stiff Glacial Till. It is assumed that the bearing capacity of the glacial clay is sufficient to support the reinforced earth abutment. If Made Ground or other poor ground, such as soft clay (which have a cu not considered to represent stiff material), are identified during the ground investigation and

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC212 OB	Line: GSW	Mileage: 132mls 46yds
Proposed Category: Category 2	Estimate Cost € (ex VAT):	

are of a significant thickness that cannot be excavated and replaced alternative options will be considered.
Anticipated vertical and lateral ground movements due to embankment loading, will be assessed during detailed design with measures proposed to deal with these effects on the existing railway assets. Differential settlements between the structure and adjacent approach embankments shall be considered during design.

19.0 Planning
The estimated total construction cost for this structure is €. Construction work on site is anticipated to commence February 2021.

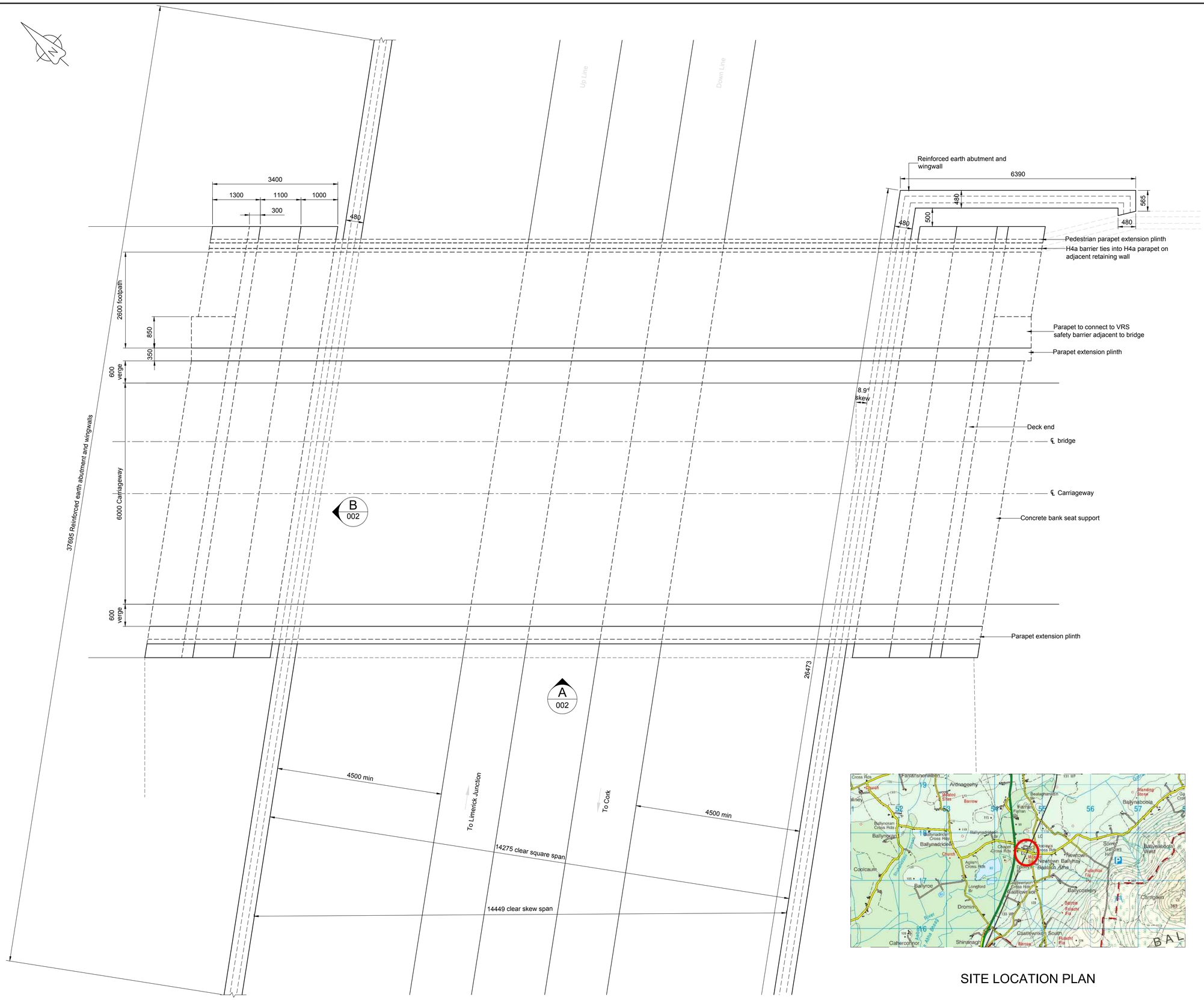
20. Drawings and Documents
Appendix A: List of Relevant Documents and Standards
Appendix B: General Arrangement Drawings

PREPARED BY: Lisa Gough Signature: Date: 29/8/19	**APPROVED BY:** Nick Speight CEng. M.I.C.E. Signature: Date: 29/8/19

Amendments and Conditions

Annex A1 List of Relevant Standards

Annex A2 List of Drawings and Schedules
32111000-XC212-STR-001 Rail Overbridge General Arrangement Drawing 1 of 2
32111000-XC212-STR-001 Rail Overbridge General Arrangement Drawing 2 of 2
32111000-XC212-STR-002 Retaining Wall General Arrangement



Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. This drawing shows preliminary design only and is subject to detailed design.
5. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
6. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.

0 1 2 3 4 5 m
SCALE 1 : 50

PLAN OF PROPOSED BRIDGE

(Scale 1:50)

SITE LOCATION PLAN

P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	DC	AB
Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd

JACOBS
5 First Street, Manchester, M15 4GU
Tel:+44(0)161 253 6000 Fax:+44(0)161 235 6001
www.jacobs.com

Client
Iarnród Éireann
Irish Rail

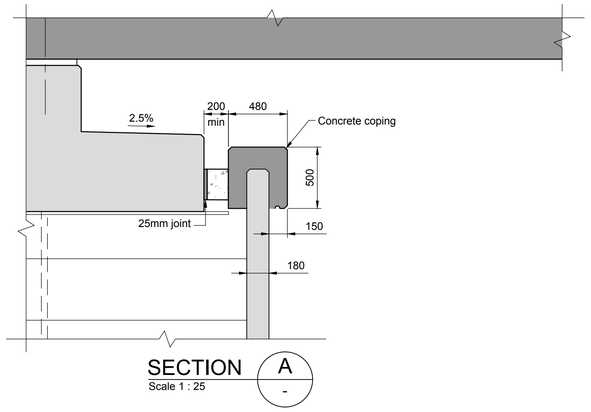
Project
CORK LEVEL CROSSING REPLACEMENT
XC212

Drawing title
GENERAL ARRANGEMENT
SHEET 1 OF 2

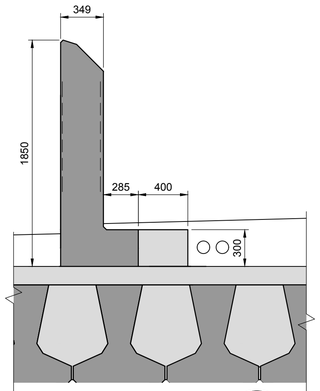
Drawing status
FOR INFORMATION

Scale	1:50 @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

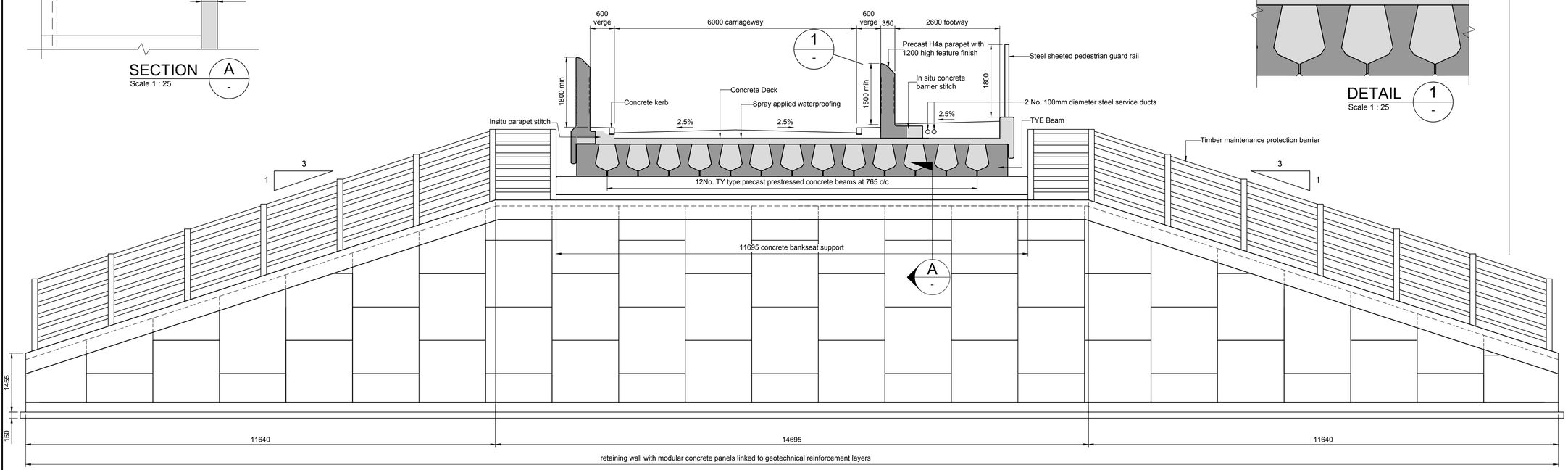
Drawing number
32111000-XC212-STR-001



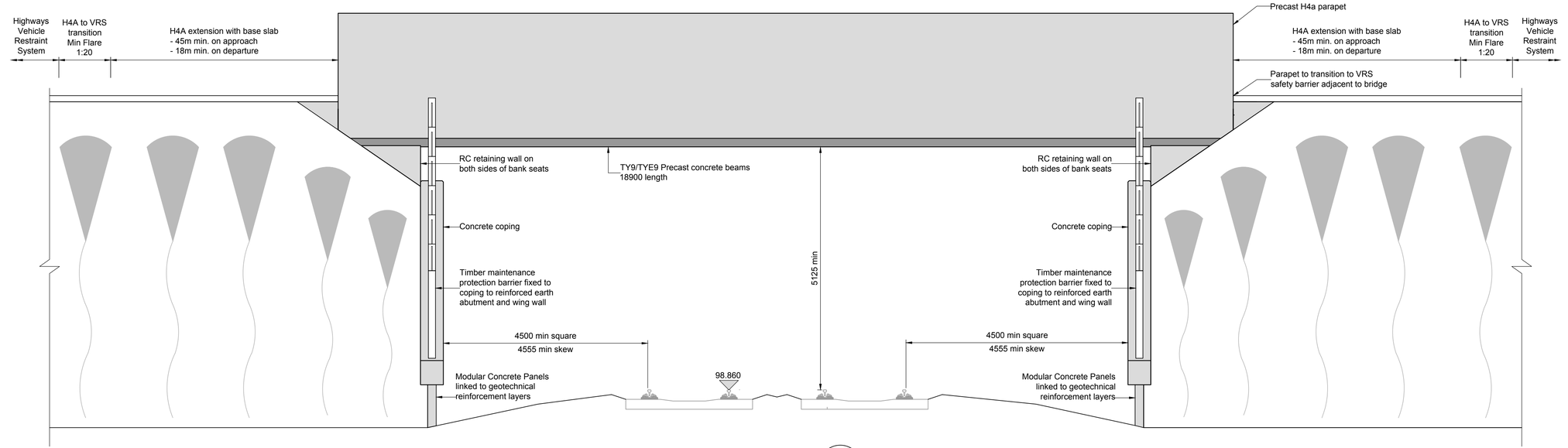
SECTION A
Scale 1 : 25



DETAIL 1
Scale 1 : 25



ELEVATION B
Scale 1 : 50
001



ELEVATION A
Scale 1 : 50
001

0 1 2 3 4 5 m
SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5 m
SCALE 1 : 25

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. All levels are shown in metres A.O.D unless stated otherwise.
5. This drawing shows preliminary design only and is subject to detailed design.
6. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
7. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.
7. 6N/6P structural backfill is to have a Φ' peak of <45°.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	DC	AB

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Client: Iarnród Éireann Irish Rail

Project: CORK LEVEL CROSSING REPLACEMENT XC212

Drawing title: GENERAL ARRANGEMENT SHEET 2 OF 2

Drawing status: FOR INFORMATION

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number: 32111000-XC212-STR-002

Approval in Principle and General Arrangement Drawings: XC219 – Buttevant

- BRIDGE XC219 OB
- BRIDGE XC219 AWBEG RIVER CULVERT

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC219 OB	Line: GSW	Mileage: 137mls 367yds
Proposed Category: Category 2	Estimate Cost € (ex VAT): €576,120	

1.0 Brief/ Background

Following a feasibility study undertaken by Iarnród Éireann (IÉ) to investigate and appraise options for the elimination/de-manning of level crossing XC219 Buttevant, Level crossing XC219 is to be closed (with extinguishment of the public right of way across the level crossing) and an alternative access constructed by way of a new offline highway route with the inclusion of a new overbridge. The new overbridge will cross the Dublin to Cork line at approximately 137miles 367yards, approximately 48m south of the existing level crossing.

2.0 Site Description, Crossing Details

2.1 Existing Level Crossing

Level Crossing XC219, Buttevant is a 'CX-Type' manually operated gated level crossing located at 137 miles 315 yards on the Dublin to Cork line. The level crossing is located on regional road R522 on the outskirts of Buttevant in the townland of Greggane, County Cork.

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gatekeeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The level crossing is located in a rural area with low density individual housing in the vicinity and is directly adjacent to the former Buttevant Station. The site of the former station is currently in use by Iarnród Éirenn as a maintenance yard and contains a number of derelict buildings. To the east of the rail crossing, the highway crosses an access road to the maintenance yard. A proprietary concrete box culvert is proposed at this location which is covered by a separate culvert AiP.

The level crossing is close to the Awbeg River which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). As part of the proposal, the Awbeg River is to be culverted beneath the proposed carriageway. A proprietary concrete box culvert is proposed at this location which is covered by a separate culvert AiP.

2.2 Proposed Bridge Location

The proposed structure is to replace the level crossing and will be located over the Dublin to Cork line at approximately 137 miles 367 yards. The existing topography comprises open fields with the existing railway approximately level with the surrounding area.

The proposed new bridge accommodates a new highway alignment that will cross the railway at a level of 94m AOD, providing a minimum of 5.3m clearance from top of rail, taking construction depth into account. There will be approximately 6m high embankments to the east and west of the proposed structure, tapering at a gradient of 3:1.

The new structure will be located approximately 9m west of the proposed concrete box culvert, which will accommodate the IÉ access road that is located to the east of the proposed bridge. It is not anticipated that the culvert will affect the design of the rail overbridge.

3.0 Structure Description

The proposed structure is a single span bridge with a 0° skew and square span of 18.6m between faces of supports. The deck will be constructed from precast, prestressed TY-type concrete beams with concrete infill and topping. End supports will be in-situ reinforced concrete bankseats, integral with the deck and supported on sleeved concrete piles behind reinforced earth wall abutments. The reinforced earth walls are parallel to the railway track and extend to form wingwalls which are also parallel to the railway line.

The structure will be fully integral at end supports, with a monolithic connection between the substructure and superstructure. Saw cut joints in the surfacing, sealed with bitumen will be used between the structure and the embankment.

The structure will have 1.8m high precast concrete parapets with H4a containment. The parapets will be structurally tied to the deck through an in situ concrete outstand.

4.0 Alignment Details

The cross-section details for the Cork to Dublin line at the proposed structure location are shown in Table 1 below:

Table 1

Item	Width (mm)
Upside clearance	4500 (to wall coping)
Existing Up Track Gauge	1600
Track Spacing	1850
Existing Down Track Gauge	1600
Downside Clearance	4500 (to wall coping)

The maximum gradient of the proposed highway will be up to 6% on either approach or departure to the new rail bridge. This is within the desirable minimum gradient permitted under Section 4.1 of DN-GEO-03031. The highway at the proposed structure location has a vertical radius of 1001.8m which peaks at the centre-span of the bridge and falls towards each abutment.

At the proposed bridge location, the highway falls at a gradient of 3.5% from South to North.

Table 2

Item	Width (mm)
Parapet Upstand	350
North Raised Verge	1450
Carriageway	5500
South Raised Verge	2000
Parapet Upstand	350

5.0 Geotechnical Summary

A high-level review of existing published information has been undertaken to inform preliminary foundation design for the proposed overbridge structure. The review of the available data obtained from the Geological Survey of Ireland database has led to the following preliminary assumptions being made with regards to typical ground conditions at the structure location:

- Alluvium and Glacial Till over bedrock of Limestone.
- Top Soil expected at surface, with potential for Made Ground to be encountered.
- Limited local groundwater information available, however shallow groundwater is expected

due to nearby watercourse.
- Sulphate/ pH ground and ground water conditions unknown, assumed DS-1/ ACEC-1 at this stage.

The current level of ground related information is considered to be insufficient to adequately manage the ground risk during the detailed design process for the foundations of this structure. The key geotechnical constraints considered to be present at XC219, which will be addressed by the proposed ground investigation and detailed design process are bulleted below:

- Unclear and variable depth of bedrock below proposed foundations;
- Variability of glacial deposits below proposed foundations;
- Little specifically known about relevant material properties at this location;
- Potential shallow groundwater and long-term variability in groundwater levels;
- Potential for Alluvial deposits in the western part of the site;
- Potential for contamination and wide scale variability within any made ground;
- Unclear Sulphate/ pH ground and groundwater conditions;
- Close proximity to live existing railway and highway.

A ground investigation is proposed to be undertaken during Autumn 2019, to help facilitate the management of ground risks, specific to this structure and provide a sufficient level of information to facilitate detailed design and management. The proposals currently include:

- 6 Cable percussive, 5 with rotary follow-on;
- 4 Trials pits;
- Installation of groundwater standpipes; and

Geotechnical and Geo-environmental laboratory testing.

6.0 Hydrology and Hydraulic Summary

A hydraulic model has not been undertaken at this stage.

The proposed highway alignment involves construction in the existing floodplain. There is potential requirement to allow additional culverts in the adjoining flood plain. The bridge itself is at the highest point of the proposed highway alignment and it is not anticipated to be at risk from flooding.

7.0 Services Details

There are no services identified in the vicinity of the proposed structure. Existing services in the vicinity of the existing level crossing will be maintained on their current alignment. 2 No. 100mm diameter steel ducts will be provided in the South verge for future use.

8.0 Corrosion Protection, Waterproofing, Impregnation

8.1 Waterproofing

Deck Surface: NRA approved sprayed deck membrane satisfying the requirements of NRA BD47 will be provided.

Walls and base: Two coats of epoxy resin waterproofing paint to buried surfaces in accordance with NRA Specification for Roadworks Series 2000.

8.2 Concrete Materials and Finishes

All in situ concrete structural elements outside the splash zone of the bridge shall be constructed from C40/50 concrete.

All exposed concrete faces within the splash zone shall be treated as follows:

- All precast concrete elements shall be C50/60
- All in situ concrete elements shall be grade C40/50 concrete with a minimum 50 percent ground granulated blast furnace slag and impregnated with a hydrophobic pore liner.

Precast concrete parapets will include a feature finish.

9.0 Drainage

The highway at the proposed structure location has a vertical radius of 1001.8m which peaks at the centre-span of the bridge and falls towards each abutment. The high falls transversely at a gradient of 3.5% from South to North. The transverse fall, together with the longitudinal fall, will prevent any water from ponding on the carriageway.

Substructure drainage: A perforated pipe situated at the rear of each bankseat will provide backfill drainage. The pipe will be surrounded by porous no fines concrete and connect to the highway drainage.

10.0 Containment

The structure will have 1.8m high precast concrete parapets of H4a containment level in accordance with DN-STR-03011 (Historic NRA BD 52), DN-REQ-03034 (Historic NRA TD 19), and EN 1317. H4a W5 safety barriers will extend for the appropriate distance on approach and departure from the structure as necessary in accordance with DN-STR-03011 (Historic NRA BD 52), DN-REQ-03034 (Historic NRA TD 19), and EN 1317. The H4a W5 barrier will tie into N2 containment safety barriers on the bridge approaches.

11.0 Construction Proposals

It is envisaged that the construction sequence will be as follows:

1. Vegetation Clearance and site preparation – re-establish location of services and establish work zones
2. Construct base for reinforced earth wall and erect precast, all in accordance with manufacturer instructions
3. Install sleeves and concrete piles
4. Place bankseats
5. Erect precast beams & fix deck reinforcing
6. Pour concrete deck to create integral deck and bankseats
7. Place precast parapet walls
8. Cast in situ parapet outstand
9. Backfill abutments to final levels
10. Position services, construct kerbs, complete earthworks and drainage, lay surfacing.

The bridge will be constructed with precast prestressed concrete beams and an in situ concrete infill and topping. This form of construction is widely used both within Eire and the UK and there is expertise in the use of concrete in bridge construction.

The prestressed precast concrete beams are stable in the temporary condition. Erection of precast beams, precast parapets and concrete pour of the deck will be undertaken during railway possession.

During construction works the track will require monitoring in accordance with CCE-TRK-SPN-010.

12.0 Inspection and Maintenance Provisions

<u>12.1 Superstructure</u>

The proposed integral concrete structure eliminates the requirement for structural bearings and deck expansion joints and will therefore minimise maintenance requirements. The underside of the structure can be inspected during rail possession with use of a RRV MEWP.

12.2 Substructure

The substructure is in situ reinforced concrete and should not incur any significant maintenance costs. Formed concrete surfaces below ground will be waterproofed using a proprietary epoxy resin paint. The substructure, including reinforced earth panels, can be inspected under rail possession with use of a RRV MEWP where necessary.

13.0 Loading

The structure will be designed to Eurocodes. Actions relating to normal traffic will be considered through Load Model 1 and Load Model 2 in accordance with IS EN 1991-2:2003. No special vehicle (SV) types will be considered.

The verges will be loaded with footway loading in accordance with IS EN 1991-2:2003.

The bridge is to be designed for an anticipated 25mm differential settlement subject to confirmation by ground investigation.

14.0 Surfacing Proposals

All surfacing will be designed in accordance with DN-PAV-03023 (Historic NRA HD 36), DN-PAV-03024 (Historic NRA HD 37), and NRA Specification for Road Works Series 700, 900 and 1000.

15.0 Authority Consultations

It is envisaged that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order.

16.0 Proposed Relaxations and Departures from Standard

None.

17.0 Proposed Design Approach, Material Parameters

17.1 Bridge Deck and Bankseat Abutment Modelling

The temporary condition will be modelled using a line beam analysis of wet concrete and self-weight of the precast beams.

The distribution of forces and moments in the permanent stage will be determined from analysis of a 3D space frame model using a suitable and verified computer program. The deck ends will be connected to the substructure to allow forces to distribute into the bankseat abutments. Vertical and horizontal spring stiffnesses will be used to represent the soil/structure interaction.

A grillage mesh will be adopted for analysis of the deck, with longitudinal members representing precast prestressed beams and transverse members representing the topping and a diaphragm at each transverse reinforcement location. These elements will be connected into vertical and horizontal elements representing the abutment. Transverse members of the abutment will represent the bankseat behaviour in the transverse direction.

17.2 Earth retaining System Structural Analysis

The reinforced earth walls will be designed by the supplier.

17.3 Foundation Design

The foundation design to the soil reinforced abutment shall be developed by the company responsible for detailed design, based on loadings obtained from the structural analysis in accordance with IÉ requirements. The foundation design shall be undertaken following IS-EN-1997 and shall meet the requirements of differential settlement as set out in Section 13.

18.0 Foundation Design

The bridge is an integral structure, with bank-seat type abutments on reinforced earth embankments. The abutments are supported by a single row of piles which are sleeved through the reinforced earth to allow them to flex without displacing the surrounding soil. Piles will be founded in the Glacial Till or in bedrock. Negative skin friction shall be considered in the design of piles where applicable. Following completion of the ground investigation a formal Ground Investigation Report will be prepared which will enable structure specific ground characterisation assessment and review of the proposed foundation solutions.

The reinforced soil embankment and wingwalls are fully independent of the bridge superstructure. The reinforced earth embankment, wingwalls and approach embankment are likely to be founded on stiff Glacial Till. It is assumed that the bearing capacity of the Glacial Till is sufficient to support the reinforced earth embankment. There is a possibility that Alluvium could be encountered at the abutment position, in which case dig out and replacement with structural fill could be undertaken. If Made Ground or other poor ground, such as soft Alluvium or clay (which have a cu not considered to represent stiff material), are identified during the ground investigation and are of a significant thickness that cannot be excavated and replaced alternative options will be considered.

Anticipated vertical and lateral ground movements due to embankment loading, will be assessed during detailed design with measures proposed to deal with these effects on the existing railway assets. Differential settlements between the structure and adjacent approach embankments shall be considered during design.

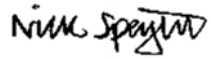
19.0 Planning and Costing

The estimated total construction cost for this structure is €. Construction work on site is anticipated to commence February 2021.

20. Drawings and Documents

Appendix A: List of Relevant Documents and Standards

Appendix B: General Arrangement Drawings

PREPARED BY: Lisa Gough	**APPROVED BY: Nick Speight**
Signature: 	Signature: 
Date: 29/8/19	Date:29/8/19

Amendments and Conditions

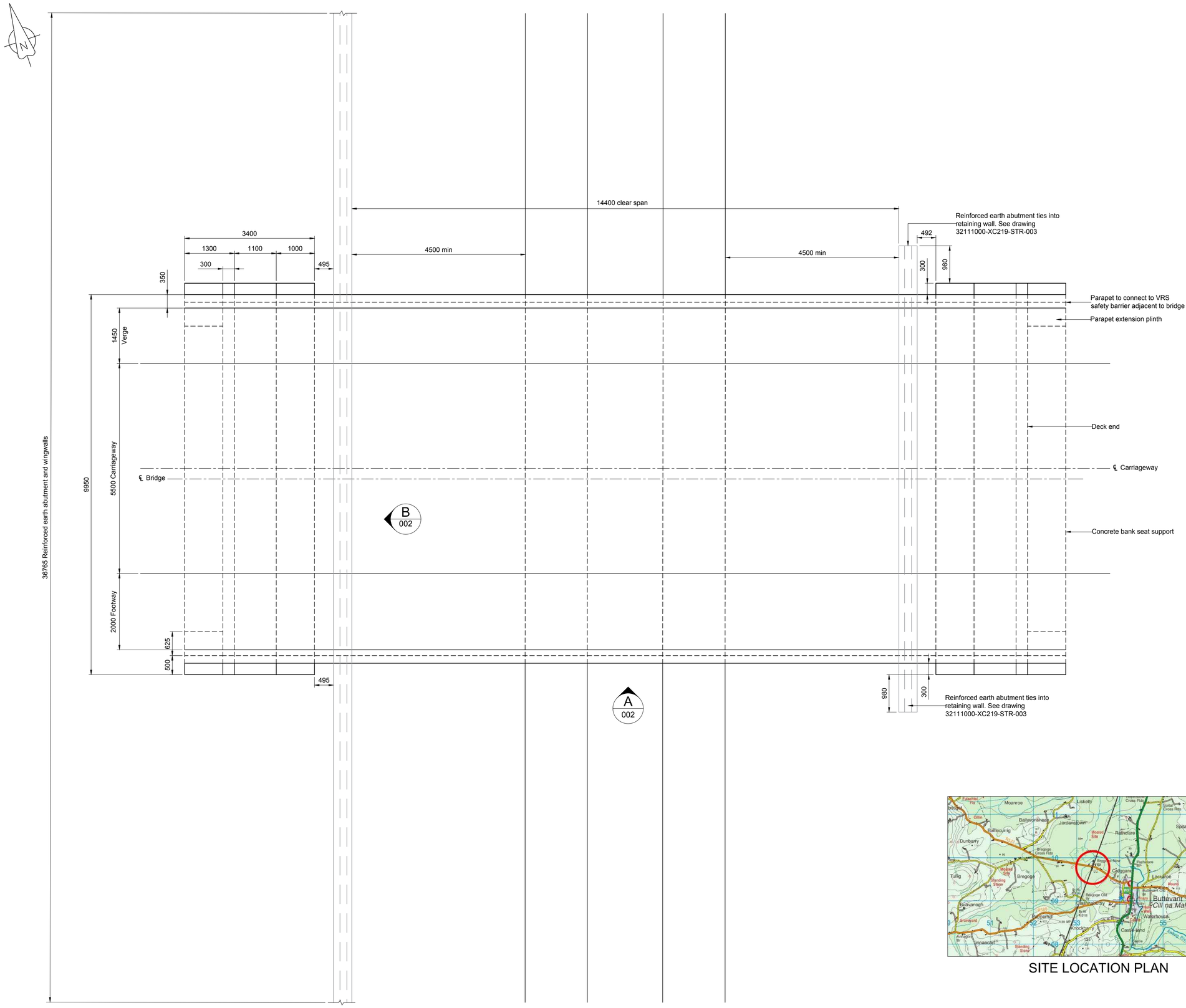
Annex A1 List of Relevant Standards

Annex A2 List of Drawings and Schedules

32111000-XC219-STR-001 Rail Overbridge General Arrangement Drawing 1 of 2

32111000-XC219-STR-001 Rail Overbridge General Arrangement Drawing 2 of 2

32111000-XC219-STR-002 Access Road & Retaining Wall General Arrangement



PLAN OF PROPOSED BRIDGE

(Scale 1:50)

0 1 2 3 4 5 m

SCALE 1 : 50

SITE LOCATION PLAN

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. This drawing shows preliminary design only and is subject to detailed design.
5. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
6. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	DC	AB

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Client: Iarnród Éireann Irish Rail

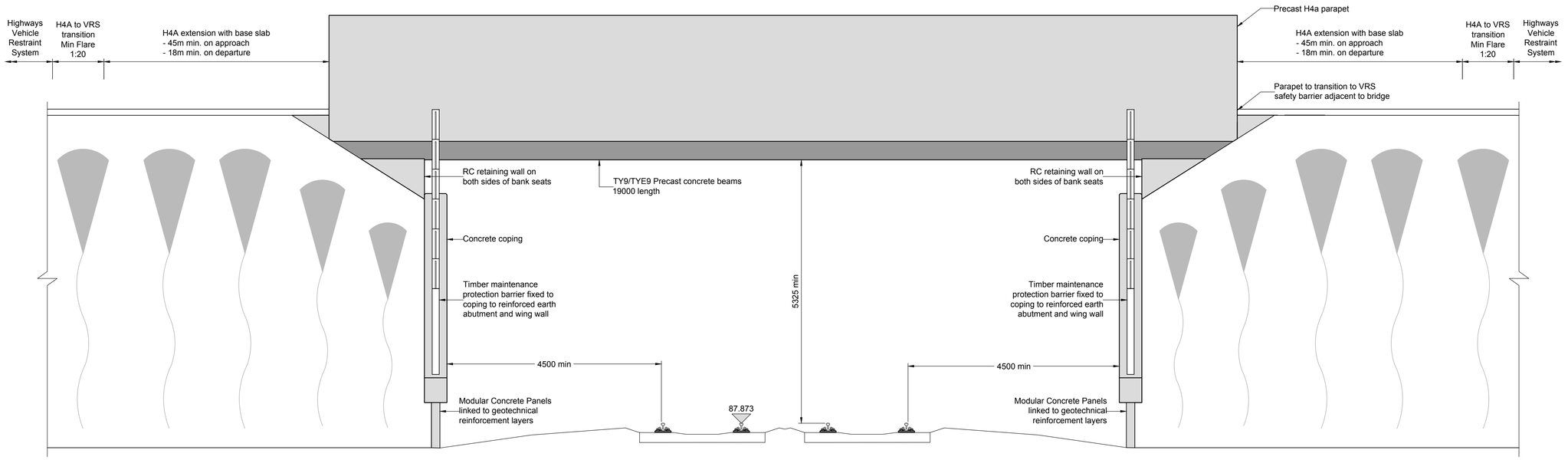
Project: CORK LEVEL CROSSING REPLACEMENT XC219

Drawing title: GENERAL ARRANGEMENT RAIL OVERBRIDGE SHEET 1 OF 2

Drawing status: FOR INFORMATION

Scale	1:50 @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number: 32111000-XC219-STR-001



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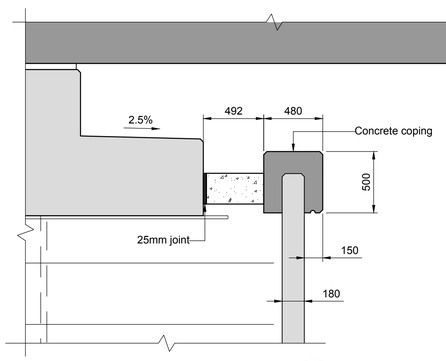

SECTION A
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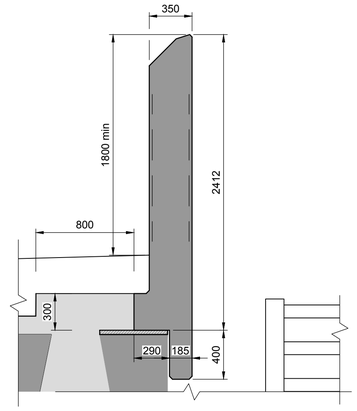
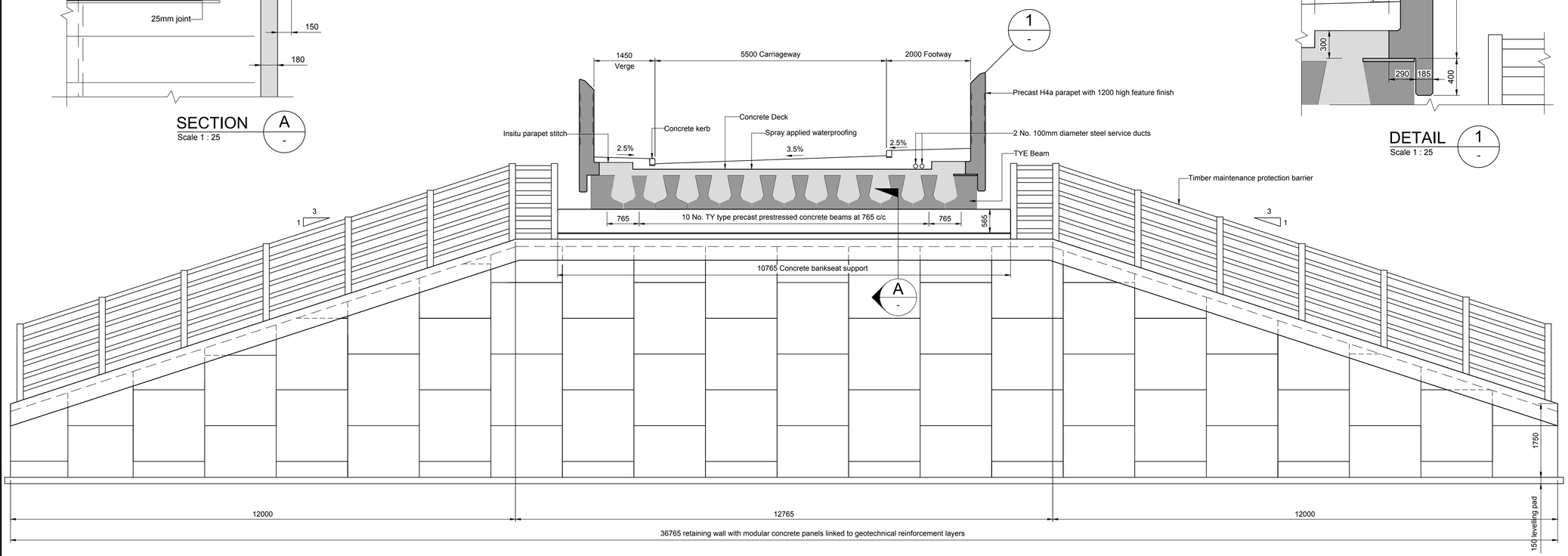


DETAIL 1
Scale 1 : 25
-



ELEVATION B
Scale 1 : 50
001

0 1 2 3 4 5 m
SCALE 1 : 50

0 0.5 1.0 1.5 2.0 2.5 m
SCALE 1 : 25

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All chamfers to be 25x25mm unless noted otherwise.
4. All levels are shown in metres A.O.D unless stated otherwise.
5. This drawing shows preliminary design only and is subject to detailed design.
6. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
7. Waterproofing:
   - Bridge deck waterproofing shall be two coats spray applied.
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.
7. 6N/6P structural backfill is to have a Φ' peak of <45°.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P01	OCT 2019	ISSUED FOR PLANNING	LG	EK	DC	AB

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Client
Iarnród Éireann Irish Rail

Project
CORK LEVEL CROSSING REPLACEMENT XC219

Drawing title
GENERAL ARRANGEMENT SHEET 2 OF 2

Drawing status
FOR INFORMATION

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number
32111000-XC219-STR-002

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

1.0 Brief/ Background

Following a feasibility study undertaken by Iarnród Éireann (IÉ) to investigate and appraise options for the elimination/de-manning of level crossing XC219 Buttevant, Level crossing XC219 is to be closed (with extinguishment of the public right of way across the level crossing) and an alternative access constructed by way of a new offline highway route to the south. The new highway will cross the River Awbeg approximately 200m west of the proposed level crossing replacement bridge at approximately 137miles 367yards.

2.0 Site Description, Crossing Details

2.1 Existing Level Crossing

Level Crossing XC219, Buttevant is a 'CX-Type' manually operated gated level crossing located at 137 miles 315 yards on the Dublin to Cork line. The level crossing is located on regional road R522 on the outskirts of Buttevant in the townland of Greggane, County Cork.

The level crossing is manned from 07.30hrs until 23.30hrs and the gates are normally closed to road traffic with the gatekeeper opening the gates as required for vehicle traffic. The level crossing is unmanned and closed to traffic from 23.30hrs until 07.30hrs. There are also pedestrian wicket gates at the crossing but the gatekeeper has no function in relation to the use of these gates.

The crossing is located in a rural area with low density individual housing in the vicinity and is directly adjacent to the former Buttevant Station. The site of the former station is currently in use by Iarnród Éirenn as a maintenance yard and contains a number of derelict buildings. To the east of the rail crossing, the highway crosses an access road to the maintenance yard.

The level crossing is close to the River Awbeg which is a tributary of the Blackwater River Special Area of Conservation (Site No. 002170). As part of the proposal, the River Awbeg is to be culverted beneath the proposed carriageway. This AiP relates to the proposed River Awbeg culvert.

2.2 Proposed Culvert Location

The proposed structure is to be located approximately 25m south of the existing bridge which carries the R522 single lane highway over the River Awbeg.

The proposed culvert accommodates a new single lane highway alignment that will cross the river at a level of approximately 87.5m AOD. It is proposed to provide a culvert roof soffit level of 84.8m AOD to give a headroom of approximately 2.5mm headroom over an assumed water level. This arrangement results in a minimum of approximately 1.475m of fill over the roof of the culvert. Either side of the culvert, the highway is located on embankments at a gradient of 3:1 to the south and 2:1 to the north.

3.0 Structure Description

The proposed structure is a single span precast reinforced concrete culvert with the following features:

- Internal dimensions, 6m wide x 3.5m high

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

- Base, wall and roof thicknesses of 0.6m with 0.15m x 0.15m internal chamfers to the corners.
- Total length of 38.815m comprising 11No. 2m long standard precast units with bespoke wingwall and apron sections at each end.
- To facilitate transportation, the precast culvert will comprise lower and upper reinforced concrete U sections, jointed at mid height of the walls.
- The headwalls and wingwalls at each end are protected with galvanised steel guardrail.

4.0 Alignment Details

The cross-section details for the carriageway at the proposed structure location are shown in Table 1 below:

Table 1

Item	Width (mm)
North Footway	3000
Carriageway	5500
South Footway	3500

The culvert is skewed at 40.2° skew to the highway

5.0 Geotechnical Summary

A high-level review of existing published information has been undertaken to inform preliminary foundation design for the proposed overbridge structure. The review of the available data obtained from the Geological Survey of Ireland database has led to the following preliminary assumptions being made with regards to typical ground conditions at the structure location:

- Alluvium and Glacial Till over bedrock of Limestone.
- Top Soil expected at surface, with potential for Made Ground to be encountered.
- Limited local groundwater information available, however shallow groundwater is expected due to nearby watercourse.
- Sulphate/ pH ground and ground water conditions unknown, assumed DS-1/ ACEC-1 at this stage.

The current level of ground related information is considered to be insufficient to adequately manage the ground risk during the detailed design process for the foundations of this structure. The key geotechnical constraints considered to be present at XC219 River Bridge, which will be addressed by the proposed ground investigation and detailed design process are bulleted below:

- Unclear and variable depth of bedrock below proposed foundations;
- Variability of glacial deposits below proposed foundations;
- Little specifically known about relevant material properties at this location;
- Potential shallow groundwater and long-term variability in groundwater levels;
- Potential for Alluvial deposits in the western part of the site;
- Potential for contamination and wide scale variability within any made ground;
- Unclear Sulphate/ pH ground and groundwater conditions;

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
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Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

- Close proximity to live existing railway and highway.
- Potential impact of the river on the structure and embankment, requirement for scour protection.

A ground investigation is proposed to be undertaken during Autumn 2019, to help facilitate the management of ground risks, specific to this structure and provide a sufficient level of information to facilitate detailed design and management. The proposals currently include:

- 2 Cable percussive with rotary follow-on;
- Installation of groundwater standpipes; and
- Geotechnical and Geo-environmental laboratory testing.

* Note that proposed ground investigation listed only includes that prescribed to clarify constraints for the design of the river bridge, not for the overbridge and road realignment, which is given in separate AiP.

6.0 Hydrology and Hydraulic Summary

A hydraulic model has not been undertaken at this stage. In the meantime, the culvert cross sections have been adopted to provide a minimum 500mm freeboard with a span exceeding the width of the river. These assumptions are subject to confirmation by hydraulic modelling.

7.0 Services Details

There are no services identified in the vicinity of the proposed structure. Existing local services in the vicinity of the existing highway will be maintained on their current alignment. There is sufficient cover over the proposed culvert to accommodate new services.

8.0 Corrosion Protection, Waterproofing, Impregnation

8.1 Waterproofing

Top slab surface & external walls to 200mm below the top slab soffit: NRA approved sprayed deck membrane satisfying the requirements of NRA BD47 will be provided.

Remaining external walls and base: Two coats of epoxy resin waterproofing paint to buried surfaces in accordance with NRA Specification for Roadworks Series 2000.

8.2 Concrete Materials and Finishes

All precast concrete structural elements shall be constructed from minimum C40/50 concrete.

9.0 Drainage

Back of wall drainage will be provided where appropriate to prevent build-up of hydrostatic head in the retaining elements.

10.0 Containment

The culvert is below highway level therefore permanent vehicle safety barriers will be installed in the verges.

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
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Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

- The speed limit is derestricted, therefore N2 level containment is required (TD19/06 cl. 3.4);
- Impact severity level should not normally exceed class B (TD19/06 cl. 3.6);
- Working width class for the safety barrier must be the greatest that highway geometry will allow, therefore W5 (TD19/06 cl. 3.9);
- The safety barrier will extend 30m on approach to the hazard and 7.5m on departure from the hazard (TD19/06 cl.3.28).

11.0 Construction Proposals

It is envisaged that the construction sequence will be as follows:

1. Vegetation Clearance and site preparation
2. Stank and overpump waterflow
3. Excavate and blind base
4. Install lower precast concrete culvert sections
5. Install upper precast concrete culvert sections
6. Seal joints
7. Reinstate flow
8. Waterproof, install back of wall drainage and backfill
9. Complete earthworks and highway drainage, construct kerbs, lay surfacing.

The culvert will be constructed with precast culvert sections which are widely available within Eire. Temporary arrangements for dealing with the water flow are subject to Office of Public Works approval.

12.0 Inspection and Maintenance Provisions

The inspection and maintenance of non-waterside elements of the headwalls and wingwalls can be carried out from the embankments.

The inspection and maintenance of the waterside elements of the structure will be undertaken from the waterway with the use of waders. Access is available via concrete aprons from both ends of the culvert of the structure from within the highway scheme's red line boundary.

The proposed box culvert structure eliminates the requirement for structural bearings and deck expansion joints and will therefore minimise maintenance requirements.

All concrete surfaces exposed to ground will be waterproofed.

13.0 Loading

Permanent Actions

Material densities and load factors for permanent actions will be taken in accordance with IS EN 1991-1-1:2002 and IS EN 1990:2002+A1:2005, respectively, along with any associated National Annexes.

Live Actions

Iarnród Éireann Infrastructure	APPROVAL IN PRINCIPLE (DESIGN STATEMENT)	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

Snow loading will not be considered.
Wind loading will not be considered.
Thermal loads will be taken in accordance with IS EN 1991-1-5:2003 Clause 6.1.4.2 (Approach 2) and associated National Annexes.

Actions relating to normal traffic under AW regulations and C&U regulations will be taken into account through Traffic Load Models 1 and 2 in accordance with IS EN 1991-2:2003 and associated National Annexes. No special vehicle (SV) types will be considered.

No assessment of footway variable actions due to pedestrian traffic on the bridge will be considered as the traffic loading detailed in the above and following sections is more onerous.

Accidental Wheel Load will be considered in accordance with the requirements of IS EN 1991-1-2:2003 and the associated National Annex.

Action During Construction
Consideration will be given to the construction sequence when determining temporary actions.

The culvert is to be designed for an anticipated 25mm differential settlement subject to confirmation by ground investigation.

14.0 Surfacing Proposals
All surfacing will be designed in accordance with DN-PAV-03023 (Historic NRA HD 36), DN-PAV-03024 (Historic NRA HD 37), and NRA Specification for Road Works Series 700, 900 and 1000.

15.0 Authority Consultations
It is envisaged that the necessary planning permission, land acquisition and extinguishments of rights of way for the proposed solution will be provided through the application to An Bord Pleanála for a Railway Order.

16.0 Proposed Relaxations and Departures from Standard
None.

17.0 Proposed Design Approach, Material Parameters
Structural analysis and stability checks for the concrete box culvert will be carried out in accordance with the load cases outlined in the Eurocodes and their corresponding National Annexes. It will be ensured that the bearing pressure beneath the base slab remains within the limits of the bearing capacity of the supporting subsoil.
The wing walls will be designed as earth retaining structures in accordance with PD 6694-1.
The analysis methods will include first order, elastic, linear and static analyses for all combinations of actions in accordance with IAS EN 1992-1-1:2004 (cl. 5.4) and PD 6694-1.17.1 Bridge Deck and Bankseat Abutment Modelling

Iarnród Éireann Infrastructure	**APPROVAL IN PRINCIPLE (DESIGN STATEMENT)**	
DEPARTMENT: Design and Construction, New Works	PROJECT REFERENCE: TBC	
Bridge/ Structure Name/ No.: XC219 River Awbeg Culvert	Line: GSW	Mileage: N/A
Proposed Category: Category 2	Estimate Cost € (ex VAT): TBC (see Section 19)	

18.0 Foundation Design

The substructure will be founded on a concrete blinding layer with the base of the box acting as a shallow spread foundation which supports the integral wall and slab system of the box structure.
The base of the wing walls will act as a spread foundation and the foundation design is subject to the results of the Ground Investigation Report.

19.0 Planning and Costing

The original estimated total construction cost for this structure was based upon a bridge solution which was proposed in response to the initial information available. A subsequent value engineering exercise proposed the current box culvert solution and the construction cost estimate is to be updated to reflect this change.
Construction work on site is anticipated to commence February 2021.

20. Drawings and Documents

Appendix A: List of Relevant Documents and Standards
Appendix B: General Arrangement Drawings

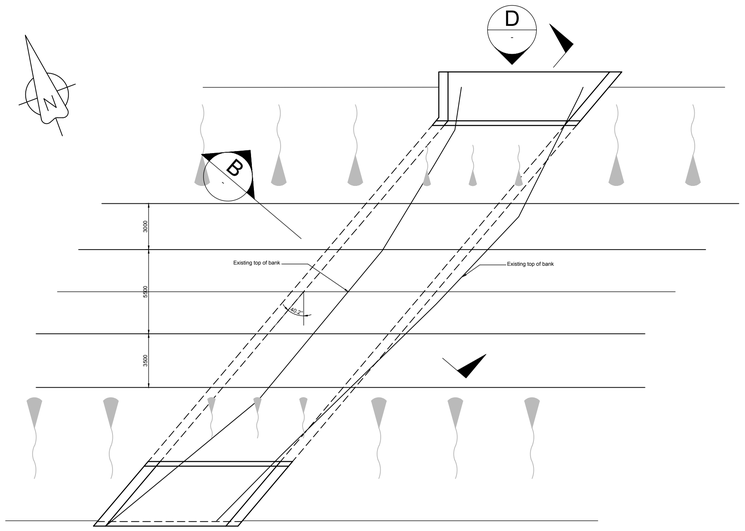
PREPARED BY: Lisa Gough Signature: Date: 30/8/19	**APPROVED BY:** Nick Speight CEng. M.I.C.E. Signature: Date:30/8/19

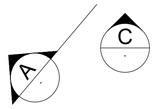
Amendments and Conditions

Annex A1 List of Relevant Standards

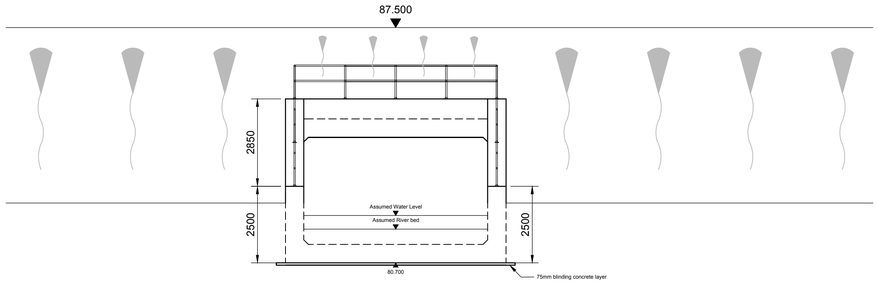
Annex A2 List of Drawings and Schedules

32111000-XC219-STR-003 River Awbeg Culvert General Arrangement

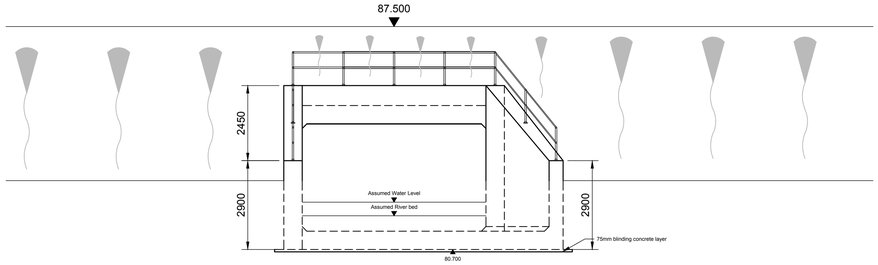




PLAN OF PROPOSED CULVERT
(Scale 1:200)



ELEVATION C
Scale 1 : 100



ELEVATION D
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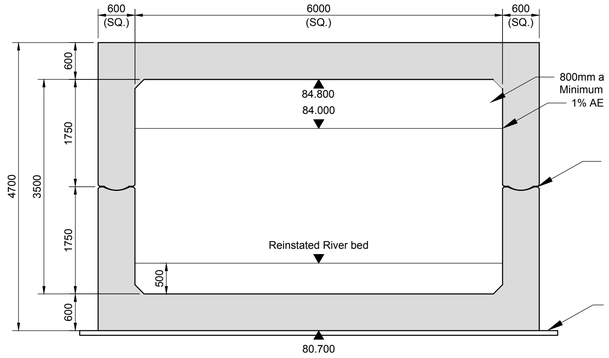
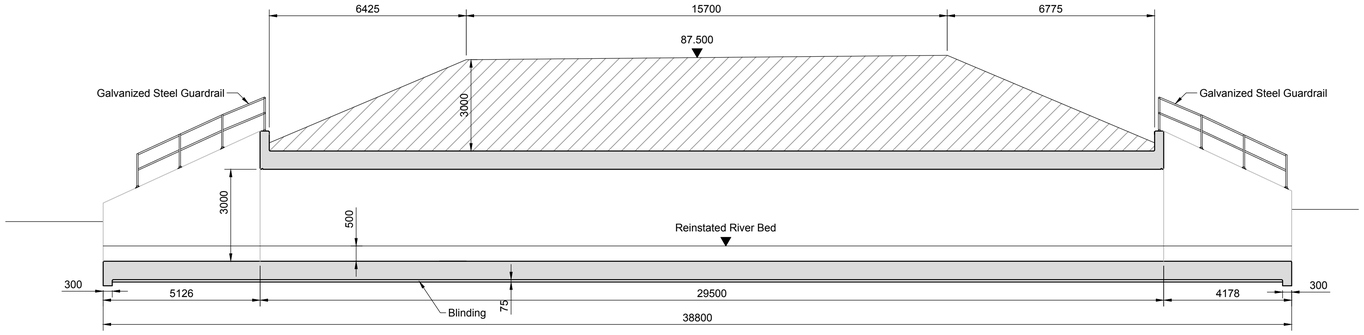


SECTION B
Scale 1 : 50



SECTION A
Scale 1 : 100

(Wingwalls shown for information)

Notes:

1. Do not scale from this drawing.
2. All dimensions are given in millimetres unless noted otherwise.
3. All levels are in mAOD
4. All chamfers to be 25x25mm unless noted otherwise.
5. This drawing shows preliminary design only and is subject to detailed design.
6. Foundation type/size is subject to change and is to be confirmed by the Geotechnical Design Report.
7. Waterproofing:
   - All buried concrete surfaces shall be treated with two coats of epoxy resin waterproofing paint.

Rev	Rev. Date	Purpose of revision	Drawn	Checkd	Rev'd	Apprv'd
P0x	XXX. YYYY					

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Client: Iarnród Éireann Irish Rail

Project: CORK CULVERT XC219

Drawing title: GENERAL ARRANGEMENT River Awbeg Culvert

Drawing status: FOR INFORMATION

Scale	AS SHOWN @ A1	DO NOT SCALE
Jacobs No.	32111000	Rev P01
Client no.		

Drawing number: 32111000-XC219-STR-003

METRES @ 1:200 0 2 5 10 20
METRES @ 1:100 0 1 2 5 10
METRES @ 1:50 0 0.5 1 2 5

Appendix D. Route Options Report

Cork Line Level Crossing Options Report

Multi-Criteria Analysis

32111000-JAC-GEN-XX-RP-Z-0001 | 0

06/11/19

Irish Rail

Cork Line Level Crossing Options Report

Project No:	Cork Line Level Crossing
Document Title:	Multi-Criteria Analysis
Document No.:	32111000-JAC-GEN-XX-RP-Z-0001
Revision:	0
Date:	06/11/19
Client Name:	Irish Rail
Client No:	
Project Manager:	
Author:	Luciana Pires
File Name:	32111000-JAC-GEN-XX-RP-Z-0001

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Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
0	17/09/19	Draft Issue	LP	AB	DK	AB
1	05/11/19	Revised Issue	FD	AB	DK	AB

Contents

1. Introduction

Jacobs are engaged to provide consultancy services to Iarnród Éireann (IÉ) for the removal of 7no. manned level crossings on the Dublin to Cork Line, between Limerick Junction and Mallow Stations. The crossings are located within a 15 mile/24 km section of the line between 122 miles 0808 yards and 137 miles 0315 yards which straddles the Cork/Limerick county boundary.

The level crossings are located midway between the stations, such that the trains are travelling at speed. The scheduled trains which pass through these crossings each day must lower their speed, increasing travel time for passengers. Eliminating the level crossings is paramount in reducing the safety risks associated with the interface between rail and road traffic and lowering the potential for accident, injury or loss of life.

In 2010/2011, concept stage designs were developed for overbridge schemes to eliminate each of the level crossings. None of the schemes were progressed due to a lack of funding.

In 2018, Iarnród Éireann undertook a feasibility study to investigate and appraise the options for the elimination/de-manning of the level crossings. The options considered for the elimination/de-manning of the level crossings included closure (extinguishment of the public right of way across the level crossing), provision of alternative access through the construction of an access road and/or overbridge and the upgrade to a CCTV level crossing.

To determine the emerging preferred option at each of the level crossing points Jacobs have undertaken an option selection analysis at each location. This work took into account the work undertaken previously as detailed above and was supplemented with additional options as identified during site visits. The emerging preferred option at each location was determined following a comparative Multi Criteria Analysis (MCA) utilising key criteria of all the feasible options that were identified at each location. Further to the identification or each Emerging Preferred option these will be taken forward for further development and Preliminary Design.

1.1 Objective

The purpose of this report is to undertake a comparative assessment of the feasible options at each level crossing location to determine the Emerging Preferred Option at each of the applicable locations.

1.2 Report Structure

The following outlines each chapter of the report:

- Chapter 2: outlines the feasibility study done in March 2018;
- Chapter 3: provides a description of the methodology adopted in this assessment;
- Chapter 4: describes the level crossing locations and options developed;
- Chapter 5: undertakes a comparative assessment of the options and outlines the preferred option for each level crossing.

2. Feasibility Study

Following a culmination of previous work undertaken in 2018, Iarnród Éireann published a Feasibility Report in February 2019 identifying the feasibility options to eliminate/de-man the seven manned crossing as summarised below.

- **XC187 Fantstown:** elimination/de-manning of the level crossing through the extinguishment of the public right of way across the level crossing and the possible upgrade of the existing alternative access provision of alternative access route.
- **XC201 Thomastown:** elimination/de-manning of the level crossing through provision of alternative access across the railway line via a new overbridge.
- **XC209 Ballyhay:** elimination/de-manning of the level crossing through provision of alternative access across the railway line via a new overbridge, or, elimination/de-manning of the level crossing through the upgrade of the level crossing to a 4-barrier CCTV controlled level crossing.
- **XC211 Newtown:** elimination/de-manning of the level crossing through provision of a new link road to the west of the railway corridor to connect the local road at the west site of level crossing XC211 with Beechwood Grove and on to the proposed new overbridge at level crossing X212.
- **XC212 Ballycoskery:** elimination/de-manning of the level crossing through provision of alternative access across the railway line via a new overbridge.
- **XC215 Shinanagh:** elimination/de-manning of the level crossing through provision of alternative access across the railway line via a new overbridge.
- **XC219 Buttevant:** elimination/de-manning of the level crossing through provision of alternative access across the railway line via a new overbridge.

3. Methodology

3.1 Introduction

This chapter sets out the methodology followed in undertaking the options assessment study and the selection of the preferred option for each level crossing. The appraisal is based on the criteria identified in the Common Appraisal Framework for Transport Projects and Programmes (DTTS, 2016).

3.2 Methodology

For the comparative assessment of the level crossing options, a qualitative assessment of the criteria outlined for Stage 2 and 3 is proposed. To identify the emerging preferred option at each location, an MCA was undertaken based on criteria in the Common Appraisal framework for Public Transport Projects and Programmes. This comparative assessment is qualitative, high level, and is based only on key criteria that would offer differentiation between the different options. As such, it was assumed that there is no relevant differentiation between the route options regarding the following criteria:

- Accessibility & Social Inclusion;
- Integration; and,
- Physical Activity

Table 3-1 outlines the criteria and sub-criteria utilised for the assessment.

Table 3-1 Criteria and sub-criteria

Criteria	Sub-criteria	Description
Economy	Cost	Comparison of options with regards to comparative capital cost
	Land Take	Comparative qualitative assessment of land requirements for each option
	Reliability / Journey Time	Comparative assessment of journey time for each option
Engineering	Geotech	Comparison of options with regards to the assumed ground conditions based upon a desktop assessment
	Structures	Comparison of options with regards to number and complexity of bridges/structures required within each option
	Geometry	Comparison of options with regards to compliance to design criteria and ability for options to achieve required design speeds
Environment	Ecology	Qualitative appraisal of potential effects of proposed option on internationally and nationally important designated sites and associated flora and fauna
	Water/Flood Risk	Qualitative appraisal of potential impacts of proposed options on existing surface water bodies and aquifers.

Criteria	Sub-criteria	Description
	Landscape	Qualitive assessment of potential impacts on the landscape and amenity
	Noise	Qualitative assessment of sensitive receptors within the vicinity of the different options
	Cultural Heritage	Qualitative assessment of potential impacts of proposed options on legally protected sites.

3.3 Scoring Procedure

For each of the criterion, the options will be compared against each other based on the primary and sub criteria utilising a five point scale, ranging from having significant advantages over other options, to having significant disadvantages over other options. This five-point scale is colour coded as presented in Table 3-2, shown below.

Table 3-2 Options Appraisal Colour Coding System

Score/Colour	Description
	Significant advantages over other options
	Some advantages over other options
	Comparable to other options
	Some disadvantages over other options
	Significant disadvantages over other options

4. Level Crossing and Route Options

4.1 Introduction

There are 7 manned public road level crossings in operation on the Dublin to Cork line between Limerick Junction and Mallow stations. The crossings are located within a 15 mile/24 km section of the line between 122 miles 808 yards and 137 miles 315 yards, which straddles the Cork/Limerick county boundary.

Details of the level crossings are provided in Table 4-1.

Table 4-1 Level crossing details

Level Crossing	Mileage	Crossing Type	Road Type	Local Authority
XC187 – Fantstown	122mi 808yds	C – Type	Local	Limerick City & County
XC201 – Thomastown	127mi 70yds	C – Type	Local	Limerick City & County
XC209 – Ballyhay	130mi 878yds	CD – Type	Local	Cork County Council
XC211 – Newtown	131mi 1385yds	CD – Type	Local	Cork County Council
XC212 – Ballycoskery	131mi 1759yds	CD – Type*	Local	Cork County Council
XC215 – Shinanagh	134mi 260yds	CD – Type*	Local	Cork County Council
XC219 – Buttevant	137mi 315yds	CX - Type	Regional	Cork County Council

* Operated on a 24-hour basis as a CX – Type level crossing.

The Iarnród Éireann designations for Gated Manned Level Crossing are as follows:

- C Type – Gates normally CLOSED to road traffic;
- CX Type – Gates normally OPEN to road traffic;
- CD Type – Gates normally OPEN to road traffic by DAY and normally closed at other times;
- CN Type – Gates normally OPEN to road traffic by NIGHT and normally closed at other times.

The following section describes the seven level crossings and provides details of alternative options developed for each of them.

4.2 Level Crossing Locations and Proposed Options

4.2.1 XC187 – Fantstown

Level Crossing XC187, Fantstown is a 'C-Type' manually operated gated level crossing located at 122 miles 808 yards on the Dublin to Cork. The level crossing is located on local road LS 8514, 3km to the east of Kilmallock in the townland of Fantstown in County Limerick.

Figure 4-1 XC187 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC187 is a straight closure and diversion of traffic along existing roads. For this reason, no alternative options were considered at Preliminary Stage.

4.2.2 XC201 – Thomastown

XC201, located in the townland of Thomastown, Co. Limerick, is a “C-type” manually operated gated level crossing on a local road. The gates are manually opened by a gatekeeper from 07.30 – 23.30hrs and closed to road traffic outside of these hours. There are also pedestrian wicket gates at the crossing, which the gatekeeper does not control.

Figure 4-2 XC201 Scheme Location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC201 is closure and alternative route via new road alignment and new road-over-rail bridge. Four alternative options were developed for the closure of this crossing as shown in Figure 4-3 and described below.

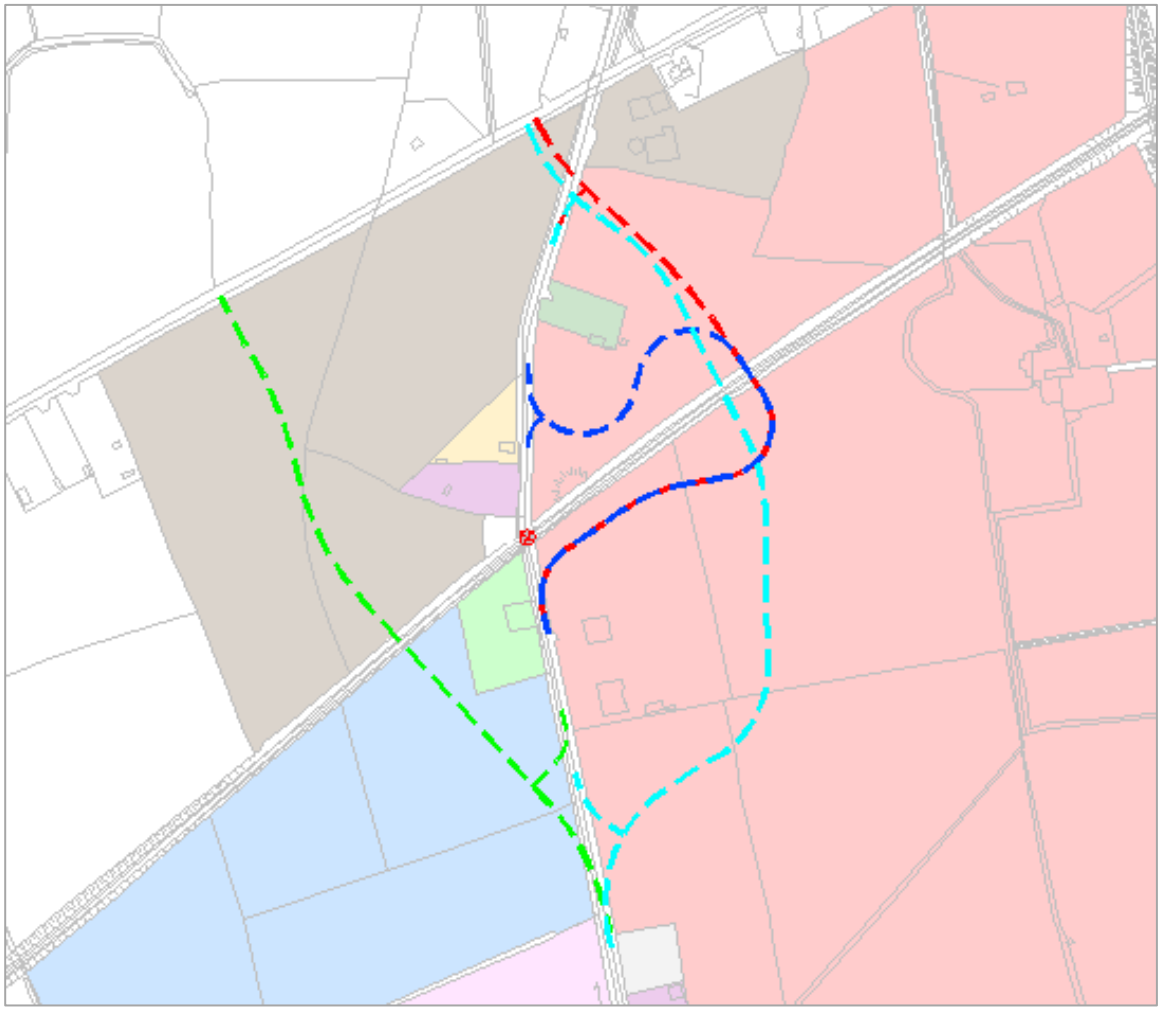

Figure 4-3 XC201 Alternative Options

- **Green option:** This alignment proposes a new road-over-rail bridge to the south west of the closed level crossing, and a new junction onto the Regional Road R515, to the west of the existing junction. New junctions would be required to the south of the level crossing.

  The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Red option:** This alignment proposes a new road-over-rail bridge to the north west of the closed level crossing, and the implementation of a staggered junction on the Regional Road R515.

  The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Blue option:** This alignment proposes a new road-over-rail bridge to the north west of the closed level crossing, with tie-ins to the existing road to the north and south of the level crossing.

  The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Cyan option:** This alignment proposes a new road-over-rail bridge to the north west of the closed level crossing, and the implementation of a staggered junction on the Regional Road R515. New junctions would be required to the south of the level crossing.

The remaining sections of the existing local road pavement to the north and south of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

4.2.3 XC209 – Ballyhay

Level Crossing XC209, located in Ballyhay, Co. Cork, is a “CD-type” manually operated level crossing on a local road. The gates are manually opened by a gatekeeper from 07.30 – 23.30hrs and closed to road traffic outside of these hours. There are also pedestrian wicket gates at the crossing, which the gatekeeper does not control.

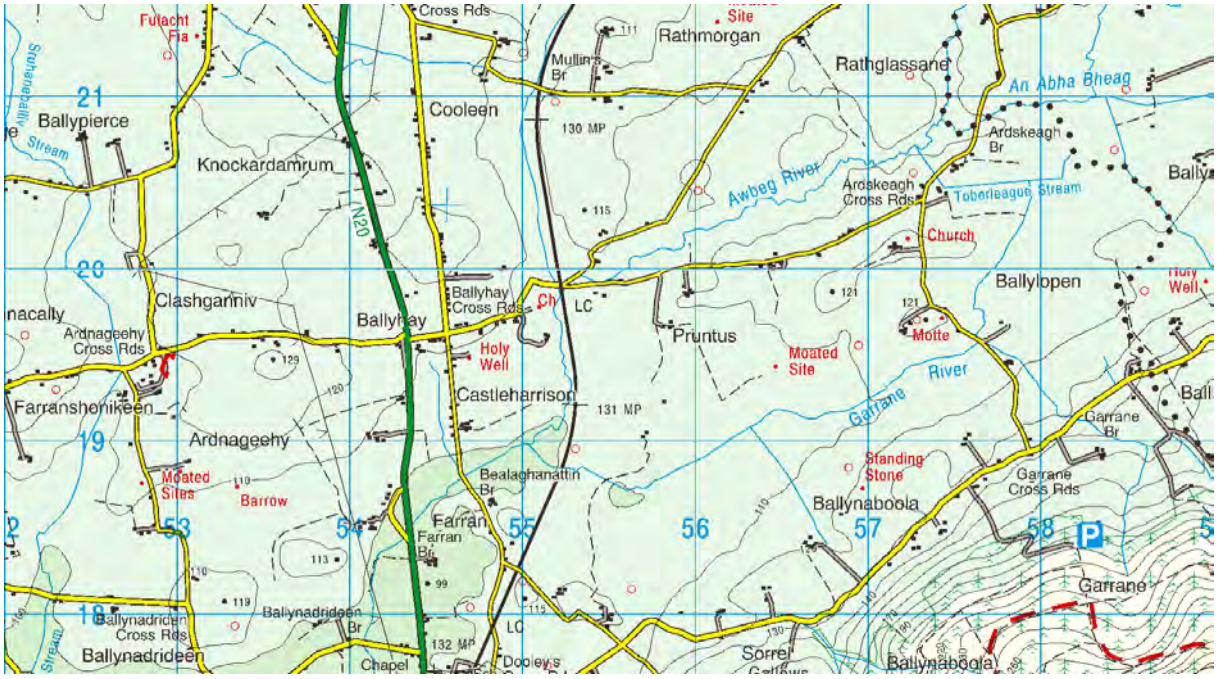

Figure 4-4 XC209 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC209 is to either convert to CCTV level crossing or closure or the crossing and alternative route via new road alignment and new road-over-rail bridge.

For the level crossing closure, a number of alternative options were developed through the combination of alternative mainline options (green, blue and cyan) and link options (red, pink and orange). The mainline and link options are show in Figure 4-5.

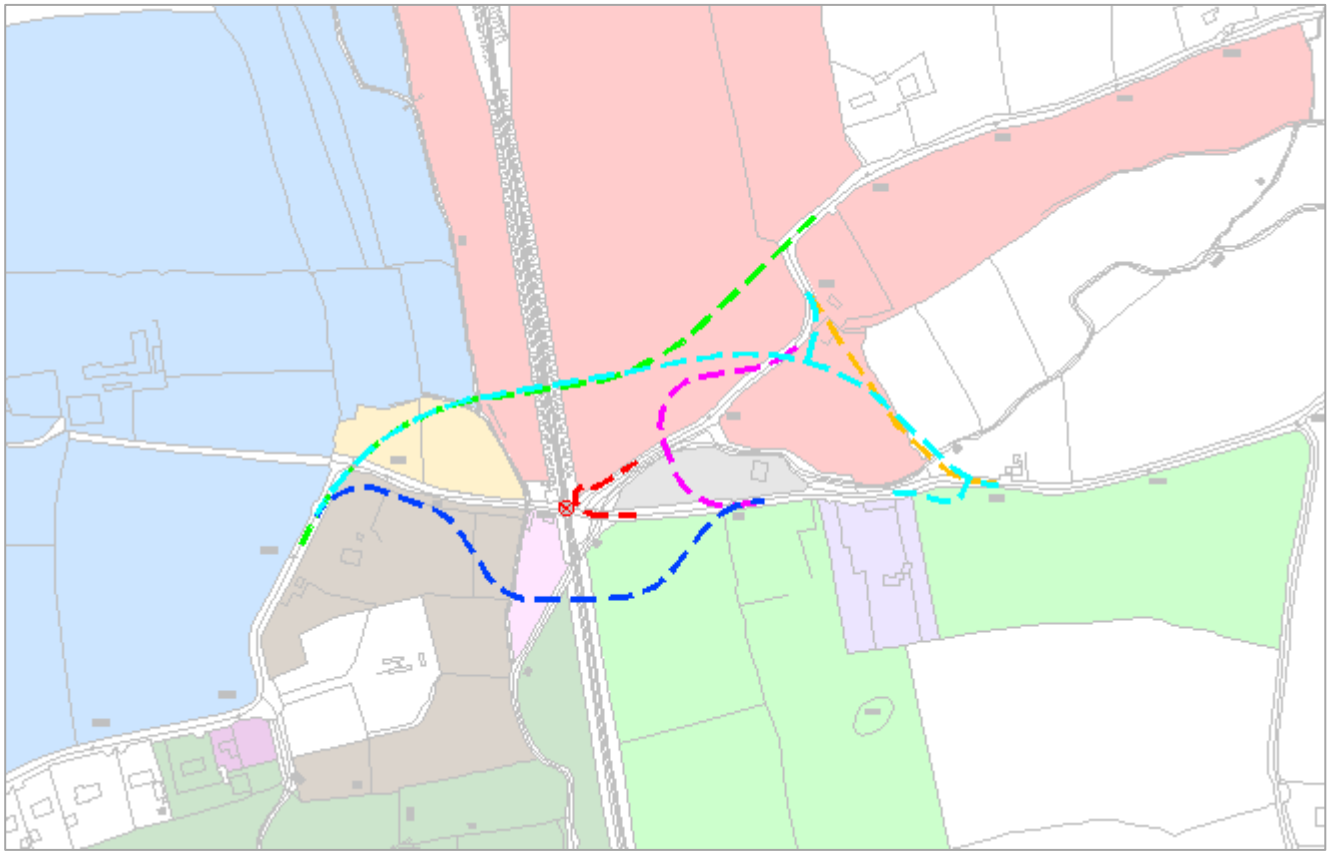

Figure 4-5 XC209 Alternative Options

The combined alternative options are described below:

- **Green-Red option:** This alignment proposes a new road-over-rail bridge to the north of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the north east of the crossing. Improvements would be made to the existing highway alignment to the east of the level crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Green-Pink option:** This alignment proposes a new road-over-rail bridge to the north of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the north east of the crossing. An additional new road alignment and river bridge is proposed to link the two existing local roads to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Green-Orange option:** This alignment proposes a new road-over-rail bridge to the north of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the north east of the crossing. An additional new road alignment and river bridge is proposed to link the two existing local roads to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Blue-Red option:** This alignment proposes a new road-over-rail bridge to the south of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the east of the crossing. Improvements would be made to the existing highway alignment to the east of the level crossing.

The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Blue-Pink option:** This alignment proposes a new road-over-rail bridge and river bridge to the south of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the east of the crossing. An additional new road alignment and river bridge is proposed to link the two existing local roads to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Blue-Orange option:** This alignment proposes a new road-over-rail bridge and river bridge to the south of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the east of the crossing. An additional new road alignment and river bridge is proposed to link the two existing local roads to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Cyan option:** This alignment proposes a new road-over-rail bridge to the north of the closed level crossing, linking the existing local road to the west of the crossing with the existing local road to the north east of the crossing with an additional river bridge. An additional new link road is proposed to link the proposed alignment with the existing local road to the north-east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

4.2.4 XC211 – Newtown

Level Crossing XC211, located in the townland of Newtown, Co. Cork, is a “CD-type” manually operated level crossing on a local road, 0.5km to the north of Ballyhea village. The gates are manually opened by a gatekeeper from 07.30 – 23.30hrs and closed to road traffic outside of these hours. There are also pedestrian wicket gates at the crossing, which the gatekeeper does not control.

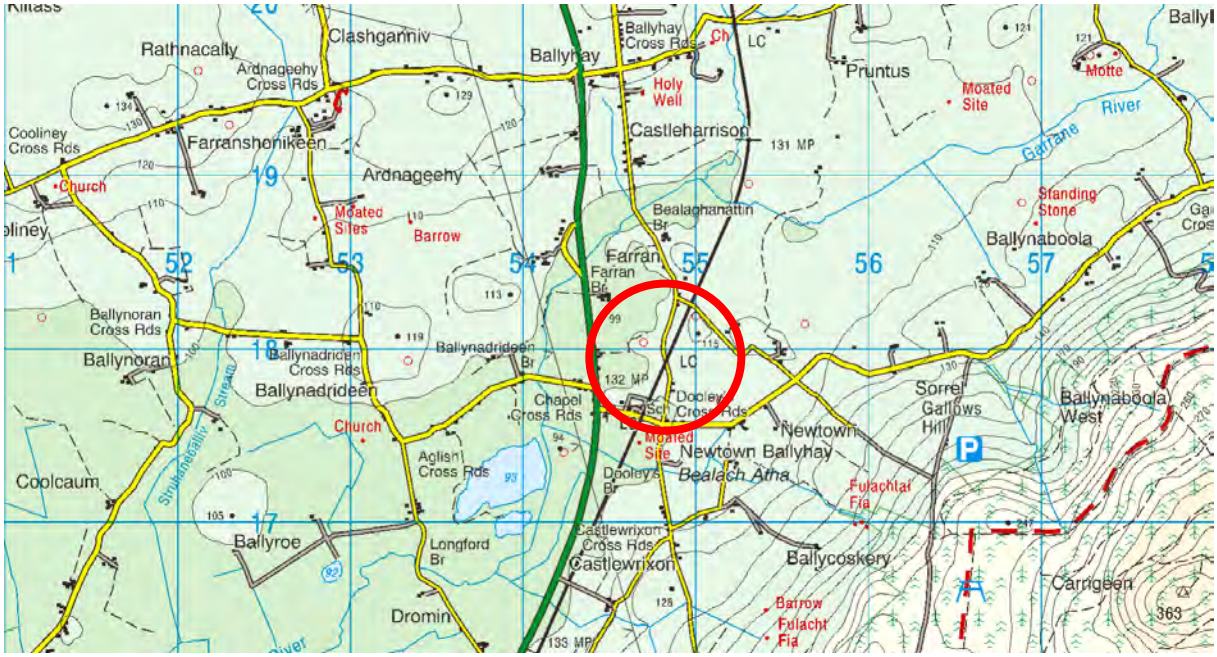

Figure 4-6 XC211 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC211 is closure and alternative diversion route via new road alignment. Two alternative options were developed for the closure of this crossing as shown in Figure 4-7.

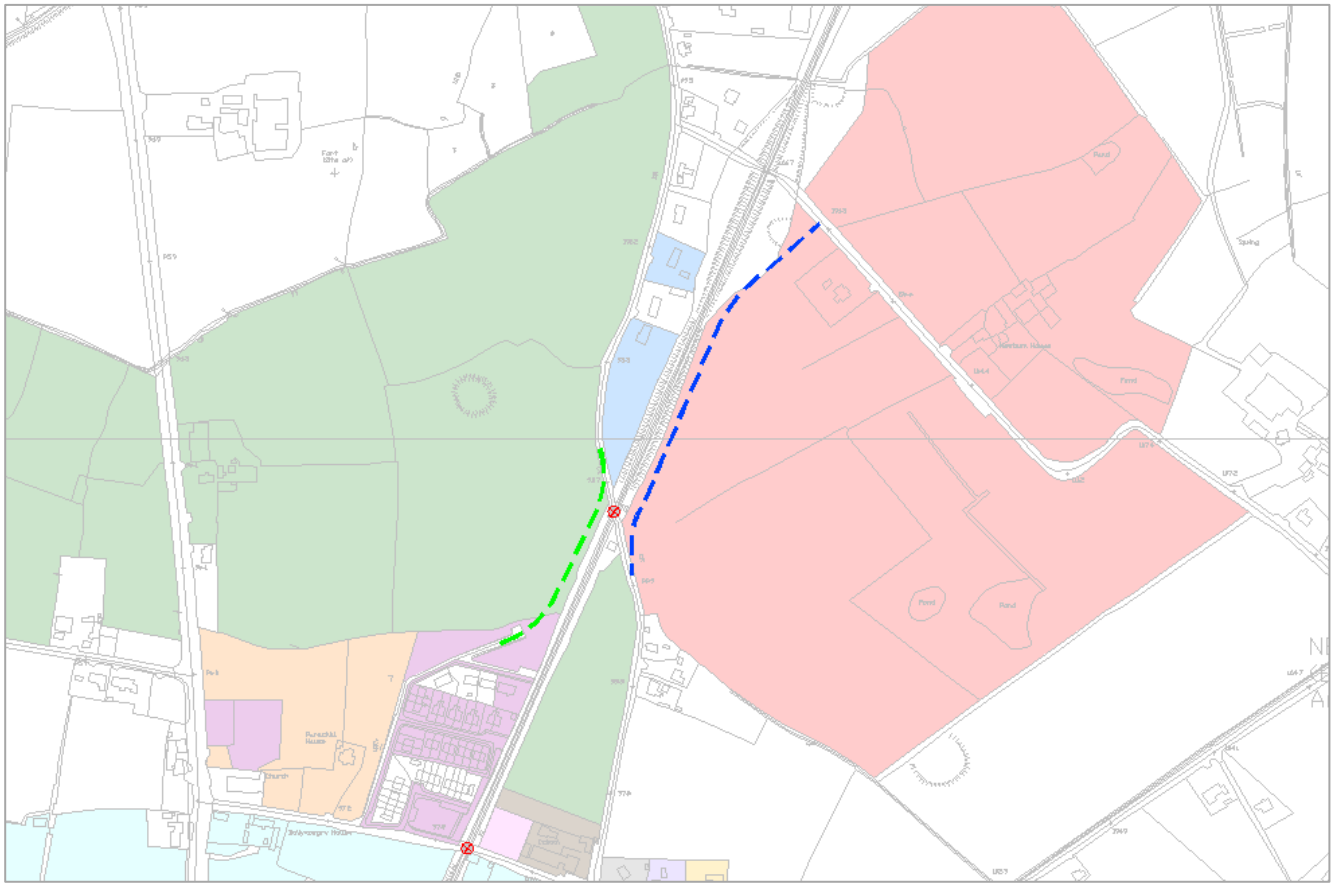

Figure 4-7 XC211 Alternative options

The alternative options are described below:

- **Green option**: This alignment proposes to realign the local road to connect into the back of Beechwood Grove housing estate to the South (which is immediately West of the XC212 level crossing). The proposed realignment will not require any structures.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.
- **Blue option**: This alignment proposes to realign the local road, from Dooley's Cross Road, to connect into the local road to the north east of the level crossing. The proposed realignment will not require any structures.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

4.2.5 XC212 – Ballycoskery

Level Crossing XC212, located in Ballycoskery, Co. Cork, is a “CD-type” manually operated level crossing on the local road, L1533. Although it is designated as a CD-type crossing, it is operated as a CX-type and is manned on a 24-hour basis. The gates are manually closed by a gatekeeper to allow the rail traffic to pass through and the pedestrian wicket gates are permanently locked.

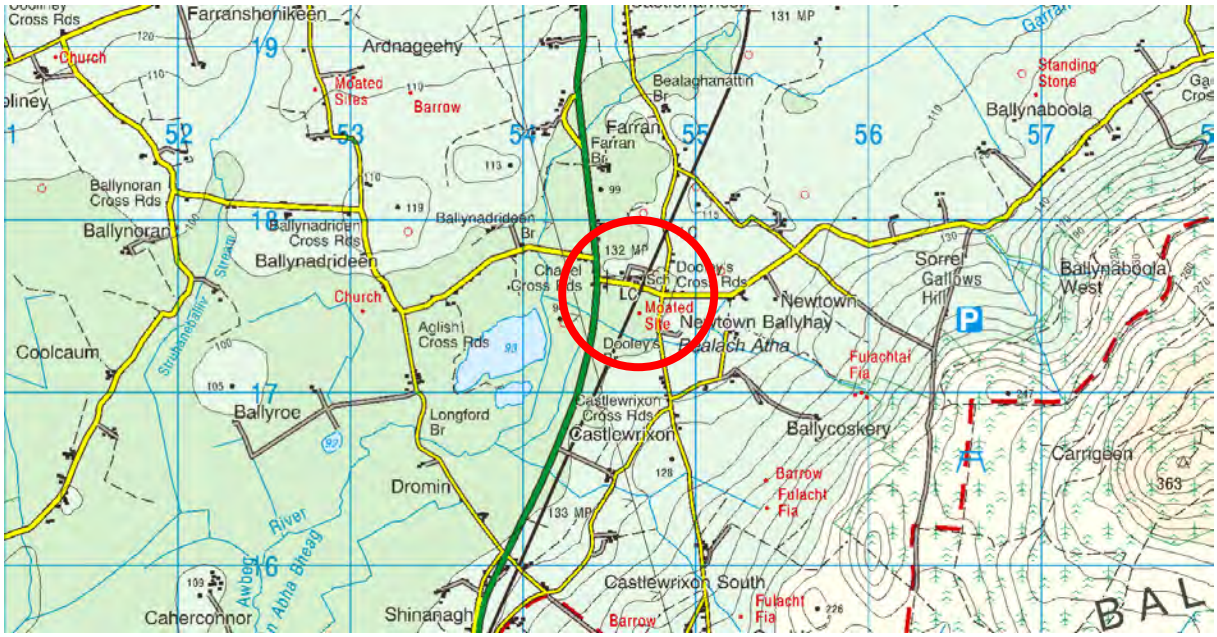

Figure 4-8 XC212 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC212 is closure and alternative route via new road alignment and new rail bridge. Three alternative options were developed for the closure of this crossing as shown in Figure 4-9.

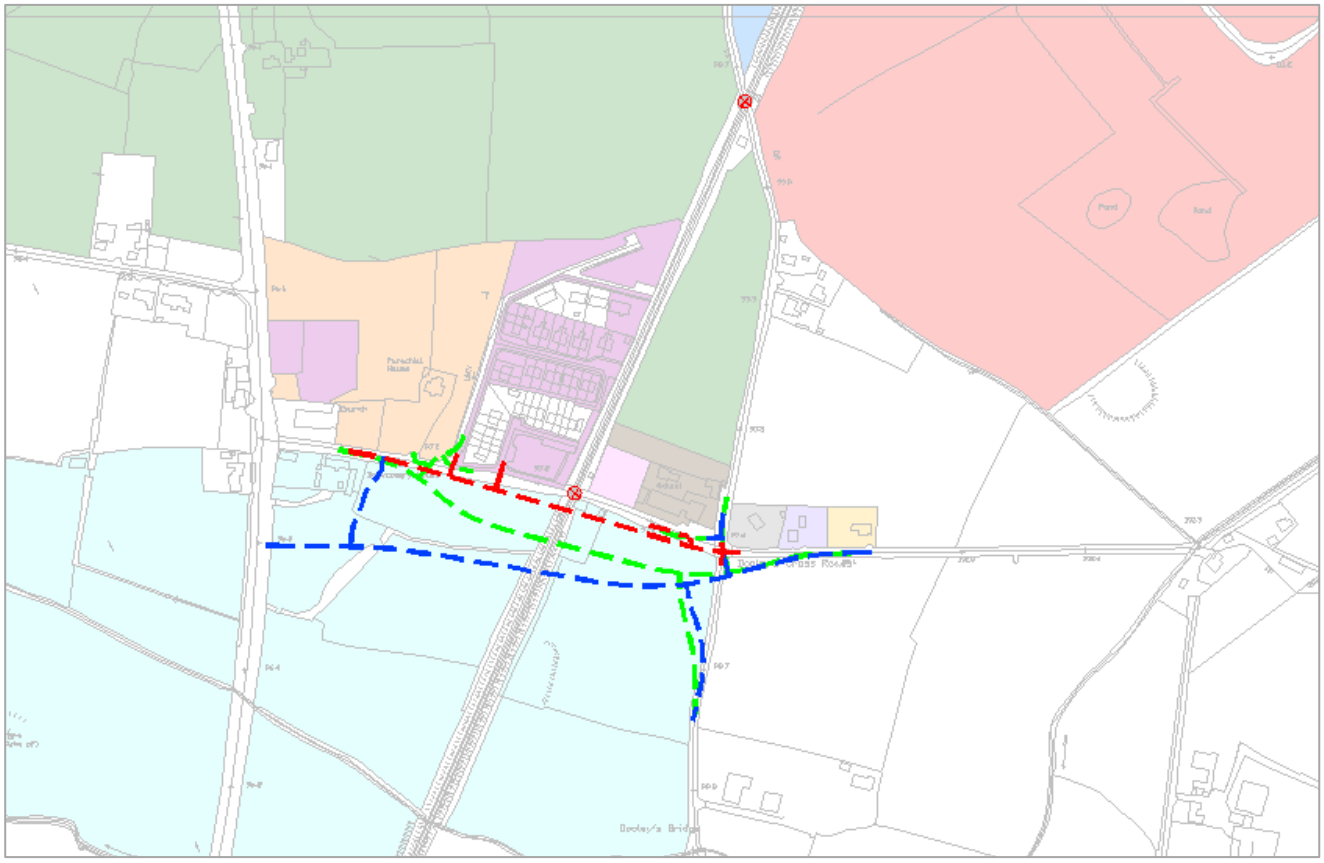

Figure 4-9 XC212 Alternative options

The alternative options are described below:

- **Green option**: This alignment proposes a new road-over-rail bridge to the south of the level crossing, linking the existing local road to the west of the crossing with the existing local road to the east of the crossing.

  The existing road to the east of the level crossing would be replaced with a car park and school drop-off area which would be developed in association with the local school. The remaining sections of the existing local road pavement to the west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Red option**: This alignment proposes a new rail-over-road bridge to the south of the level crossing, linking the existing local road to the west of the crossing with the existing local road to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Blue option**: This alignment proposes a new road-over-rail bridge to the south of the level crossing, linking the existing local road to the east of the crossing with the existing N20 via a new junction.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

4.2.6 XC215 – Shinanagh

Level Crossing XC215, located in the townland of Imphrick, Co. Cork, is a “CD-type” manually operated level crossing on the local road, L1320. Although it is designated as a CD-type crossing, it has been operated as a CX-type for 25 years and is manned on a 24-hour basis. The gates are manually closed by a gatekeeper to allow the rail traffic to pass through and the pedestrian wicket gates are permanently locked.

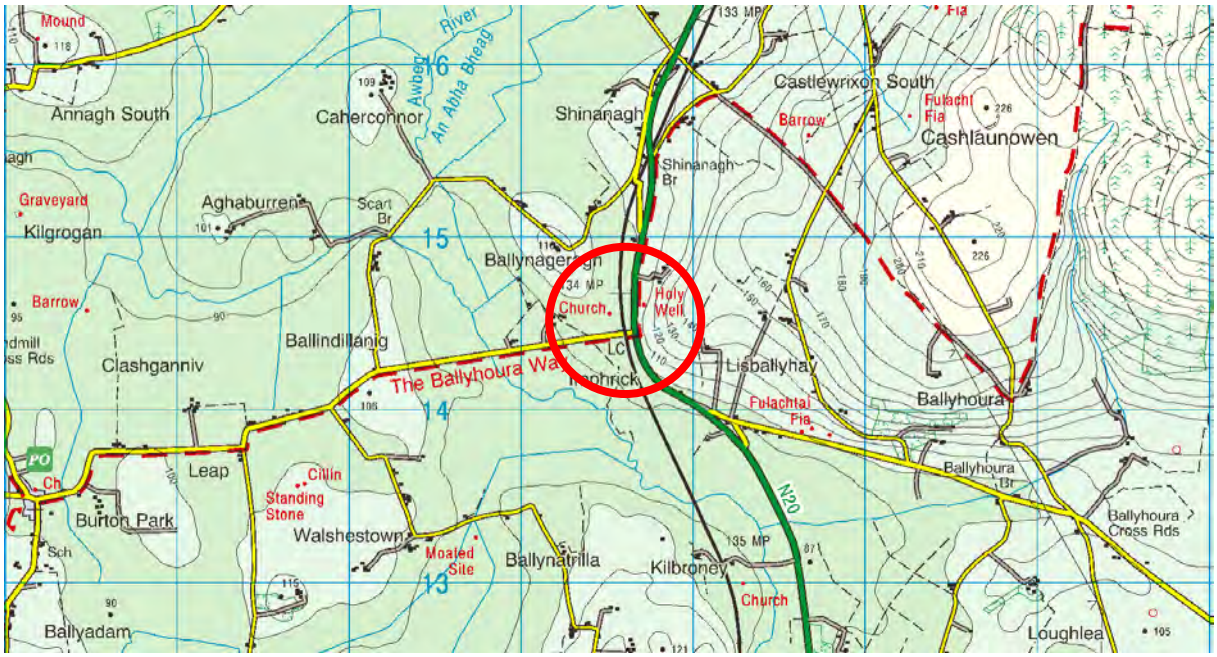

Figure 4-10 XC215 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC215 is closure and alternative route via new road alignment and new/existing road-over-rail bridge. A number of alternative options were developed through the combination of alternative mainline options (green, red and blue) and link options (orange and pink). The mainline and link options are show in Figure 4-11.

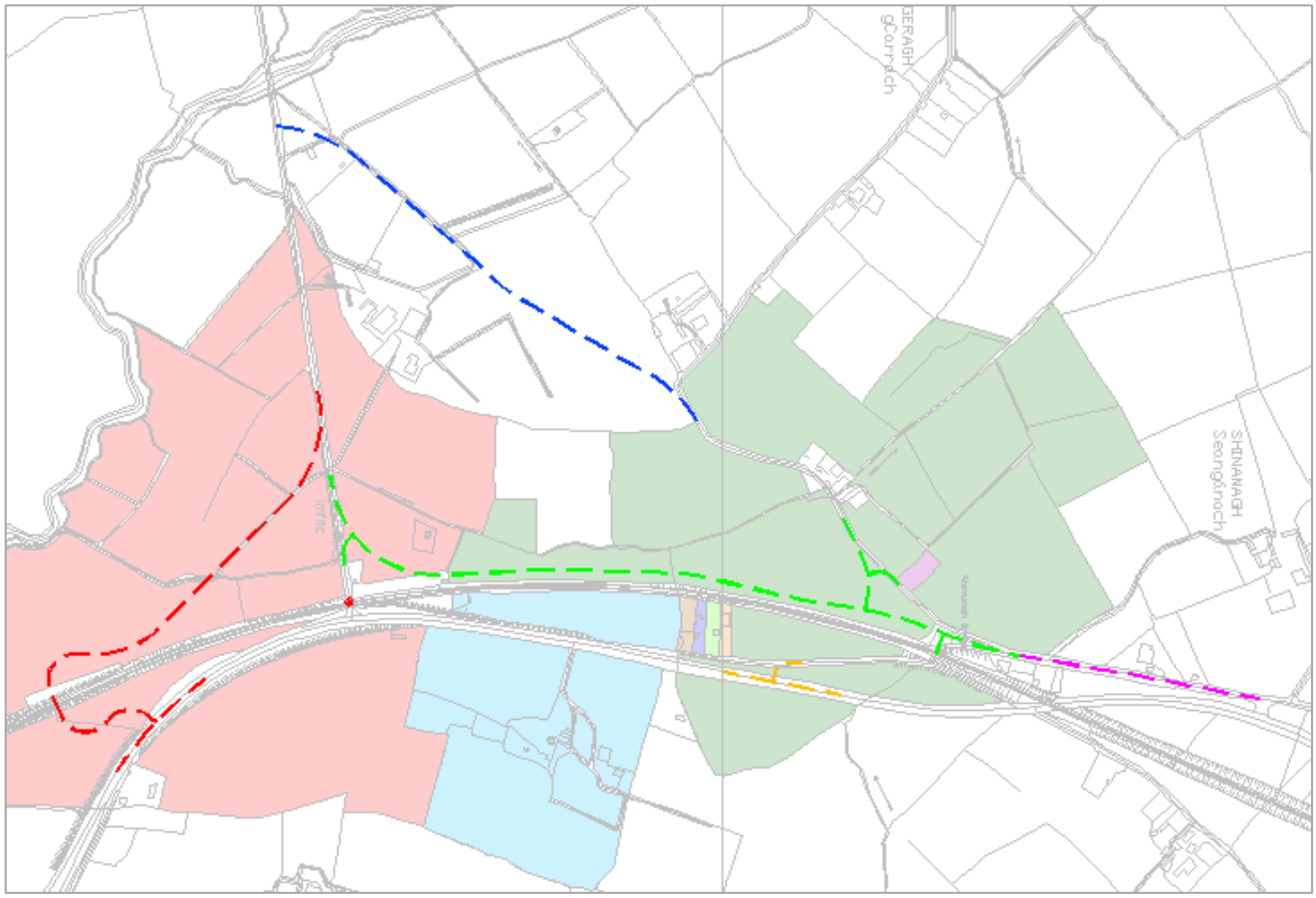

Figure 4-11 XC215 Alternative options

The alternative options are described below:

- **Green-Orange option**: This alignment proposes a new section of local road and tie-in to an existing road-over-rail bridge to the north of the level crossing. The existing tie-in to this bridge will be improved, and it is also proposed to upgrade the existing junction onto N20 national road at this location, to accommodate the increase in traffic numbers.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Green-Pink option:** This alignment proposes a new section of local road and tie-in to an existing road-over-rail bridge to the north of the level crossing. The existing tie-in to this bridge will be improved, and it is also proposed to tie-in with the local road to the north of the bridge.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Blue-Orange option**: This alignment proposes a new section of local road and tie-in to an existing road to the north-west of the level crossing. It is also proposed to upgrade the existing junction onto N20 national road at this location, to accommodate the increase in traffic numbers.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Blue-Pink option**: This alignment proposes a new section of local road and tie-in to an existing road to the north-west of the level crossing. It is also proposed to tie-in with the local road to the north of the bridge.

The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Red option**: This alignment proposes a new road-over-rail bridge to the south of the level crossing, linking the existing local road to the N20 national road.

  The remaining sections of the existing local road pavement to the west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

4.2.7 XC219 – Buttevant

Level Crossing XC219, located in the townland of Greggane, Co. Cork, is a “CX-type” manually operated level crossing on the regional road, R522. The crossing is manned on a 24-hour basis, with the gates being manually closed by a gatekeeper to allow the rail traffic to pass through.

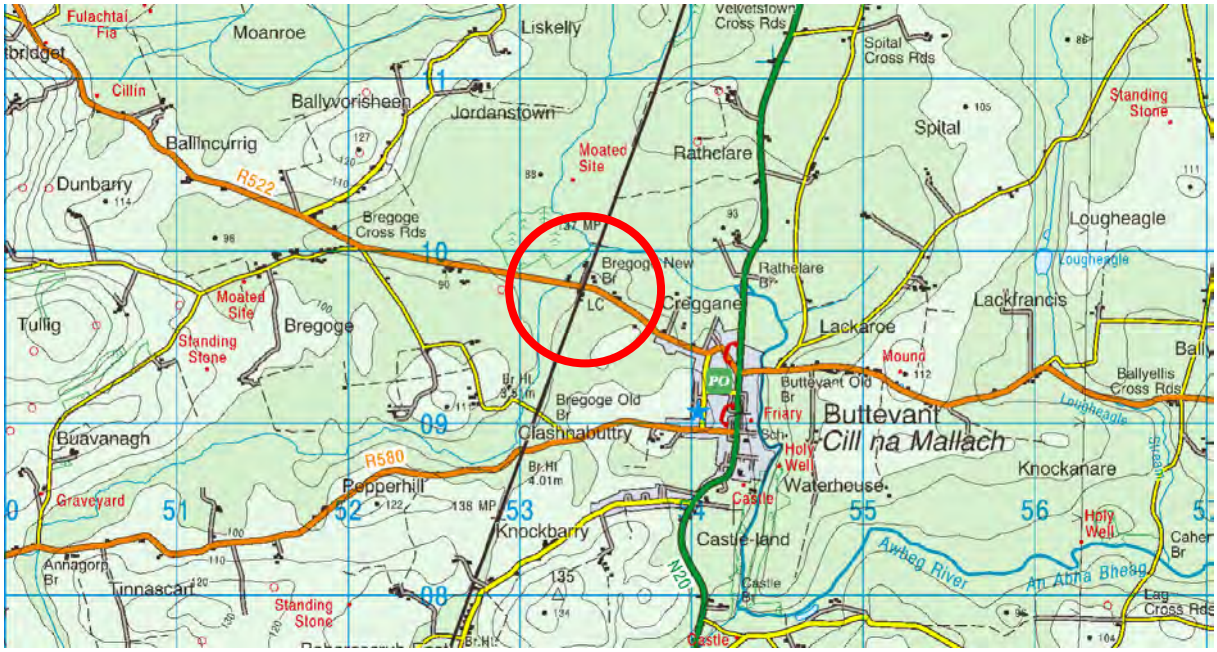

Figure 4-12 XC219 Scheme location

As per Feasibility Study Options Appraisal, the preferred solution for Level Crossing XC219 is closure and alternative route via new road alignment and new road-over-rail bridge. Three alternative options were developed for the closure of this crossing as shown in Figure 4-13.

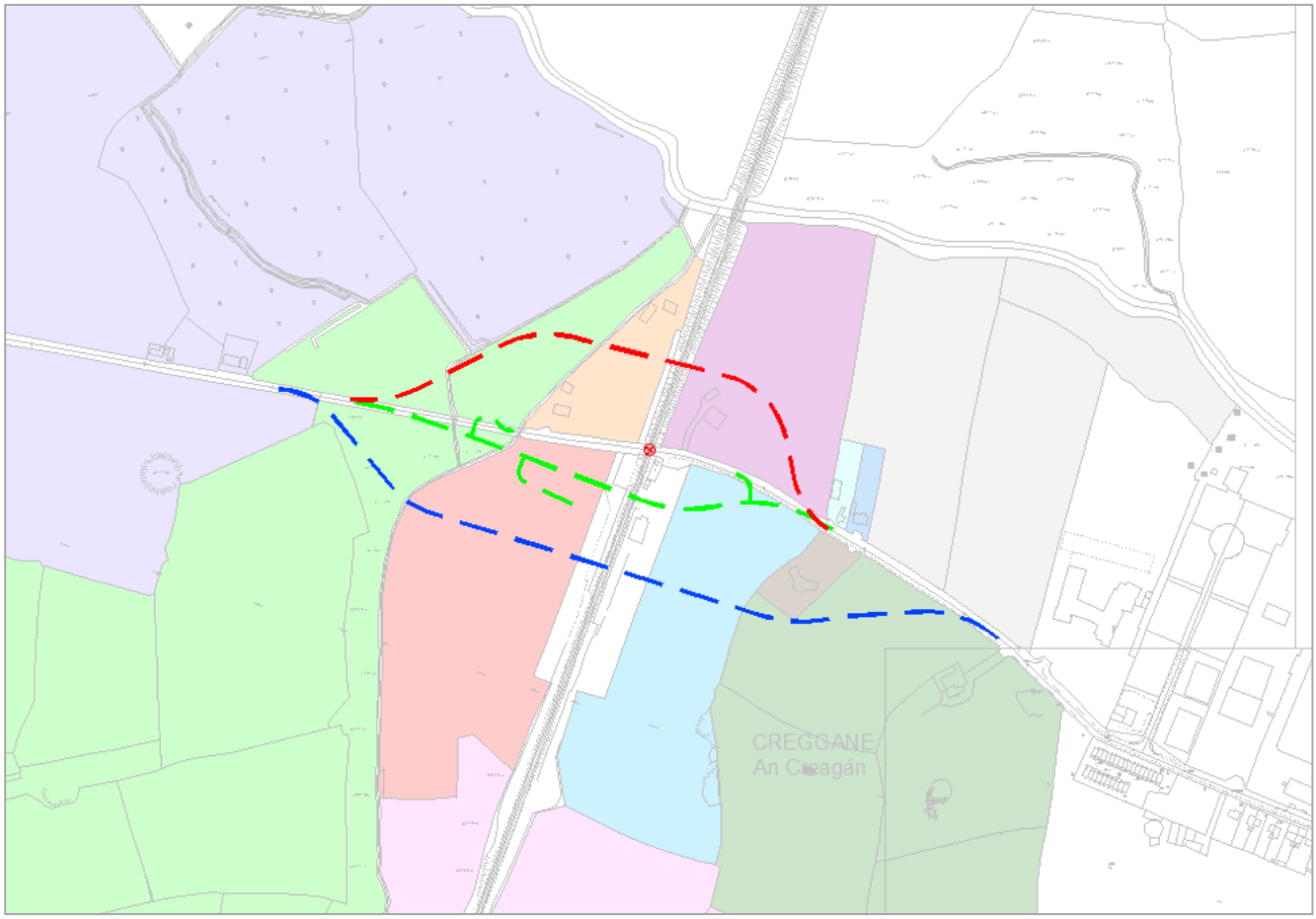

Figure 4-13 XC219 Alternative options

The alternative options are described below:

- **Green option:** This alignment proposes a new road-over-rail bridge to the south of the level crossing, linking the existing regional road to the west of the crossing with the existing regional road to the east of the crossing with a river bridge on the western .

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Red option:** This alignment proposes a new road-over-rail bridge to the north of the level crossing, linking the existing regional road to the west of the crossing with the existing regional road to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required.

- **Blue option:** This alignment proposes a new road-over-rail bridge to the south of the level crossing, linking the existing regional road to the west of the crossing with the existing regional road to the east of the crossing.

  The remaining sections of the existing local road pavement to the east and west of the closed level crossing will be retained where required to allow access to properties or broken up and removed where no longer required

4.3 Summary

Table 4-2 summarises the feasible options developed for each of the level crossing locations described in the previous section.

Table 4-2 Summary of the level crossings and alternative options

Level Crossing	Option Number	Option Colour	Description
XC187 – Fantstown	None	n/a	Based on the outcomes from the Feasibility Report, no review of route options required
XC201 – Thomastown	Option 1	Green	New road-over-rail bridge to SW of level crossing. New junction on R515.
	Option 2	Red	New road-over-rail bridge to NE to level crossing. Upgrade existing junction on R515.
	Option 3	Blue	New road-over-rail bridge to NE of level crossing.
	Option 4	Cyan	New road-over-rail bridge to NE to level crossing. Upgrade existing junction on R515.
XC209 – Ballyhay	Option 1	Green-Red	New road-over-rail bridge to North of level crossing. Widen existing junction.
	Option 2	Green-Pink	New road-over-rail bridge to North of level crossing. New road alignment with river bridge.
	Option 3	Green-Orange	New road-over-rail bridge to North of level crossing. New road alignment with river bridge.
	Option 4	Blue-Red	New road-over-rail bridge to South of level crossing. Widen existing junction.
	Option 5	Blue-Pink	New road-over-rail bridge to South of level crossing. New road alignment with river bridge.
	Option 6	Blue-Orange	New road-over-rail bridge to South of level crossing. New road alignment with river bridge
	Option 7	Cyan	New road-over-rail bridge to North of level crossing with river bridge.
XC211 – Newtown	Option 1	Green	New road alignment to west of level crossing. No structure.
	Option 2	Blue	New road alignment to east of level crossing. No structure.
XC212 – Ballycoskery	Option 1	Green	New road-over-rail bridge to South of level crossing.
	Option 2	Red	New rail-over-road bridge to South of level crossing.
	Option 3	Blue	New road-over-rail bridge to South of level crossing. New junction on the N20.
XC215 – Shinanagh	Option 1	Green-Orange	New road alignment to North of level crossing. Upgrade existing junction on N20.
	Option 2	Green-Pink	New road alignment to North of level crossing. Extend diversion to existing junction on N20 with some traffic restrictions required at existing bridge junction.
	Option 3	Blue-Orange	New road alignment to North West of level crossing. Upgrade existing junction on N20.

Level Crossing	Option Number	Option Colour	Description
	Option 4	Blue-Pink	New road alignment to North of level crossing. Extend diversion to existing junction on N20 with some traffic restrictions required at existing bridge junction.
	Option 5	Red	New road-over-rail bridge to West to level crossing. New junction on N20.
XC219 - Buttevant	Option 1	Green	New road-over-rail bridge to South of level crossing.
	Option 2	Red	New road-over-rail bridge to North to level crossing.
	Option 3	Blue	New road-over-rail bridge to South to level crossing.

5. Multi Criteria-Analysis

5.1 Introduction

A multi-criteria analysis was undertaken to evaluate the performance of the options developed for each one of the level crossing locations described in chapter 4, against the criteria outlined in Chapter 3.

5.2 Multi-Criteria Analysis

The following section of the chapter outline the assessment of feasible option alternatives for each one of the level crossing locations described in chapter 4. Further details surrounding the assessment of each option can be found in Appendix A: Options Appraisal.

5.2.1 XC201 Thomastown

The comparative assessment of the options for XC201 Ballyhay level crossing location is summarised below and shown in Table 5-1.

- Due to safety concerns with sub-standard alignment and reduced sightlines, Option Red and Option Blue were sifted out of further assessment;
- The Green option is considered the least onerous in terms of cost and land take. It is also considered slightly advantageous in terms of reliability / journey time.
- The geometry of the Green option is considered favourable to the Red option.
- The Green Option would have a slightly greater loss of hedgerow at the new junction on the R515, but otherwise quite limited hedgerow loss. The Cyan option would have a moderately higher potential for increased pluvial flood risk locally.

Table 5-1 Comparative assessment - XC201 Thomastown

Primary Criteria	Secondary Criteria	Route Option	
		Green	Cyan
Economy	Cost		
	Land Take		
	Reliability / Journey Time		
	Aggregated score		
Engineering	Geotech		
	Structures		
	Geometry		
	Aggregated score		
Environment	Ecology		
	Water/Flood Risk		
	Landscape		
	Noise		
	Cultural Heritage		

Primary Criteria	Secondary Criteria	Route Option	
		Green	Cyan
	Aggregated score		

Based on the outcome of the above comparative assessment, the preferred option is the Green Option, which has some significant advantages over the Cyan Option.

5.2.2 XC209 Ballyhay

The comparative assessment of the options for XC209 Ballyhay level crossing location is summarised below and shown in Table 5-2.

- With regard to the link road options, the Red option is ruled out immediately due to geometry constraints as HGVs cannot manoeuvre the curve;
- The Green options are the cheapest for the link roads as it requires less land and construction;
- Considering the mainline options, the Green options are significantly less curved than the Blue which would lessen its construction, environmental impacts and safety concerns;
- Due their curvature, the Blue options would require more land take and would also split some plots;
- The Blue options cross the Awbeg river which would cause some environmental issues but would also require the construction of a two-span bridge;
- The secondary Green-Orange option would require the shortest diversion for travelling to the north east but would cause a long diversion if the Green mainline option was implemented;
- Although the secondary Blue-Pink option is the easiest for crossing the Awbeg river, it has the most onerous construction and land take.

Table 5-2 Comparative assessment - XC209 Ballyhay

Primary Criteria	Secondary Criteria	Route Option				
		Green-Pink	Green-Orange	Blue-Pink	Blue-Orange	Cyan
Economy	Cost					
	Land Take					
	Reliability / Journey Time					
	Aggregated score					
Engineering	Geotech					
	Structures					
	Geometry					
	Aggregated score					
Environment	Ecology					
	Water/Flood Risk					
	Landscape					

Primary Criteria	Secondary Criteria	Route Option				
		Green-Pink	Green-Orange	Blue-Pink	Blue-Orange	Cyan
	Noise					
	Cultural Heritage					
	Aggregated score					

Based on the outcomes of the above comparative assessment, the preferred option is the Green-Pink Option. The Green-Pink Option presents significant economic, engineering and environmental advantages, rendering the Blue Options to be of a significant disadvantage. The Green-Pink option has significant advantages over the Green-Orange option in terms of land take which is a key criterion and therefore is the preferred option. Whilst there are some disadvantages within the Green Options, there are considerably more disadvantages associated with the Blue Options.

5.2.3 XC211 Newtown

The comparative assessment of the options for XC211 Newtown level crossing location is summarised below and shown in Table 5-3.

- Due to its length the Blue option is the more expensive option being considered;
- Despite the difficulties with the housing estate, the Green option would be preferable for its lower cost and ease of construction;
- Although the Green option is the shortest, it will bring a lot of extra traffic through a housing estate. This would cause a lot of problems for the residents and make the housing estate more dangerous. It is also the more environmentally friendly option of the two;
- There are no significant differences between the Green and Blue options regarding reliability/journey time, Geotech and structures criteria;
- The Blue option would lead to a greater loss of vegetation, including an area of scrub located to the north of the scheme;
- In the water/flood risk criterion, the Blue option has some disadvantages over the red option due to increase run off particularly to the east of the railway;
- The Green option has some advantages over the Blue option in the landscape criteria due to potential visual impacts from dwelling on the western side of the railway line.

Table 5-3 Comparative assessment - XC211 Newtown

Primary Criteria	Secondary Criteria	Route Option	
		Green	Blue
Economy	Cost		
	Land Take		
	Reliability / Journey Time		
	Aggregated score		
Engineering	Geotech		
	Structures		

Primary Criteria	Secondary Criteria	Route Option	
		Green	Blue
	Geometry		
	Aggregated score		
Environment	Ecology		
	Water/Flood Risk		
	Landscape		
	Noise		
	Cultural Heritage		
	Aggregated score		

Based on the outcomes of the above comparative assessment, the preferred option is the Green Option, which has significant advantages over the Blue option in the economy criterion. Whilst the Blue option presents some advantages over the Green Option in the engineering criterion, the Green option has some advantages over the Blue option regarding the environment criterion, giving an overall more advantageous assessment.

5.2.4 XC212 Ballycoskery

The comparative assessment of the options for XC212 Ballycoskery level crossing location is summarised below and shown in Table 5-4.

- The Green option is the least expensive option as the construction of an underbridge is not required, in comparison with the Red option which is considered the most expensive;
- The construction of an underbridge with the Red option produces safety concerns, increased land take, and disruption during construction;
- The Blue option moves road traffic the furthest away from receptors, making it the best option for noise.

Table 5-4 Comparative assessment - XC212 Ballycoskery

Primary Criteria	Secondary Criteria	Route Option		
		Green	Red	Blue
Economy	Cost			
	Land Take			
	Reliability / Journey Time			
	Aggregated score			
Engineering	Geotech			
	Structures			
	Geometry			
	Aggregated score			

Primary Criteria	Secondary Criteria	Route Option		
		Green	Red	Blue
Environment	Ecology			
	Water/Flood Risk			
	Landscape			
	Noise			
	Cultural Heritage			
	Aggregated score			

Based on the outcomes of the above comparative assessment, the preferred option is the Green Option. Whilst the Green option is not the best option regarding the engineering criterion, its overall score in the economic and environment criteria presents it as the best option when compared to the others.

5.2.5 XC215 Shinanagh

As mentioned in section 5.2, the Red option was sifted out in the preliminary analysis due to safety concerns with sub-standard geometry and reduced sightlines. The remaining options were assessed as summarised below and shown in Table 5-5

- The Green options are the longest and require construction adjacent to the railway. A potential heritage site would be impacted in the proposed solution. These constraints would require extra consideration and well-thought mitigation measures.
- The Blue options are shorter than the Green alternatives and therefore would require less construction and land take. However, the Blue option might split many plots of land, which would require careful stakeholder engagement.
- The Green options would have high costs due to their length.
- The cost of the Blue options are expected to be quite low and would therefore be preferable.

Table 5-5 Comparative assessment - XC215 Shinanagh

Primary Criteria	Secondary Criteria	Route Option			
		Green-Orange	Green-Pink	Blue-Orange	Blue-Pink
Economy	Cost				
	Land Take				
	Reliability / Journey Time				
	Aggregated score				
Engineering	Geotech				
	Structures				
	Geometry				

Primary Criteria	Secondary Criteria	Route Option			
		Green-Orange	Green-Pink	Blue-Orange	Blue-Pink
	Aggregated score				
Environment	Ecology				
	Water/Flood Risk				
	Landscape				
	Noise				
	Cultural Heritage				
	Aggregated score				

Based on the outcomes of the above comparative assessment, the Green-Orange option is the preferred option. Whilst the Green-Orange is not the best option regarding the economy criterion, its overall score in the environment and engineering criteria presents it as the best option when compared to the others.

5.2.6 XC219 Buttevant

The comparative assessment of the options for XC219 Buttevant level crossing location is summarised below and shown in Table 5-6.

- The Green option has advantages over the Red and Blue options. The cost of the Green option would be significantly lower due to its shorter length and lower land take. The short length of the Green option would also enhance journey time when comparable to the other two alternatives;
- The Red option has the most onerous alignment, however there is no structural preference between the options;
- The Red option has some advantages over the other options such as no direct impact on Buttevant Station or Bregoge Bridge, minor interruptions of hedgerows and mature tree lines and low potential increase in pluvial flood risk.
- The Red option goes through the largest flood area of the options.
- The Green option presents significant advantages over the other options in both the economic and engineering criterion.

Table 5-6 Comparative assessment - XC219 Buttevant

Primary Criteria	Secondary Criteria	Route Option		
		Green	Red	Blue
Economy	Cost			
	Land Take			
	Reliability / Journey Time			
	Aggregated score			
Engineering	Geotech			
	Structures			

Primary Criteria	Secondary Criteria	Route Option		
		Green	Red	Blue
	Geometry			
	Aggregated score			
Environment	Ecology			
	Water/Flood Risk			
	Landscape			
	Noise			
	Cultural Heritage			
	Aggregated score			

Based on the outcomes of the above comparative assessment, the preferred option is the Green Option. Whilst the Green option does present significant disadvantages in the geotech, ecology and noise criteria, however there is a higher aggregate of advantages overall with the Green option compared to the Red and Blue options.

5.3 Summary

Following a comparative assessment of the various options utilising an MCA at each level crossing location, the emerging preferred option for each of the locations is summarised below.

At XC201 Thomastown, due to safety concerns with sub-standard alignment and reduced sightlines, Options Red, and Option Blue were ruled out of further assessment. The Green Option is the least onerous in terms of cost and land take, and the most favourable in terms of reliability / journey time.

At XC209 Ballyhay, the Green-Pink Option presents significant economic, engineering and environmental advantages over the other options, making it the preferred option at this location also. The Green-Pink Option is the least expensive as it requires less land and construction, as well as being considerably less curved than the other options, reducing construction, environmental and safety concerns.

At XC211 Newtown, the Green Option is the preferred option as it presents significant advantages over the Blue Option in the economy criterion. Whilst the Blue Option presents some advantages over the Green Option in the engineering criterion, the Green Option has some advantages over the Blue Option regarding the environment criterion, giving an overall preferred option.

At XC212 Ballycoskery, the Green Option is the preferred option when compared to the others. Whilst the Green Option is not the best option regarding the engineering criterion, it is the least expensive option as there is no requirement for the construction of an underbridge, which also presents engineering advantages.

At XC215 Shinanagh, the Green-Orange Option is the preferred option as it presents significant advantages over the other options in each criterion. Whilst the Green-Orange option does prove more expensive, it does present advantages over the Green-Pink option in terms of the environment criterion and has significant advantages over the blue options.

At XC219 Buttevant, the preferred option is the Green Option as it has a higher aggregate of advantages overall when compared to the other options.

Appendix A. Options Appraisal

A.1 Level Crossing XC 201 Thomastown

Primary Criteria	Secondary Criteria	XC 201 Route Option			
		Green	Red	Blue	Cyan
Economy	Cost	Considered to be similar capital cost to other schemes.	Considered to be similar capital cost to other schemes.	Considered to be similar capital cost to other schemes.	Considered the most expensive in terms of capital cost.
	Land Take	Land take required from 2no. landowners.	Land take required from 1no. landowner.	Land take required from 1no. landowner.	Considered the most onerous in terms of land take (area and number of landowners).
	Reliability / Journey Time	Shorter journey time when compared to the other options.	Journey time would be increase due to the route alignment when compared to other options.	Journey time similar to the Red Option.	Route length would increase the journey time when compared to the Green Option.
Engineering	Geotech	No significant differences in ground conditions between options.	No significant differences in ground conditions between options.	No significant differences in ground conditions between options.	No significant differences in ground conditions between options.
	Structure	No preference with regards to structures as bridge will be same for all	No preference with regards to structures as bridge will be same for all	No preference with regards to structures as bridge will be same for all	No preference with regards to structures as bridge will be same for all
	Geometry	Best alignment in terms of safety and driver comfort. New junction required on Regional Road. Works may impact existing groundwater well/spring to south west of level crossing.	**Safety concerns with sub-standard alignment and reduced sightlines.** Upgrade of existing junction required on Regional Road. New junction to Reg Road is also in close proximity to existing NIAH (National Inventory of Architectural Heritage) site – cost/time implications.	**Safety concerns with sub-standard alignment and reduced sightlines.** Upgrade of existing junction required on Regional Road. Works within pluvial flood risk area – drainage and structural implications. Works within SMR (Sites & Monuments Record) zone of	Upgrade of existing junction to Reg Road is also in close proximity to existing NIAH (National Inventory of Architectural Heritage) site – cost/time implications. Works within pluvial flood risk area – drainage and structural implications.

Primary Criteria	Secondary Criteria	XC 201 Route Option			
		Green	Red	Blue	Cyan
			Works within pluvial flood risk area – drainage and structural implications. Works within SMR (sites & monuments record) zone of existing archaeological monument – cost/time implications.	existing archaeological monument – cost/time implications.	Works within SMR (sites & monuments record) zone of existing archaeological monument – cost/time implications.
Environment	Ecology	Very limited loss of hedgerow at the new junction with R515. Crossing of watercourses.	Loss of hedgerow sections and loss of mature trees to north of scheme.	Limited loss of hedgerow.	Loss of hedgerow sections to the south and loss of hedgerows/mature trees to north of scheme.
	Water/Flood Risk	Low potential increase in pluvial flood risk locally due to increased runoff.	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to south of railway (see PFRA).	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to south of railway (see PFRA).	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to south of railway (see PFRA). Potential for road to intersect with surface water flows and cause localised flooding.
	Landscape	Considerable visual extent of development Interrupts several hedgerows Visual impacts at proposed intersection at R515	Development will be over-looked by a dwelling whose upper floor views are oriented in the direction of the development – any ground floor views are likely to be screened by a large mature coniferous hedgerow to rear of dwelling. Visual impacts at proposed intersection at R515	Development will be over-looked by a dwelling whose upper floor views are oriented in the direction of the development – any ground floor views are likely to be screened by a large mature coniferous hedgerow to rear of dwelling. Interrupts several hedgerows	Crosses access lane to the immediate east of farm buildings. Severance issues associated with this. Appears to be an OHL (possibly telephone lines) at the southern section along the road leading to the existing crossing as well as OHL to running parallel and to the east of the farm buildings which may need to be diverted.

Primary Criteria	Secondary Criteria	XC 201 Route Option			
		Green	Red	Blue	Cyan
			Interrupts several hedgerows		
	Cultural Heritage	Potential for unrecorded archaeology to be encountered in greenfield areas. Possible indirect impacts on setting of thatched dwelling (RPS No. 38/NIAH 21904709).	Traverses RMP constraints area for enclosure LI047-045 with potential for associated archaeological remains to be impacted. Potential for further unrecorded archaeology to be encountered in greenfield areas. Indirect impacts on setting of enclosure LI047-045 and mound LI047-046. Increased risk of traffic impact (collision) on water pump (NIAH 21904708).	Traverses RMP constraints area for enclosure LI047-045 with potential for associated archaeological remains to be impacted. Potential for further unrecorded archaeology to be encountered in greenfield areas. Indirect impacts on setting of enclosure LI047-045 and mound LI047-046.	Potential for unrecorded archaeology to be encountered in greenfield areas. Indirect impacts on setting of enclosure LI047-045 and mound LI047-046. Increased risk of traffic impact (collision) on water pump (NIAH 21904708).
	Noise	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.

A.2 Level Crossing XC 209 Ballyhay

Primary Criteria	Secondary Criteria	XC 209 Route Option		
		Green-Red*	Green-Pink	Green-Orange
Economy	Cost	Considered to be the least expensive of all options based on capital cost. This is based on the Green option having a higher capital cost than the Blue option due to the structural requirements of the Blue option. The Red link option is considered to have a lower capital cost than the Pink and Orange options.	Considered to be preferable to other routes based on the Green option having a higher capital cost than the Blue option due to the structural requirements of the Blue option. The Pink route requires a river bridge and more road works than the Red option. This route is considered to be similar capital cost to the Green-Orange and Cyan options.	Considered to be preferable to other routes based on the Green route having a higher capital cost than the Blue route due to the structural requirements of the Blue route. The Orange route requires a river bridge and more road works than the Red route. This route is considered to be similar capital cost to the Green-Pink and Cyan routes.
	Land Take	Considered to be preferable due to minimal land take required for the link road. Green option preferable to blue option due to area and number of landowners.	Considered neutral in comparison to others. Pink option affects more landowners than Orange option, and splits land more onerously. Green option preferable to Blue route due to area and number of landowners.	Considered preferable to some others as land take is close to land borders. Green option preferable to Blue option due to area and number of landowners.
	Reliability / Journey Time	No significant differences between the options in terms of journey time.	No significant differences between the options in terms of journey time.	No significant differences between the options in terms of journey time.
Engineering	Geotech	Green option has no additional structures. Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Red option has no impact to the river, significantly reduced ground investigation, foundation and earthworks requirements.	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Pink route crosses river, which will require additional bridge and scour protection, environmental issues with working in close to the river.	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Orange option crosses river, which will require additional bridge and scour protection, environmental issues with working in close to the river.

Primary Criteria	Secondary Criteria	XC 209 Route Option		
		Green-Red*	Green-Pink	Green-Orange
	Structure	No bridge required to this option.	Option has cross watercourse close to the road.	Option has cross watercourse close to the road.
	Geometry	Green option has the best alignment in terms of safety and driver comfort, and required works are outside flood risk area. **Red option cannot accommodate swept path of tractor-trailer vehicle while retaining existing river bridge.** Works within fluvial flood risk area – drainage and structural implications.	Green option has the best alignment in terms of safety and driver comfort, and required works are outside flood risk area. Pink option works within SMR zone – cost/time implications. Works within indicative and extreme fluvial flood risk area – drainage and structural implications.	Green option has the best alignment in terms of safety and driver comfort, and required works are outside flood risk area. Orange option has the best alignment in terms of safety and driver comfort. It works very close to existing SMR site and within SMR zone – cost/time implications. Works within fluvial flood risk area – drainage and structural implications.
Environment	Ecology	Loss of low ecological value habitat. Green route crosses area of marsh habitat with potential to support species of conservation interest (plants). Red option has limited impacts to watercourse and limited loss of aquatic habitat from bridge widening.	Loss of low ecological value habitat in the green section and loss of mainly low ecological value terrestrial habitat in the pink section. Green option crosses area of marsh habitat with potential to support species of conservation interest (plants). Pink option has one crossing of watercourse tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter (less disturbed area as away from dwelling)).	Loss of low ecological value habitat in the green section and loss of mainly low ecological value terrestrial habitat in the orange section. Green option crosses area of marsh habitat with potential to support species of conservation interest (plants). Orange option has one crossing of watercourse tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter).
	Water/Flood Risk	Green option has low potential increase in pluvial flood risk locally due to increased runoff. New road alignment for red option may intrude on fluvial floodplain to the east of the railway (low/moderate impact envisaged).	Green option has low potential increase in pluvial flood risk locally due to increased runoff. Pink option has potential to remove existing bridge immediately to east of railway (if railway crossing is closed),	Green option has low potential increase in pluvial flood risk locally due to increased runoff. Orange option has potential to remove existing bridge immediately to east of railway (if railway crossing is closed), however may

Primary Criteria	Secondary Criteria	XC 209 Route Option		
		Green-Red*	Green-Pink	Green-Orange
		New river crossing required immediately to east of railway. Stage 3 FRA (including modelling required). Red option avoids the need for a new bridge/river crossing (compared to the pink and orange link road options)	however may need to be retained due to landscape character / architectural significance.	need to be retained due to landscape character / architectural significance.
	Landscape	Green option has greater separation distances from nearby dwelling in comparison to blue option – reduced visual impacts. It interrupts several hedgerows and has potential minor loss of immature conifer woodland. Red option has minor vegetation loss, low visual impacts and small loss of hedgerow vegetation.	Green option has greater separation distances from nearby dwelling in comparison to blue option – reduced visual impacts. It interrupts several hedgerows and has potential minor loss of immature conifer woodland. Pink option has low visual impacts due to intervening screening. It interrupts several hedgerows and tree lines, create awkward field patterns and has loss of riparian vegetation (river crossing).	Green option has greater separation distances from nearby dwelling in comparison to blue option – reduced visual impacts. It interrupts several hedgerows and has potential minor loss of immature conifer woodland. Orange option has limited visual impacts due to intervening screening. It interrupts several hedgerows and areas of scrubby vegetation and has loss of riparian vegetation (river crossing).
	Cultural Heritage	No direct impact on any recorded cultural heritage sites and lower potential to impact unrecorded archaeology in the red link road. Green option has potential for unrecorded archaeology to be encountered in greenfield/marshy areas. Possible indirect impacts on setting of mill (CO008-059), church (CO008-001002) and graveyard (CO008-001001). Red optionhas potential minor impact on heritage values of crossing/railway line (if any) and bridge over Awbeg River.	No direct impact on any recorded cultural heritage sites. Green option has potential for unrecorded archaeology to be encountered in greenfield/marshy areas. Possible indirect impacts on setting of mill (CO008-059), church (CO008-001002) and graveyard (CO008-001001). Pink option has potential for unrecorded archaeology to be encountered in greenfield/marshy areas and at crossing of Awbeg River. Potential impact on setting of any heritage values near	Green option has no direct impact on any recorded cultural heritage sites. Potential for unrecorded archaeology to be encountered in greenfield/marshy areas. Possible indirect impacts on setting of mill (CO008-059), church (CO008-001002) and graveyard (CO008-001001). Orange option is potentially the least impact on setting of church (CO008-001002) and graveyard (CO008-001001). It has potential impact on mill (CO008-059). Potential for unrecorded archaeology to be encountered

Primary Criteria	Secondary Criteria	XC 209 Route Option		
		Green-Red*	Green-Pink	Green-Orange
			crossing/railway line (e.g. bridge over Awbeg River).	in greenfield/marshy areas and at crossing of Awbeg River.
	Noise	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.

Level Crossing XC 209 Ballyhay Continued

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
Economy	Cost	Considered to be the least expensive of the Blue option options due to no requirement for structural works for the link road. However, the Blue option is considered more onerous than the Green option from a structural perspective due to the bridge requirement at the south of the level crossing.	Considered to be the most expensive of all options in terms of capital cost, along with the Blue-Orange option. This is due to having the most structural requirements of all routes (with the exception of the Blue-Orange option).	Considered to be the most expensive of all options in terms of capital cost, along with the Blue-Orange option. This is due to having the most structural requirements of all routes (with the exception of the Blue-Pink option).	Considered to be similar capital cost to the Green-Pink option and Green-Orange option.
	Land Take	Considered preferable in comparison to other blue options. Green option is preferable to Blue option due to area and number of landowners.	Pink option affects more landowners than Orange route, and splits land more onerously. Green option preferable to Blue option due to area and number of landowners.	Considered preferable to some others as land requirement is close to land borders. Green option preferable to Blue route due to area and number of landowners.	Considered preferable to all options except the Green-Red option as this option splits land less onerously.

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
	Reliability / Journey Time	No significant differences between the options.	No significant differences between the options.	No significant differences between the options.	Route alignment would reduce the journey time when compared to the other options.
Engineering	Geotech	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Blue option crossing river will require additional bridge and scour protection, environmental issues with working in close to the river. In closer proximity to residences and church graveyard. Red option has no impact to the river, significantly reduced ground investigation, foundation and earthworks requirements.	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Blue option crossing river will require additional bridge and scour protection, environmental issues with working in close to the river. In closer proximity to residences and church graveyard. Pink option crosses river, which will require additional bridge and scour protection, environmental issues with working in close to the river.	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Blue option crossing river will require additional bridge and scour protection, environmental issues with working in close to the river. In closer proximity to residences and church graveyard. Orange option crosses river, which will require additional bridge and scour protection, environmental issues with working in close to the river.	Alluvial deposits shown to be present across the site. Marsh land with standing water shown in areas. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace, piling or ground improvement). Option crosses river, which will require additional bridge and scour protection, environmental issues with working in close to the river.
	Structure	Blue option has cross rail and watercourse in close proximity. Additional river bridge/possibly combined structure required.	Blue option has cross rail and watercourse in close proximity.	Blue option has cross rail and watercourse in close proximity.	Cyan option has cross rail and watercourse in close proximity.

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
	Geometry	Blue option works within fluvial flood risk area – drainage and structural implications. Additional river bridge/possibly combined structure required. **Red option cannot accommodate swept path of tractor-trailer vehicle while retaining existing river bridge**.	Blue option works within fluvial flood risk area – drainage and structural implications. Additional river bridge/possibly combined structure required. Pink option works within SMR zone – cost/time implications. Works within indicative and extreme fluvial flood risk area – drainage and structural implications.	Blue option works within fluvial flood risk area – drainage and structural implications. Additional river bridge/possibly combined structure required. Orange option has the best alignment in terms of safety and driver comfort. It works very close to existing SMR site and within SMR zone – cost/time implications. Works within fluvial flood risk area – drainage and structural implications.	The cyan option provides a single connection to both link roads. The geometry is favourable and is similar to the green route. The option accommodates the greater flow of traffic which travels west rather than the north west.
Environment	Ecology	Loss of mainly low ecological value terrestrial habitat. One crossing of watercourse tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Crossing tributary of the Awbeg River. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter). Potential for loss of kingfisher habitat. Red option has limited impact to water course and limited loss	Loss of mainly low ecological value terrestrial habitat. One crossing of watercourse tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Crossing tributary of the Awbeg River. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter). Potential for loss of kingfisher habitat. Pink option has one crossing of watercourse tributary	Loss of mainly low ecological value terrestrial habitat. One crossing of watercourse tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Crossing tributary of the Awbeg River. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter). Potential for loss of kingfisher habitat. Orange option has one crossing of watercourse	Similar to green-orange option including river crossing and loss of hedgerows/mature trees in places. Cyan option deviates from Green-orange option by crossing field instead of connecting directly with existing access; this would lead to a slightly greater effect on habitats, however habitat here is mainly low ecological value. Loss of mature trees and hedgerows alongside river.

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
		of aquatic habitat from bridge widening.	(Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter (less disturbed area as away from dwelling)).	tributary (Awbeg River) of the Blackwater River (Cork/Waterford) SAC. Loss of supporting habitat for aquatic species (fish, crayfish, plants, otter).	
	Water/Flood Risk	New road likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway. Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff. Red option avoids the need for a new bridge/river crossing (compared to the pink and orange link road options)	New road likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway. Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff. Pink option has potential to remove existing bridge immediately to east of railway (if railway crossing is closed), however may need to be retained due to landscape character / architectural significance.	New road likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway. Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff. Orange option has potential to remove existing bridge immediately to east of railway (if railway crossing is closed), however may need to be retained due to landscape character / architectural significance.	Cyan option requires crossing of Buttevant (East)_020. New bridge would be required. As for orange route option. Hydrological connection to Blackwater/Cork SAC. Option crosses fluvial flood plain; depending on design, has potential to bisect flood plain and cause flooding upstream.
	Landscape	Blue option has loss of riparian vegetation, visual impacts at	Blue option has loss of riparian vegetation, visual	Blue option has loss of riparian vegetation, visual impacts at	Impacts would be similar to those for orange, pink and part

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
		graveyard and loss of small area of woodland. The development will benefit from mature tree line/hedgerow screening to the east of the proposed alignment. Red option has minor vegetation loss, low visual impacts and small loss of hedgerow vegetation.	impacts at graveyard and loss of small area of woodland. The development will benefit from mature tree line/hedgerow screening to the east of the proposed alignment. Pink option has low visual impacts due to intervening screening. It interrupts several hedgerows and tree lines, create awkward field patterns and has loss of riparian vegetation (river crossing).	graveyard and loss of small area of woodland. The development will benefit from mature tree line/hedgerow screening to the east of the proposed alignment. Orange option has limited visual impacts due to intervening screening. It interrupts several hedgerows and areas of scrubby vegetation and has loss of riparian vegetation (river crossing).	of green option (bridge section). Suggests limited visual impacts and lower than for blue option.
	Cultural Heritage	No direct impact on any recorded cultural heritage sites and lower potential to impact unrecorded archaeology in the red link road. Blue option has potential for unrecorded archaeology to be encountered in greenfield areas. Possible indirect impacts on setting of church (CO008-001002) and graveyard (CO008-001001) and house listed on NIAH (Reg. No. 20900801). Red option has potential minor impact on heritage values of	No direct impact on any recorded cultural heritage sites and lower potential to impact unrecorded archaeology in the red link road. Blue option has potential for unrecorded archaeology to be encountered in greenfield areas. Possible indirect impacts on setting of church (CO008-001002) and graveyard (CO008-001001) and house listed on NIAH (Reg. No. 20900801).	No direct impact on any recorded cultural heritage sites and lower potential to impact unrecorded archaeology in the red link road. Blue option has potential for unrecorded archaeology to be encountered in greenfield areas. Possible indirect impacts on setting of church (CO008-001002) and graveyard (CO008-001001) and house listed on NIAH (Reg. No. 20900801). Orange option is potentially the least impact on setting of	Eastern section of the Cyan option is similar to the Orange route. It has potential impact on mill (CO008-059). Potential for unrecorded archaeology to be encountered in greenfield/marshy areas and at crossing of Awbeg River. Possible indirect impacts on setting of church (CO008-001002) and graveyard (CO008-001001).

Primary Criteria	Secondary Criteria	XC 209 Route Option			
		Blue-Red*	Blue-Pink	Blue-Orange	Cyan
		crossing/railway line (if any) and bridge over Awbeg River.	Pink option has potential for unrecorded archaeology to be encountered in greenfield/marshy areas and at crossing of Awbeg River. Potential impact on setting of any heritage values near crossing/railway line (e.g. bridge over Awbeg River).	church (CO008-001002) and graveyard (CO008-001001). It has potential impact on mill (CO008-059). Potential for unrecorded archaeology to be encountered in greenfield/marshy areas and at crossing of Awbeg River.	
	Noise	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.	Potential construction noise impacts. Operational noise impacts unlikely.

A.3 Level Crossing XC 211 Newtown

Primary Criteria	Secondary Criteria	XC 211 Route Option	
		Green	Blue
Economy	Cost	Significantly cheaper option compared to Blue option in terms of capital cost.	Significantly more expensive option compared to Green option in terms of capital cost.
	Land Take	Significantly less land take required compared to the Blue option.	Significantly more land take required compared to the Green route.
	Reliability / Journey Time	Journey time would be shorter when comparable to the Blue option.	Route length would lead to a longer journey time when comparable to the Green option.
Engineering	Geotech	No significant differences in ground conditions between options.	No significant differences in ground conditions between options.
	Structure	No structures.	No structures.
	Geometry	No significant differences between the alignments. The green option is the shortest, but it will bring a lot of extra traffic through a housing estate. This would cause a lot of problems for the residents and make the housing estate more dangerous	No significant differences between the alignments. The blue is preferable as it avoids routing traffic through the housing estate.
Environment	Ecology	Loss of low ecological value habitat and small area of hedge row.	Loss of mainly low ecological value habitat. Greater loss of vegetation including area of scrub to north of scheme.
	Water/Flood Risk	Low potential increase in pluvial flood risk locally due to increased runoff.	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to east of railway (see PFRA).
	Landscape	Minor loss of vegetation. Potential visual impacts at archaeological feature to the west. Loss of section of mature hedgerow.	Minor loss of vegetation. Road runs along a locally elevated section of terrain Potential visual impacts from dwellings on western side of railway line.

Primary Criteria	Secondary Criteria	XC 211 Route Option	
		Green	Blue
	Cultural Heritage	No direct impact on any recorded cultural heritage sites. Shorter option may represent lower potential to impact unrecorded archaeology. Potential for unrecorded archaeology to be encountered in greenfield areas. Potential minor indirect impact on setting of ringfort CO008-034.	No apparent advantages when compared with Green option. Potential direct impact on ringfort CO008-040 and associated archaeological remains. Potential for unrecorded archaeology to be encountered in greenfield areas.
	Noise	Potential operational impact unlikely to lead to significant effect. Potential construction noise impacts Potential operational impacts depending on expected traffic changes	Potential operational impact unlikely to lead to significant effect. Potential construction noise impacts Potential operational impacts depending on expected traffic changes

A.4 Level Crossing XC 212 Ballycoskery

Primary Criteria	Secondary Criteria	XC 212 Route Option		
		Green	Red	Blue
Economy	Cost	Considered to be the least expensive in terms of capital cost. When compared to the Red option, the requirement for an underbridge makes the Green option less expensive. The tie-in to the national road and more extensive road works make the Blue option more expensive than this option.	Considered the most expensive due to requirement of constructing an underbridge.	Considered slightly more expensive than Green option in terms of capital cost.
	Land Take	Less onerous land take than the Blue option. More land take required than the Red option.	Considered the least onerous in terms of land area, however risk of requiring school land makes this option less preferable.	Considered the most onerous of the options.
	Reliability / Journey Time	No significant differences between the options.	No significant differences between the options.	No significant differences between the options.
Engineering	Geotech	Proximity to school requiring reinforced earth solution to reduce land take.	Proposed underbridge option. Potential increased impact to the railway through settlement of the track caused by the underbridge. Groundwater control required for cutting and underbridge. Potential increased land take or retainment required depending on ground conditions	Potential to reduce reinforced earth length compared to green option. Greater land-take required if go for embankments for approach.
	Structure	Square span. Simpler construction compared to red option. Safest operationally.	Underbridge provides potential for graffiti and social issues Underbridge close to school is less safe Disruption to railway during construction	Similar to green option.
	Geometry	The green option has constraints due to the tie in locations which results is less than desirable geometry which will	The red option maintains the existing line of road. The geometry is relatively simple. The construction of the option would cause	The blue option is similar to the green option but requires a new junction with the N20. The existing junction with the

Primary Criteria	Secondary Criteria	XC 212 Route Option		
		Green	Red	Blue
		need to be mitigated. A lower than desirable headroom over the railway is required to tie into the existing carriageway at both tie in points.	significant disruption to existing traffic and the railway.	N20 would have to be closed to facilitate this.
Environment	Ecology	Loss of moderate ecological value terrestrial habitat. Loss of building with high bat roost potential. Loss of some mature trees. Low impact. Larger area of wet meadow loss to mainly to west and some in east of scheme.	Little to no loss of mainly moderate ecological value habitat. Loss of building with high bat roost potential. Loss of some mature trees. Low impact.	Retention of building with high bat roost potential. Loss of mainly low ecological value terrestrial habitat. Loss of some area of wet meadow. Loss of some mature trees. Moderate impact.
	Water/Flood Risk	Low potential increase in pluvial flood risk locally due to increased runoff.	Moderate potential increase in pluvial and groundwater flood risk locally due to new underbridge at railway.	New road alignment may intrude on fluvial floodplain to the west of the railway (low impact envisaged). Potential requirement for Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff.
	Landscape	Road alignment benefits from layer of hedgerow screening on southern verge of L1533 west of railway line. Nearest above ground alignment to Beechwood residential estate to north – potential for visual impacts Potential visual impacts along Kilmallock Cycle Hub Route 1 Interrupts several hedgerows and mature tree lines.	Road alignment benefits from layer of hedgerow screening on southern verge of L1533 west of railway line. Underground route will have less visual exposure – low visual impacts. Potential visual impacts along Kilmallock Cycle Hub Route 1 Interrupts several hedgerows and mature tree lines.	Largest offsets from surrounding dwellings Benefits from additional layer of hedgerow screening from residential estate to north. Potential visual impacts at proposed new intersection with N20 Largest visual extent of development

Primary Criteria	Secondary Criteria	XC 212 Route Option		
		Green	Red	Blue
		Alignment passes south of dwelling immediately east of railway line. Visual impacts at school and dwellings to east of railway line	Visual impacts at school and dwellings to east of railway line.	Interrupts several hedgerows and mature tree lines. Potential visual impacts along Kilmallock Cycle Hub Route 1.
	Cultural Heritage	No direct impact on architectural heritage sites. Enters RMP constraints area for church CO008-069 with potential impacts on subsurface archaeology and setting. Potential for unrecorded archaeology to be encountered in greenfield areas, particularly in the vicinity of moated site CO008-035.	Lower potential to impact unrecorded archaeology. Enters RMP constraints area for church CO008-069 with potential impacts on subsurface archaeology and setting. Potential for direct impact on possible station house which may be of architectural heritage interest.	No direct impact on any recorded cultural heritage sites. Mostly avoids RMP constraints area for church CO008-069. Potential for unrecorded archaeology to be encountered in greenfield areas, particularly in the vicinity of moated site CO008-035. Potential indirect impact on setting of church (CO008-069) and moated site (CO008-035).
	Noise	Least preferred option for noise compared to the red and blue options but still moves traffic away from receptors compared to the existing road. Potential construction noise impacts	Second best option for operational noise. Potential construction noise impacts	Best option for operational noise as moves road traffic furthest from receptors. Potential construction noise impacts

A.5 Level Crossing XC 215 Shinanagh

Primary Criteria	Secondary Criteria	XC 215 Route Option				
		Green - Orange	Green-Pink	Blue-Orange	Blue-Pink	Red
Economy	Cost	Considered to be more expensive than other routes in terms of capital cost, due to extent of road works and working on the N20.	Considered to be less expensive than the Green-Orange option as this option does not require works to the N20. More expensive than other options in terms of capital cost.	Considered to be more expensive than the Blue-Pink option as this option requires works to the N20. Less expensive than other options in terms of capital cost.	Considered to be the least expensive of the options in terms of capital cost, based on extent of road works.	Considered to be the most expensive option in terms of capital cost due to the need for a bridge construction and significant work to the N20.
	Land Take	Considered preferable to Blue options as fewer land owners and less split of land would be required. No preference between Orange and Pink options.	Considered preferable to Blue options as fewer land owners and less split of land would be required. No preference between Orange and Pink options.	Considered more onerous than Green options as more land owners and more split of land required. No preference between Orange and Pink options.	Considered more onerous than Green route options as more land owners and more split of land required. No preference between Orange and Pink options.	Considered to be onerous in terms of land take due to number of landowners and construction either side of the railway.
	Reliability / Journey Time	No significant differences between the options.	No significant differences between the options.	No significant differences between the options.	No significant differences between the options.	No significant differences between the options.
Engineering	Geotechnical	Reduced geotechnical investigation and design as no structures (overbridge) required on this alignment. Alignment expected to be underlain by glacial till. Ground/surface obstructions due to proximity to the historic church and graveyard to	Reduced geotechnical investigation and design as no structures (overbridge) required on this alignment. Alignment expected to be underlain by glacial till. Ground/surface obstructions due to proximity to the historic church and graveyard to the west and the railway to the east.	Located further from karst feature (found to the north of level crossing, between railway and N20). Significantly reduced ground investigation, foundation and earthworks requirements compared to overbridge solution to the south, and marginally reduced	Located further from karst feature (found to the north of level crossing, between railway and N20). Significantly reduced ground investigation, foundation and earthworks requirements compared to overbridge solution to the south, and marginally reduced compared to green option.	Located away from Imphrick Church and graveyard. It is also further from karst feature (found to the north of level crossing, between railway and N20). Alluvial deposits shown to be present at the bridge crossings. Potential soft ground conditions, issues associated with foundation solution

Primary Criteria	Secondary Criteria	XC 215 Route Option				
		Green - Orange	Green-Pink	Blue-Orange	Blue-Pink	Red
		the west and the railway to the east. Karst feature shown in close proximity to the route.	Karst feature shown in close proximity to the route. Pink section is an existing road, no geotechnical investigation required.	compared to green option. Option falls within wayleave of the Gas Transmission pipeline. Alluvial deposits shown to be present along half of the route. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace or ground improvement).	Option falls within wayleave of the Gas Transmission pipeline. Alluvial deposits shown to be present along half of the route. Potential soft ground conditions, issues associated with foundation solution (requirement for dig out and replace or ground improvement). Pink section is an existing road, no geotechnical investigation required.	(requirement for dig out and replace, piling or ground improvement). Increased geotechnical investigation and design as structure (overbridge) required on this alignment.
	Structure	Some works required to existing overbridge.	Some works required to existing overbridge.	Some works required to existing overbridge.	Some works required to existing overbridge.	Most onerous due to requirement for new bridge.
	Geometry	No significant differences between the options. The upgrade of the existing N20 junction (orange link) is less favorable as it would require significant upgrade to the existing N20 and the approach to the junction on the local road.	The upgrade of the existing N20 junction (orange link) is less favorable as it would require significant upgrade to the existing N20 and the approach to the junction on the local road.	No significant differences between the options. The upgrade of the existing N20 junction (orange link) is less favorable as it would require significant upgrade to the existing N20 and the approach to the junction on the local road.	The upgrade of the existing N20 junction (orange link) is less favorable as it would require significant upgrade to the existing N20 and the approach to the junction on the local road.	**Safety concerns with sub-standard alignment and reduced sightlines.** The red option is the least favorable option as the geometry is significantly below standard and requires a new junction on the N20. The N20 is also on a curve at this location as had an existing junction in close proximity.

Primary Criteria	Secondary Criteria	XC 215 Route Option				
		Green - Orange	Green-Pink	Blue-Orange	Blue-Pink	Red
Environment	Ecology	No impact on Blackwater River (Cork/Waterford) SAC. Loss of low ecological value habitat. Loss of mature trees in one location.	Loss of low ecological value habitat. Moderate potential for impact to Blackwater River (Cork/Waterford) SAC given distance to watercourse.	Loss of low ecological value habitat. High potential for impact to Blackwater River (Cork/Waterford) SAC given close proximity at southern end.	No impact on Blackwater River (Cork/Waterford) SAC and using existing road results in no loss of vegetation for birds and bats.	Loss of low ecological value habitat. Moderate potential for impact to Blackwater River (Cork/Waterford) SAC given distance to watercourse.
	Water/Flood Risk	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to west of existing N20 junction of railway (see PFRA).	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to south of existing N20 junction of railway (see PFRA).	New road alignment may intrude on fluvial floodplain to the west of the railway (low impact envisaged). Potential requirement for Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff.	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to west of existing N20 junction of railway (see PFRA).	Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to south of existing N20 junction of railway (see PFRA).
	Landscape	Road alignment primarily follows alignment of railway line – minor loss of vegetation and minimal disruption to field pattern Road alignment benefits from screening of mature tree line hedgerows to west and to east along railway line boundary.	Minor loss of vegetation through use of existing farm tracks. Visual impacts from proposed N20 junction Visual impacts from dwellings east of N20.	Minor loss of vegetation through use of existing farm tracks. Visual impacts along Ballyhoura way national waymarked trail Road alignment situated on locally elevated terrain – potential increase in visual exposure.	Road alignment primarily follows alignment of railway line – minor loss of vegetation and minimal disruption to field pattern Road alignment benefits from screening of mature tree line hedgerows to west and to east along railway line boundary	Minor loss of vegetation through use of existing farm tracks. Visual impacts from proposed N20 junction Visual impacts from dwellings east of N20 Largest visual exposure due to elevated nature of proposed overbridge

Primary Criteria	Secondary Criteria	XC 215 Route Option				
		Green - Orange	Green-Pink	Blue-Orange	Blue-Pink	Red
		Visual impacts along Ballyhoura way national waymarked trail Vegetation loss at N20 junction Visual impacts at dwellings at north-western end of alignment. Visual impacts at archaeological feature – graveyard Potential loss of mature vegetation at proposed new intersection west of existing railway overbridge	Largest visual exposure due to elevated nature of proposed overbridge.	Potential visual impacts at dwelling to north-west of alignment Very minor amount of existing vegetative screening	No vegetation lost at N20 junction. Visual impacts along Ballyhoura way national waymarked trail Visual impacts at dwellings at north-western end of alignment. Visual impacts at archaeological feature – graveyard Potential loss of mature vegetation at proposed new intersection west of existing railway overbridge	
	Cultural Heritage	Increased appreciation of church and graveyard (CO007-120001 and CO007-120002) and Shinanagh Bridge from greater visibility. Enters RMP constraints area for church and graveyard (CO007-120001 and CO007-120002) with potential impacts on associated archaeology and setting.	No direct impact on any recorded cultural heritage sites. Avoids RMP constraints area for church and graveyard (CO007-120001 and CO007-120002). Also avoids Shinanagh Bridge. Potential for unrecorded archaeology to be encountered in greenfield areas. Traverses RMP constraints area for castle CO007-119001	Avoids RMP constraints area for church and graveyard (CO007-120001 and CO007-120002). Also avoids Shinanagh Bridge.	Pink Option would take less traffic over Shinanagh Bridge than a new N20 junction. Option has no additional disadvantages to those already identified above for the Green Option.	No direct impact on any recorded cultural heritage sites. Avoids RMP constraints area for church and graveyard (CO007-120001 and CO007-120002). Also avoids Shinanagh Bridge. Potential for unrecorded archaeology to be encountered in greenfield areas.

Primary Criteria	Secondary Criteria	XC 215 Route Option				
		Green - Orange	Green-Pink	Blue-Orange	Blue-Pink	Red
		Potential for unrecorded archaeology to be encountered in greenfield areas, particularly in the vicinity of the church and graveyard and holy well (CO007-121). Possible direct impact on Shinanagh Bridge. Possible slight negative impact on townland boundaries.	with potential for impacts on subsurface archaeology. Occupation site (CO007-119002) previously excavated in this area. Potential for unrecorded archaeology to be encountered in remaining greenfield areas.			
	Noise	Green option has potential operational impact unlikely to lead to significant effect. Potential construction noise impacts and potential operational impacts depending on expected traffic changes.	Green option has potential operational impact unlikely to lead to significant effect. Potential construction noise impacts and potential operational impacts depending on expected traffic changes. The pink option has potential operational impact unlikely to lead to significant effect.	No construction or operational impacts likely.	No construction or operational impacts likely. The pink option has potential operational impact unlikely to lead to significant effect.	Potential operational impact unlikely to lead to significant effect. Potential construction noise impacts Potential operational impacts depending on expected traffic changes.

A.6 Level Crossing XC 219 Buttevant

Primary Criteria	Secondary Criteria	XC 219 Route Option		
		Green	Red	Blue
Economy	Cost	This option is considered to be the cheapest option based on extent of road works, based on capital cost.	This option is considered to be the most expensive due to extra structural requirements compared to the other routes, based on capital cost.	This option is more expensive than the Green option but less expensive than the Red option in terms of capital cost, based on the extent of road works required,
	Land Take	This option is considered the most preferable based on the total area and number of land owners affected.	This option is considered preferable to the Blue option based on the total area and number of land owners affected.	This option is considered the least preferable based on the total area and number of land owners affected.
	Reliability / Journey Time	Shorter route length would reduce the journey time when compared to the other options.	Journey time would be greater than the Green option.	Due to route alignment, the journey time would be similar to the Red option.
Engineering	Geotech	Ground investigation and construction would be required in close proximity to disused station, which may cause disruption and also presents increased potential for made ground/contamination/surface obstructions. Crosses two watercourses.	Avoids issues relating to working close to disused station during ground investigation and construction. Alignment in proximity to residences to the northeast and northwest, ground investigation/construction may cause disruption. Alignment crosses overhead lines.	Reduces issues relating to working close to disused station during ground investigation and construction. Increased linear length impacting cost and land take.
	Structure	No preference with regards to bridges as implications are similar for all.	No preference with regards to bridges as implications are similar for all.	No preference with regards to bridges as implications are similar for all.
	Geometry	No significant differences between the options. The green option is seen as the most favourable option as it closer to the existing alignment.	No significant differences between the options.	No significant differences between the options.

Primary Criteria	Secondary Criteria	XC 219 Route Option		
		Green	Red	Blue
Environment	Ecology	Most terrestrial habitat comprises low ecological value pasture fields. One crossing of watercourse tributary of the Blackwater River (Cork/Waterford) SAC. Moderate potential for impact to Blackwater River (Cork/Waterford) SAC. Loss of very high rare meadow habitat. May not be mitigatable. In close proximity to two buildings with high roosting potential for bats. Crosses marsh area with potential for aquatic plant species of conservation interest and may change hydrological regime. Otter recorded under existing bridge potential for disturbance and loss of supporting habitat.	Most terrestrial habitat comprises low ecological value pasture fields. Two crossings of watercourse tributaries of the Blackwater River (Cork/Waterford) SAC. Higher potential for impact to Blackwater River (Cork/Waterford) SAC given closer proximity to the watercourse. Loss of supporting habitat for aquatic species and otter.	Most terrestrial habitat comprises low ecological value pasture fields. Area less suitable for otter holting habitat. One crossing of watercourse tributary of the Blackwater River (Cork/Waterford) SAC. Lower potential for impact to Blackwater River (Cork/Waterford) SAC. In close proximity to one building with high roosting potential for bats. Loss of very high rare meadow habitat (area more scrub-like in comparison to Green Option). May not be mitigatable. In close proximity to two buildings with high roosting potential for bats.
	Water/Flood Risk	Potential to remove existing culverted river crossings associated with the existing R522 alignment (to partially offset new river crossing required, see cons). Potential to enhance existing ditch capacity and habitat diversity to west of main river at location of works. New embankment likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway (may be partially offset by removal of existing river crossings.	Potential to enhance existing ditch capacity and habitat diversity to west of main river at location of works. New embankment likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway. Potential requirement for Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff.	Potential to enhance existing ditch capacity and habitat diversity to west of main river at location of works. New embankment likely to intrude on fluvial floodplain to the west of the railway (moderate/high impact envisaged). New river crossing required immediately to west of railway. Potential requirement for Stage 3 FRA (including modelling required). Moderate potential increase in pluvial flood risk locally due to increased runoff, particularly to east of railway (see PFRA).

Primary Criteria	Secondary Criteria	XC 219 Route Option		
		Green	Red	Blue
		Potential requirement for Stage 3 FRA (including modelling required). Low potential increase in pluvial flood risk locally due to increased runoff.		
	Landscape	Smallest visual extent of development. Visual impacts at dwelling west of railway line – dwelling affords some degree of screening from hedgerow along the southern verge of R522. Visual impacts along R522 regional road	Minor interruption of hedgerows and mature tree lines Alignment makes use of existing agricultural entrances east of railway tracks – reducing amount of hedgerow vegetation to be removed. Visual impacts at dwelling west of railway line, however high degree of screening occurs to the rear of this dwelling. Visual impacts along R522 regional road	Good separation distances from majority of dwellings aside from dwelling on eastern side of railway which benefits from a high degree of mature screening in the surrounds of the dwelling. Largest visual extent of development Interrupts several hedgerows and mature tree lines. Visual impacts at dwelling west of railway line. Visual impacts along R522 regional road.
	Cultural Heritage	There are no apparent benefits to this option for cultural heritage. Potential direct impacts on historic buildings and features associated with Buttevant Station, including the railway store/warehouse (NIAH 20803040). Also, potential impact on Bregoge Bridge. Potential for unrecorded archaeology to be encountered in greenfield areas.	No direct impact on Buttevant Station or Bregoge Bridge. Potential for unrecorded archaeology to be encountered in greenfield areas.	Avoids Bregoge Bridge. Potential direct impacts on historic elements of Buttevant Station. Potential indirect impact on Protected Structure RPS No. 988 (farmhouse). Potential for unrecorded archaeology to be encountered in greenfield areas.
	Noise	Least preferred option for noise compared to the red and blue options	Second best option for operational noise. Potential construction noise impacts	Best option for operational noise as moves road traffic furthest from receptors.

Primary Criteria	Secondary Criteria	XC 219 Route Option		
		Green	Red	Blue
		but still moves traffic away from receptors compared to the existing road. Potential construction noise impacts.		Potential construction noise impacts

Appendix E. Archaeological Assessment Reports

Appendix C – Archaeological Reports

- **Archaeological Assessment Report on XC187, XC201, XC209, XC215 & XC219;**
- **Archaeological Assessment Report on XC212;**
- **Historic Building Survey at XC219.**

DRAFT

Archaeological Assessment
Level Crossings
XC219 Clashnabuttry Co. Cork
XC215 Shinanagh Co. Cork
XC209 Ballyhay Co. Cork
XC201 Thomastown Co. Limerick
XC187 Fantstown Co. Limerick

Author: Colm Flynn
Job No: 1571-10-100
Client: Roughan & O'Donovan / Iarnród Eireann
Date: July 2011

Valerie J. Keeley Ltd.

SUMMARY

An archaeological impact assessment was undertaken by Valerie J Keeley Ltd, Archaeological Consultancy, on behalf of Roughan O'Donovan/ Iarnród Eireann at five locations, three in Co. Cork and two in Co. Limerick, on the sites of proposed developments associated with the replacement of existing level crossings.

The report comprises a desk-based archaeological assessment of the locations of the proposed developments. This report does not include any site inspection of the proposed development areas.

At XC187 Fantstown the proposed development will have a direct impact on the Industrial Archaeological site (IA1). A Written and Photographic survey of site (IA1) is recommended. Construction stage archaeological monitoring is recommended for XC187 Fantstown. This recommendation is subject to review after the site inspection has taken place.

It is concluded that the proposed development at XC201 Thomastown will have an indirect impact on the known monument LI047-045 (A2), and a direct impact on the Industrial Archaeological site (IA2). A Written and Photographic survey of site (IA2) is recommended. Pre construction test trenching of the proposed development is recommended. Construction stage vegative screening is recommended to mitigate the indirect impact.

The proposed development at XC209 Ballyhay will have an indirect impact on the known monuments CO008-001001, CO008-001002, CO008-001003 (A4) and CO008-059 (A5), and a direct impact on the Industrial Archaeological site (IA3). A Written and Photographic survey of site (IA3) is recommended. Pre construction test trenching of the proposed development is recommended. Construction stage vegative screening is recommended to mitigate the indirect impact.

The proposed development at XC215 Shinanagh will have an indirect impact on the known archaeological monuments CO007-12001 and CO007-12002

(A6), and a direct impact on the Industrial Archaeological site (IA4). A Written and Photographic survey of site (IA4) is recommended. Pre construction test trenching of the proposed development is recommended. Construction stage vegative screening is recommended to mitigate the indirect impact.

At XC219 Clashnabuttry the proposed development will have a direct impact on Industrial Archaeological site (IA5). A Written and Photographic survey of site (IA5) is recommended. Construction stage archaeological monitoring is recommended for XC219 Clashnabuttry. This recommendation is subject to review after the site inspection has taken place.

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1 INTRODUCTION

An archaeological impact assessment was undertaken by Valerie J Keeley Ltd, Archaeological Consultancy, on behalf of Roughan & O'Donovan on the sites of proposed developments associated with the replacement of existing level crossings at XC219 Clashnabuttry, XC215 Shinanagh and XC209 Ballyhay, Co. Cork, and XC201 Thomastown and XC187 Fantstown Co. Limerick. This report comprises a desk-based assessment that discusses the receiving environment from an archaeological perspective and describes the existing baseline data in detail. Proposals are set out for evaluating the nature and extent of potential sub-surface archaeological remains within the proposed site, and mitigating the potential impact of the development.

2 THE PROPOSED DEVELOPMENTS

At XC219 Clashnabuttry (Fig 6) the proposed development site is situated on the western limits of Buttevant, Co. Cork. The development area comprises the existing Dublin-Cork railway, an existing level crossing, a railway station house, an existing local roadway (R522), Bregoge New Bridge, and several fields.

At XC215 Shinanagh (Fig 5) the proposed development site is situated 5km north of Buttevant, Co. Cork and 8km south of Charleville Co. Cork. The development area is situated in the townland of Imphrick Co. Cork and comprises the existing Dublin-Cork railway, an existing level crossing, an existing local roadway and several fields.

At XC209 Ballyhay (Fig 4) the proposed development site is situated 3km SSE of Charleville Co. Cork. The development area comprises the existing Dublin-Cork railway, an existing level crossing, an existing local road, several fields and a building.

At XC201 Thomastown Co. Limerick (Fig 3) the proposed development site is situated 4km NNE of Charleville Co. Cork. The development area comprises the existing Dublin-Cork railway, an existing level crossing, an existing local road and several fields.

At XC187 Fantstown Co. Limerick (Fig 2) the proposed development is situated 2.5km east of Kimallock Co. Limerick. The development area comprises the existing Dublin-Cork railway, an existing level crossing, an existing local road and several fields.

3 STUDY METHODOLOGY

An archaeological desk-based study of existing archaeological records and other potentially relevant literary and cartographic sources was undertaken. This was conducted in conjunction with a site inspection to assess the current condition of previously recorded features, and to record any additional features of interest. A list of all consulted sources is provided in bibliographic form.

3.1 Desk-Based Study

Record of Monuments & Places

The Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Service with accompanying RMP maps, based on OS 6" Sheets, which indicate the location of each recorded site. The RMP list is based on the Sites and Monuments Record files housed in the National Monuments Service Archive. The Sites and Monuments Record (SMR) consists of lists with accompanying maps and files of all certain or possible archaeological sites mainly dating to before 1700 A.D. for all counties in the State. These lists were in many cases based initially on cartographic, documentary and aerial photographic sources. The SMR (as revised in the light of available fieldwork) form the basis of the statutory Record of Monuments and Places (RMP). The record is updated on a constant basis by the National Monuments Service.

National Museum of Ireland Topographical Files

The National Museum of Ireland Topographical Files are the national archive of all known antiquities by the National Museum. These files relate primarily to artefacts but also include references to monuments and are a unique archive of records of previous excavations. The find-spots of artefacts can also be an important indication of the archaeological potential of the related or surrounding area. The Museum's files present an accurate catalogue of objects reported to that institution since 1928. Records both of these and of material acquired by the Museum before this date are summarised in a computerised database which may be consulted by researchers.

The National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a survey commissioned by DoEHLG .The NIAH aims to promote the appreciation of, and contribute to, the protection of the architectural heritage by systematically recording the built heritage on a nation-wide basis. An Introduction to the Architectural Heritage of North County Cork was completed by the NIAH in 2007, and contains entries

for buildings considered to be architectural heritage value. These entries may form the basis for inclusion in the statutory RMP.

County Development Plans

These are made in accordance with the requirements of the Local Government (Planning and Development) Acts (1963-2010) and are an important source for identifying protected structures. The plans set out each Council's policy for the conservation and enhancement of a county's natural and built environment and lists items of special environmental or archaeological interest. The inclusion of archaeological objectives by planning authorities in their statutory development plan provides the basis for such authorities to provide for the protection of the archaeological heritage. They also contain lists of historic buildings and other items for preservation as compiled for the County Council by expert bodies. The Cork County Heritage Plan 2005-2010 and the Cork County Council Development Plan 2009 were consulted for this assessment. The Cork County Council Development Plan includes a Record of Protected Structures (RPS), and designates Architectural Conservation Areas (ACA). The RPS is a list of buildings, which may not be altered or demolished without grant of permission under the Local Government (Planning and Development) Acts, 1963-2010. The Cork County Council Development Plan 2009 states that a Historic Character Assessment of County Cork will be completed, and this will allow for the identification of Archaeological Landscapes which are not as yet identified. The Limerick County Council County Development Plan 2005-2011 and the Limerick County Council Limerick County Development Plan 2010-2016 were also consulted.

Literary Sources

A number of published secondary literary sources were consulted. These are a valuable means of completing the written archaeological and architectural record of an area and gaining insight into the history of the area of the proposed development. The principal sources consulted are listed in the bibliography.

4 THE RECEIVING ENVIRONMENT

4.1 Archaeological Landscape

According to the Cork County Council Development Plan (2009) there are over 1600 known archaeological sites and monuments in County Cork. According to Limerick County Development Plan (2010-2016) there are 1694 known archaeological sites listed in the Record of Protected Structures (RPS). The earliest of these sites date to the Mesolithic period. The earliest evidence of human settlement on the island of Ireland dates from the Mesolithic *c.*7000-4000BC. The larger Mesolithic archaeological sites such as at Mount Sandel Co. Antrim, Ferriter's Cove, Co. Kerry, and the Céide Fields in north Mayo, have not as yet been identified in Co. Cork and Co. Limerick. Although evidence of Mesolithic activity has been found in Cork and Limerick in smaller sites. Mesolithic flint scatters have been found in Kilcummer Lower, between Fermoy and Mallow, and in Gortore near Fermoy. These sites may represent temporary settlements of the hunter-gatherer Mesolithic societies. A Mesolithic camp site was identified in a cave at Killuragh Co. Limerick (Woodman 1996, 93E175) which is northeast of the development area.

Evidence of settlement and burial during the Neolithic *c.*4000-2400BC is found throughout Co. Cork and Co. Limerick. Megalithic tombs have been identified in Glantane, Knocknagoun and Inchincurka, and are believed date from this period. These sites have been identified as Wedge Tombs. Wedge tombs are roofed by slabs laid directly on the side-walls, which often have one or more (double or triple) rows of walling. They were originally covered by a cairn (a large mound of stones), evidence of which survives at few sites.

A large number of enclosures are located within the wider study area. The term enclosure is generally used to describe an enclosed area of a variety of shapes and sizes, possessing no diagnostic features which would allow classification within another monument category. These may date to any period from prehistory onwards.

A number of ringfort are located within the wider landscape near Kilmallock, Buttevant and Charleville. Ringforts are one of the most numerous and widely distributed monuments on the Irish landscape. A typical ringfort consists of a circular area with D-shaped or sub-circular examples also occurring. They are usually 20-50m in diameter and can be enclosed by single or multiple ditches, with single or multiple banks of earth, a combination of earth and stone (known as a rath) or a drystone wall (refered to as a cashel). These monuments served as enclosed homesteads, protecting houses, their inhabitants and livestock. Some of the more elaborate ringforts may have served as venues for social gatherings. Research and excavation have dated the majority of ringforts to between c. AD500-1200 (Mitchell & Ryan 1997, 254-261). Many of these sites as have been destroyed above ground and are now evidenced only by cartographic record and/or aerial photography. In instances where the surviving

remains are insufficient to determine whether the monument was originally a rath or cashel, the monument is termed an unclassified ringfort.

The town of Charleville was founded in the Anglo Norman period. It was then named Rathcogan/Rathgoggan after the Anglo Norman founder Miles de Cogan who founded the town after he received a grant of "The Kingdom of Cork" from Henry II in 1177. A number of sites around Charleville and its environs tell us that the area was populated throughout the medieval period. Indeed an enclosure site to the east of the town in Rathgoggan Middle townland (CO 002-060) could represent prehistoric activity while a number of ringforts in Ballysallagh (CO 003-005 & CO003-06) give us evidence for medieval settlement.

During the Elizabethan Munster Plantation the present town founded and renamed "Charleville" under Royal Charter in 1671. Charleville as we know it was founded by Roger, first Earl of Orrery and Lord-President of Munster in the year 1671. He erected a mansion there for his own residence that was burnt by the Irish under the command of the Duke of Berwick, in 1690. However the town has continued to expand and by 1837 Lewis records 4766 inhabitants living there.

After the Local Government Act of 1898 the people of Charleville petitioned the government to have the name of the area changed to Rath Luirc (Luirc's Fort), after Lorc an ancient king of Munster.

The town of Buttevant is identified as a Zone of Archaeological Potential in the Cork County Council Development Plan (2009). Buttevant was founded as an Anglo Norman military outpost in the 12th century. The name "Buttevant" is a corruption of a French word for outpost, and is also used for one of the towers forming Dublin Castle. The Irish name for Buttevant is "Cill na Mallach" which translates as Church of the hills. In 1234 Henry III granted David deBarry a fair at Buttevant. DeBarry also founded a friary at Buttevant.

The townland of Thomastown has 8 known archaeological sites, and is situated roughly midway between Kilmallock and Charleville. The paper survey shows that a high number of recorded monuments fall within this area and it should be considered an area of high archaeological potential. Thomastown is in the parish of Kilbreedy Minor and placename evidence would lead us to believe that a church founded by St. Bridgit once existed in this parish. Lewis's Topographical Directory of Ireland (1837) describes the parish as containing 600 inhabitants, comprising 2087 statute acres of good soil with about one-fifth of it is under tillage, the remainder being meadow or pasture land. To the south of Kilbreedy Minor is the parish of Effin, and to the south of, bordering Thomastown is Effin/ Gortacrank townland where a church (in ruins), well, graveyard and deserted settlement are located (RMP 047- 067 & 047- 068). The oldest headstone located in the graveyard dates 1747 but according to Maurice Lenihan's 'Limerick, Its History and Antiquities', there were several ancient tombstones with Gaelic inscriptions in the graveyard (Lenihan 1884).

Regarding Thomastown, a number of recorded enclosure sites shows the possibility of prehistoric activity in the area (RMP 047-049 & 047-050) while a number of moated sites nearby in Portauns townland (RMO047-051) and Garrynderk North (RMP 047-064) gives us evidence for Anglo- Norman activity outside the estate at Kilmallock. The Ordnance Survey Name Books (1838) records 4 'ancient forts' in Thomastown townland, "*one of which is near the northeast boundary, another in the southeast part of the townland, another in the south part and another in the west*" and the 1st edition Ordnance Survey map also of 1838 reflects this.

Kilmallock (LI 047-022) is an anglicised version of the Irish Cill Mocheallóg which translates as "the Church of Mocheallóg". In the early medieval period (AD400-1000) during the 6th or 7th century a church (LI 047-019001) was established at Kilmallock to the north of the modern town. A castle was built in Kilmallock in the late 12th century. In 1291 the Dominican Priory was founded and the town grew around the priory and the Anglo-Norman castle. This resulted in Kilmallock becoming one of the main urban centres in Ireland in the medieval period. In 1375 the medieval town of Kilmallock was fortified with five towers and a stone wall. Kilmallock was located in a position of some strategic importance, and in consequence the town frequently became a target during times of war. In 1571, the town was burned by the rebel Earl of Desmond during the Desmond Rebellions. In 1648 during the Irish Confederate Wars, the Dominican Priory was attacked and destroyed by a Parliamentary Army under Lord Inchiquin.

The townlands of Clashnabuttry, Shinanagh, Ballyahay, Thomastown and Fantstown are situated on the western slopes of the Ballyhoura Hills, a range of hills located in County Cork and County Limerick. The Ballyhoura Hills Research Project is an ongoing archaeological research project that has used aerial photography and previous complete archaeological surveys, to identify archaeological sites that may date to the late prehistoric period, within the Ballyhoura Hills.
The townland of Clashnabuttry Co. Cork has no known archaeological sites. The townland of Shinanagh Co. Cork has 7 known archaeological sites. The townland of Ballyhay Co. Cork has 3 known archaeological sites.
The townland of Fantstown Co. Limerick has 9 known archaeological sites.

According to the online archaeological excavations database www.excavations.ie no previous archaeological excavations have taken place in Clashnabuttry, Shinanagh, Ballyhay Co. Cork, or in Fantstown or Thomastown Co. Limerick.

The topographical files contain no entries for any of the five townlands affected by the proposed developments.

5 IMPACT ASSESSMENT

At XC187 Fantstown Co. Limerick the proposed development will have a direct impact on the Industrial Archaeological site (IA1) which consists of the existing 19th century railway and level crossing.

At XC201 Thomastown Co. Limerick the development will have an indirect impact on the known monument LI047-045 which is identified in the RMP files as an enclosure of unknown date. The development will also have a direct impact on the Industrial Archaeological site (IA2) which consists of the existing 19th century railway and level crossing.

The proposed development at XC209 Ballyhay will have an indirect impact on the known monuments CO008-001001 (identified as a graveyard in the RMP files), CO008-001002 (identified as a church in the RMP files), CO008-001003 (identified as an effigy in the RMP files) and CO008-059 (identified as a mill in the RMP files). The development will also have a direct impact on the Industrial Archaeological site (IA3), which consists of the existing 19th century railway and level crossing.

The proposed development at XC215 Shinanagh will have an indirect impact on the known archaeological monuments CO007-12001 (identified as a graveyard in the RMP files) and CO007-12002 (identified as a church in the RMP files). The development will have a direct impact on the Industrial Archaeological site (IA4), which consists of the existing 19th century railway and level crossing.

At XC219 Clashnabuttry the proposed development will have a direct impact on Industrial Archaeological site (IA5), which consists of the existing 19th century railway and level crossing.

6 RECOMMENDATIONS & MITIGATION MEASURES

Ideally, ground works should be kept to a minimum to avoid unknown archaeology. Where this is not possible, the following recommendations and mitigation measures are made to fully resolve and record the archaeology in advance of construction.

6.1 Recommendations Prior to Construction

Written and Photographic Survey

A written and photographic survey of Industrial Archaeological Sites IA1-IA5 is recommended. This will ensure any impact by the development on the industrial archeology of the rail line is mitigated.

Pre Construction Test Trenching

Pre Construction Archaeological Test Trenching of the footprint of the proposed development will ensure that any impact on archaeology present is mitigated. This recommendation is made in lieu of archaeological monitoring of groundworks during construction, which has a higher risk of incurring delays to the development.

XC201 Thomastown Co. Limerick

Archaeological test trenching is recommended for XC 201 Thomastown. The proximity of the known enclosure (LI047-045) to the development area presents a high risk of further as yet unknown archaeology being within the development area.

XC209 Ballyhay Co. Cork

Archaeological test trenching is recommended for XC209 Ballyhay. The proximity of Ballyhay church (CO008-001002) and graveyard (CO008-001001) to the development area presents a high risk of further as yet unknown archaeology being within the development area. Unofficial burial grounds called "cillíns" or "Children's Burial Grounds" were often located close to consecrated ground. As an earlier church is known to have been situated in the area of the existing Ballyhay church (CO-008-001002) it is prudent to establish through test trenching that no unknown archaeological sites are contained within the development area.

XC215 Shinanagh Co. Cork

Archaeological test trenching is recommended for XC215 Shinanagh. The proximity of the development to Imphrick Church (CO007-120002) and graveyard (CO007-120001) presents a high risk of further as yet unknown archaeology being within the development area. Unofficial burial grounds called "cillíns" or "Children's Burial Grounds" were often located close to consecrated ground.

6.2 Recommendations During Construction

Archaeological Monitoring

Archaeological Monitoring of groundworks associated with the development is recommended when the proposed development is located within an area of archaeological potential, but does not have any level of impact on known archaeological sites.

XC187 Fantstown Co. Limerick

Construction stage archaeological monitoring of all ground works is recommended at XC187 Fantstown. The proximity of the development to a known enclosure (LI048-001) and the concentration of other archaeological sites in the vicinity of the development presents a risk of archaeology being discovered during the development works.

XC219 Clashnabuttry Co. Cork

Construction stage archaeological monitoring of all ground works is recommended at XC219 Clasnabuttry. The proximity of the development to a known ringfort (CO016-211) and the concentration of other archaeological sites in the vicinity of the development presents a risk of archaeology being discovered during the development works.

Vegative Screening

Construction stage planting of trees, shrubs or hedges is recommended at XC209 Ballyhay at the southern edge of the development area nearest Ballyhay Church (CO008-001002) and graveyard (CO008-001001). This work is recommended to mitigate the visual impact of the proposed new road on Ballyhay Church (CO008-001002) and graveyard (CO008-001001).

Construction stage planting of trees, shrubs or hedges is recommended at XC215 Shinanagh at the western edge of the development area nearest Imphrick Church (CO007-120002) and graveyard (CO007-120001). This work is recommended to mitigate the visual impact of the proposed new road on Imphrick Church (CO007-120002) and graveyard (CO007-120001).

In the event of archaeology being discovered:

Works in areas where archaeology is identified should be halted until an appropriate level of excavation and recording can be undertaken. This work will be done under licence in accordance with Section 26 of the National Monuments Acts 1930-2004, and with a method statement agreed in advance with the Heritage & Planning Division, Department of the Environment, Heritage & Local Government and the National Museum of Ireland.

- Where archaeology is found to be present, preservation *in situ* will be the preferred option. Strategies for the *in situ* preservation of archaeological remains are considered on a case-by-case basis, in consultation with the Statutory Authority. Preservation *in situ* can be undertaken

through avoidance, if possible, of the confirmed feature during the development process, or preservation through detailed design, e.g. using a raft foundation

- If substantial archaeological deposits are present and cannot be preserved *in situ*, they will be recorded during licensed archaeological excavation in advance of the development and thus preserved by record

RETAINING AN ARCHAEOLOGIST/S an archaeologist/s should be retained for the duration of the relevant earthworks.

THE TIME-SCALE for the construction phase should be made available to the archaeologist, with information on where and when topsoil stripping will take place.

SUFFICIENT NOTICE. It is essential to give sufficient notice to the archaeologist(s) in advance of topsoil stripping (minimum four weeks). This will allow for prompt arrival on site to monitor the soil stripping. As often happens, intervals may occur during the construction phase, in this case, it is also necessary to inform the archaeologist(s) as to when earthworks will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that the machine work cease in this immediate area to allow the archaeologist(s) to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once established that archaeologically significant material is present, full archaeological excavation and recording of such would be recommended.

ARCHAEOLOGICAL TEAM. It is also recommended that the core of an archaeological team be on standby to deal with any such rescue excavation. This would be complemented in the event of full excavation.

SECURE SITE OFFICES and facilities should be provided on or near those sites where excavation is required.

FENCING of any such areas would be necessary once discovered and during excavation.

ADEQUATE FUNDS to cover preparatory survey work, excavation, post-excavation work, and any testing or conservation work required should be made available.

SITE OFFICES. No site offices, depots, or storage facilities should be placed on or near any of the selected sites or areas of archaeological potential.

MACHINERY TRAFFIC during construction must be restricted so as to avoid any of the selected sites and their environs.

ACCESS ROADS or haul roads during construction should not encroach on any of the selected sites or areas of archaeological potential and their environs.

SPOIL should not be dumped on any of the selected sites or their environs.

PLEASE NOTE: This report and accompanying recommendations are based on mapping, as supplied by Roughan & O'Donovan Ltd. Should any alteration occur, further assessment would be required.

PLEASE NOTE: Recommendations are subject to approval by The National Monuments Service at the Department of the Environment.

Table 1: Summary of Recommendations & Mitigation Measures for Archaeological, Architectural Heritage and Industrial Archaeological Sites within and in close proximity to the proposed development.

Site Number	RMP Number	Townland	NGR	Site Type	Proximity to Development	Mitigation Measures
IA1	-	Fantstown		Railway & Level Crossing	0m	Written & Photographic Survey
IA2	-	Thomastown		Railway & Level Crossing	0m	Written & Photographic Survey
IA3	-	Ballyhay		Railway & Level Crossing	0m	Written & Photographic Survey
IA4	-	Shinanagh/Imphrick		Railway & Level Crossing	0m	Written & Photographic Survey
IA5	-	Clasnabuttry		Railway & Level Crossing	0m	Written & Photographic Survey
A1	LI048-001	Gibbonstown	163898 128467	Enclosure	50m	Construction stage archaeological monitoring
A2	LI047-045	Thomastown	157698 124572	Enclosure	0m	Pre construction test trenching
A3	LI047-046	Thomastown	158011 124685	Mound	50m	Pre construction test trenching
A4	CO008-001001 CO008-001002 CO008-001003	Ballyhay		Graveyard Church Effigy	10m	Pre construction test trenching
A5	CO008-059	Rathmorgan	155428 120044	Corn mill	30m	Pre construction test trenching

Site Number	RMP Number	Townland	NGR	Site Type	Proximity to Development	Mitigation Measures
A6	CO007-120001 CO007-120002	Imphrick	153507 614610	Graveyard Church	20m	Pre construction test trenching
A7	CO007-121	Imphrick	153603 114603	Holy Well	30m	No Specific Mitigation Measure
A8	CO016-211	Bregoge	15289 10976	Ringfort	300m	Construction stage archaeological monitoring

Catalogue of Archaeological Sites

This catalogue details the known archaeological sites in proximity to the proposed five areas of works. It consists of 8 sites; the locations of the sites are indicated on Figures 2-6. The catalogue entries provide information on location, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact.

Archaeological Sites Listed in the Record of Monuments and Places

SITE A1	Figure 2
TOWNLAND	Gibbonstown
COUNTY	Limerick
O.S. 6" SHEET/PLAN/TRACE	048
NGR	163898 128467
IDENTIFICATION	Extant
SITE TYPE	Enclosure
R.M.P. NO.	LI048-001
REFERENCE	-
PROXIMITY	50m N of development at XC187
DESCRIPTION	Circular platform.
IMPACT CLASSIFICATION	No impact

SITE A2	Figure 3
TOWNLAND	Thomastown
COUNTY	Limerick
O.S. 6" SHEET/PLAN/TRACE	047
NGR	157698 124572
IDENTIFICATION	Extant
SITE TYPE	Enclosure
R.M.P. NO.	LI047-045
REFERENCE	-

PROXIMITY	Possible direct impact of development at XC201
DESCRIPTION	Circular platform, truncated by existing railway line.
IMPACT CLASSIFICATION	Possible direct impact

SITE A3	Figure 3
TOWNLAND	Thomastown
COUNTY	Limerick
O.S. 6" SHEET/PLAN/TRACE	047
NGR	158011 124685
IDENTIFICATION	Extant
SITE TYPE	Mound
R.M.P. NO.	LI047-046
REFERENCE	-
PROXIMITY	50m E of development at XC201
DESCRIPTION	Ovoid platform, possible barrow.
IMPACT CLASSIFICATION	No impact

SITE A4	Figure 4
TOWNLAND	Ballyhay
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	155086 119767
IDENTIFICATION	Extant
SITE TYPE	Graveyard
R.M.P. NO.	CO 008-001001
REFERENCE	Grove-White (1905-25), Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	10m SE of development area at XC209
DESCRIPTION	Irregular shaped graveyard enclosed by earthen bank and low stone wall. Ruins of church (CO-008-001002) in centre.
IMPACT CLASSIFICATION	Possible indirect impact

SITE A4	Figure 4
TOWNLAND	Ballyhay
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	155086 119767
IDENTIFICATION	Extant
SITE TYPE	Church
R.M.P. NO.	CO 008-001002
REFERENCE	Grove-White (1905-25), Leask (1960), Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	10m SE of development area at XC209
DESCRIPTION	Ruins of rectangular church in centre of graveyard (C0-008-001001). Church comprises nave and chancel with 12th century door in south wall of nave. Additions and alterations to church in 17th century. Early 14th century effigy (CO-008-001003) in inner face of east gable.
IMPACT CLASSIFICATION	Possible indirect impact

SITE A4	Figure 4
TOWNLAND	Ballyhay
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	155102 119771
IDENTIFICATION	Extant
SITE TYPE	Effigy
R.M.P. NO.	CO 008-001003
REFERENCE	Grove-White (1905-25), Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	10m SE of development area at XC209
DESCRIPTION	Early 14th century stone effigy cemented into inner face of east gable wall of medieval Ballyhay church (CO008-

	001002), which is in centre of graveyard (CO008-001001).
IMPACT CLASSIFICATION	Possible indirect impact

SITE A5	Figure 4
TOWNLAND	Rathmorgan
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	155428 120044
IDENTIFICATION	Extant
SITE TYPE	Mill- corn
R.M.P. NO.	CO 008-059
REFERENCE	Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	200m E of development area at XC209
DESCRIPTION	Rectangular mill (in ruins), 3 walls still standing. Remains of 2 single storey buildings to the NE.
IMPACT CLASSIFICATION	Possible indirect impact

SITE A 6	Figure 5
TOWNLAND	Imphrick
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	007
NGR	153507 614610
IDENTIFICATION	Extant
SITE TYPE	Graveyard
R.M.P. NO.	CO 007-120001
REFERENCE	Grove-White (1905), Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	20m west of development area at XC215
DESCRIPTION	Sub rectangular graveyard enclosed by earthen bank near to 18th century Imphrick Church (CO-007-120002).

IMPACT CLASSIFICATION	Indirect impact

SITE A6	Figure 5
TOWNLAND	Imphrick
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	007
NGR	153504 114563
IDENTIFICATION	Extant
SITE TYPE	Church
R.M.P. NO.	CO 007-120002
REFERENCE	Brady (1863), Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	20m west of development area at XC215
DESCRIPTION	In NW corner of graveyard (CO-007-120001), ruins of rectangular 18th century church. A church is listed here in the Papal Taxation of AD1291.
IMPACT CLASSIFICATION	Indirect impact

SITE A7	Figure 5
TOWNLAND	Imphrick
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	007
NGR	153603 114603
IDENTIFICATION	Extant
SITE TYPE	Ritual site-holy well
R.M.P. NO.	CO 007-121
REFERENCE	Archaeological Inventory of County Cork Volume 4: North Cork, 2000.
PROXIMITY	30m E of development area at XC215
DESCRIPTION	Rectangular well partially enclosed and covered by low stone surrounds. Named "Tobernadeecla" (Declan's Well) on 1st ed map
IMPACT CLASSIFICATION	Possible indirect impact

SITE A 8	Figure 6
TOWNLAND	Bregoge
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	016
NGR	15289 10976
IDENTIFICATION	Extant
SITE TYPE	Ringfort
R.M.P. NO.	CO 016-211
REFERENCE	-
PROXIMITY	300m west of XC219
DESCRIPTION	Ringfort univallate, depression in northern corner. Situated on a gentle NE facing slope, with bank and fosse visible.
IMPACT CLASSIFICATION	No Impact

Catalogue of Industrial Archaeological Sites

This catalogue details the known industrial archaeological sites in proximity to the proposed area of works. It consists of 5 sites; the location of the sites are indicated on Figures 2-6. The catalogue entry provides information on location, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact.

SITE IA 1	Figure 2
TOWNLAND	Fantstown
COUNTY	Limerick
O.S. 6" SHEET/PLAN/TRACE	048
NGR	-
IDENTIFICATION	Extant
SITE TYPE	Level crossing, railway, embankment, stone walls and fences.
R.M.P. NO.	-
REFERENCE	Cartographic
PROXIMITY	0m
DESCRIPTION	Level Crossing XC187. A 19th Century railway and associated level crossing
IMPACT CLASSIFICATION	Direct Impact

SITE IA 2	Figure 3
TOWNLAND	Thomastown
COUNTY	Limerick
O.S. 6" SHEET/PLAN/TRACE	047
NGR	-
IDENTIFICATION	Extant
SITE TYPE	Level crossing, railway, embankment, stone walls and fences.
R.M.P. NO.	-

REFERENCE	Cartographic
PROXIMITY	0m
DESCRIPTION	Level Crossing XC201. A 19th Century railway and associated level crossing
IMPACT CLASSIFICATION	Direct Impact

SITE IA 3	Figure 4
TOWNLAND	Ballyhay
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	-
IDENTIFICATION	Extant
SITE TYPE	Level crossing, railway, embankment, stone walls and fences.
R.M.P. NO.	-
REFERENCE	Cartographic
PROXIMITY	0m
DESCRIPTION	Level Crossing XC209. A 19th Century railway and associated level crossing
IMPACT CLASSIFICATION	Direct Impact

SITE IA 4	Figure 5
TOWNLAND	Shinanagh / Imphrick
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	007
NGR	-
IDENTIFICATION	Extant
SITE TYPE	Level crossing, railway, embankment, stone walls and fences.
R.M.P. NO.	-
REFERENCE	Cartographic
PROXIMITY	0m
DESCRIPTION	Level Crossing XC215. A 19th Century railway and associated level crossing

IMPACT CLASSIFICATION	Direct Impact
SITE IA 5	Figure 6
TOWNLAND	Clashnabuttry
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	016
NGR	-
IDENTIFICATION	Extant
SITE TYPE	Level crossing, railway, embankment, stone walls and fences.
R.M.P. NO.	-
REFERENCE	Cartographic
PROXIMITY	0m
DESCRIPTION	Level Crossing XC219. A 19th Century railway and associated level crossing
IMPACT CLASSIFICATION	Direct Impact

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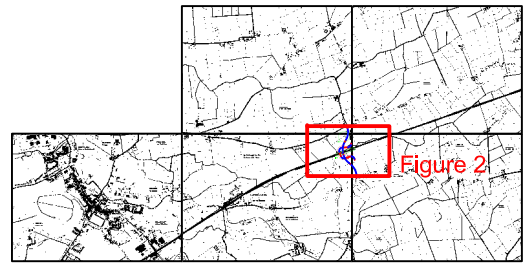

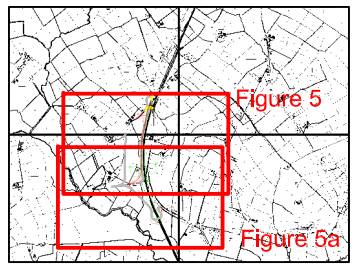

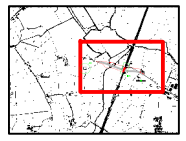

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Inspection Area		1571-10-100	GW	Fig1-6/Reports	Roughan & O'Donovan/Iarnrod Eireann
		Date July 11	**Scale** N.T.S.	**Drawing No.** Figure 1	**Project** Iarnrod Eireann Level Crossing Project

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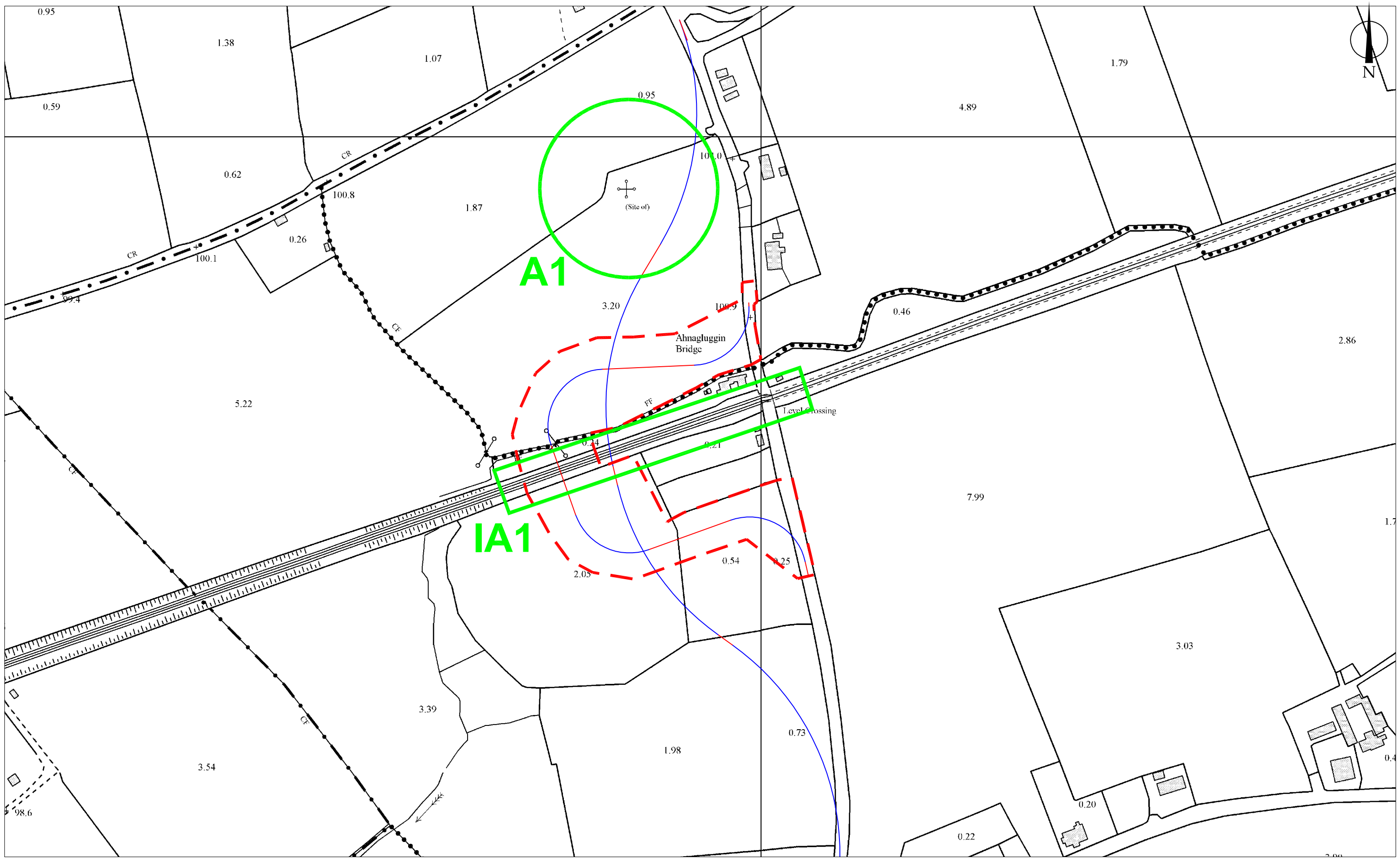

Title Plan of Level Crossing XC187 showing Archaeological / Industrial Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC187	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100 **Date** July 11	**Compiled by** GW **Scale** 1:2500	**CAD reference** Fig1-6/Reports **Drawing No.** Figure 2	**Client** Roughan & O'Donovan/Iarnrod Eireann **Project** Iarnrod Eireann Level Crossing Project	VJK Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY

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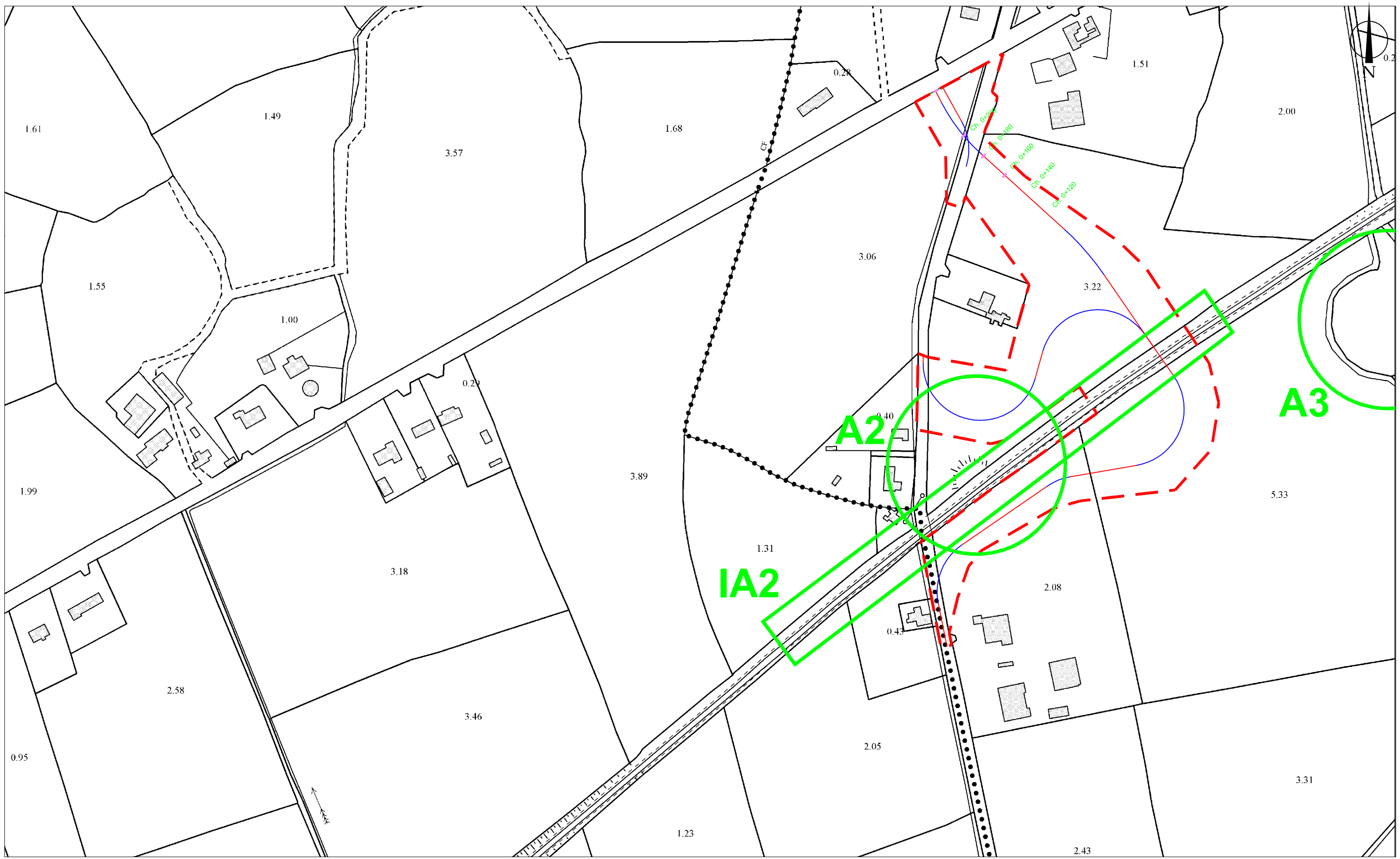

Title Plan of Level Crossing XC201 showing Archaeological / Industrial Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC201	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100	**Compiled by** GW	**CAD reference** Fig1-6/Reports	**Client** Roughan & O'Donovan/Iarnrod Eireann	Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY
		Date July 11	**Scale** 1:2500	**Drawing No.** Figure 3	**Project** Iarnrod Eireann Level Crossing Project	

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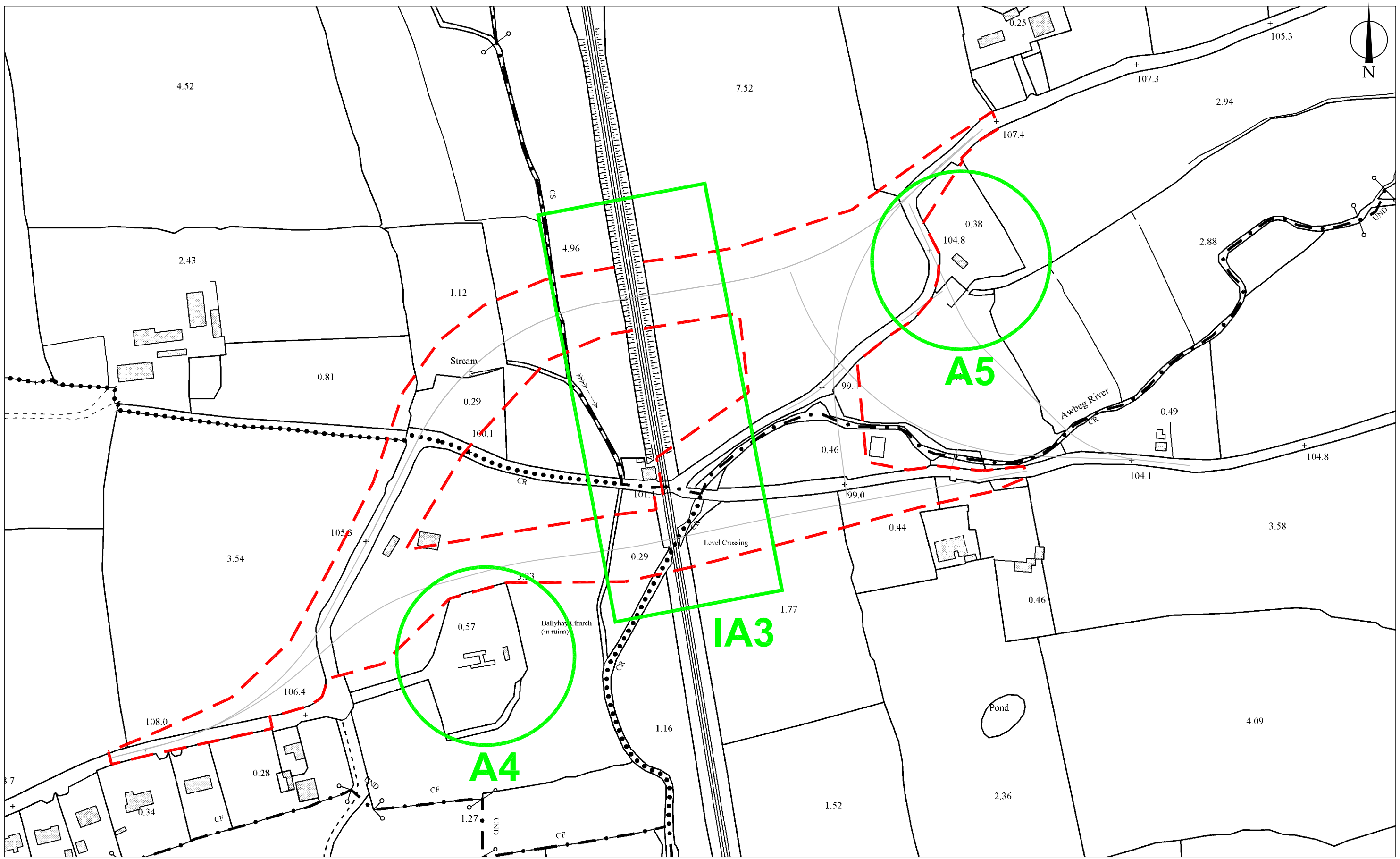

Title Plan of Level Crossing XC209 showing Archaeological Sites, Industrial Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC209	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100	**Compiled by** GW	**CAD reference** Fig1-6/Reports	**Client** Roughan & O'Donovan/Iarnrod Eireann	VJK Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY
		Date July 11	**Scale** 1:2500	**Drawing No.** Figure 4	**Project** Iarnrod Eireann Level Crossing Project	

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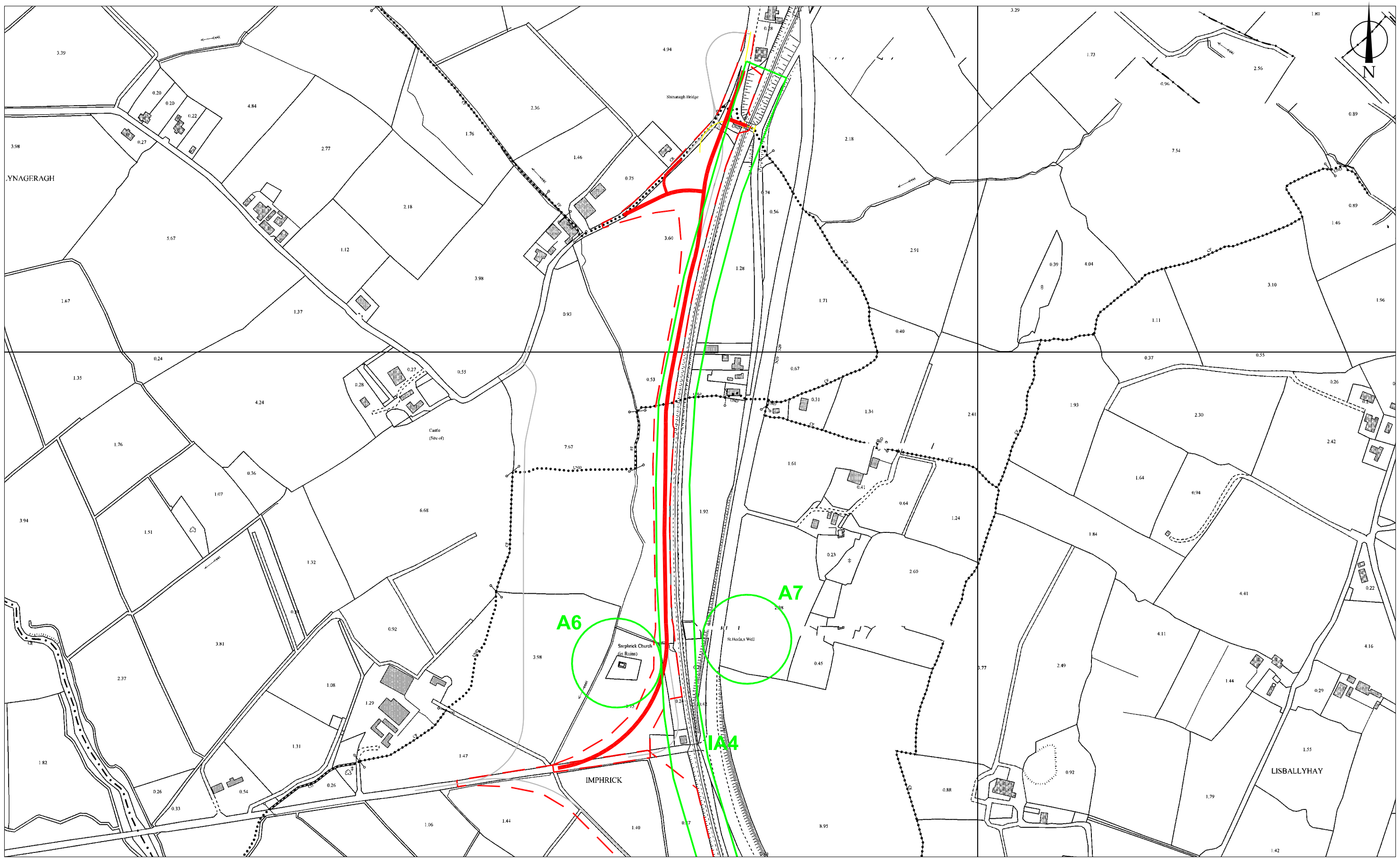

Title Plan of Level Crossing XC215 North showing Archaeological / Industrial Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC215	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100	**Compiled by** GW	**CAD reference** Fig1-6/Reports	**Client** Roughan & O'Donovan/Iarnrod Eireann	VJK Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY
		Date July 11	**Scale** 1:5000	**Drawing No.** Figure 5	**Project** Iarnrod Eireann Level Crossing Project	

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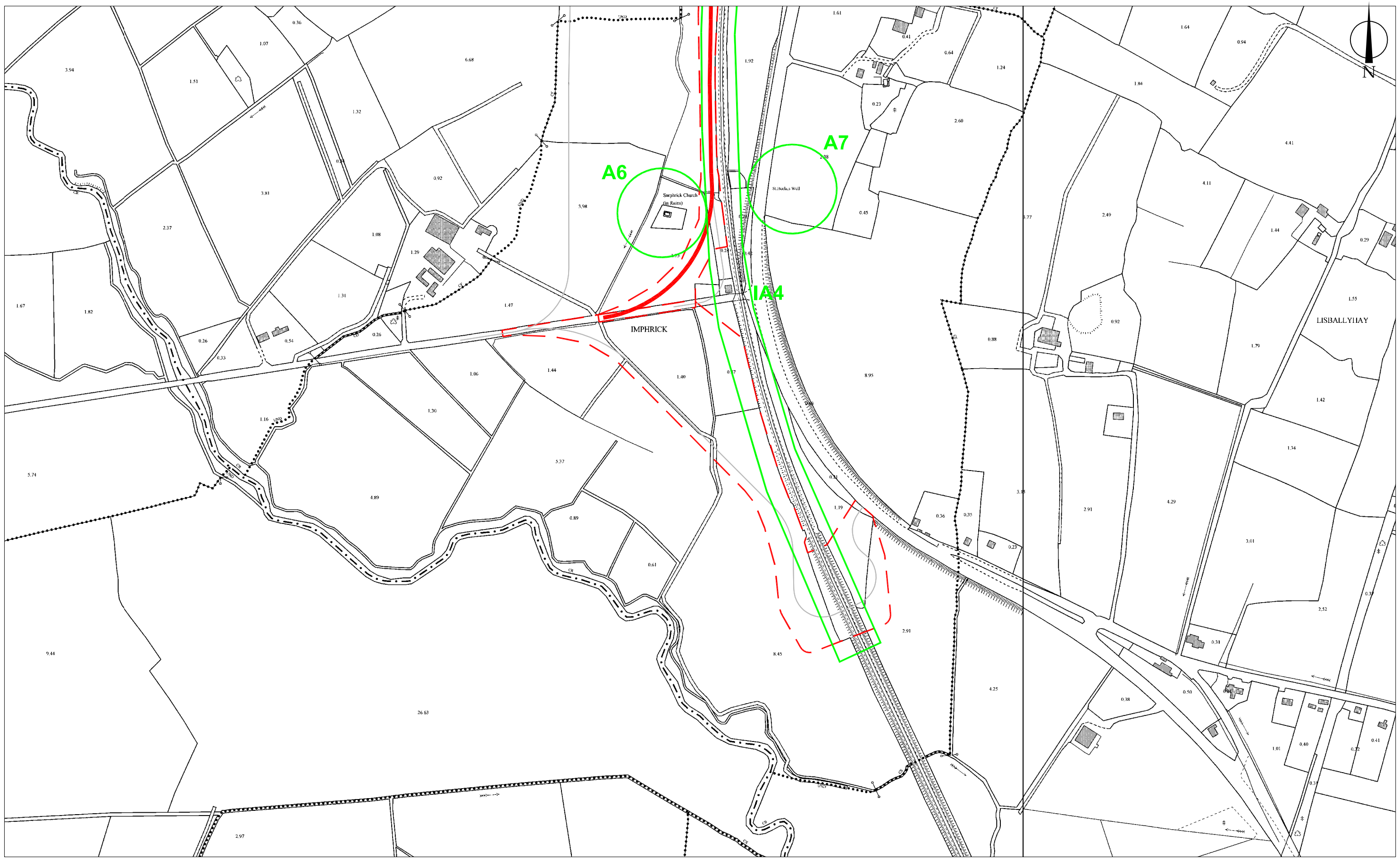

Title Plan of Level Crossing XC215 South showing Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC215	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100	**Compiled by** GW	**CAD reference** Fig1-6/Reports	**Client** Roughan & O'Donovan/Iarnrod Eireann
		Date July 11	**Scale** 1:5000	**Drawing No.** Figure 5a	**Project** Iarnrod Eireann Level Crossing Project

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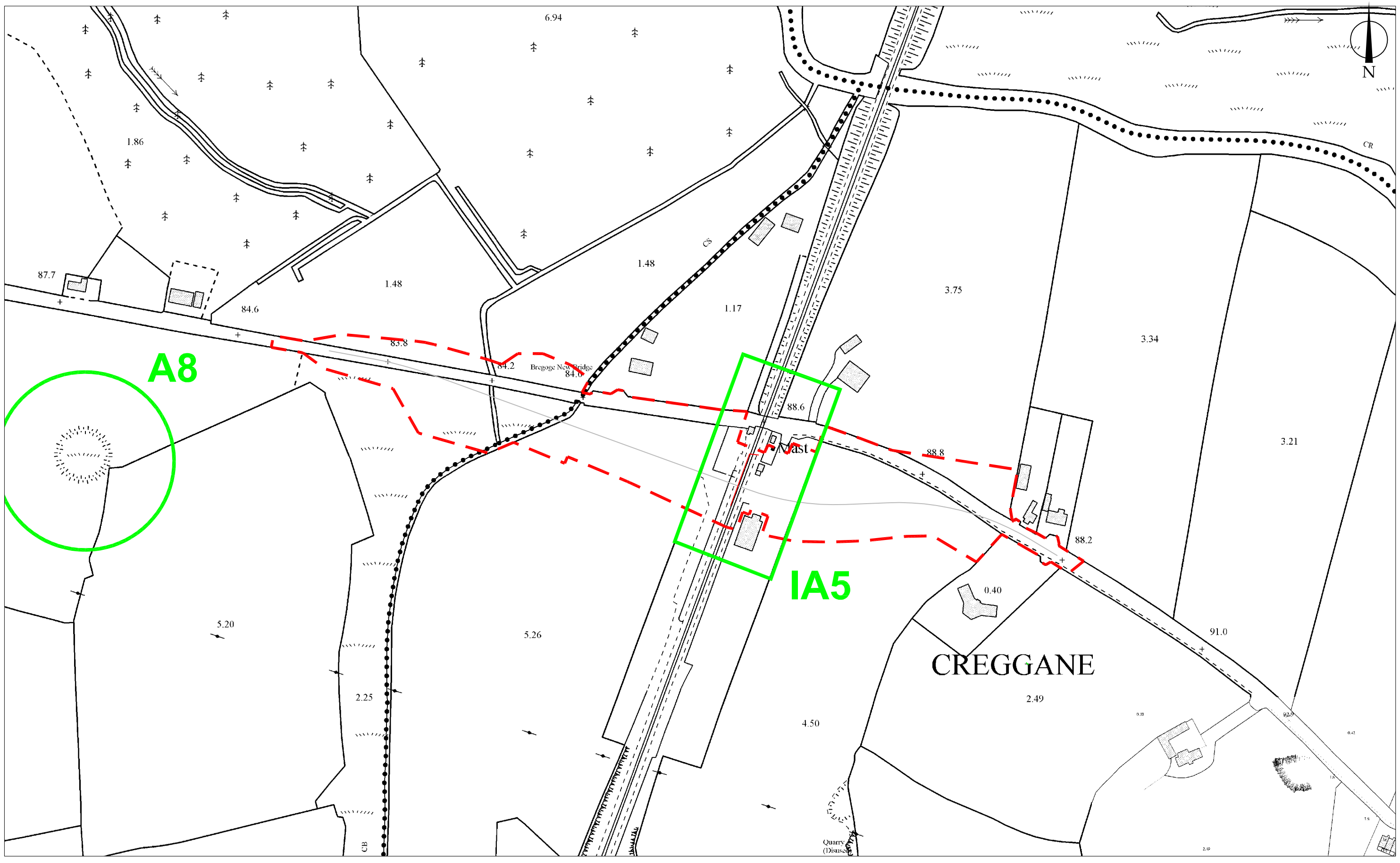

Title Plan of Level Crossing XC219 showing Archaeological Sites, Architectural Heritage Sites and Areas of Archaeological Potential DRAFT OF XC219	**Notes** Archaeological / Industrial Archaeological Site Architectural Heritage Site Area of Archaeological Potential	**Job/Exc No.** 1571-10-100	**Compiled by** GW	**CAD reference** Fig1-6/Reports	**Client** Roughan & O'Donovan/Iarnrod Eireann	Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY
		Date July 11	**Scale** 1:2500	**Drawing No.** Figure 6	**Project** Iarnrod Eireann Level Crossing Project	

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Archaeological Assessment
XC212 Level Crossing
Ballycoskery
Co. Cork

Author: Colm Flynn
Job No: 1561-10-100
Client: Roughan & O'Donovan / Iarnród Eireann
Date: October 2010

Valerie J. Keeley Ltd.

SUMMARY

An archaeological impact assessment was undertaken by Valerie J Keeley Ltd, Archaeological Consultancy, on behalf of Roughan O'Donovan/ Iarnród Eireann on the proposed site of a road diversion to replace a level crossing, at Ballycoskery, County Cork.

The report comprises a desk-based archaeological assessment and site inspection of the site. It is concluded that the proposed development will have no measurable impact on any known monument.

A pre-construction Written and Photographic Survey of the identified Industrial Archaeological Site (IA1) is recommended.

Pre-construction archaeological test trenching of the footprint of the development area is recommended.

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1 INTRODUCTION

An archaeological impact assessment was undertaken by Valerie J Keeley Ltd, Archaeological Consultancy, on behalf of Roughan & O'Donovan on the proposed site of the replacement of an existing level crossing by the construction of a new road and overbridge at Ballycoskery, Co. Cork. The report comprises a desk-based assessment and site inspection that discusses the receiving environment from an archaeological perspective and describes the existing baseline data in detail. Proposals are set out for evaluating the nature and extent of potential sub-surface archaeological remains within the proposed site, and mitigating the potential impact of the development.

2 THE PROPOSED DEVELOPMENT

The proposed development site is situated on the eastern limits of Ballycoskery village, Co. Cork. The development area comprises a station house, an existing local roadway and several fields. The proposed development will involve the demolition of the station house and the closure of the existing level crossing XC212, and the creation of an overbridge over the existing railline, and associated new link roads, which will connect with the existing local road network.

3 STUDY METHODOLOGY

An archaeological desk-based study of existing archaeological records and other potentially relevant literary and cartographic sources was undertaken. This was conducted in conjunction with a site inspection to assess the current condition of previously recorded features, and to record any additional features of interest. A list of all consulted sources is provided in bibliographic form.

3.1 Desk-Based Study

Record of Monuments & Places

The Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Service with accompanying RMP maps, based on OS 6" Sheets, which indicate the location of each recorded site. The RMP list is based on the Sites and Monuments Record files housed in the National Monuments Service Archive. The Sites and Monuments Record (SMR) consists of lists with accompanying maps and files of all certain or possible archaeological sites mainly dating to before 1700 A.D. for all counties in the State. These lists were in many cases based initially on cartographic, documentary and aerial photographic sources. The SMR (as revised in the light of available fieldwork) form the basis of the statutory Record of Monuments and Places (RMP). The record is updated on a constant basis by the National Monuments Service.

National Museum of Ireland Topographical Files

The National Museum of Ireland Topographical Files are the national archive of all known antiquities by the National Museum. These files relate primarily to artefacts but also include references to monuments and are a unique archive of records of previous excavations. The find-spots of artefacts can also be an important indication of the archaeological potential of the related or surrounding area. The Museum's files present an accurate catalogue of objects reported to that institution since 1928. Records both of these and of material acquired by the Museum before this date are summarised in a computerised database which may be consulted by researchers.

The National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) is a survey commissioned by DoEHLG .The NIAH aims to promote the appreciation of, and contribute to, the protection of the architectural heritage by systematically recording the built heritage on a nation-wide basis. An Introduction to the Architectural Heritage of North County Cork was completed by the NIAH in 2007, and contains entries for buildings considered to be architectural heritage value. These entries may form the basis for inclusion in the statutory RMP.

County Development Plans

These are made in accordance with the requirements of the Local Government (Planning and Development) Acts (1963-2000) and are an important source for identifying protected structures. The plans set out each Council's policy for the conservation and enhancement of a county's natural and built environment and lists items of special environmental or archaeological interest. The inclusion of archaeological objectives by planning authorities in their statutory development plan provides the basis for such authorities to provide for the protection of the archaeological heritage. They also contain lists of historic buildings and other items for preservation as compiled for the County Council by expert bodies. The Cork County Heritage Plan 2005-2010 and the Cork County Development Plan 2009 were consulted for this assessment. The Cork County Development Plan includes a Record of Protected Structures (RPS), and designates Architectural Conservation Areas (ACA). The RPS is a list of buildings, which may not be altered or demolished without grant of permission under the Local Government (Planning and Development) Acts, 1963-1993.

Literary Sources

A number of published secondary literary sources were consulted. These are a valuable means of completing the written archaeological and architectural record of an area and gaining insight into the history of the area of the proposed development. The principal sources consulted are listed in the bibliography.

3.2 Site Inspection

The site of the proposed development was inspected by walking the ground in which it is to be located. This is essential in determining the potential impact of the proposed development on the receiving environment including existing monuments or buildings. The site inspection also offers the opportunity of observations on the topography, which often leads to the discovery of hitherto unrecorded sites.

4 THE RECEIVING ENVIRONMENT

4.1 Archaeological Landscape

The earliest evidence of human settlement on the island of Ireland dates from the Mesolithic *c.*7000-4000BC. The larger Mesolithic archaeological sites such as at Mount Sandel Co. Antrim, Ferriter's Cove, Co. Kerry, and the Céide Fields in north Mayo, have not as yet been identified in Co. Cork. Although evidence of Mesolithic activity has been found in Cork in smaller sites. Mesolithic flint scatters have been found in Kilcummer Lower, between Fermoy and Mallow, and in Gortore near Fermoy. These sites may represent temporary settlements of the hunter-gatherer Mesolithic societies.

Evidence of settlement and burial during the Neolithic *c.*4000-2400BC is found throughout Co. Cork. Megalithic tombs have been identified in Glantane, Knocknagoun and Inchincurka, and are believed date from this period. These sites have been identified as Wedge Tombs. Wedge tombs are roofed by slabs laid directly on the side-walls, which often have one or more (double or triple) rows of walling. They were originally covered by a cairn (a large mound of stones), evidence of which survives at few sites.

A large number of enclosures are located within the wider study area. The term enclosure is generally used to describe an enclosed area of a variety of shapes and sizes, possessing no diagnostic features which would allow classification within another monument category. These may date to any period from prehistory onwards.

A number of ringfort are located within the wider landscape near Ballycoskery. Ringforts are one of the most numerous and widely distributed monuments on the Irish landscape. A typical ringfort consists of a circular area with D-shaped or sub-circular examples also occurring. They are usually 20-50m in diameter and can be enclosed by single or multiple ditches, with single or multiple banks of earth, a combination of earth and stone (known as a rath) or a drystone wall (refered to as a cashel). These monuments served as enclosed homesteads, protecting houses, their inhabitants and livestock. Some of the more elaborate ringforts may have served as venues for social gatherings. Research and excavation have dated the majority of ringforts to between c. AD500-1200 (Mitchell & Ryan 1997, 254-261). Many of these sites as have been destroyed above ground and are now evidenced only by cartographic record and/or aerial photography. In instances where the surviving remains are insufficient to determine whether the monument was originally a rath or cashel, the monument is termed an unclassified ringfort.

The townland of Ballycoskery has 9 known archaeological sites. Four of these sites are believed to be Fulacht Fia. Two of the sites have been identified as ringforts. The three other sites are a moated site, a church, and a vernacular house. Although these archaeological sites have not been scientifically dated, it is likely that Ballycoskery has evidence of human activity from the Bronze Age to the modern period.

Ballycoskery is situated on the western slope of the Ballyhoura Hills, a range of hills located in County Cork and County Limerick. The Ballyhoura Hills Research Project is an ongoing archaeological research project that has used aerial photography and previous complete archaeological surveys, to identify archaeological sites that may date to the late prehistoric period, within the Ballyhoura Hills.

According to the online archaeological excavations database www.excavations.ie one previous archaeological excavation has taken place in Ballycoskery, CO. Cork. This excavation was carried out under archaeological licence 06E1001, and identified nothing of archaeological significance.

The Topographical Files contain no entries for Ballycoskery, CO. Cork.

4.2 Site Inspection

The site inspection took place on Friday 15th October 2010 in dry bright weather conditions. The following field numbers are depicted on figure 2.

Field 1 was a level grass field, which was in use for pasture/silage. An earth embankment topped by a hedgerow formed the northern boundary of Field 1. There was a substantial drop from the existing road level to the ground level in Field 1 (approx 2m in height).

Field 2 was a level grass field, which was in use for pasture. Cattle were present on the day of the site inspection. A known archaeological site (AP3 on figure 2) RMP CO008-035 is situated in the southwest corner of this field, and has been disturbed by the existing railway. A modern wire and post fence forms the northern boundary of Field 2.

Field 3 was a gently undulating grass field, which was in use for pasture/silage. At the northwest corner of field 3 two noticeable rises were identified. This rises were both sub-circular in plan, with slopes to the west. The rises were less pronounced on the east side. A wooden fence forms the western boundary of field 3. A small earth and stone bank topped by a hedgerow forms the northern boundary of field 3.

Station House (IA1) was identified as a two storey rectangular building, of unknown date.

5 IMPACT ASSESSMENT

Following a cartographic and documentary survey, it is concluded that the proposed development will not have an impact on any known monuments.

6 RECOMMENDATIONS & MITIGATION MEASURES

Ideally, ground works should be kept to a minimum to avoid unknown archaeology. Where this is not possible, the following recommendations and mitigation measures are made to fully resolve and record the archaeology in advance of construction.

6.1 Recommendations Prior to Construction

Written and Photographic Survey

A written and photographic survey of Industrial Archaeological Site IA1is recommended. This will ensure any impact by the development on the industrial archeology of the rail line is mitigated.

Pre Construction Test Trenching

Pre Construction Archaeological Test Trenching of the footprint of the proposed development will ensure that any impact on archaeology present is mitigated. The presence of the known archaeological moated site CO 008-035 (NGR 15466, 11746) to the south of the development area, indicates the possible presence of outlying archaeology associated with this site. This recommendation is made in lieu of archaeological monitoring of groundworks during construction, which has a higher risk of incurring delays to the development.

Works in areas where archaeology is identified should be halted until an appropriate level of excavation and recording can be undertaken. This work will be done under licence in accordance with Section 26 of the National Monuments Acts 1930-2004, and with a method statement agreed in advance with the Heritage & Planning Division, Department of the Environment, Heritage & Local Government and the National Museum of Ireland.

- Where archaeology is found to be present, preservation *in situ* will be the preferred option. Strategies for the *in situ* preservation of archaeological remains are considered on a case-by-case basis, in consultation with the Statutory Authority. Preservation *in situ* can be undertaken through avoidance, if possible, of the confirmed feature during the development process, or preservation through detailed design, e.g. using a raft foundation
- If substantial archaeological deposits are present and cannot be preserved *in situ*, they will be recorded during licensed archaeological excavation in advance of the development and thus preserved by record

RETAINING AN ARCHAEOLOGIST/S an archaeologist/s should be retained for the duration of the relevant earthworks.

THE TIME-SCALE for the construction phase should be made available to the archaeologist, with information on where and when topsoil stripping will take place.

SUFFICIENT NOTICE. It is essential to give sufficient notice to the archaeologist(s) in advance of topsoil stripping (minimum four weeks). This will allow for prompt arrival on site to monitor the soil stripping. As often happens, intervals may occur during the construction phase, in this case, it is also necessary to inform the archaeologist(s) as to when earthworks will recommence.

DISCOVERY OF ARCHAEOLOGICAL MATERIAL. In the event of archaeological features or material being uncovered during the construction phase, it is crucial that the machine work cease in this immediate area to allow the archaeologist(s) to inspect any such material.

ARCHAEOLOGICAL MATERIAL. Once established that archaeologically significant material is present, full archaeological excavation and recording of such would be recommended.

ARCHAEOLOGICAL TEAM. It is also recommended that the core of an archaeological team be on standby to deal with any such rescue excavation. This would be complemented in the event of full excavation.

SECURE SITE OFFICES and facilities should be provided on or near those sites where excavation is required.

FENCING of any such areas would be necessary once discovered and during excavation.

ADEQUATE FUNDS to cover preparatory survey work, excavation, post-excavation work, and any testing or conservation work required should be made available.

SITE OFFICES. No site offices, depots, or storage facilities should be placed on or near any of the selected sites or areas of archaeological potential.

MACHINERY TRAFFIC during construction must be restricted so as to avoid any of the selected sites and their environs.

ACCESS ROADS or haul roads during construction should not encroach on any of the selected sites or areas of archaeological potential and their environs.

SPOIL should not be dumped on any of the selected sites or their environs.

PLEASE NOTE: This report and accompanying recommendations are based on mapping, as supplied by Roughan & O'Donovan. Should any alteration occur, further assessment would be required.

PLEASE NOTE: Recommendations are subject to approval by The National Monuments Service at the Department of the Environment.

Table 1: Summary of Recommendations & Mitigation Measures for Archaeological, Architectural Heritage and Industrial Archaeological Sites within and in close proximity to the proposed development.

SITE NO.	RMP NO.	TOWNLAND	NGR	SITE TYPE	PROXIMITY TO AREA OF PROPOSED WORKS	RECOMMENDATIONS
AP1	CO008-033	Ballycoskery	15423 11740	Ringfort	*c.*300m	No specific ameliorative measures
AP2	CO008-034	Ballycoskery	15470 11804	Ringfort	*c.*200m	No specific ameliorative measures
AP3	CO008-035	Ballycoskery	15466 11746	Moated Site	*c.*100m	No specific ameliorative measures
AP4	CO008-036	Ballycoskery	15482 11735	Vernacular House	*c.*300m	No specific ameliorative measures
AP5	CO008-03701	Ballycoskery	15592 11698	Fulacht Fia	*c.*800m	No specific ameliorative measures
AP6	CO008-03702	Ballycoskery	15595 11698	Fulacht Fia	*c.*820m	No specific ameliorative measures
AP7	CO008-03703	Ballycoskery	15597 11697	Fulacht Fia	*c.*840m	No specific ameliorative measures
AP8	CO008-03704	Ballycoskery	15601 11694	Fulacht Fia	*c.*860m	No specific ameliorative measures
AP9	CO008-069	Ballycoskery	15448 11765	Church	*c.*150m	No specific ameliorative measures
AH1	-	Ballycoskery	15457 11769	Parochial House	*c.*100m	No specific ameliorative measures
IA1	-	Ballycoskery	15468 11760	Station House	Direct Impact	Written and Photographic Survey

Catalogue of Archaeological Sites

This catalogue details the known archaeological sites in proximity to the proposed area of works. It consists of 9 sites; The locations of the sites are indicated on Figure 2. The catalogue entries provide information on location, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact.

Archaeological Sites Listed in the Record of Monuments and Places

SITE AP 1	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15423 11740
IDENTIFICATION	Extant
SITE TYPE	Trivallate Ringfort
R.M.P. NO.	CO 008-033
REFERENCE	-
PROXIMITY	450m SW of development area
DESCRIPTION	Trivallate ringfort with earthen enclosing banks and external fosse. Interior of ringfort measures 32m N-S, and 31m E-W. Possible original entrance in the east.
IMPACT CLASSIFICATION	No Impact

SITE AP 2	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15470 11804

IDENTIFICATION	Extant
SITE TYPE	Ringfort
R.M.P. NO.	CO 008-034
REFERENCE	-
PROXIMITY	200m NW of development area
DESCRIPTION	Univallate ringfort in poor condition. Interior of ringfort measures 39m N-S and 35m E-W. Enclosed by a single earthen bank.
IMPACT CLASSIFICATION	No Impact

SITE AP 3 **Figure 2**

TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15466 11746
IDENTIFICATION	Extant
SITE TYPE	Moated Site
R.M.P. NO.	CO 008-035
REFERENCE	-
PROXIMITY	100m south of development area
DESCRIPTION	Moated enclosure disturbed on its west side by the railway. Internal bank measures 0.75m height and 2m wide. A wide fosse surrounds the north, east and south.
IMPACT CLASSIFICATION	No Impact

SITE AP 4 **Figure 2**

TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15482 11735
IDENTIFICATION	Extant
SITE TYPE	Vernacular house
R.M.P. NO.	CO 008-036

REFERENCE	-
PROXIMITY	300m south of development
DESCRIPTION	3 bay 1 storey mud walled vernacular house. Glavinised roof. Stone buttresses along front wall.
IMPACT CLASSIFICATION	No Impact

SITE AP 5 **Figure 2**

TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15592 11698
IDENTIFICATION	Extant
SITE TYPE	Fulacht Fia
R.M.P. NO.	CO 008-03701
REFERENCE	-
PROXIMITY	800m East of development area
DESCRIPTION	Depicted only on 3rd ed OS map. Mound is partially levelled and measures 12.5m N-S and 11.8m E-W, 0.4m height.
IMPACT CLASSIFICATION	No Impact

SITE AP 6 **Figure 2**

TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15595 11698
IDENTIFICATION	Extant
SITE TYPE	Fulacht Fia
R.M.P. NO.	CO 008-03702
REFERENCE	-
PROXIMITY	820m East of development area
DESCRIPTION	Depicted only on 3rd ed OS map. Mound is partially levelled and measures 12m N-S and 6.55m E-W, 0.35m

	height.
IMPACT CLASSIFICATION	No Impact

SITE AP 7	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15597 11697
IDENTIFICATION	Extant
SITE TYPE	Fulacht Fia
R.M.P. NO.	CO 008-03703
REFERENCE	-
PROXIMITY	840m East of development area
DESCRIPTION	Depicted only on 3rd ed OS map. Roughly circular in shape. Mound measures 10.8m N-S and 0.4m in height.
IMPACT CLASSIFICATION	No Impact

SITE AP 8	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15601 11694
IDENTIFICATION	Extant
SITE TYPE	Fulacht Fia
R.M.P. NO.	CO 008-03704
REFERENCE	-
PROXIMITY	860m East of development area
DESCRIPTION	Depicted only on 3rd ed OS map. Site not located. In heavily wooded area.
IMPACT CLASSIFICATION	No Impact

SITE AP 9	**Figure 2**
TOWNLAND	Ballycoskery

COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15448 11765
IDENTIFICATION	Extant
SITE TYPE	Church
R.M.P. NO.	CO 008-069
REFERENCE	NIAH 20900804
PROXIMITY	150m west of development area
DESCRIPTION	RC Church-AD1831 on west gable
IMPACT CLASSIFICATION	No Impact

Catalogue of Architectural Heritage Sites

This catalogue details the known architectural heritage sites in proximity to the proposed area of works. It consists of 1 site; The location of the site is indicated on Figure 2. The catalogue entry provides information on location, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact.

SITE AH 1 **Figure 2**

TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	15457 11769
IDENTIFICATION	Extant
SITE TYPE	Parochial House
R.M.P. NO.	-
REFERENCE	NIAH 20900805
PROXIMITY	100m west of development area
DESCRIPTION	Parochial house. Detached 3 bay 2 storey former parochial house
IMPACT CLASSIFICATION	No Impact

Catalogue of Industrial Archaeological Sites

This catalogue details the known industrial archaeological sites in proximity to the proposed area of works. It consists of 2 sites; The location of the sites are indicated on Figure 2. The catalogue entry provides information on location, a description, an outline of the potential impact of the development and recommendations towards the mitigation of this impact.

SITE IA 1	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	154685 117604
IDENTIFICATION	Extant
SITE TYPE	Station House
R.M.P. NO.	-
REFERENCE	-
PROXIMITY	0m
DESCRIPTION	Level Crossing XC212. A possible 19th Century railway Station House
IMPACT CLASSIFICATION	Direct Impact

SITE IA 2	**Figure 2**
TOWNLAND	Ballycoskery
COUNTY	Cork
O.S. 6" SHEET/PLAN/TRACE	008
NGR	154824 117925
IDENTIFICATION	Extant
SITE TYPE	Level Crossing
R.M.P. NO.	-
REFERENCE	-
PROXIMITY	0m

DESCRIPTION	Level Crossing XC212. A 19th Century railway level crossing
IMPACT CLASSIFICATION	Direct Impact

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Plates

Plate 1 Field 2 facing west

Plate 2 Field 2 showing AP3

Plate 3 Station House facing east

Plate 4 Field 3 facing east

Title Site location map based on Ordnance Survey Discovery Series			**Notes**			VJK Valerie J. Keeley Ltd. ARCHAEOLOGICAL CONSULTANCY	Brehon House, Kilkenny Road, Castlecomer, Co. Kilkenny Tel: (+353) 056 4440236 Fax: (+353) 056 4440237 Email: vjk@vjk.ie Website: www.vjk.ie
						Client Iarnród Éireann/Roughan & O'Donovan	
Job No. 1561-10-100	**Drawn by** GW	**CAD reference** 1561/Fig1-3.dwg	**Date** October 10	**Scale** 1:50000	**Drawing No.** Figure 1	**Project** XC212, Ballycoskerry, Co. Cork	

Title
1st Edition Ordnance Survey map showing Area of Development, sites of Industrial archaeology, areas of archaeological potential and sites of archaeological heritage.

Notes
- Industrial Archaeological Site
- Area of Archaeological Potential
- Archaeological Heritage Site

Job/Exc No.	Compiled by	CAD reference	Client
1561-10-100	GW	1561/Fig1-3.dwg	Iarnród Éireann/Roughan & O'Donovan
Date	**Scale**	**Drawing No.**	**Project**
October 10	1:10000	Figure 3	XC212, Ballycoskerry, Co. Cork

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Historic Building Survey
XC219 Level Crossing
Buttevant,
Co. Cork

Author: Rob Goodbody Historic Building Consultant
Job No: 1571-10-100
Client: Roughan & O'Donovan / Iarnród Eireann
Date: March 2012

Valerie J. Keeley Ltd.

Contents

Summary

This report has been produced as a historical and historic building survey of the former railway station at Buttevant, County Cork as part of the assessment of the proposal to provide a bridge crossing of the railway to eliminate the at-grade crossing.

The historical background finds that the railway was constructed between Dublin and Cork in the 1840s and that the line reached Buttevant in 1846, in which year a station was opened on this site, then known as Buttevant and Doneraile. The station closed in 1977 and over time some of the buildings and other structures on the site have been removed, while others are now derelict or ruinous. Some of the structures on the site are assessed as being part of the original station complex from 1846, such as the boundary walls, the eastern goods shed and a small single-storey structure that was originally attached to the now-demolished station building. It is considered that the station platforms are slightly later than the original phase of construction, and that the walls at the back of the platforms and a passenger shelter on the up line date from that event. At the western side of the site there are walls that survive from a second goods shed, and within the walls a number of cast iron columns still stand, and it is considered that this shed was an addition in the later nineteenth century. The crossing-keeper's box was built in the late 1980s, while the flight of iron stairs leading to it is part of the footbridge that crossed the railway, and which was erected at the end of the nineteenth century or the beginning of the twentieth.

The building survey shows that the eastern goods shed is derelict, the small single-storey structure is partly derelict and partly ruinous, while the shelter and the western goods shed are unroofed and ruinous. The flight of iron steps to the crossing-keeper's box is in good condition, as is the box itself. The boundary walls are in reasonable condition.

The proposal is to divert the existing road up an embankment and over a new bridge. The embankment would run through the station site and would result in the loss of part of the western goods shed and the shelter and would pass within a few metres of the single-storey building and the eastern goods shed. The crossing keeper's box with its stairway and the level crossing may be removed following the diversion of the road away from the crossing, though this does not form part of the present scheme.

It is not considered that the western shed or the shelter are of such heritage significance that they should be retained. It is recommended that a record be made of the buildings prior to their removal.

Background

This report has been prepared for Valerie J Keeley Ltd on behalf of Iarnród Éireann as part of the assessment of a proposal to replace a level crossing on the main Dublin to Cork railway line at Buttevant, Co. Cork.

The site was inspected for the purposes of preparing this report on 15th February 2012 on which occasion the photographs incorporated in the report were taken and the site examined to prepare the descriptions contained therein.

Historical research was carried out on the background history of the property and the results are set down below.

While this report contains comment on aspects of the condition of the buildings it is not a condition report or a structural report and must not be read as such.

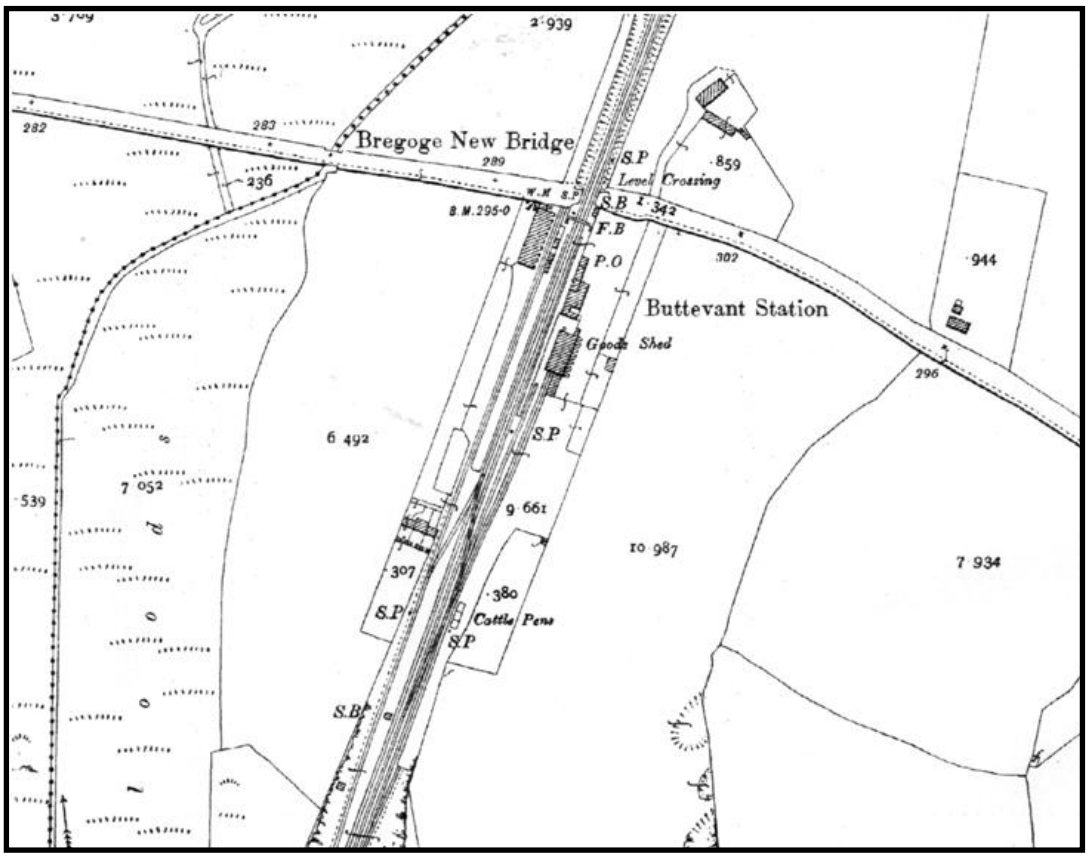
This report has been prepared by Rob Goodbody BA(mod), DipEnvPlanning, DipABRC, MA, MUBC, MIPI, MRTPI.

Historical background

Buttevant is a medieval town, founded in the 13th century by the de Barry family. Surviving medieval buildings may seen at the Franciscan Abbey, in the main street, the castle of the de Barrys on the southern outskirts of the town and the bridge over the Awbeg river to the east. The late medieval remnants of Lombard Castle front onto the street near the southern end of the town.

The arrival of the railway brought a new focus to Buttevant, with the station serving Buttevant and Doneraile and the general area in the vicinity. This was on the Great Southern Railway route between Dublin and Cork, which commenced construction in Dublin in 1845. The line opened gradually, reaching Limerick Junction in 1848 and arriving at Buttevant in the following year, when the station was opened as Buttevant and Doneraile Station, a name it kept until 1884, following which it became simply Buttevant Station.

Figure 1: Buttevant Station in 1904 – Ordnance Survey 1:2500 map



The station at Buttevant had sidings on either side of the main line, with goods sheds and other ancillary buildings, in addition to the station house. This was normal on the Great Southern and Western line between Dublin and Cork, every station along the line having sidings. At Buttevant there were two sidings on the down side, to the east of the station, and one on the up side. Other sidings were located beyond the station to the south.

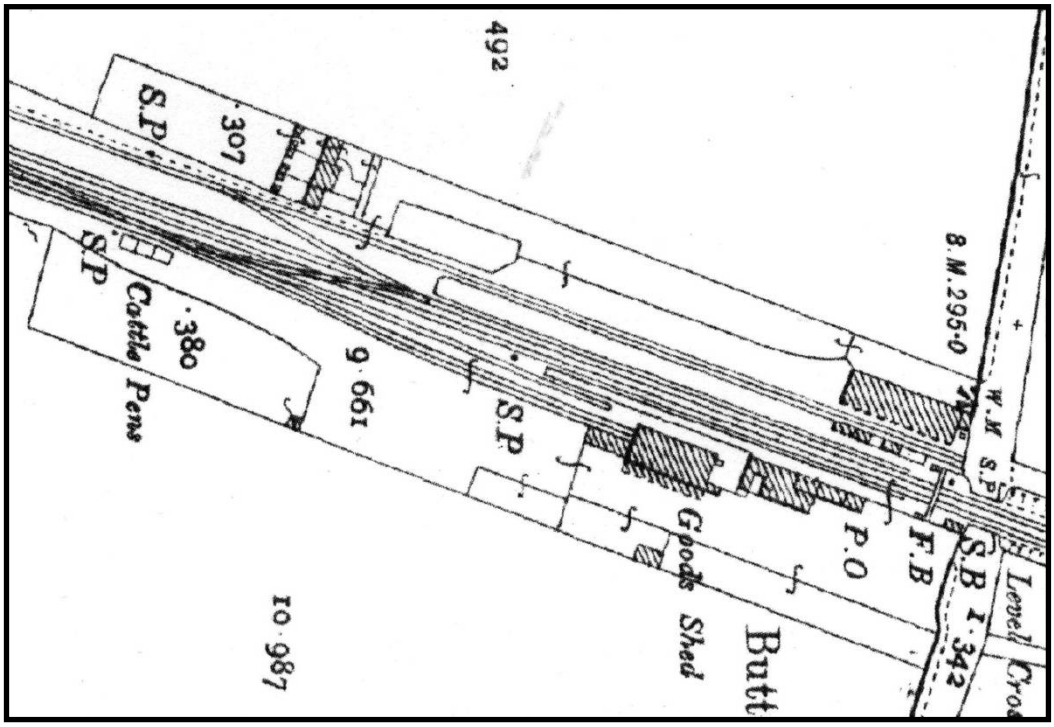


Figure 2: Detail of Buttevant Station, 1904, turned with west at the top

The station complex began at the level crossing at the northern end, seen at left in the map extract above, and extended southwards over a distance of about 220 metres, this area, extending in width to about 67 metres, was fenced off from the surrounding land. On the down side of the line, to the east of the track, lay the main station building, facing directly onto the down platform, and with a narrow projection extending northwards towards the level crossing. The northern end of this projecting structure is marked "P.O" on the map, denoting that it was a post office. To the south of this was a goods shed, with a siding running northwards into the western side of the shed. A second short siding lay between this siding and the main line, with a narrow section of the platform to the south of the station.

On the western, or up, side of the track there were small buildings facing on to the up platform and to the rear a siding ran through to the northern end of the station, running off the main line some distance to the south of the station, and coming in at the western side of the down platform, which was double sided. This siding had an open-fronted goods shed alongside it on the western side.

At the northern end of the platforms, close to the level crossing, there was a wrought iron footbridge.

Various other structures and facilities were located around the station property, including cattle pens that indicate the nature of some of the goods traffic using the station. Near the southern end of the station property, on the western side, there was a terrace of three railway workers' cottages with small gardens to the front and rear. The centre cottage was larger than the other two and was occupied by the station master. The other two houses accommodated the head porter and the signalman.

In common with other stations along the line, Buttevant catered for the local needs, particularly in the moving of agricultural produce from the area to the markets and ports. There was also a substantial infantry barracks at Buttevant, and the army was a major customer of the station, to the extent of awarding a present of a gold ring to the station master in the 1870s for his continued assistance with the movement of army supplies and personnel.

By the second half of the twentieth century the railways were in decline. Many lines around the country were closed, most of these permanently. Where lines were kept open, principally the main lines connecting directly to the cities, there were closures of the smaller stations.

Buttevant Station closed in 1977, and the sidings remained in use for some time for maintenance purposes, accommodating ballast trains and so forth. During the 1980s the sidings were lifted, the points removed and some of the buildings demolished. These included the main station building and the signal box, which was no longer as necessary given that the points had been removed. A new box was erected on the western side of the line in 1988 to serve as the base for the crossing keeper. The footbridge was removed and one of its flights of steps was reused as the access to the crossing keeper's box.

As will be seen in the building survey below, many of the remaining buildings are no longer complete, the roof of the shed on the western side has gone and the post office building is semi-derelict.

In August 1980 the station site was the scene of a serious accident during maintenance work on the line. The accident was centred on the southern part of the station site and had no direct effect on any of the buildings.

Conservation context

Record of Protected Structures

The railway station at Buttevant is not a protected structure, not being listed in the Record of Protected Structures as set down in the Cork County Development Plan 2009.

Conservation areas

Buttevant is designated as an Architectural Conservation Area (ACA) in the Cork County Development Plan 2009. However, the extent of the ACA, as set down in map form in the plan, is limited to the town itself and does not extend out to the station. The distance of the station from the ACA and the local topography ensure that the station is not visible from the ACA and vice versa.

National Inventory of Architectural Heritage

The National Inventory of Architectural Heritage (NIAH) carried out its survey of north County Cork in 2006 and the results have been published, including a representative sample of the architectural heritage of the north county. This included the goods shed on the eastern side of the former station at Buttevant, which was described as follows[1]:

> Detached four-bay single-storey railway goods shed, built c. 1870, with lower office projection to south gable, and canopy to west elevation. Now disused. Pitched corrugated-iron roof, and slate roof to projection, latter with brick chimneystack with limestone coping. Coursed rubble limestone walls with limestone voussoirs to segmental-arched openings, latter with multiple-pane fixed timber windows with limestone sills. Metal sheeting to doorway in south gable. Square-headed window to office, with barred six-over-six pane timber sliding sash window. Square-headed door openings to east elevation, with brick retaining arches and remains of sliding timber battened doors. Memorial to train crash at site

The appraisal of the building summed up the qualities of the building:

> This goods shed forms part of an interesting group of related structures with the former railway station, signal box and platform to the site. It retains much of its original detailing, including the sliding timber battened doors. The site was the scene of a fatal railway accident in 1980, commemorated by a monument

The NIAH survey concluded that this goods shed was of Regional architectural heritage significance for its architectural, social and technical interest.

[1] NIAH reference 20803040.

Building survey

The surviving structures at Buttevant station include the goods shed and post office on the eastern side of the line, the signal box, a shelter and part of the goods shed on the western side, the station platforms and the level crossing gates. Part of the iron footbridge survives in use with the signal box.

In this survey each of these structures is taken in turn, examining them from east to west, commencing with the goods shed, followed by the post office, the platforms, the crossing gates, the shelter on the up platform, the signal box and the western goods shed.

Eastern goods shed

The goods shed on the eastern side of the station is the largest and most intact structure on the site, and hence its inclusion in the National Inventory of Architectural Heritage.

Plate 1: Goods shed on eastern side of line

The goods shed on the eastern side of the line is single-storey with gable ends and is constructed of coursed rubble limestone. The roof is slated on the western side, while the covering has been replaced with corrugated iron on the eastern side, set on timber boarding. Against the northern gable of the shed there is a projecting single-storey structure that appears to have been an office associated with the shed as it gains access only from within the shed and has no independent doorway – though it is possible that a blocked up ope on the eastern side may have been a door, provided there were steps or a higher ground level adjacent originally. The roof of this structure has a covering of slate and has been reduced in pitch, as is seen in the scar of the original pitch on the gable end of the shed. The building is lit by small-paned cast iron clerestorey windows on the western side and the gable ends. On the eastern side there are three pairs of large timber doors to permit access for goods being loaded or unloaded. The eastern slope of the roof projects over this loading area to form a canopy.

The masonry of this building appears to be in reasonable condition. The canopy has lost most of its timber sheeting and its corrugated iron covering. The doors are in poor condition and some are boarded up. The glass in the windows has been broken, though the cast iron sashes appear to be intact.

Plate 2: Goods shed seen from south-east, with canopy over loading area

Plate 3: Northern gable of goods shed, with projecting office

Plate 4: Internal roof structure of goods shed

The roof of the goods shed is a single span, achieved by means of king-post trusses carrying purlins to support the rafters and roof covering. The floor within this shed was of timber and is now missing, with parts of joists remaining, and part of the masonry supporting structure.

Plate 5: Interior of goods shed

Single-storey building on eastern side

The small structure adjacent to the station platform on the eastern side of the track has been noted above as having been a post office at some time. This building is divided into two, the northern part being roofed, but in poor condition, while the southern part is in ruins.

Plate 6: Single-storey building on eastern side of track, seen from south-west

This building had two windows facing the down platform, both now blocked up. The northern portion was accessed via a doorway leading from the down platform.

Plate 7: Eastern elevation of single-storey building

Plate 8: Single-storey building seen from south-east

This building is constructed of red brick and rubble stone, rendered, ruled and lined externally, and rising off a chamfered plinth of hammer-dressed limestone. The slate roof on the northern portion is in poor condition and missing some slates. The roof of the southern portion is missing. A tall chimney stack rises from the centre of the building, with a corbelled top to the stack and with two chimneypots. The southern end wall of the building is missing, and the maps show that it was originally attached to the main station building. The entrance to the southern part of this building would have been from the south, as no doorway survives in the surviving eastern, western and northern walls.

Internally the northern section is plastered with timber sheeted wainscoting. The floor is timber boarded, but rotten, and the ceiling has been replaced with hardboard or similar material. The interior of the southern section appears to have been similar, but is now derelict. There is a cast iron fireplace in the northern section, the southern section having a hearth in a chimneybreast of brick, while the fireplace is missing. In both sections the windows had timber architraves and shutters and the surviving windows on the eastern elevation are timber sliding sashes.

Signal box and stairs

Plate 9: Signal box, with iron stairs

As noted in the historical background, the original signal box was on the eastern side of the line, adjacent to the level crossing. This is now gone, and the present signal box is a newer structure, built in about the 1980s, on the western side of the line. This has a base constructed of concrete blocks at ground floor level and a boarded upper floor, with a flat roof. A chimney projects above the roof level.

The stairs to the upper level are external and of a combination of cast iron and wrought iron. Cast iron columns support wrought iron runners and cast iron steps, with a balustrade of wrought iron having newels of cast iron. This is a surviving section of the footbridge that crossed the line adjacent to the level crossing while the station was in use. The newels carry the maker's name "E. Manisty Dundalk". Edward Manisty was an engineer who acquired the Dundalk Iron Works in 1878. In 1894 he began to manufacture iron footbridges for railways, as many rail companies were at that time replacing their timber footbridges. The company closed upon the death of Edward Manisty in 1928, which dates the bridge to some time between 1894 and 1928.

Plate 10: Stairs to signal box, taken from footbridge

Shelter

The original station building may have had a waiting room for passengers, or at the very least a canopy over the platform to provide shelter. This would have served the down platform, for passengers heading towards Mallow and Cork. The Ordnance Survey map of 1904, reproduced above, shows various structures on the up platform, only one of which survives, and this is in a state of ruin.

Plate 11: Shelter on up platform

This structure is constructed of rubble stone, with dressed quoins. It had a monopitch roof, now missing, with the slope towards the rear, away from the track. The front of the structure was open and faced the railway. Internally, the lower section of the building was faced with wainscoting, probably timber sheeting as in the former post office building on the opposite platform. Above the wainscoting the walls are plastered. In the northern wall there is a timber-lined ope.
A timber bench is set against the rear wall inside the shelter, though now rotten.

Plate 12: Shelter seen from north-west, with timber-lined ope visible

Western goods shed

At the western side of the station there is the remnants of a second goods shed. This was seen in the Ordnance Survey map of 1904 as a rectangular structure with an open front facing a siding that extended a significant distance to the south. The shed was close to the public road at its northern end.

Plate 13: Western goods shed, seen from the south-east

The view of the shed seen above is from the station platform to the south east of the shed. The siding ran from the bottom centre of the photograph towards the oil tank in the background. The two columns on the right represent the open front of the building facing the siding. The rear wall survives to the west, but with the upper part missing. Part of the northern wall survives, as does the southern wall. The masonry walls of the shed are constructed of coursed rubble limestone with some brick detailing. A substantial panel of brick in the centre of the western wall appears to represent a large ope that was stopped up during the time that the railway was in use. The surviving northern wall is plastered on its internal face, above a certain level, suggesting that this was the office area, and that the lower part of the wall was wainscoted. The roof is entirely missing, both the covering and the structure. The two lines of cast iron columns suggest that the roof was held on trusses of some kind, though whether timber, as in the eastern shed, or wrought iron is not known. It is noted that the king post trusses in the eastern shed do not require columns, suggesting that the western shed had wrought iron trusses. A marked difference in the nature of the stonework in the upper part of the western wall, as compared with the lower part, suggests that this wall was raised significantly at some point, and suggests that the western shed was a later addition to the structures at the station; this could explain the difference in structure between the eastern and western sheds, as wrought iron was not as widely used in the 1840s when the station was built, as it was to become later.

Plate 14: Western shed, seen from the road to the north-west

Plate 15: View southwards through former shed

Platforms

As noted in the historical background, there were platforms serving the main line at this station and others serving sidings to the east and west. The latter are now missing, apart from a short section of platform to the south of the eastern goods shed, now partially missing. There are still platforms on either side of the main line. On the down side of the line the platform has an uneven surface of hardcore and is bounded alongside the track by a plinth wall of concrete blocks. This is not the original platform. The southern portion of this platform, adjacent to the eastern goods shed, the original platform survives, with limestone slab copings.

Plate 16: Down platform in northern part of station

On the up side of the line, on the western side of the station, the platform survives with a rubble plinth wall carrying limestone slab copings.

Plate 17: Up platform, with southern part of down platform visible at left

It is not known when these platforms were constructed, as early railways did not have platforms, the passengers climbing up from ground level into the carriages.

Boundary walls

The original station property was bounded by walls to form a long rectangular enclosure that is visible on the 1904 Ordnance Survey map reproduced above. This enclosure still survives for the most part, and would have been a means of curtailing pilferage of goods in transit and demarcating the property boundary to prevent trespass.

A second set of walls remains within the station, closing off those parts to which the public in transit had access, such as the platforms, from those parts to which access was more restricted.

Plate 18: Western boundary wall

In the view above, the western boundary wall may be seen, with the western goods shed at left and the eastern goods shed at rear. Between the boundary wall and the eastern shed the wall at the rear of the up platform is seen.

The walls at the rear of the two main platforms may be seen above in plate 17, and part of the wall at the rear of the down platform is visible in plate 1.

These walls are of limestone rubble. The boundary walls have a capping of larger stones set vertically, while the walls bounding the platforms have dressed limestone copings with rounded upper surfaces.

Crossing gates

The level crossing at Buttevant is a manned crossing, with gates closing off the railway track and maintaining the access for the public road to cross the line except when required for railway traffic.

Plate 19: Level crossing gates

The gates are of timber, with a pair of boards crossing the entire width of the line, stayed by steel rods held on the hinge post of the gates. A red light is carried at the centre of each gate, facing the track.

Assessment

The surviving structures at the former Buttevant railway station are of mixed periods and are in varied states of preservation. The crossing keeper's box is a modern structure, as are other features not addressed in this report such as the entrance gates, the front boundary wall on the eastern side and the memorial to the railway accident of 1981. The earliest surviving features are the eastern goods shed and the single-storey former post office, though both of these are derelict, the latter partly ruinous. The boundary walls of the station, with their vertical course of limestone capping, would also date from the construction of the railway in the 1840s. The platforms would be comparatively early, at least as regards those portions that retain their limestone copings, and the shelter on the up platform would be of similar date, along with the walls at the back of the two main platforms, with their rounded copings of dressed limestone. The western goods shed is somewhat later, and as noted above probably had wrought iron trusses that were supported on the cast iron columns that remain in position.

An assemblage of railway buildings such as this survives in many nineteenth century stations around the country, much of it in very much better condition than those at Buttevant. However, it should also be noted that there has been a significant loss of buildings associated with railways over the years, particularly through the remodelling of stations and other railway property and the closure of various railway lines. In most cases the buildings that have disappeared were not recorded in any detail, often not even being captured by photography. The architecture is often particular to railways, with the specific requirements of the handling of goods and the accommodation of passengers resulting in designs that are not found elsewhere. Even where there is a similarity in function to the buildings associated with canals, the difference in period results in notable differences in design and materials.

At Buttevant the most significant building to survive is the eastern goods shed, and this has been noted in its inclusion in the National Inventory of Architectural Heritage for County Cork. While it is in poor condition, with the floors missing, doors and windows damaged and the roof covering no longer intact, it is recognisably a railway goods shed, and its original form may be deduced from the surviving elements.

The other surviving buildings on the station site are derelict or ruinous and with the exception of the former post office they are unroofed and in ruins. These could no longer be considered to be sufficiently intact to be reinstated in their original form, or even to a level of usefulness for a new function.

Proposed development

It is proposed to erect a road bridge over the railway and to close the level crossing. This is an inevitable move on a busy main line, with each movement of trains resulting in delays to road-borne traffic. The safety of users of a level crossing is also a factor, and this is a more significant issue since the closure of the station, as the mere act of stopping at the station would have reduced the speed of non-express trains and hence made accidents less likely. As early as 1850 the driver of a horse and cart was killed at the level crossing at Buttevant and there have been other accidents until as recently as 2010, not all fatal.

It is proposed to divert the road towards the south to run through the station site, and through part of the land to the east and west of the station. The road would turn off its present alignment and climb a gradient up an earth embankment to cross the railway line on an overbridge. Running from the west, the proposed road and embankment would be diverted to the south of the existing road, and into the site of the former station. The embankment would stop at a reinforced earth wall at the back of the up platform. From there an overbridge would span the railway with the road deck at a height of approximately 6.5 metres above the track. To the rear of the down platform, on the eastern side of the track, the road would be carried on an embankment retained by walls of of reinforced earth, to cross most of the eastern part of the site, with a second earth embankment commencing at the rising ground on the eastern side of the station. Within the station site there would be a box culvert beneath the road to give access to the southern side of the station property.

Potential impact

The resultant impact on the structures within the station site would be:

Eastern goods shed

The eastern goods shed would be retained in the proposed scheme, though the northern end of it would be close to the margin of the works. The portion of the realigned road on the eastern side of the track would run past the goods shed at a distance of about nine metres from the single-storey office structure on the northern side of the shed. The nearest point of the main shed building would be about twelve metres from the elevated section of the realigned road.

Built heritage implications

There would be no direct effect on the goods store arising from the proposal. It is not considered that the presence of a road, embankment and bridge such as those proposed would have major impact on the setting of the shed of such magnitude as to warrant any change in the design or other modification to the scheme.

Recommendation

It is not considered that any action needs to be taken to mitigate the effects of the scheme on the eastern goods shed.

Single-storey building on eastern side

The single storey building that represents the northern end of the former station building, and which appears to have housed a post office, would be within the area to the north of the proposed bridge and would not be directly affected. The bridge and the part of the embankment that would be contained within a reinforced earth wall would be the closest parts of the proposal to this building and would be at a distance of about seven metres.

Built heritage implications

As has been seen above, the single-storey building is not considered to have a significant heritage value due to its poor condition. It is not considered that the proposed scheme would have any effect on the setting of the building of such magnitude as to warrant any modification to the scheme.

Recommendation

It is not considered that any action needs to be taken to mitigate the effects of the scheme on the single-storey building.

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Signal box and stairs

The proposed scheme would not have a direct effect on the signal box or the iron stairway that leads to the upper level. However, the removal of the level crossing would render this structure redundant, as the controls for the gate would no longer be needed and this would facilitate the removal of the box, or the upper level at least, the lower level being used for storage purposes.

Built heritage implications

The assessment above has shown that the crossing-keeper's box was built in the 1980s and is not of heritage significance. The iron stairway is, however, of significance, and dates from the end of the nineteenth, or early twentieth century.

Recommendations

It is recommended that if the box or its upper level are no longer required and removal is proposed the stairway should be retained at the former station site – possibly as a pedestrian access to the new overbridge.

Shelter on up platform

The small shelter on the up platform would be removed to facilitate the scheme, with the reinforced earth wall retaining the embankment running through the rear of the shelter..

Built heritage implications

This is an early feature amongst the assemblage of structures at the former station and, as seen in the survey above, is derelict, with no significant heritage value to be gained from its retention.

Recommendation

It is not considered that the shelter is of sufficient built heritage significance as to warrant modifying the scheme to ensure its retention.It is recommended that the shelter be recorded by means of measured survey, photography and written description prior to its removal.

Western goods shed

The survey has shown that all that survives of the goods shed on the western side of the line is walls on two sides, part of a wall on the northern side, and the cast iron columns that formerly held the roof trusses. The southern end of the goods shed would be buried beneath the embankment for the bridge approach, amounting to approximately a third of the area of the surviving remains. This would result in the removal of the southern wall of the shed and part of the western wall. The cast iron columns would remain substantially unaffected.

Built heritage implications

In view of the limited amount of this building that survives it is not considered to be of sufficient heritage significance to warrant a modification to the proposed scheme so as to ensure the retention of the southern section.

Recommendation

It is recommended that the remnants of the shed be recorded by means of measured survey, photography and written description prior to the removal of the southern portion of the shed.

Platforms

The historical background has shown that there were two platforms on the main line in Buttevant station and others associated with the various sidings. The building survey has shown that the platform on the up line remains more or less intact and that on the down platform has been partially modified, with the loss of original copings. Most of the other platforms have now gone, apart from an incomplete section of platform to the south of the eastern goods shed. The bridge would fly over the up and down platforms on the main line, while having no effect on the remnant of the platform to the south of the goods shed.

Built heritage implications

There is not likely to be any effect on the built heritage significance of the platforms.

Boundary walls

The survey has shown that the original boundary walls of the station survive more or less intact. There are also walls at the rear of the up and down platforms. The proposed scheme would breach the eastern and western boundary walls and would also affect the walls along the two platforms.

Built heritage implications

The boundary walls are original features of the station from the 1840s, while the walls on the platforms are also relatively early features at the station.

Recommendation

It is recommended that the walls be recorded by means of photographic and written description prior to their removal.

Crossing gates

While the crossing gates would not be directly affected by the proposed embankments and bridge, the purpose of the scheme is to eliminate the level crossing and hence it is assumed that the gates would be removed upon completion of the scheme.

Built heritage implications

While level crossing gates of timber are becoming less common it is not considered that these gates are of such significance as to warrant retention, even if left permanently open to rail traffic.

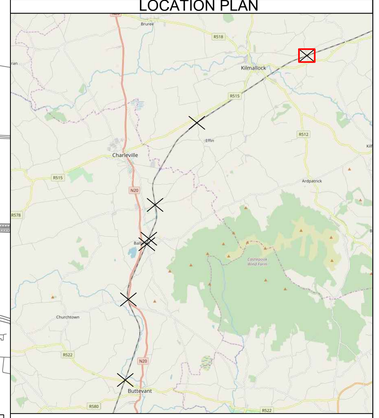
Recommendation

It is recommended that the gates be recorded by means of photographic and written description prior to their removal.

Appendix F. Public Consultation Drawings

Drawing Title	Drawing Ref No.	Revision
OVERALL CONTEXT PLAN	32111000-JAC-HAC-XX-DR-CH-001	0
PLAN – XC187 FANTSTOWN	32111000-JAC- HAC -XC187-DR-CH-001	0
PLAN – XC201 THOMASTOWN	32111000-JAC- HAC -XC201-DR-CH-001	0
PLAN – XC209 BALLYHAY	32111000-JAC- HAC -XC209-DR-CH-001	0
PLAN – XC211 NEWTOWN	32111000-JAC- HAC -XC211-DR-CH-001	0
PLAN – XC211 NEWTOWN – BLUE ROUTE OPTION	32111000-JAC- HAC -XC211-DR-CH-002	
PLAN – XC212 BALLYCOSKERY	32111000-JAC- HAC -XC212-DR-CH-001	0
PLAN – XC215 SHINANAGH	32111000-JAC- HAC -XC215-DR-CH-001	0
PLAN – XC219 BUTTEVANT	32111000-JAC- HAC -XC219-DR-CH-001	0

LOCATION PLAN



CIE
Iarnród Éireann
Infrastructure

Rev	By	Date	Description
0	JS	OCT' 19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS		
Component:	PUBILIC CONSULTATION		
Title:	PLAN - XC187 FANTSTOWN		
Designed: FMD	File Name: -	Drawing No.	
Drawn: JS	Original scales: PLAN AS SHOWN @ A1	32111000-JAC-HAC-XC187-DR-CH-0001	
Checked: FMD	Date: OCT '19		

R515

PRIVATE ACCESS

PRIVATE ACCESS

PASSING BAY

A

A

PROPOSED ROAD-OVER-RAIL BRIDGE

PASSING BAY

EXISTING ROAD PAVEMENT RETAINED FOR LOCAL ACCESS

DUBLIN-CORK RAIL LINE

EXISTING LEVEL CROSSING TO BE CLOSED

PRIVATE ACCESS

PRIVATE ACCESS

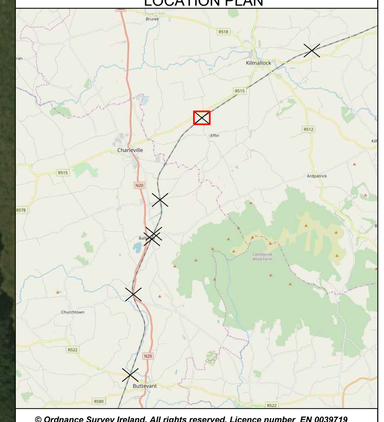
L8572

N

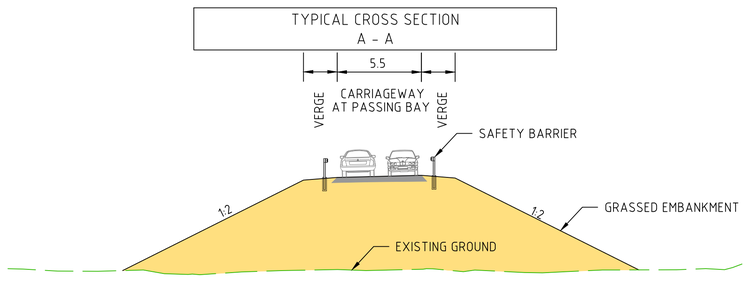
Legend

- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

LOCATION PLAN



TYPICAL CROSS SECTION
A - A



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CIE

Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	JS	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PUBILIC CONSULTATION
Title:	PLAN - XC201 THOMASTOWN
Designed: FMD	File Name: -
Drawn: JS	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: OCT '19
Drawing No.	32111000-JAC-HAC-XC201-DR-CH-0001

LOCATION PLAN

CIE

Iarnród Éireann
Infrastructure

Rev	By	Date	Description
0	JS	NOV' 19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS		
Component:	PUBILIC CONSULTATION		
Title:	PLAN - XC209 BALLYHAY		
Designed: FMD	File Name: -	Drawing No.	
Drawn: JS	Original scales: PLAN 1:1000 @ A1	32111000-JAC-HGN-XC209-DR-CH-0001	
Checked: FMD	Date: OCT '19		

ROAD N20

LINK TO XC212 ALIGNMENT

DUBLIN-CORK RAIL LINE

EXISTING LEVEL CROSSING
TO BE CLOSED

A

A

BEACHWOOD ESTATE

SCHOOL

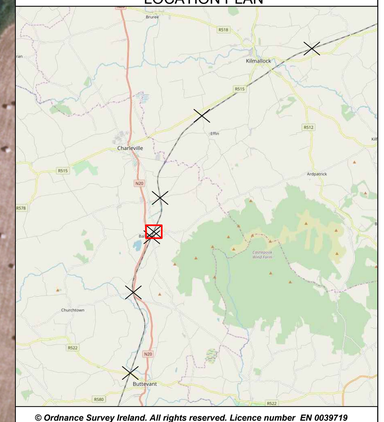
EXISTING LEVEL CROSSING
TO BE CLOSED

N

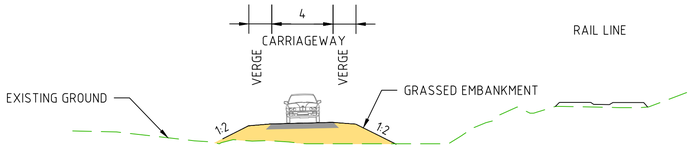
Legend

- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

LOCATION PLAN



TYPICAL CROSS SECTION
A - A



SCALE: 1:200

CIE

Iarnród Éireann
Infrastructure

Rev	By	Date	Description
0	JS	NOV' 19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS		
Component:	PUBILIC CONSULTATION		
Title:	PLAN - XC211 NEWTOWN		
Designed: FMD	File Name: -	Drawing No.	
Drawn: JS	Original scales: PLAN 1:1000 @ A1	32111000-JAC-HAC-XC211-DR-CH-0001	
Checked: FMD	Date: OCT '19		

BEACHWOOD ESTATE

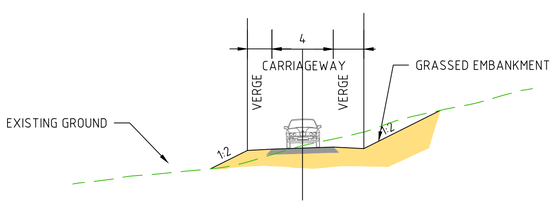
EXISTING LEVEL CROSSING TO BE CLOSED

DUBLIN-CORK RAIL LINE

Legend

- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

TYPICAL CROSS SECTION A - A



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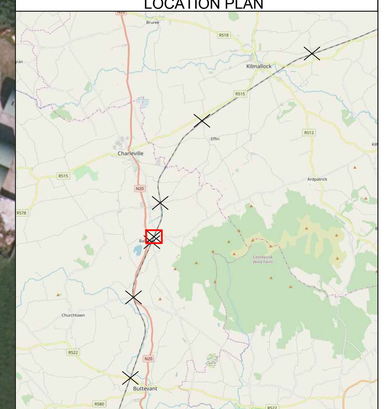
LOCATION PLAN

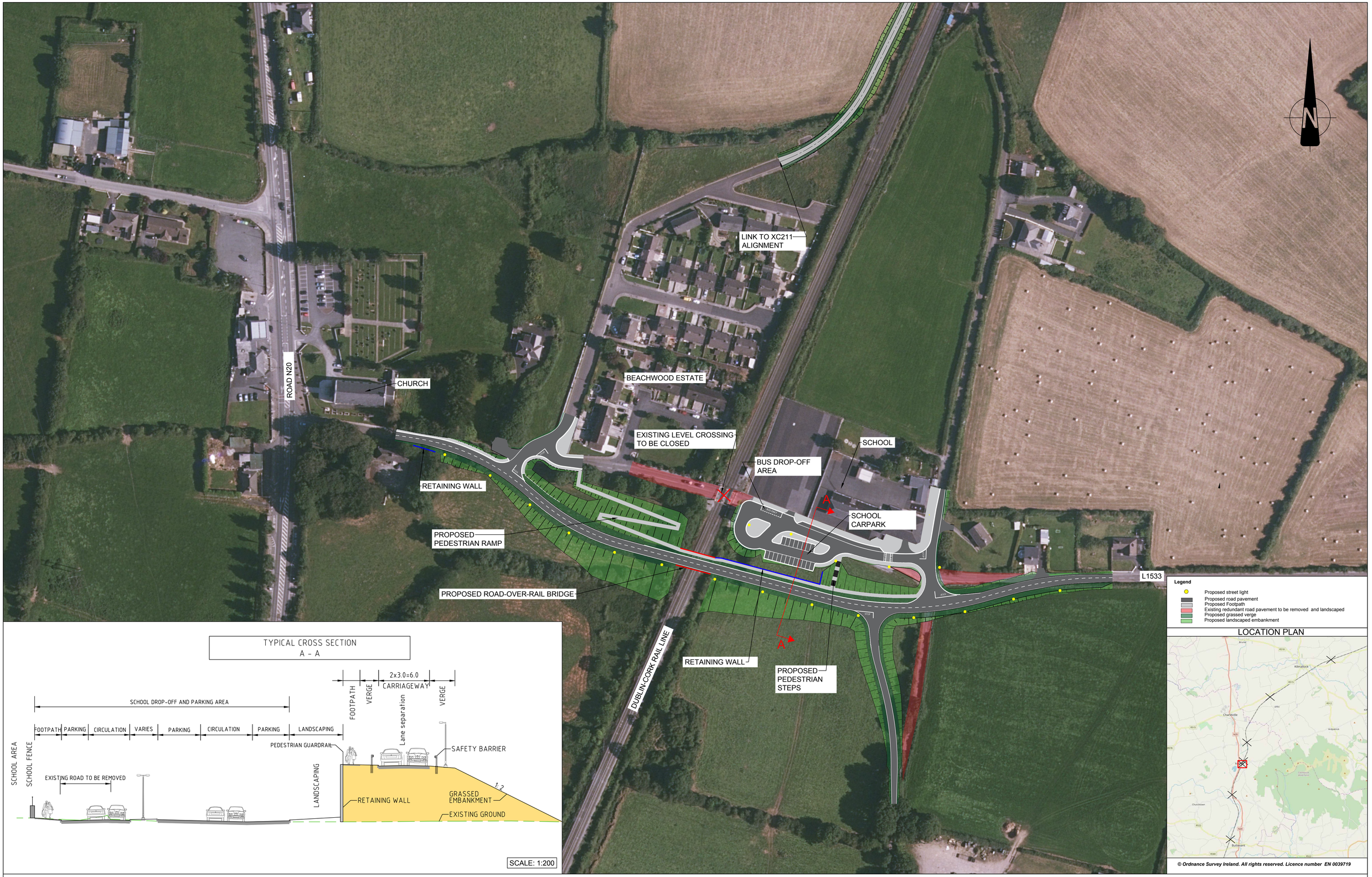


CIE

Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	EB	JAN' 20	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS		
Component:	PUBLIC CONSULTATION		
Title:	PLAN - XC211 NEWTOWN - BLUE ROUTE OPTION		
Designed: FMD	File Name: "	Drawing No.	
Drawn: JS	Original scales: PLAN 1:1000 @ A1	32111000-JAC-HAC-XC211-DR-CH-0002	
Checked: FMD	Date: JAN '20		



TYPICAL CROSS SECTION
A - A

SCALE: 1:200

Legend

- Proposed street light
- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

LOCATION PLAN

CIE Iarnród Éireann Infrastructure

Rev	By	Date	Description
1	JS	NOV' 19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PUBILIC CONSULTATION
Title:	PLAN - XC212 BALLYCOSKERY
Designed: FMD	File Name: -
Drawn: JS	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: OCT '19
Drawing No.	32111000-JAC-HAC-XC212-DR-CH-0001

EXISTING ROAD-OVER-RAIL BRIDGE TO BE RETAINED

PROPOSED RIGHT TURN LANE ON N20

L550

N20

EXISTING JUNCTION TO BE UPGRADED

DUBLIN-CORK RAIL LINE

EXISTING RIGHT TURN LANE ROAD MARKING TO BE REMOVED AND REPLACED

EXISTING LEVEL CROSSING TO BE CLOSED

PRIVATE ACCESS

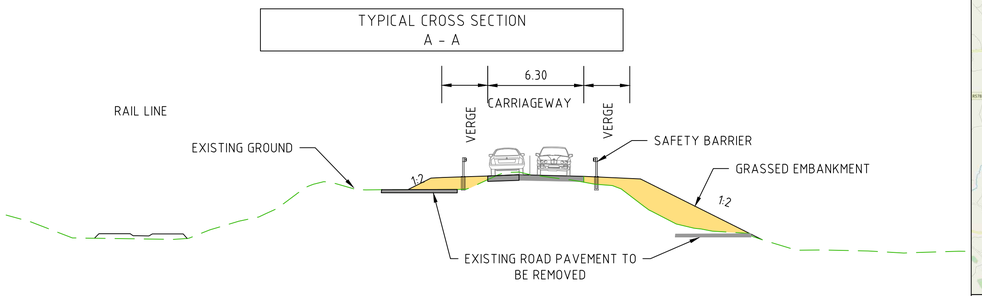
PRIVATE ACCESS

L1320

A

A

TYPICAL CROSS SECTION A - A

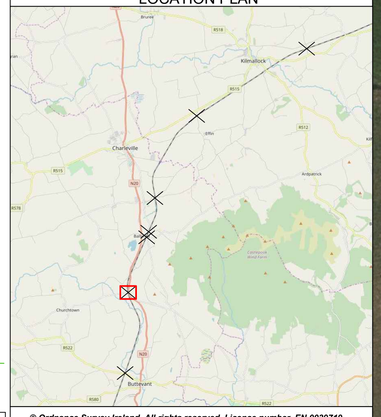


SCALE: 1:200

Legend

- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

LOCATION PLAN



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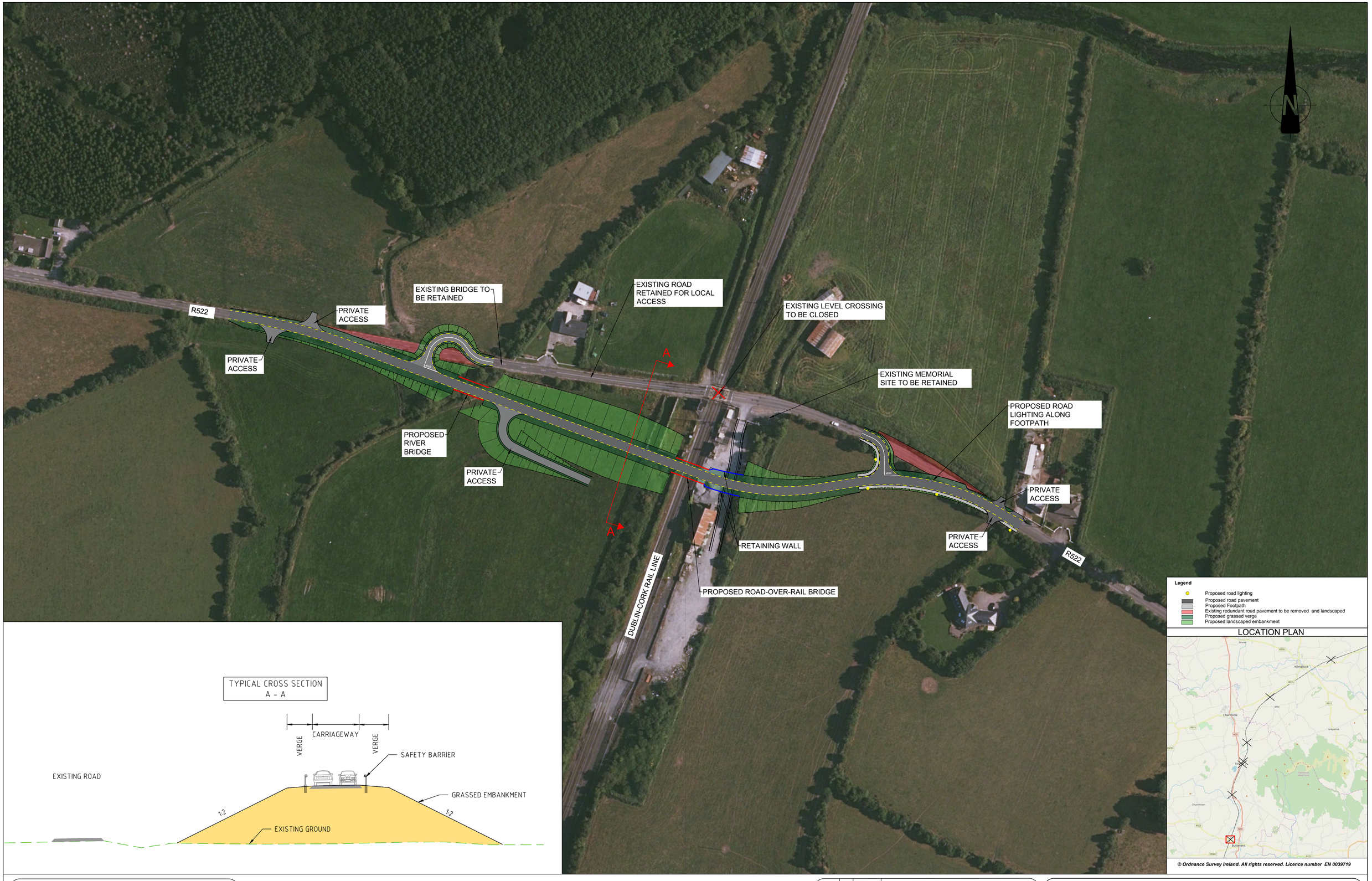
Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	JS	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS		
Component:	PUBILIC CONSULTATION		
Title:	PLAN - XC215 SHINANACH		
Designed: FMD	File Name: -	Drawing No.	
Drawn: JS	Original scales: PLAN 1:1250 @ A1	32111000-JAC-HAC-XC215-DR-CH-0001	
Checked: FMD	Date: OCT '19		



Legend

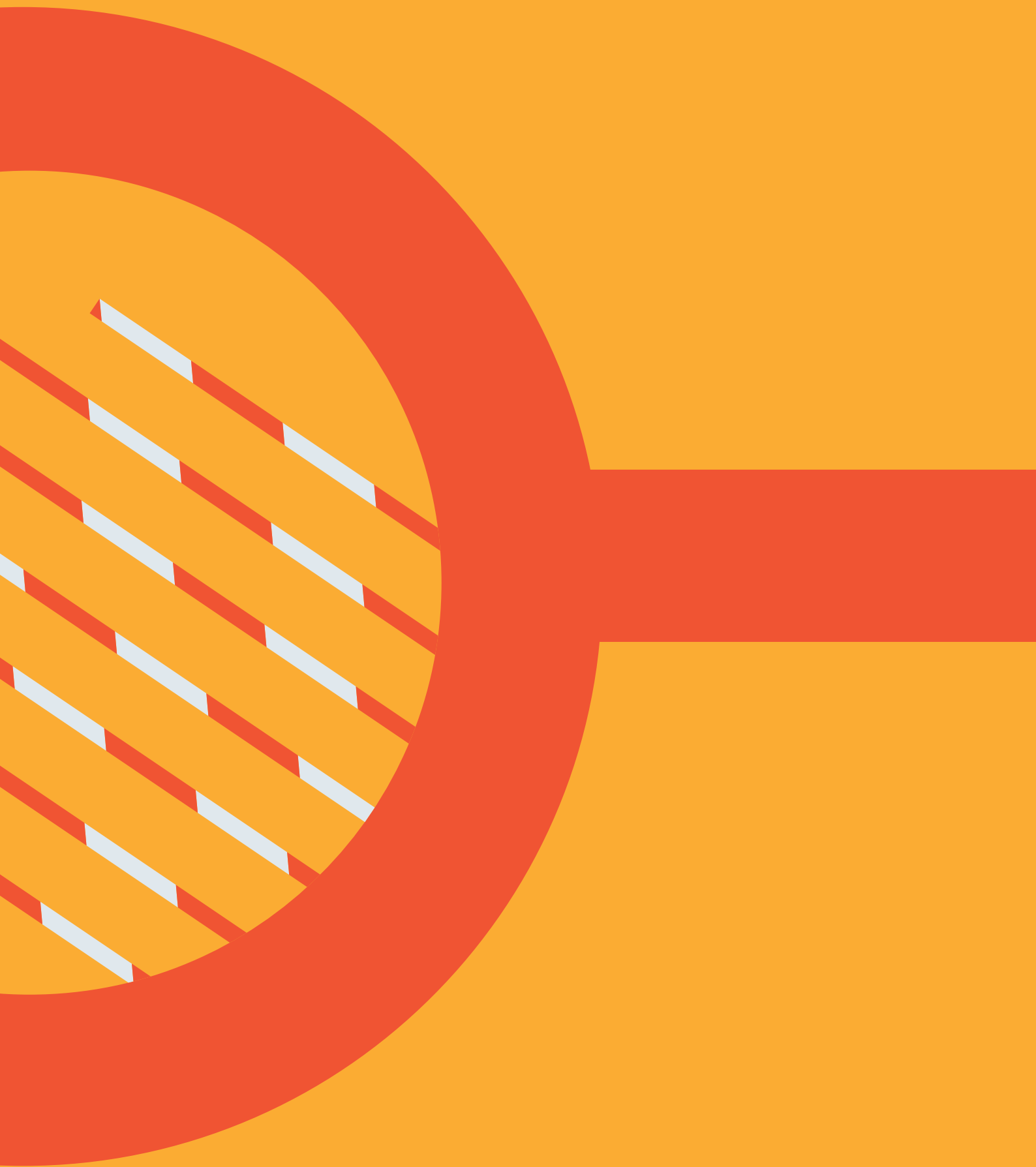
- Proposed road lighting
- Proposed road pavement
- Proposed Footpath
- Existing redundant road pavement to be removed and landscaped
- Proposed grassed verge
- Proposed landscaped embankment

LOCATION PLAN

CIE Iarnród Éireann Infrastructure

Rev	By	Date	Description
0	JS	NOV '19	FIRST ISSUE

Project:	CORK LINE LEVEL CROSSINGS
Component:	PUBILIC CONSULTATION
Title:	PLAN - XC219 BUTTEVANT
Designed: FMD	File Name: -
Drawn: JS	Original scales: PLAN 1:1000 @ A1
Checked: FMD	Date: OCT '19
Drawing No.	32111000-JAC-HAC-XC219-DR-CH-0001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