

CORK LINE
**LEVEL
CROSSINGS
PROJECT**

**Screening and
Scoping Report**



**Iarnród Éireann
Infrastructure**

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Executive Summary

It is the policy of Córas Iompair Éireann (CIÉ) and Iarnród Éireann (IÉ) to remove all railway level crossings where possible and practicable on the Irish Railway network due to the health and safety risks associated with the interface between road users and rail traffic. The Commission for Railway Regulation (CRR) recognises that railway level crossings are a significant area of risk and commits itself to working with work with IÉ to reduce risk at all railway level crossings.

IÉ is proposing to eliminate/upgrade public road level crossings on the Dublin-Cork line. There are currently seven public road level crossings that remain in operation on the Dublin-Cork Line between Limerick Junction and Mallow stations. The crossings are located within a 24 km section of the line.

In 2010/2011 Concept stage schemes were developed by IÉ for overbridges to eliminate the seven public road level crossings. In 2018, IÉ undertook a feasibility study to investigate and review the options for the elimination/upgrade of the level crossings. These options were then appraised using multi-criteria analysis and a preferred concept solution was identified for each level crossing, subject to further design development.

This next stage of the proposed Project for IÉ is to refine and develop preliminary designs to a level suitable for an application for a Railway Order Application on behalf of CIÉ.

The application for a Railway Order requires the submission of materials as described in Section 37 of the Transport (Railway Infrastructure) Act 2001 (as amended). This includes the preparation of an Environmental Impact Assessment Report (EIAR) detailing the potential significant impacts of the proposed Project. In the absence of updated legislation for EIA in relation to Railway Orders, it is proposed to follow the requirements set out in S.I. 296 of 2018: European Union (Planning and Development) (Environmental Impact assessment) Regulations 2018, to ensure the requirements of Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment are met.

This report is the EIA Screening and Scoping Report. Screening determines the need for Environmental Impact Assessment (EIA). The screening exercise has determined that EIA is required as it is mandatory for a Railway Order Application. Scoping is a key stage of the EIA process and the purpose of this Screening and Scoping Report is to request an opinion from the planning authority on the scope and level of detail of the information to be contained within the EIAR. To that end, this Screening and Scoping Report includes:

- a description of the proposed Project;
- a screening determination on the need for Environmental Impact Assessment (EIA);
- a description of the potential significant impacts which may arise during construction and operation of the proposed Project; and
- an outline of the proposed methods for assessment of the potential impacts.

The Scoping Report sets out the proposed contents of the EIAR, which will be in accordance with Schedule 6 of S.I.296.

It is envisaged that the EIAR will be presented in five volumes as follows:

- **Volume 1: Non-Technical Summary** – summary of the EIAR in non-technical language;
- **Volume 2: Introduction and Project Description** – introduction to the proposed Project and EIA process, including a project background, legislative and planning context, description of alternatives, and a description of consultation;
- **Volume 3: Environmental Baseline and Assessment** – a separate chapter for each environmental topic, describing the baseline, potential impacts, mitigation and monitoring requirements for each environmental topic;

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- **Volume 4: Figures** - graphics and plans supporting the EIAR chapters, illustrating the proposed Project and environmental information; and
- **Volume 5: Appendices** - technical reference information supporting the EIAR chapters, such as calculations and detailed background data.

The aspects of the environment to be assessed ('environmental topics') are in accordance with Schedule 6 of European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) as follows:

- Population & Human Health;
- Biodiversity;
- Soils, Geology & Hydrogeology;
- Water;
- Air Quality;
- Noise and Vibration;
- Traffic and Transport;
- Cultural Heritage;
- Landscape;
- Cross-cutting themes;
- Risks of Major Accidents and Disasters;
- Material Assets;
- Resource Use and Waste;
- Climatic Factors; and
- Interactions & Cumulative Impacts.

This EIA Screening and Scoping Report describes the approach to be taken in assessing the potential effects of the proposed Project on each of these environmental aspects, including a description of the study area for each topic; a description of the methodology to be used in assessment, including desk-based surveys, field surveys and consultation to be undertaken to inform the assessment; as well as outlining the current baseline conditions and the likely impacts which may occur as a result of construction and operation of the proposed Project.

CIÉ and IÉ are now inviting submissions on the EIA Screening and Scoping Report and would like your views having regard to the following:

- Is the scope of the proposed assessment adequate or are there any additional environmental issues that should be taken into consideration in preparing the EIAR?
- Is the level of detail proposed sufficient or is there any additional information that should be considered in the EIAR?

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To make a submission please use the following contact details:

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1. Introduction

1.1 Introduction

This report is the Environmental Impact Assessment (EIA) Screening and Scoping Report. Screening determines the need for EIA. Scoping sets out the breadth and depth of the information to be contained within the EIAR and the methods proposed to assess the significance of effects.

The key objectives of this Report are:

- Provide a description of the proposed Project;
- Identify likely significant impacts which may arise during construction and operation of the proposed Project and which will be addressed in detail in the EIAR;
- Identify potential environmental impacts which may be partially or wholly omitted from the EIAR (scoped out);
- Outline proposed assessment methodologies for completing the EIAR;
- Outline the likely contents of the EIAR; and
- Form a basis of common reference for consultation about the scope and methodology for the EIAR.

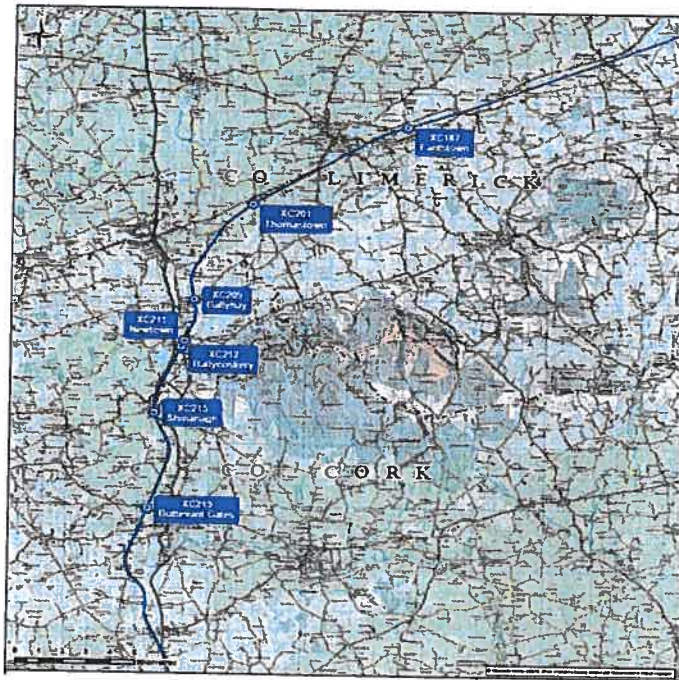
1.2 Project Overview

It is the policy of CIÉ and IÉ to eliminate/upgrade where practicable and possible all public road level crossings on the rail network across Ireland. There are seven remaining public road level crossings on the Dublin to Cork line between Limerick Junction and Mallow Stations. On this stretch of the railway line rail speeds can reach up to 150km/hr and the safety of the level crossings in this area needs to be reviewed.

The proposed Project seeks to eliminate/upgrade these public road level crossings and considers the level of relief required to facilitate the closures. The options considered for the relief are described in Chapter 3.

The crossings for the proposed Project, as shown in Figure 1.1, are located within a 24 km section of the line, which straddles the Cork/Limerick county boundary.

Figure 1.1 Locations of the 7 no. Level Crossings



1.3 EIA Screening and Scoping Report

1.3.1 EIA Screening

Screening is the first stage of the EIA process, whereby a decision is made as to whether an EIA is required. Screening for environmental impact assessment is defined in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 Regulation 21(1) s follows:

'screening for environmental impact assessment' means a determination—

(a) as to whether a proposed development would be likely to have significant effects on the environment, and

(b) if the development would be likely to have such effects, that an environmental impact assessment is required.

However, this definition only applies to projects being proposed under the Planning and Development Act 2000 (as amended). The proposed Project is being progressed through an application for a Railway Order, under the Transport (Railway Infrastructure) Act 2001 (S.I. No.55 of 2001) as amended.

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S.I.55 includes a requirement for:

'(e) a statement of the likely effects on the environment (referred to subsequently in this Part as an 'environmental impact statement') of the proposed railway works.'

This requirement effectively negates the screening stage for EIA as it is mandatory to submit a 'statement of the likely effects on the environment' to accompany the application for a Railway Order. For the purposes of the proposed Project and this report, the 'statement' is interpreted as an Environmental Impact Assessment Report (EIAR).

This report represents the outputs of the 'scoping stage' of the EIA. It sets out the proposed scope of work and methodologies to be applied in the development of the EIAR for the proposed Project and outlines the proposed structure of the EIAR document.

1.3.2 EIA Scoping

All of the topics set out further below have been scoped into the EIAR.

1.3.3 Report Structure

This EIA Scoping Report is structured as follows:

- Chapter 17: Cross-Cutting Themes;
 - Chapter 18: Interactions and Cumulative Impacts; and
 - Chapter 19: Conclusion.
- Executive Summary
 - Chapter 1: Introduction;
 - Chapter 2: Project Need;
 - Chapter 3: Alternatives;
 - Chapter 4: Project Description;
 - Chapter 5: National, Regional and Local legislation and Policy;
 - Chapter 6: EIA Process;
 - Chapter 7: EIA Consultation;
 - Chapter 8: Population & Human Health;
 - Chapter 9: Biodiversity;
 - Chapter 10: Soils, Geology & Hydrogeology;
 - Chapter 11: Water;
 - Chapter 12: Air Quality;
 - Chapter 13: Noise & Vibration;
 - Chapter 14: Traffic & Transport;
 - Chapter 15: Cultural Heritage;
 - Chapter 16: Landscape;

2. Project Need

The National Development Plan (2018-2027) sets out that the Dublin-Belfast, Dublin-Limerick and Dublin-Cork lines will be 'subject to an examination to move to higher speeds leading to improved connectivity to regional cities through improved rail journey times (p. 42).

It is the general duty of CIÉ, as detailed in Section 15 of the Transport Act 1950 (i.e. establishing legislation for CIÉ), to:

'provide or secure or promote the provision of an efficient, economical, convenient and properly integrated system of public transport for passengers and merchandise by rail, road and water with due regard to safety of operation, the encouragement of national economic development and the maintenance of reasonable conditions of employment for its employees and for that purpose it shall be the duty of the Board to improve in such manner as it considers necessary transport facilities so as to provide for the needs of the public, agriculture, commerce and industry'. (underlining emphasis)

The proposed Project is an improvement to Ireland's railway network infrastructure and is principally driven by the need to improve safety.

Specifically, in regard to the proposed Project in the village of Ballyhea (crossing XC212 Ballycoskery), the Fermoy Municipal District Local Area Plan (LAP) (August 2017) paragraph 5.2.21 sets out that 'Reservation is made for possible construction of a new road alignment as detailed on the accompanying map. This may result in the creation of a new parking area in front of the school.' The road and walkway defined in the LAP crosses the railway line on an east-west axis to the immediate south of the school and residential area. Clearly, the principle of and need for a new road crossing point over the railway line at Ballycoskery has already been accepted by Cork County Council.

2.1 Safety

The 2030 Rail Network Strategy Review sets out under 'Background' that a broad strategic goal for the rail network is:

'To provide safe, accessible and integrated rail services that contribute to the sustainable economic and regional development in an efficient manner.'

It continues under Section 2.3.5 (Safety) that:

'Current Irish policy on railway safety has its roots in the Railway Safety Investment Programme that was developed in 1999 following an in-depth Safety Review that had been carried out the previous year.'

It sets out that a Railway Safety Task Force was established to address the recommendations from the review. The Task Force recommended a series of investments including the closure or upgrading of level crossings. It further outlines under Section 4.2 (Rehabilitation of Infrastructure & other Key Investments) that over the 11 year period between 1999 and 2009 the Programme of investment has enabled IÉ to (inter alia):

'Close or upgrade over 1,000 level crossings.'

The IÉ 10-year asset strategy for user-worked level crossings outlines that:

'Ultimately, the elimination of level crossings is always going to be the best solution to reducing risk.'

It further states that:

'The Irish Rail Network Wide Risk Model (NWRM) determined that train collision with vehicles at level crossings remains one of the single biggest accident types that contribute to the overall risk on the rail network.'

The Commission for Railway Regulation (CRR) in the Statement of Strategy 2018 – 2020 states under the heading 'Railway Interfaces' that:

'While the number of level crossings continues to decline, they are a significant area of risk given the reliance of third parties to operate and use the level crossing correctly. Misuse by level crossing users remains a cause for concern and we will continue to work with Iarnród Éireann and the road safety authority on reducing risk at level crossings.'

The NTA has prepared the Draft Integrated Implementation Plan 2019-2024 and one of its objectives under Section 7.2 for rail investment is to:

'Continue investment in a level crossing closure programme.'

In addition to the above, if there was any issue at a level crossing junction a train driver may not be able to react quickly or bring a train to a halt to avoid a health and safety issue. The permitted line speed of trains at the

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level crossing locations can reach up to 150km/hr. There are 30 to 35 scheduled trains (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.

In the first six months of 2019, IÉ reported 51 incidents at level crossings, an increase of 82% on the same period in 2018. This figure includes cars and Heavy Goods Vehicles (HGVs) colliding with barriers and near-misses between vehicles and trains.

2.1.1 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 IÉ 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	XC 187	XC 201	XC 209	XC 211	XC 212	XC 215	XC 219
Crossing Equipment Failure	1		1		1	1	4
Level Crossing Equipment RSF					1	1	1
Level Crossing Incident	1						
MoP Trespass 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

Table 1.1 provides a snapshot of the situation and there is a much wider issue across the Irish Rail network.

Furthermore, the proposed Project will help to reduce ongoing operational and maintenance costs associated with public road level crossings and will assist in reducing the risk of trespass onto the railway line.

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 health and safety risks associated with the interface between road users and rail, 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 public road level crossings and to provide a safer environment for those using the crossing points.

2.2 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 CO₂ emissions.

2.3 Efficiency of the Local Road Network

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 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 remaining 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/cyclist/pedestrian users using the level crossing; it allows 24/7 unfettered

movement for both the railway line and for those using the crossing.

2.4 Guidelines on a Common Appraisal Framework (CAF) for Transport Projects and Programmes'

In accordance with the Department of Transport, Tourism and Sports' *'Guidelines on a Common Appraisal Framework for Transport Projects and Programmes'* (2016) as per Table 9 (Project Appraisal Criteria), the provision of and need for improved transport systems is based on the following criteria:

- Economy;
- Safety;
- Physical Activity;
- Environment;
- Accessibility and Social Inclusion; and
- 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'* (2005). The 2018 IÉ Feasibility Study (as set out in Section 3.2 further below) utilised the CAF approach. The development and appraisal of this proposed Project is being undertaken in accordance with the National Transport Authority (the NTA) *'Project Management Guidelines'* (2011).

3. Alternatives

A description of the alternatives considered is a requirement under Directive 2014/52/EU amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment (EIA Directive) in accordance with Article 5.1 (d), Annex IV paragraph 2 and Annex IV.3. The Directive states that the EIAR should include:

'A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects'.

The Alternatives Assessment in the EIAR will consider the main alternatives for the proposed Project. This can include alternatives such as: 'the do nothing' scenario, alternative locations, alternative alignments, alternative processes or equipment, alternative site layouts, alternative operating conditions, construction methodologies and alternative ways of addressing potential environmental impacts.

3.1 Proposed Project: Options Assessment process

Figure 3.1 illustrates the process to determine a preferred solution at each site.

Figure 3.1 Steps in the Options Appraisal Process



In 2010/2011, alternative route designs were developed for schemes to eliminate each of the level

crossings. None of the schemes were progressed at that time.

3.2 Feasibility Study

3.2.1 Overview

In 2018, IÉ undertook a Feasibility Study (finalised in February 2019) to investigate and appraise the options for the elimination/upgrade of the level crossings. The Feasibility Study included an options appraisal.

The Feasibility Study was informed by a workshop held by IÉ in Limerick Junction to assess options to eliminate/upgrade each of the seven level crossings. The workshop included representatives from IÉ New Works Department, the IÉ Chief Civil Engineers Department (CCE), IÉ Infrastructure Management Operations Department (IMO), IÉ Signalling, Electrical and Telecommunications Department (SET) and CIÉ Group Property.

3.2.2 Options Considered

The Feasibility Study options appraisal assessed the following four options for each of the sites, as follows:

- Do Nothing;
- Straight Closure;
- Alternative access/Overbridge; and
- Upgrade to 4 Barrier CCTV.

3.2.3 Findings

Detailed appraisal tables are provided in the Feasibility Study. Scores were given from 1 to 5 for each criterion, ranging from 1 'significant disadvantages over other options' to 5 'significant advantages over other options'.

Table 3.1 provides an overview of the summary results for each option at each site.

Table 3.1 Summary results at each site

Site	Do Nothing	Straight closure	Alt access/ overbridge	CCTV
XC187	11	14	13	13
XC201	11	14	16	13
XC209	9	N/A	13	13

XC211	11	12	15	13
XC212	10	N/A	16	11
XC215	10	N/A	15	11
XC219	9	N/A	15	11




3.3 Level Crossing and Emerging Preferred Solutions


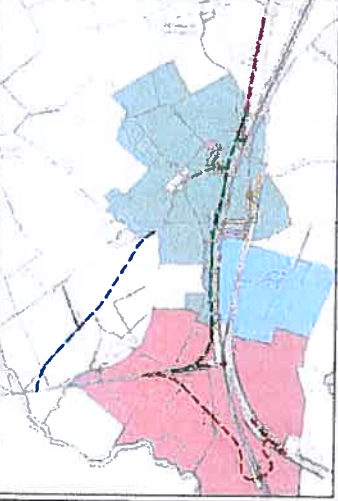

Building on this, the options appraisal has been taken further in a Route Options Report which was developed to determine the emerging preferred route at each of the applicable locations. The Route Options Report performed a Multi-Criteria Analysis (MCA) for each route option where an alternative access/overbridge option was found to be the preferred solution in the options appraisal. This work has taken into account existing studies and was supplemented with additional options as identified during site visits.

The Route Options Report forms Appendix D of the Preliminary Design Report (PDR) prepared for the Project and will accompany the EIAR.

Table 3.2 sets out the options considered at each of the crossing points.

Table 3.2 Crossing Options

Level Crossing	Proposed Options
XC187 – Fantstown	Closure and diversion only. No other options considered.
XC201 – Thomastown	<p>Closure and alternative route via a new road alignment and new road over rail bridge: 4 options for the road alignment were considered.</p> 
XC209 – Ballyhay	<p>Convert to CCTV or closure and alternative route via a new road over rail bridge. Three options for the road alignment considered.</p> 
XC211 – Newtown	<p>Closure and alternative diversion route via a new road alignment. Two options for the road alignment considered.</p> 

Level Crossing	Proposed Options
<p>XC212 – Ballycoskery</p>	<p>Closure and alternative route via new road alignment and overbridge and underbridge. Three options for alignment considered.</p> 
<p>XC215 – Shinanagh</p>	<p>Closure and alternative route via new road alignment and new/existing road-over-rail bridge. Three options for road alignment considered.</p> 
<p>XC219 – Buttevant</p>	<p>Closure and alternative route via new road alignment and new road-over-rail bridge. Three options for road alignment considered.</p> 

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Table 3.3 Summary of Level crossings and Alternative Options

Level Crossing	Option Number	Option Colour	Description
XC187 Fantstown	None	n/a	Based on the outcomes from the Feasibility Study, 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 new river bridge.
XC211 Newtown	Option 1	Green	New road alignment to west of level crossing. No new structures.
	Option 2	Blue	New road alignment to east of level crossing. No new structures.
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 East of level crossing to connect with upgraded junction at existing road over rail bridge. Upgrade existing junction on N20.
	Option 2	Green-Pink	New road alignment to North East of level crossing. Extend diversion to existing junction on N20 with some traffic restrictions required at existing improved bridge junction.
	Option 3	Blue-Orange	New road alignment to North West of level crossing to connect with upgraded junction at existing road over rail bridge. Upgrade existing junction on N20.
	Option 4	Blue-Pink	New road alignment to North West of level crossing. Extend diversion to existing junction on N20 with some traffic restrictions required at existing improved 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 with new river bridge.
	Option 2	Red	New road-over-rail bridge to North to level crossing with new river bridge .
	Option 3	Blue	New road-over-rail bridge to South to level crossing with new river bridge.

3.4 Multi-Criteria Analysis

Table 3.4 below sets out the summary results of the multi criteria analysis and identifies the emerging preferred solution for each of the subject sites.

Table 3.4 MCA Summary results

Level Crossing	Emerging Preferred Option	Option Colour	Description
XC187 – Fantstown	N/A	N/A	Closure and diversion only. No other options considered at this stage.
XC201 – Thomastown	Option 1	Green	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 presents economic and engineering advantages over the Cyan option; it would lead to a slight increase in hedgerow loss over the cyan option but would still be a limited amount of loos; the cyan option has a higher potential for increased pluvial flood risk local. As a result, the Green option is the preferred solution overall.
XC209 - Ballyhay	Option 2	Green-Pink	The 'Green' options represent the best performing options for the environment; of these, 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, which further reduces construction, environmental and safety concerns. As a result, the Green-Pink Option presents significant economic, engineering and environmental advantages over the other options, making it the preferred option at this location.
XC211 – Newtown	Option 1	Green	The Blue option is the longest road length and was discounted on that basis from further assessment. The increased land take and construction work for the blue option makes it the least favourable for a number of environmental criteria, such as ecology, water and flood risk and landscape. The Green Option presents significant advantages over the Blue Option in the economy criterion, whilst the Blue Option was similar on to the Green on the engineering criterion of Geotech and structures but performed better on Geometry. Overall, the Green option performed better than the blue. .
XC212 – Ballycoskery	Option 1	Green	The red option performs poorly on engineering and economic criterion; it performs the best on the environment, except for flood risk. Whilst the Green Option is not the best option regarding the engineering criterion, it does perform well, and it is the least expensive option as there is no requirement for the construction of an underbridge, which also presents engineering advantages. Overall, the Green Option is the preferred option.
XC215 – Shinanagh	Option 1	Green-Orange	The Green-Orange option does prove more expensive; however, it does present advantages over the Green-Pink option in terms of the environment criterion and has significant advantages over the blue options on the environmental criterion. Its overall assessment showed it was the best performing option overall
XC219 - Buttevant	Option 1	Green	The Green option is the preferred from an economic perspective as it would cost less, require less land take. It does not perform best on Geotech and there are potential issues from ecology and noise with his option. However, overall, the preferred option is the Green Option as it has a higher aggregate of advantages overall when compared to the other options.

4. Project Description

4.1 Introduction

This chapter provides a description of the proposed Project, history of the project, and description of the emerging preferred options with available design details of the proposed Project.

The proposed Project comprises the elimination/upgrade of the seven public road level crossings on the Dublin-Cork line.

The location and type of each crossing is detailed in Table 4.2.

4.2 History of the Project

Table 4.1 Relevant Project History provides a brief overview of the history of the project.

Table 4.1 Relevant Project History

Timeline	Details
2009	XC187 - Fantstown Oral Hearing under Section 73 of the Roads Act 1993. This sought to close the crossing by extinguishing the public right of way. The Inspector recommended closure primarily due to health and safety benefits and this decision was supported by the management/executive of Limerick County Council. However, the 'Section 73' motion was never finalised or brought before the Council.
2010/2011	Concept stage schemes developed for over-bridges to eliminate each of the level crossings.
2018	Preparation of a feasibility study into the elimination/upgrade of the seven level crossings.
2019	Current: Updated Route Options Report, refining and developing a preliminary design for the proposed Project. Preparation of EIAR, Appropriate Assessment Screening and all required materials for the submission of a Railway Order Application under Section 37 of the Transport (Railway Infrastructure) Act 2001 amended.

Table 4.2 Level Crossings

Level Crossing	Co-ordinates	Crossing Type	Road Type	Local Authority
XC187- Fantstown	E: 563962 N:628368	C – Type (Gates normally CLOSED to road traffic)	Local	Limerick City & County
XC201- Thomastown	E:557627 N:624583	C – Type (Gates normally CLOSED to road traffic)	Local	Limerick City & County
XC209- Ballyhay	E:555182 N:619940	CD – Type (Gates normally OPEN to road traffic by DAY and normally closed at other times)	Local	Cork County Council
XC211- Newtown	E:554787 N:617982	CD – Type (Gates normally OPEN to road traffic by DAY and normally closed at other times)	Local	Cork County Council
XC212- Ballycoskery	E: 554646 N:617659	CD – Type* (Gates normally OPEN to road traffic by DAY and normally closed at other times)	Local	Cork County Council
XC215- Shinanagh	E:553565 N:614500	CD – Type* (Gates normally OPEN to road traffic by DAY and normally closed at other times)	Local	Cork County Council
XC219- Buttevant	E:553331 N:609848	CX - Type (Gates normally OPEN to road traffic)	Regional	Cork County Council

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

4.3 Project Description

4.3.1 Existing Conditions

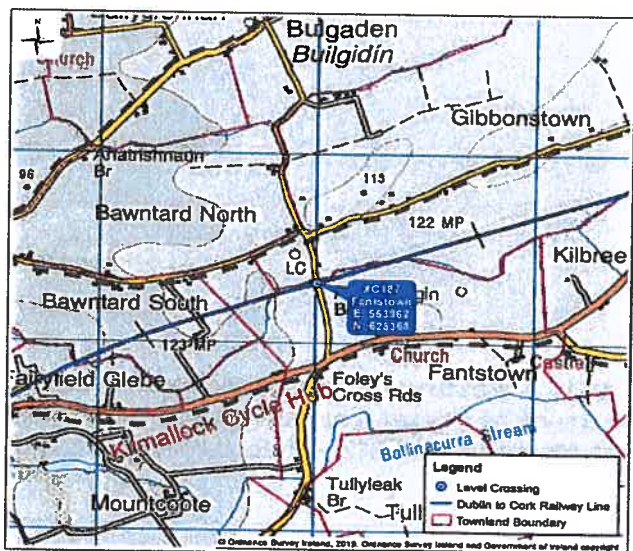
As set out further above under Section 2.1 there is a relatively high volume of railway traffic along the Dublin-Cork line that approaches significant speeds of around 150km/hr taking only around 15 minutes to travel past all seven public road level crossing locations.

XC187 - Fantstown

Level Crossing XC187 - Fantstown is a manually operated gated level crossing located 3km to the east of Kilmallock in the townland of Fantstown in County Limerick, intersecting a local road 122 miles 808 yards on the Dublin-Cork line. See Figure 4.1. The surrounding area is characterised as a dispersed rural area with low density individual housing in the vicinity.

The crossing is manned 07.30hrs-23.30hrs and the gates are normally closed to road traffic, with the gate keeper opening the gates as required. The crossings are closed to road traffic from 23.30hrs until 07.30hrs.

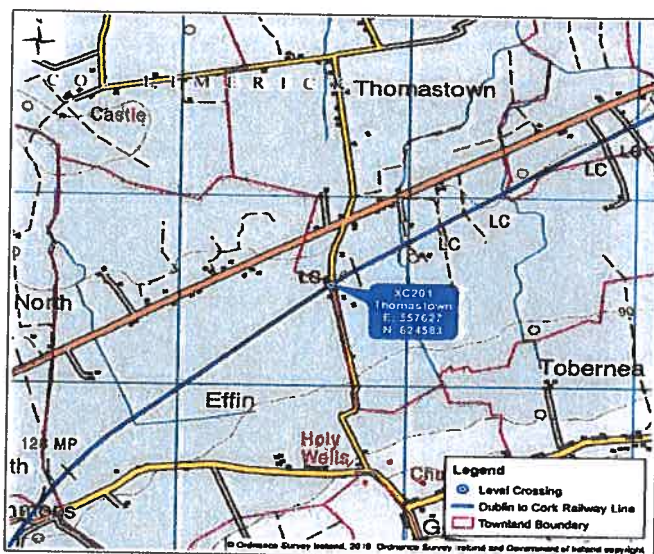
Figure 4.1 XC187 - Fantstown



XC201 – Thomastown

Level Crossing XC201 - Thomastown is a manually operated gated level crossing located 5km to the east of Charleville in the townland of Thomastown in County Limerick, intersecting a local road at 127 miles 70 yards on the Dublin-Cork line (See Figure 4.2). The surrounding area is rural with a dispersed community consisting of low-density individual housing.

Figure 4.2 XC201 - Thomastown

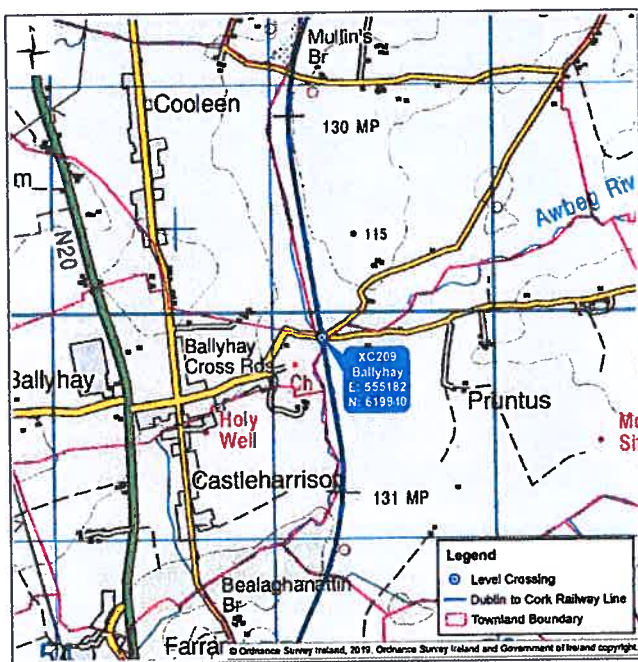


The crossing is manned 07.30hrs-23.30hrs and the gates are normally closed to road traffic with the gate keeper opening the gates as required. The crossing is unmanned and closed to road traffic from 23.30hrs until 07.30hrs.

XC209 - Ballyhay

Level Crossing XC209 is a manually operated gated level crossing located in the townland of Ballyhay in County Cork, intersecting a local road at 130 miles 878 yards on the Dublin-Cork line. The surrounding area is characterised as a rural dispersed community consisting of low-density individual housing, with a built-up area consisting of a supermarket distribution centre, GAA Club and ribbon development centring on a crossroads to the west. See Figure 4.3.

Figure 4.3 XC209 - Ballyhay



The crossing is normally open to road traffic and manned by day while normally closed and unmanned at other times.

XC211 - Newtown and XC 212 – Ballycoskery

Level Crossings XC211 and XC212 are both manually operated gated level crossings located along the north-eastern side of Ballyhea Village in County Cork, intersecting local roads at 131 miles 1385 yards and 131 miles 1759 yards respectively on the Dublin-Cork line (see Figure 4.4). The XC212 - Ballycoskery crossing is located close to the local Primary School (east side) and the Beechwood housing estate (west side), while the Newton crossing is approximately 500m to the north-east of the XC212 - Ballycoskery crossing in a slightly more rural, dispersed location outside the village.

Figure 4.4 XC211 - Newtown and XC212 - Ballycoskery

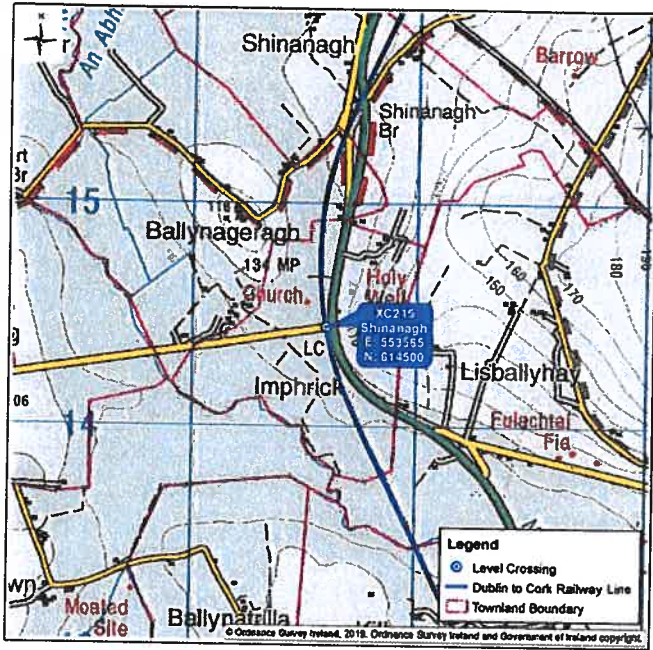


XC211 - Newtown is normally open to road traffic and manned by day while normally closed and unmanned at other times. XC212 – Ballycoskery is manned 24 hours a day.

XC215 – Shinanagh

Level Crossing XC215 - Shinanagh is a manually operated gated level crossing located in the townland of Imphrick, County Cork, approximately 3.5km north-east of the village of Churchtown, intersecting a local road at 134 miles 260 yards on the Dublin-Cork line. See Figure 4.5.

Figure 4.5 XC215 - Shinanagh



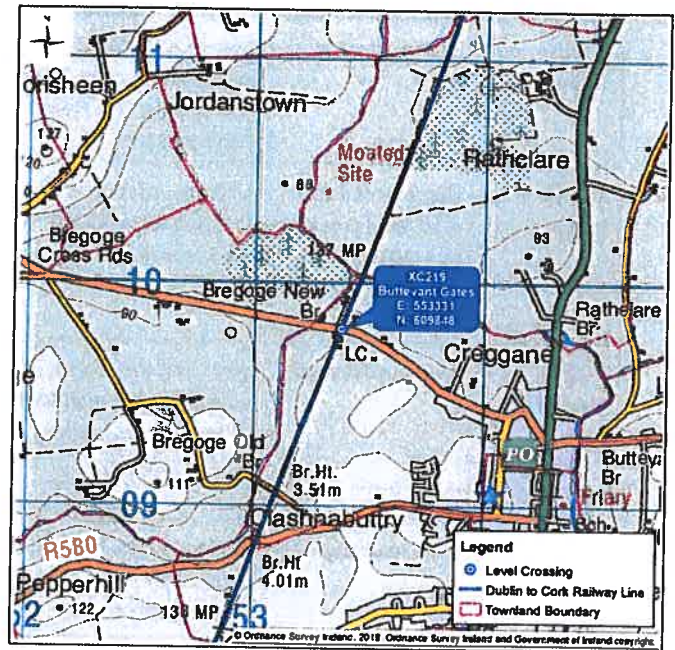
The surrounding area is predominantly rural in character with a dispersed population and low-density individual housing. The crossing is immediately adjacent to the junction between the N20 National Primary Route, which is due to be downgraded on the completion of the M20 in 2027.

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

XC219 – Buttevant

Level Crossing XC219 is a manually operated gated level crossing located on the outskirts of the town of Buttevant, County Cork, intersecting a regional road at 137 miles 315 yards on the Dublin-Cork line. The surrounding area is rural in character with higher-density housing and small-scale commercial enterprises in the town 500m to the south-east. See Figure 4.6.

Figure 4.6 XC219 - Buttevant



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.

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4.3.2 Proposed Solutions

ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact.

Table 4.3 below provides a summary of the proposed infrastructure to be put in place in the elimination/upgrade of the seven level crossings.

Table 4.3 Emerging Preferred Solutions

Location	Infrastructure	Description
XC187- Fantstown	N/A.	Straight Closure: Divert traffic along existing roads to existing overbridge approx. 3km to the north east.
XC201- Thomastown	1no. overbridge.	New Overbridge: Tie in to existing local road to South and new junction on Regional Road R515 to North.
XC209- Ballyhay	Upgrade of public road level crossing to a CCTV controlled level crossing.	Upgrade of public road level crossing to a CCTV controlled level crossing.
XC211- Newtown	New access road.	New Access Road: Tie in to existing Local road to North, tie in to existing housing estate at XC212 to South.
XC212- Ballycoskery	1 no. overbridge, 1no. retaining wall.	New Overbridge: Tie in to existing Local Road to East and West, new carpark proposed for existing school. Tie in to housing estate and school to North and existing Local road to South.
XC215- Shinanagh	Upgrade to existing overbridge.	Tie in to existing local road to North, new access road to tie in to existing overbridge approx. 1km to the North.
XC219- Buttevant	1no. overbridge, 1no. portal frame overbridge, 1no. ditch box culvert, 1no.access road box culvert, 2no. retaining walls.	New Overbridge.

4.4 Construction Phase

Construction of the proposed Project is proposed to take place over 18 no. months, commencing in around February 2021. A detailed construction plan and schedule will be developed for the proposed Project to

5. National, Regional and Local legislation, Policies and Transport Programmes

This section provides a summary of the relevant legislation, planning policy and guidance for the proposed Project. The National Development Plan (2018-2027) and other policy documents highlighted below demonstrate the Government's commitment to support investment in gaining the service and journey time efficiencies within the rail network that the upgrade of the seven level crossings will deliver.

Safety is the key driver behind the proposed Project. The IE Safety Report 2017 sets out that:

'Safety is Iamród Éireann's number one priority.'

It notes at pages 23 that 2017 saw an increase in category 1 level crossing near misses and sets out that:

'Closures continue to be sought on a line by line basis and a range of work streams and initiatives are ongoing in the area of the management of level crossings.'

As set out above and under Chapter 2 the full hierarchy of national, regional and local policy supports the closure/replacement of level crossings. An overview of the policy context, including that for each EIAR discipline is provided in Appendix C Policy.

5.1 Legislation & Guidance

The EIA (and EIAR) will be delivered in accordance with, but not limited to, the following legislation and guidance:

- Planning and Development Act 2000 - 2018;
- Planning and Development Regulations 2001 - 2019;
- Transport (Railway Infrastructure) Act 2001, as amended;
- S.I. 296 of 2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018; and
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017).

Key documents that inform the examination of all environmental areas include:

- Project Ireland 2040: National Planning Framework;

- National Development Plan 2018 – 2027;
- National Mitigation Plan (2017);
- Draft Regional Spatial and Economic Strategy for the Southern Region;
- Regional Planning Guidelines for the South West and Mid West (2010 – 2022);
- Relevant Metropolitan Area Strategic Plans (MASPs);
- Cork County Development Plan (CCDP) 2014;
- Limerick County Development Plan (LCDP) 2010-2016; and
- Relevant Local Area Plans.

Relevant IE and railway infrastructure plans, and strategies include:

- 2030 Rail Network Strategy Review, 2011;
- Draft Cork Metropolitan Area Transport Strategy (CMATS) 2040;
- Building on Recovery: Infrastructure and Capital Investment 2016 – 2021;
- Rail Review: 2016 Report;
- Commission for Railway Safety - Statement of Strategy 2018 – 2020;
- NTA - Draft Integrated Implementation Plan 2019-2024; and
- Smarter Travel: A Sustainable Transport Future: A new Transport Strategy for Ireland 2009 -2020.

6. EIA Process

This chapter describes the EIA process of identifying, predicting, evaluating and mitigating the effects (positive and negative) on the receiving environment caused by a proposed Project or project. Where negative effects are considered unacceptable, design changes and/or other mitigation measures will be proposed to minimise these effects to acceptable levels.

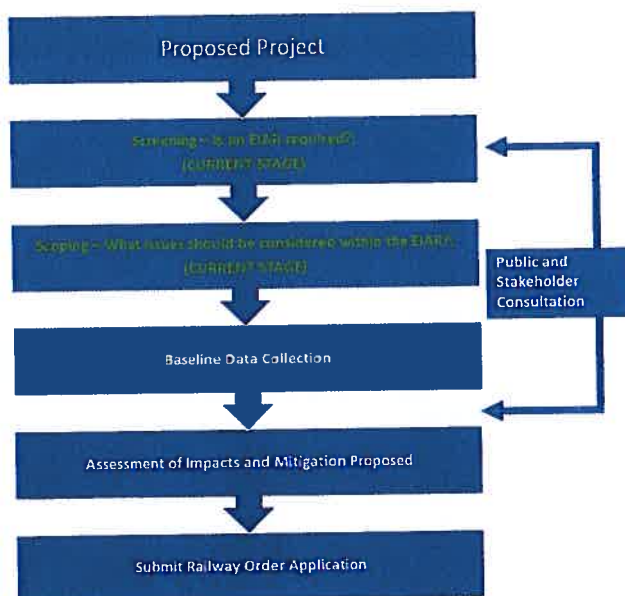
6.1 Legislation

Directive (2014/52/EU) on The Assessment of the Effects of certain Public and Private projects on the Environment became applicable in Ireland from May 16th, 2017. It was transposed into Irish Law by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. no. 296 of 2018) which came into effect on 1 September 2018 and the EIAR will be prepared in accordance with these Regulations.

6.2 Environmental Impact Assessment Process

An overview of the stages of the EIA process for the proposed Project is presented in Figure 6.1.

Figure 6.1 EIA Process



6.3 Generic Methodology

Each environmental topic has its own bespoke method for assessment, in accordance with published professional guidelines, details of which are provided within each Topic Chapter. Generic methods for EIA will also apply and the assessments will be conducted in accordance with the following EPA Guidance:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017c); and
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA 2015).

In addition to the applicable EIA legislation and guidance, all EU Directives and national legislation relating to the specialist areas will also be considered as part of the process. Further details on the Generic EIA method to be followed are provided in Appendix D.

6.4 Mitigation Measures

The EIAR will address potential environmental effects associated with the proposed Project and propose mitigation where significant effects are identified. All measures proposed as mitigation for the proposed Project will be reported within the relevant chapter of the EIAR.

The EIAR will also include a final chapter that contains a Schedule of Environmental Commitments which will bring together all of the mitigation measures recommended in the various EIAR chapters for ease of reference.

6.5 Monitoring

In addition to the proposed mitigation measures, monitoring programmes will be developed to assess the actual impacts on the receiving environment and the effectiveness of the proposed mitigation measures. Monitoring also allows for the comparison of pre and post project conditions and will enable any unforeseen impacts to be identified and mitigated where required.

6.6 Appropriate Assessment:

The EU Habitats Directive (92/43/EEC) and EU Birds Directive (2009/147/EC) have been transposed into Irish law by the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I.477/2011). Articles 6(3) and 6 (4) of the Habitat Directive requires that, any plan or project not directly connected within or necessary to the management of a European site

(comprising Special Areas of Conservation [SACs] and Special Protection Areas [SPAs]) but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to Appropriate Assessment (AA).

The Appropriate Assessment (AA) process will be undertaken concurrently with the EIAR, but both processes will be clearly distinguished.

6.7 Water Framework Directive (WFD)

A Water Framework Directive (WFD) (2000/60/EC) Compliance Report will be prepared and describe potential impacts on the quality elements of WFD Status: water quality, ecology and hydro morphology in accordance with the requirements of the WFD.

7. EIA Consultation

This chapter provides a description of the consultation process and describes the statutory and non-statutory consultation and engagement process. To assist in developing the EIAR, consultation will serve the following key objectives:

- To establish a sufficiently robust environmental baseline of the proposed Project and its surroundings;
- To identify, early in the process, specific concerns and issues relating to the proposed Project so that they can be discussed and appropriately accounted for in the design and assessment;
- To ensure the appropriate involvement of the public and stakeholders in the assessment and design process; and
- To comply in full with the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.

7.1 Consultation to Date

Public consultation is a useful tool in helping to identify local constraints which may be only locally known, and therefore not accounted for during previous parts of the process. This local knowledge gained through the public consultation process will be taken into consideration with regards to revision of the emerging preferred solution.

The consultation period is proposed to last ten weeks from Tuesday 12th November 2019 to Tuesday 21st January 2020.

To support the public consultation, a dedicated information service will be established. These services will go live on 12th November 2019 at the launch of the public consultation and will include the following;

- **Email:** CLLC@irishrail.ie
- **Post:** Cork Line Level Crossings Project, c/o Jacobs, Mahon Industrial Estate, Blackrock, Cork, T12 HY54
- **Website:** www.irishrail.ie/CorkLineLevelCrossings

7.1.1 Public Consultation Events

The public consultation will include both the Preliminary Design Report and this EIA Screening & Scoping Report. At this stage in the proposed Project,

information will be provided online and at local events which will be open to members of the public.

The public consultation events are due to take place, as follows:

Table 7.1: Information Events

Date	Venue	Time
Tuesday 19 th November 2019	Charleville Park Hotel, Charleville, Co. Cork	2.00pm to 8.00pm
Wednesday 20 th November 2019	Deebert House Hotel, Deebart, Kilmallock, Co. Limerick	2.00pm to 8.00pm

The public consultation events will be staffed by Jacobs and CIÉ/IE project team members. Prior to each public consultation event beginning, Jacobs will provide a health and safety overview and information on key messaging to ensure that all communications on the project are consistent and that all team members are fully briefed on the event logistics.

Display boards will be used to present the emerging preliminary designs for each of the seven level crossings to provide information to attendees. Project consultation roadmap display boards will also be produced. Feedback forms will be produced to provide a guide on how to make a submission. A submission box will be available at the public consultation events, or submissions will be accepted by post or by email before or after the public consultation events.

7.1.2 Key Stakeholder Consultation

Consultation is ongoing with a number of key stakeholders which includes, but is not limited to, the following:

- An Bord Pleanála; and
- Cork and Limerick County Councils within which the proposed Project is located.

The first pre application meeting with An Bord Pleanála took place on the 17th October 2019.

7.2 Consultation with Prescribed Bodies and other Consultees

In accordance with statutory requirements a number of statutory consultees and others, listed in Table 7.2:

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Prescribed Bodies and other Consultees, were issued letters in July 2019 advising of the proposed Project and seeking initial views. The consultees identified below will be issued with this Scoping Report for consultation.

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Table 7.2: Prescribed Bodies and other Consultees

Consultees	
Architectural Heritage	Environmental Protection Agency ESB Networks
Advisory Unit (AHAU)	Fáilte Ireland
An Taisce	Teagasc
Transport Infrastructure Ireland (TII)	The Arts Council (An Chomhairle Ealaíon)
National Transport Authority (NTA)	Gas Networks Ireland
National Museum of Ireland	Geological Survey of Ireland
Bat Conservation Ireland	Health Service Executive
Birdwatch Ireland	Irish Water
Coillte Teoranta	Inland Fisheries Ireland
Department of Communications, Energy and Natural Resources	National Parks and Wildlife Service
Department of Culture, Heritage and the Gaeltacht	Office of Public Works (OPW)
Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs	Irish Aviation Authority
Department of Agriculture, Fisheries & Food	
National Parks and Wildlife unit- Development Applications Unit	

- Is the scope of the proposed assessment for the EIAR adequate?
- Is there any additional information that should be considered in the development of the proposed Project?
- Are there any additional environmental issues that should be taken into consideration in preparing the EIAR?

All relevant submissions on the proposed Project are welcome.

In addition to the above, this consultation will also be undertaken with the following:

- The M20 Cork to Limerick Project; and
- Commission for Railway Regulation.

7.3 EIA Scoping Consultation

CIÉ and IÉ recognise the importance of consultation and engagement with stakeholders. The ongoing consultations and those held to date are outlined in Section 7.1. A further consultation period will commence with the publication of this EIA Scoping Report. Statutory Consultees, specific stakeholders and organisations will be invited to provide feedback on the content of the report.

CIÉ and IÉ are now inviting submissions on the EIA Screening and Scoping Report and would like your views having regard to the following:

8. Population & Human Health

8.1 Introduction

The Population & Human Health assessment seeks to identify effects, both tangible and intangible, that the proposed Project may have on people, communities and local businesses.

8.1.1 Study Area

In the socio-economic context there is typically a wide range of receptors, including: individual land interests; communities and their facilities; tourist attractions and recreational sites; and commercial interests. Defining the spatial scope can be complex since these receptors would experience aspects of the proposed Project in different ways and in different locations. A study area which encompasses all aspects of the potential effects on Population and Human Health will be devised and agreed with stakeholders. It will be informed by the following: This section sets out the various study areas used in the assessment of each type of socio-economic effect.

- The study areas and findings for the assessment of specific aspects of the environment which have the potential to lead to combined or secondary effects on amenity, in particular Landscape/views; traffic; noise; and air quality.
- Small Areas information, as defined on www.cso.ie; a number of Census 2016 datasets are available at this geographical scale.
- Electoral divisions or wards for wider effects.

8.2 Legislation, Policy & Guidelines

8.2.1 Legislation & Policy

Appendix C sets out relevant legislation and policy documents that will be used to inform the assessment.

8.3 Proposed Methodology

8.3.1 Assessment

The assessment will cover effects at the local level, on people and communities in the immediate vicinity of the proposed Project, and wider effects upon the surrounding rural areas.

The following subject areas of the receiving environment will be assessed:

- Amenity (term used to describe the overall pleasantness or attractiveness of the surroundings);
- Health;
- Land Use (temporary or permanent land-take or change in access, and the category of land use);
- Employment;
- Tourism; and
- Expenditure (supply chain).

8.3.2 Desktop Study

Desk-based information collected to inform the baseline will include: Ordnance Survey Ireland (OSI) maps; aerial photography; GIS datasets; and statistical information from the Central Statistics Office (CSO)). Further information will also be obtained through engagement with consultees.

For the amenity and health assessment, assessment findings from the constituent topic chapters.

Information relating to land ownership in proximity to the Application boundaries will be used to inform the Land Use effects assessment.

8.3.3 Field Survey Requirements

No field surveys are required for any of the assessments in this chapter.

8.3.4 Amenity and Health Assessments

The amenity assessments will draw on the residual impacts identified in other assessments, specifically, visual, traffic and transport, air quality and noise.

For the purposes of this assessment, detrimental effects on amenity are considered to arise when a combination of two or more visual, traffic, air quality and noise effects coincide on a particular area or receptor, although for commercial and tourism receptors a secondary amenity effect can occur as a result of just one of these effects. For example, a visual effect could have a secondary effect on the operation of the tourism business, potentially resulting in a loss of trade. The purpose of the amenity assessment is to recognise and assess these effects.

In determining whether the combined topic effects create a significant effect at a community level, the minimum threshold of a community is applied: an effect must be shared by at least five properties. Where

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moderate or major effects are experienced by fewer than five properties, this will be noted.

8.3.5 Significance of Effect

Generic guidance set out in Appendix D of this Scoping report will be used to determine significance of effects. It should be noted that as this assessment includes a wide range of considerations, the final significance category may be adjusted in some instances using professional judgement. Where such an adjustment is made, an explanation will be provided within the assessment.

8.4 Baseline Conditions

8.4.1 XC187 Fantstown

Amenity and Health

XC187 - Fantstown is located in a rural area away from main settlements, however there are a number of farm buildings and rural dwellings as well as few housing clusters within 1.5km of the crossing. The nearest dwelling is less than 10m. The through road has several houses to the north, whilst the southern part of the road is predominantly used for access to agricultural lands and holds one dwelling adjacent to the crossing. Within 1km there is also a B&B and Driving School. Within 1.5km there are a number of other receptors including Staker Wallace GAA Club, Bulgaden Castle pub, a catering company and a church.

There are no schools, emergency or health services located in close proximity to the site. The Section 73 application in 2009, however, proposed to close the PRow across the level crossing. This was not pursued further, and the PRow remains in place.

The 2016 census of the area found that 197 people of the 340 people surveyed were in 'Good' or 'Very Good' health with only 3 people stating that their general health was 'Bad'.

Land Use

Land Use in the area is predominantly rural, consisting of agricultural lands and farm buildings in addition to a number of residential properties.

Employment

The main employment source within 1km to the site is farming as well as a small number of small businesses between 1-1.5km from the construction site. Kilmallock

is the nearest town to the site and would be a key employment area.

The 2016 census of the Fantstown area found that 148 people of the 265 persons over 15 years old in the area were employed and only 8 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Farmers and Agricultural workers were the largest socio-economic group with 17% of the local population falling into this category.

Tourism

There are 2 hotels / B&Bs in the study area; House of Aunt Mary and Bulgaden Castle which are 800m and 1.4km away from the crossing respectively.

8.4.2 XC201 Thomastown

Amenity and Health

XC201 - Thomastown is located in a rural area away from main settlements, approximately midway between Kilmallock and Charleville (approximately 4.5km to each), however there are a number of farm buildings and rural dwellings as well as few housing clusters within 1.5km of the crossing. The nearest dwelling is close by; less than 10m. The existing crossing and through road has approximately 4 houses to the north of the railway, which stretches 350m and similarly approximately 4 houses on the stretch of road south of the crossing which is approximately 1km long.

Within 1km there is also a B&B and Driving School. Within 1.5km is Our Lady Queen of Peace Church and a church hall.

There are no schools, emergency or health services or Public Rights of Way located in close proximity to the site.

The 2016 census of the area found that 268 people of the 304 people surveyed were in 'Good' or 'Very Good' health with only 3 people stating that their general health was 'Bad'.

Land Use

Land Use in the area is predominantly rural, consisting of agricultural lands and farm buildings in addition to a number of residential properties.

Employment:

The 2016 census of the Thomastown area found that 111 people of the 231 persons over 15 years old in the

area were employed and only 6 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Farmers and Agricultural workers were the largest socio-economic group according to the 2016 census with 23% of the local population within this group. Kilmallock is the nearest town to the site and would be a key employment area.

Tourism

There are no hotels or B&Bs in the study area.

8.4.3 XC209 Ballyhay

Amenity and Health

XC209 - Ballyhay is located in a rural area away from main settlements, however there is a dwelling and a stable directly adjacent to the crossing, within 10m. The through road is a forked junction therefore 3 roads meet at the crossing and each contain a number of residential houses and farm buildings.

Within the 1.5km study area there are a number of small businesses, housing clusters and individual houses, farm buildings, recreational facilities and tourist attractions and hotels/B&Bs.

There are no schools, emergency or health services or Public Rights of Way located in close proximity to the site.

The 2016 census of the area found that 146 people of the 166 people surveyed were in 'Good' or 'Very Good' health with only 2 people stating that their general health was 'Bad'.

Land Use

Land Use in the area is predominantly rural, consisting of agricultural lands and farm buildings in addition to a number of residential properties.

Employment

The 2016 census of the Thomastown area found that 77 people of the 134 persons over 15 years old in the area were employed and only 8 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Despite being a relatively rural area, farmers and agricultural workers were the second smallest socio-economic group according to the 2016 census with only 4% of the local population within this group. Charleville is the nearest town to the site and would be a key employment area.

There are a number of businesses on the N20 road through Ballyhay including Lidl Distribution Centre and with Charleville town less than 5km away there are a number of other employment opportunities to those living in the study area.

Tourism

There is a hotel and a B&B in the study area; Corbett Court Hotel and Marengo Guest Accommodation B&B just under 1.5km from the proposed Project.

8.4.4 XC211 Newtown & XC212 Ballycoskery

Amenity and Health

XC211 - Newtown is located in a rural area with a number of dwellings in close proximity. The nearest dwelling is approximately 15m from the crossing and 4 dwellings on the through road south of the crossing and numerous on the through road heading north towards Ballyhay.

XC212 - Ballycoskery is located in a rural area however is close to some main settlements. A housing development is located within 50m of the west of the crossing and the local primary school is approximately 85m to the east.

Within 1km there is also a Church, a Filling Station and a Fast Food Outlet. Within 1.5km is a B&B and a hotel.

There are no emergency or health services, or Public Rights of Way located in close proximity to the site.

The 2016 census of the Ballycoskery area found that 237 people of the 273 people surveyed were in 'Good' or 'Very Good' health with only 6 people stating that their general health was 'Bad'.

The 2016 census of the Newtown area found that 232 people of the 263 people surveyed were in 'Good' or 'Very Good' health with only 3 people stating that their general health was 'Bad'.

Land Use

Land Use in the area is predominantly rural, consisting of agricultural lands, residential properties and a school.

Employment

The 2016 census of the Ballycoskery area found that 91 people of the 216 persons over 15 years old in the area were employed and 26 people were 'unemployed'

with the remainder students, retired, looking after the home/family or unable to work due to illness. Farmers and Agricultural workers were one of the largest socio-economic groups according to the 2016 census with 15% of the local population within this group.

The 2016 census of the Newtown area found that 103 people of the 184 persons over 15 years old in the area were employed and 9 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Farmers and Agricultural workers were the largest socio-economic group according to the 2016 census with 27% of the local population within this group.

From a desktop survey there appear to be no small businesses in the study area, however the school, hotel and B&B and the small number of facilities in the area (Filling Station and Fast Food Outlet) may provide a small amount of employment. Charleville is likely to be a key employment hub.

Tourism

There is a hotel and a B&B in the study area.

8.4.5 [XC215 Shinanagh](#)

Amenity and Health

XC215 - Shinanagh is located in a rural area away from main settlements, however there are a number of farm buildings and rural dwellings as well as few housing clusters within 1.5km of the crossing.

The nearest dwelling is less than 10m however appears to derelict. Thereafter the nearest dwelling is approximately 400m away from the crossing. The through road leads directly only the N20 road between Limerick and Cork. Within 1.5km there is also a local pub and an old church and graveyard ruin.

There are no schools, emergency or health services or Public Rights of Way located in close proximity to the site.

The 2016 census of the area found that 318 people of the 344 people surveyed were in 'Good' or 'Very Good' health with 6 people stating that their general health was 'Bad' or 'Very Bad'.

Land Use

Land Use in the area is predominantly rural, consisting of agricultural lands and farm buildings in addition to a number of residential properties. A motorway road network runs directly parallel to the railway line.

Employment

One of the main employment sources within 1.5km to the site is farming. Buttevant is the nearest town, just 5km from the proposed Project and would be a key employment area, equally Charleville is approximately 8km to the north of the proposed Project.

The 2016 census of the area found that 162 people of the 261 persons over 15 years old in the area were employed and only 8 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Farmers and Agricultural workers were the second largest socio-economic group according to the 2016 census with 16.8% of the local population within this group. 17.4% of the local population are employers or managers.

Tourism

There are no hotels or B&Bs in the study area.

8.4.6 [XC219 - Buttevant](#)

Amenity and Health

XC219 - Buttevant is located in a relatively rural area away from main settlements, however there are a number of farm buildings and rural dwellings as well as a few housing clusters within 500m of the crossing. To the east of the crossing is the town of Buttevant which has a number of local facilities including schools, churches, GP surgery and a number of shops, cafes, bars, restaurants, as well as a number of other services and businesses.

The nearest dwelling is about 100m from the crossing. The through road has a number of houses to the east and west of the crossing in addition to a number of farm buildings and farm yards. Buttevant Rail Disaster Memorial is also around 30m to the east of the crossing.

Within 500m is Coláiste Pobail Naomh Mhuire, and within 1km is Greenpark Industrial Estate and Buttevant GAA Club. There are many other facilities in Buttevant town which is less than 1km away, including local grocery shops, a pharmacy, Buttevant Soccer Club, a playground, St Mary's Catholic Church, a number of pubs, restaurants, and a number of other small and large businesses.

The 2016 census of the Buttevant Electoral Division found that 614 people of the 1,744 people surveyed were in 'Good' or 'Very Good' health with 37 people stating that their general health was 'Bad' or 'Very Bad'.

Land Use

XC219 - Buttevant is located in a relatively rural area close to a number of farm buildings and rural dwellings however the town of Buttevant is within 1km. To the west, north and south of the proposed Project, the area remains predominately rural, however 500m to the east of the crossing the area becomes much more urban towards Buttevant town.

Employment

The 2016 census of the Buttevant Electoral Area found that 708 people of the 1,426 persons over 15 years old in the area were employed and 116 people were 'unemployed' with the remainder students, retired, looking after the home/family or unable to work due to illness. Professional Services was the largest industry in the area closely followed by Commerce and Trade with 24% and 21% of the population employed in these industries. 8% of the population were employed in Agriculture, forestry and fishing.

Tourism

There are no hotels or B&Bs in the study area.

8.5 Potential Effects

8.5.1 Construction Phase

There are no construction works proposed for XC187 – Fantstown; and at XC209 - Ballyhay CCTV is proposed which would require minimal construction, so there would be no effects.

For the remaining sites, the potential effects on the local community during the construction phase include:

- Amenity effects from increased noise, traffic and possibly dust;
- Temporary land-take to accommodate construction compounds and laydown areas;
- Possible delays to travel to work as a result of diversions or closures;
- Possible beneficial effect at a local hotel at XC211 – Newtown & XC212 – Ballycoskery if used by construction workers;
- Possible beneficial effect from construction workers' spend locally.

8.5.2 Operational Phase

The potential effects on the local community during the operational phase include:

- Possible increased travel to work, school or for leisure times as a result of proposed diversion at XC187 - Fantstown;
- Beneficial effect from improved safety;
- Possible beneficial amenity effect from reduced noise and emissions from idling cars;
- At XC212 - Ballycoskery, an additional beneficial effect from the provision of parking for the local school;
- Adverse effects from visual impact of new overbridges and link roads; and
- Possible severance issues in land taken for the proposed Project.

9. Biodiversity

9.1 Legislation, Policy & Guidelines

9.1.1 Legislation and Policy

Appendix C includes key legislation and policy that will be taken into consideration as part of the biodiversity assessment.

9.2 Proposed Methodology

The impact assessment process involves:

- identifying and characterising impacts;
- incorporating measures to avoid and mitigate (reduce) these impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects, where required; and
- identifying opportunities for ecological enhancement.

Methods for assessing significance will draw on the generic method set out in Appendix D.

The following data sources have been used to inform the desktop study:

- Aerial imagery (ESRI);
- Mapping of European site boundaries available online at www.npws.ie;
- Protected and invasive species data from the National Biodiversity Data Centre online at <http://www.biodiversityireland.ie/>;
- Environmental Protection Agency (EPA) rivers and water quality data <https://gis.epa.ie/EPAMaps/>;
- Bat Roost Records from Bat Conservation Ireland at <https://www.batconservationireland.org/>; and
- Fishers data from online sources including local angling clubs and Inland Fishers Ireland (IFI) website <https://www.fisheriesireland.ie/>.

9.3 Baseline Conditions

9.3.1 XC187 - Fantstown

Results of the Desktop Study

- No designated sites within 5km of the XC187 - Fantstown crossing (hereafter referred to as the proposed crossing).
- Nearest designated site to the proposed crossing is the Ballyroe Hill & Mortlestown Hill proposed Natural Heritage Area (pNHA) (Site Code 002089), which is over 6.7km away.
- Land at crossing is surrounded predominantly by improved agricultural grassland delineated by hedgerow and scrub.
- The Ahnagluggin Stream (source name: EPA) is the nearest watercourse, approximately 20m from the proposed crossing. Under the Water Framework Directive (WFD) this stream is classified as of good status, however, the risk score is unassigned. This watercourse is not hydrologically linked to any designated site.
- A search of the National Biodiversity Data Centre (NBDC) within 2km of the proposed crossing returned records of several protected bird species and badger (*Meles meles*).
- There were no records of invasive species within this 2km area. The closest bat roosts recorded by Bat Conservation Ireland are over 7km from the proposed crossing, however, several bat species have been recorded within 3km of the proposed crossing (Leislars (*Nyctalus leisleri*); Common Pipistrelle (*Pipistrellus pipistrellus*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*)).

Survey Requirements

No earthworks or demolition is proposed for this site; as such, no detailed surveys are likely to be required. However, a walkover survey to map broad habitat types within the surrounding area will be undertaken.

Consultation

No consultation is likely to be required in relation to this crossing.

9.3.2 XC201 - Thomastown

Results of the Desktop Study

- Nearest designated site to the XC201 - Thomastown crossing (hereafter referred to as the

proposed crossing) is Mountrussell Wood proposed Natural Heritage Area (pNHA) (Site Code 002088), 5km away.

- The Blackwater River (Cork/Waterford) Special Area of Conservation (SAC) is over 6km away. This SAC is designated for a wide range of habitats and species, including freshwater pearl mussel (*Margaritifera margaritifera*), white-clawed crayfish (*Austropotamobius pallipes*), sea, brook and river lamprey (*Petromyzon marinus*, *Lampetra planeri* and *Lampetra fluviatilis* respectively), Atlantic salmon (*Salmo salar*), twaite shad (*Alosa fallax*) and otter (*Lutra lutra*) (NPWS, 2012).
- Proposed crossing is surrounded predominantly by improved agricultural grassland delineated by hedgerow and scrub.
- There are several buildings in the vicinity.
- The Gortacrank stream, approximately 360m from the proposed crossing, is classified as of good status under the WFD, however the risk score is unassigned. This watercourse is not hydrologically linked to any designated site.
- A search of the NBDC within 2km of the proposed crossing returned records of several protected bird species and badger.
- There were no records of invasive species within this 2km area.
- No other recorded of protected species were identified.
- The closest bat roosts recorded by Bat Conservation Ireland are over 13km from the proposed crossing however, several bat species have been recorded within 4km of the proposed crossing common pipistrelle and soprano pipistrelle.

Survey Requirements

A multi-disciplinary walkover survey will be carried out at an appropriate time of the year to map broad habitat types and record any rare, protected or invasive species within the study area. The data from the walkover will be used to identify the requirement for any further dedicated ecological surveys.

Based on the current proposals for XC201 - Thomastown crossing dedicated breeding bird surveys are not considered necessary. Signs (nests, calls and sightings) of breeding birds within the study area will be identified during the walkover survey. Similarly, dedicated surveys (e.g. for bats, aquatic species etc.)

are likely to be scoped out based on the current proposals but informed by walkover survey results.

Consultation

No consultation is likely to be required in relation to this crossing.

9.3.3 XC209 - Ballyhay

Results of the Desktop Study

- The Blackwater River (Cork/Waterford) Special Area of Conservation (SAC) (Site Code 002170) is the nearest designated site to the XC209 - Ballyhay crossing (hereafter referred to as the proposed crossing). The SAC is designated for a wide range of habitats and species, including freshwater pearl mussel, white-clawed crayfish, sea, brook and river lamprey, Atlantic salmon, twaite shad and otter (NPWS, 2012).
- The proposed crossing is surrounded predominantly by improved agricultural grassland and wet grassland delineated by hedgerow and scrub.
- The nearest watercourse is the Awbeg (Buttevant East) river located approximately 19m from the proposed crossing. The Awbeg falls within the Blackwater River SAC approximately 1.5km downstream of the proposed crossing. Under the WFD this river is classified as of moderate status around the proposed crossing and is classed as 'at risk'.
- A search of the NBDC within 2km of the proposed crossing returned records for several bird species, badger and white-clawed crayfish. Otter signs (spraint) were also recorded just over 2km from the proposed crossing in 2015. White-clawed crayfish are known to be present in the Awbeg river and large numbers were found during river maintenance work in 2009 upstream of Buttevant village, which were then translocated to undisturbed habitat (NPWS, 2012). It is noted that Atlantic salmon are restricted to the lower reaches of the SAC due to artificial barriers and weirs (NPWS, 2012). Freshwater pearl mussel are found predominantly in the main Blackwater River, therefore impacts to this species are unlikely to occur.
- Regular breeding of twaite shad has been confirmed in the River Blackwater in recent years (King and Linnane, 2004; King and Roche, 2008).
- There were no records of invasive species within the 2km search area.

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- There were no records of bats within 5km of the proposed crossing; the closest bat roosts recorded by Bat Conservation Ireland were over 8km from the proposed crossing.

Survey Requirements

A multi-disciplinary walkover survey will be carried out at an appropriate time of the year to map broad habitat types and record any rare, protected or invasive species within the study area. The data from the walkover will be used to identify the requirement for any further dedicated ecological surveys.

Based on the current proposals for XC209 - Ballyhay crossing dedicated breeding bird surveys are not considered necessary. Signs (nests, calls and sightings) of breeding birds within the study area will be identified during the walkover survey. Similarly, dedicated surveys for bats are likely to be scoped out based on the current proposals. However, based on the current proposals further surveys will likely be required to be undertaken in 2019 comprising the following:

- Mammal survey (otter); and
- Aquatic habitat assessment/ surveys (salmonids, lamprey, crayfish etc.).

Surveys will have regard for best practice guidelines including but not limited to:

Consultation

The Avbeg River is a tributary of the Blackwater River (Cork/Waterford) Special Area of Conservation (SAC) therefore consultation may be required with The National Parks and Wildlife Service (NPWS) in relation to potential impacts to this European designated site.

9.3.4 [XC211 - Newtown & XC212 - Ballycoskery](#)

Results of the Desktop Study

- The nearest designated site is the Blackwater River (Cork/Waterford) Special Area of Conservation (SAC), approximately 530m from the XC212 - Ballycoskery crossing and 690m from the XC211 - Newtown crossing (hereafter referred to as the proposed crossings).
- A small watercourse located along a field boundary south of the XC212 - Ballycoskery crossing flows into the SAC potentially providing a hydrological link to the SAC. The SAC is designated for a wide range of habitats and species, including freshwater pearl mussel, white-clawed crayfish, sea, brook and river lamprey,

Atlantic salmon, twaite shad and otter (NPWS, 2012).

- Ballyhoura Mountains SAC (Site Code 002036) designated for Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths and blanket bogs (* if active bog) is located around 4.5km from the crossings at XC211 - Newtown and XC212 - Ballycoskery (NPWS, 2016). Ballyhoura Mountains proposed Natural Heritage Area (pNHA) is located about 3.2km from the crossings. There is no hydrological link to either of the sites and given that these sites are designated for habitats only impacts to these sites are unlikely.
- The proposed crossing is surrounded predominantly by agricultural and amenity grassland delineated by hedgerow, scrub and treelines.
- A search of the NBDC returned records of badger within 2km of both crossings, and records of white-clawed crayfish within 2km of the crossing at XC211 - Newtown. Otter signs (spraint) were recorded just over 1.5km from the proposed XC212 - Ballycoskery crossing in 2015. Juvenile sea lamprey has been recorded in the Awbeg (Buttevant East) River south of Ballycoskery, however it has been noted that artificial barriers can block or cause difficulties to lampreys' upstream migration, thereby limiting species to lower stretches and restricting access to spawning areas (NPWS, 2012). White-clawed crayfish are present in the Awbeg river and large numbers were found during river maintenance work in 2009 upstream of Buttevant village, which were then translocated to undisturbed habitat (NPWS, 2012). It is noted that Atlantic salmon are restricted to the lower reaches of the SAC due to artificial barriers and weirs (NPWS, 2012). Freshwater pearl mussel are found predominantly in the main Blackwater River, therefore impacts to this species are unlikely to occur.
- Regular breeding of twaite shad has been confirmed in the River Blackwater in recent years (King and Linnane, 2004; King and Roche, 2008).
- There was one record of Japanese knotweed (*Fallopia Japonica*) within 2km of the proposed crossing. There were no other records of invasive species within this area.
- There were no records of bats within 5km of the proposed crossing; the closest bat roosts records from Bat Conservation Ireland were over 6km from the proposed crossing. The old station building located adjacent to the crossing may have potential to support a bat roost(s).

Consultation

No consultation is likely to be required in relation to this crossing.

9.3.5 XC215 - Shinanagh

Results of the Desktop Study

- The Blackwater River (Cork/Waterford) SAC is approximately 400m from the XC215 - Shinanagh crossing (hereafter referred to as the proposed crossing). The SAC is designated for a wide range of habitats and species, including freshwater pearl mussel, white-clawed crayfish, sea, brook and river lamprey, Atlantic salmon, twaite shad and otter (NPWS, 2012).
- The proposed crossing is surrounded predominantly by agricultural and amenity grassland delineated by hedgerow and scrub.
- The Awbeg (Buttevant) is located approximately 230m from the proposed crossing. Under the WFD this river is classified as of poor status and at risk.
- Juvenile sea lamprey has been recorded in the Awbeg (Buttevant East) River south of Ballycoskery (NPWS, 2012). White-clawed crayfish are present in the Awbeg river and large numbers were found during river maintenance work in 2009 upstream of Buttevant village, which were then translocated to undisturbed habitat (NPWS, 2012). It is noted that Atlantic salmon are restricted to the lower reaches of the SAC due to artificial barriers and weirs (NPWS, 2012). Freshwater Pearl Mussel are found predominantly in the main Blackwater River, therefore impacts to this species are unlikely to occur.
- Regular breeding of twaite shad has been confirmed in the River Blackwater in recent years (King and Linnane, 2004; King and Roche, 2008).
- Ballyhoura Mountains proposed Natural Heritage Area (pNHA) (Site Code 002036) and Ballinvonear Pond pNHA (Site Code 000012) are approximately 3.4km from the proposed crossing. There is no hydrological link to either of the sites and given that these sites are designated for habitats only impacts to these sites are unlikely.
- A search of the NBDC returned records for otter and white-clawed crayfish within 2km of the proposed crossing. Otter have been recorded within 2km of the proposed crossing. There were also records of badger, common frog (*Rana temporaria*) and bird species within 2km of the proposed crossing.

- There is an historical record of whooper swan (*Cygnus cygnus*) recorded in fields immediately west of the proposed crossing. A mean peak of 32 birds was recorded from 1994 – 2001.
- There were two records of Japanese knotweed within 2km of the proposed crossing one of which falls within the footprint of the proposed works associated with the crossing upgrade. There were no other records of invasive species within this area.
- The closest bat roost recorded by Bat Conservation Ireland is approximately 4.7km from the proposed crossing, this is a brown-long eared (*Plecotus auritus*) bat roost.

Survey Requirements

A multi-disciplinary walkover survey will be carried out at an appropriate time of the year to map broad habitat types and record any rare, protected or invasive species within the study area. The data from the walkover will be used to identify the requirement for any further dedicated ecological surveys.

Based on the current proposals for XC215 - Shinanagh crossing dedicated breeding bird surveys are not considered necessary. Signs (nests, calls and sightings) of breeding birds within the study area will be identified during the walkover survey. Similarly, dedicated surveys for bats are likely to be scoped out based on the current proposals. However, based on the current proposals further surveys will be required to be undertaken in 2019 comprising the following:

- Mammal survey (badger).

Consultation

No consultation is likely to be required in relation to this crossing.

9.3.6 XC219 - Buttevant

Results of the Desktop Study

- The Blackwater River (Cork/Waterford) Special Area of Conservation (SAC) (Site Code 002170) is within 280m from the XC219 - Buttevant crossing (hereafter referred to as the proposed crossing). The SAC is designated for a wide range of habitats and species, including freshwater pearl mussel, white-clawed crayfish, sea, brook and river lamprey, Atlantic salmon, twaite shad and otter (NPWS, 2012).

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- The proposed crossing is surrounded by predominantly improved agricultural grassland and wet grassland delineated by hedgerow and scrub.
- The nearest watercourse, located approximately 19m from the proposed crossing, is hydrologically linked to the SAC. This watercourse is the Pepperhill River (source name: EPA) which flows directly into the Awbeg River 294m downstream, which is within the Blackwater River SAC. This river has been classified under the Water Framework Directive (WFD) as poor status and 'at risk'. The biological and invertebrate status is poor and the macrophyte status is unassigned.
- Kilcolman Bog Special Protection Area (SPA) (Site Code 004095) is approximately 4km from the proposed crossing. This SPA is designated for whooper swan, teal (*Anas crecca*) and shoveler (*Anas clypeata*). Eagle Lough proposed Natural Heritage Area (pNHA) (Site Code 001049) is approximately 2.6km from the proposed crossing.
- A search of the National Biodiversity Data Centre (NBDC) returned records for badger and white-clawed crayfish within 2km of the proposed crossing. Otter have been recorded just over 2km from the proposed crossing on the Awbeg River. River and brook lamprey have also been recorded in the Awbeg river at Buttevant. It is noted that Atlantic salmon are restricted to the lower reaches of the SAC due to artificial barriers and weirs (NPWS, 2012). Freshwater pearl mussel are found predominantly in the main Blackwater River, therefore impacts to this species are unlikely to occur.
- Regular breeding of twaite shad has been confirmed in the River Blackwater in recent years (King and Linnane, 2004; King and Roche, 2008).
- There were no records of invasive species within this 2km area.
- The closest bat roosts recorded by Bat Conservation Ireland were approximately 4.9km from the proposed crossing. An old station building, and storage shed located adjacent to the crossing may have potential to support a bat roost(s).

Survey Requirements

A multi-disciplinary walkover survey will be carried out at an appropriate time of the year to map broad habitat types and record any rare, protected or invasive species within the study area. The data from the

walkover will be used to identify the requirement for any further dedicated ecological surveys.

Based on the current proposals for XC219 - Buttevant crossings dedicated breeding bird surveys are not considered necessary. Signs (nests, calls and sightings) of breeding birds within the study area will be identified during the walkover survey. However, based on the current proposals likely further surveys will be required to be undertaken in 2019 comprising the following:

- Mammal survey (bats, otter);
- Botanical survey focused on potentially important habitat types (e.g. those potentially corresponding to Annex I habitats); and
- Aquatic habitat assessment/ surveys (salmonids, lamprey, crayfish etc.).

Consultation

Consultation with Inland Fisheries Ireland (IFI) will be required in relation to works around the Bregoge River. The Bregoge River is a tributary of the Blackwater River (Cork/Waterford) SAC therefore consultation may be required with The National Parks and Wildlife Service (NPWS) in relation to potential impacts to this European designated site.

9.4 Potential Impacts

9.4.1 Construction Phase

The potential effects on biodiversity during the construction phase are set out in Table 9.1.

Table 9.1 Potential Effects Construction Phase

Impacts	Sites
Temporary loss of habitat within the footprint of the proposed Project to facilitate access roads, construction compounds and the new road alignment	XC201, XC211, XC212 and XC219
Disturbance, and temporary displacement of birds from the working corridor and in close proximity to the proposed Project	XC201, XC211 XC212 and XC219
Disturbance, and/or potential permanent loss of a bat roost(s) associated with buildings and trees to be removed.	XC211, XC212 and XC219
Disturbance and temporary displacement of birds and amphibians from the working corridor and in close proximity to the proposed Project	XC219

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Impacts	Sites
Temporary loss of bat foraging habitat	XC219
Pollution of surface waters including the Bregoge River and downstream SAC	XC219
Disturbance, and possible temporary displacement of aquatic/riparian species (otter, crayfish, lamprey etc.)	XC219
Potential temporary loss of fish habitat	XC219
Potential loss of otter foraging habitat/habitat fragmentation	XC219
Temporary displacement of foraging badger	XC215

9.4.2 Operational Phase

The potential effects on biodiversity during the construction phase are set out in Table 9.2.

Table 9.2 Potential Effects Operational Phase

Impacts	Sites
Permanent loss of habitat, including loss of bird nesting habitat, under the footprint of the proposed new road alignment.	XC201, XC211, XC212, XC215 and XC219
Permanent loss of habitat under the footprint of the proposed new road alignment; including potentially important habitat types (e.g. corresponding to Annex I habitats) and supporting bat and bird habitat.	XC211, XC212 and XC219
Permanent fragmentation of badger foraging habitat	XC215
Permanent loss of habitat supporting badger under the footprint of the new alignment.	XC215
Changes in hydrology from bridge piers/culvert	XC219
Pollution of surface waters from new outfalls.	XC219

10. Soils, Geology & Hydrogeology

10.1 Legislation, Policy & Guidelines

Appendix C includes key policy and legislation that will be taken into consideration as part of the soils, geology and hydrogeology assessment.

10.2 Proposed Methodology

10.2.1 Soils and contaminated land

To assess the consequences of encountering any contaminated land, conceptual site models (CSMs) would be developed at each site. These follow the source, pathway, receptor linkages to identify potential impacts. A receptor can be a person (including construction workers), the water environment, flora, fauna, or building/structures. The CSM represents a network of linkages between potential sources of contamination at the site, and exposure of the receptors through various different possible pathways. Historical sources of potentially contaminated land have been assessed by examining historic maps.

Within the assessment, the CSM would disregard pathways that are incomplete and thus do not pose a risk to any of the identified receptors. Where a source, pathway, receptor linkage exists, this would be a complete pollutant linkage, and a generic qualitative risk assessment would be undertaken.

Generic quantitative risk assessments cannot be reported in terms of 'sensitivity'. Instead, it will be reported as the 'likelihood' of a complete pollutant linkage being present. This is defined in CIRIA 2001.

10.2.2 Geology

Sensitivity and magnitude criteria for the geology assessment will be determined using professional judgement and existing good practice.

10.2.3 Hydrogeology

Criteria for the definition of groundwater sensitivity and magnitude will be determined using professional judgement and existing good practice.

Where dewatering is identified as being required, the potential zone of influence which the dewatering may impact upon would be calculated using the Sichardt method.

There are no groundwater flooding maps yet available in Ireland. Groundwater levels and depths observed during the ground investigation, in combination with the local geology, will be used to inform on the potential for groundwater flooding to occur. In addition, local authorities will be consulted with to confirm their knowledge of any historic occurrences of groundwater flooding and additional pertinent detail.

10.2.4 Consultation

Consultation will be made with the EPA in relation to any pre-existing knowledge on groundwater quality and/or contaminated land issues and/or active groundwater abstractions.

Local authorities and Irish Water will be consulted with to determine the potential locations of private water supplies in the area, alongside information gathered directly from land owners.

The outcomes of these consultations will feed into the identification of relevant receptors.

10.3 Baseline Information

10.3.1 XC187 - Fantstown

Desktop Study

Historic maps

Historic mapping dated at 1837 to 1842 shows the rail line present, but no other infrastructure is shown at the site. Surrounding land is indicated as vacant and therefore presumed as used for agricultural purposes, with some small dwellings shown within 500m. No industrial land uses are indicated. Therefore, historic land use is unlikely to represent a source of contaminated land, other than the rail line itself.

Soils

Available mapping suggests that there are likely to be several soil associations present at the site and within 500m, as follows:

- The Elton association, described as a fine loamy drift with limestones;
- The River association, which is described as river alluvium; and
- The Howardstown association, described as clayey drift with limestones.

Geology

Geological maps show that the bedrock geology at the crossing and within 500m comprises the Visean Limestones (undifferentiated).

Maps show that the superficial deposits at the crossing are likely to comprise Alluvium, associated with the adjacent surface water course, and Till, indicated as being derived from limestones. There is potential to encounter additional Lacustrine Sediments within 500m.

There are no active quarries or pits within 500m of the crossing. The site is located within an area with low to moderate potential for crushed rock aggregate and an area with very low potential for granular aggregate. Within 500m are areas with low potential for granular aggregate, and high to very high potential for crush rock aggregate.

Hydrogeology

The bedrock at the site is classed as a Locally Important Aquifer, where the bedrock is described as moderately productive only in local zones. This is associated with the limestone bedrock. No other aquifer types are indicated within 500m of the crossing.

Available recharge maps show that the location is within an area of moderate permeability subsoil overlain by poorly drained gley soil, with average recharge approximately 126mm/year.

No Karst Landforms are mapped as present at the site or within 500m.

There is the potential for a number of potential groundwater wells and springs in the area. One borehole is indicated approximately 420m to the south of the crossing, indicated as used for agricultural and domestic uses. The notes for this location suggest it ran dry in 1970, and therefore may no longer be in use. A potential dug well may be located within 500m of the crossing site. It should be noted that the exact location of these features are not known, as the boreholes and springs are displayed as area zone rather than a location. Additional potential wells and springs are indicated in the surrounding areas, but not within 500m.

There is also potential that additional private water supplies (PWS) may be identified during the consultation process with local authorities. These are unknown at this stage.

The crossing site is not located within a source protection area (SPA) or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

No ground investigation is proposed at this location, as no earthworks is proposed.

Land owners in the vicinity of the crossing will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk. However, assuming no construction will take place, it is unlikely this will be required.

10.3.2 XC201 - Thomastown

Desktop Study

Historic maps

Historic maps dated from 1837 to 1842 show that the rail line and roads are present, but that the surrounding land is vacant and presumed as used for agricultural purposes. There are a number of small dwellings located in the surrounding areas, but no industrial use is noted. Based on historic land use, there are unlikely to be any additional sources of potential contamination, other than materials used during the construction of the existing rail line.

Soils

Available soils maps suggest that the soils at the crossing site and within 500m are likely to comprise the Howardstown Association, described as clayey drift with limestones.

Geology

Geological maps indicate that the bedrock at the crossing site and within 500m is likely to comprise the Visean Limestones (undifferentiated).

Superficial deposits at the crossing are shown to likely comprise Till, which has been derived from Devonian sandstones.

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There are no active quarries or pits within 500m of the crossing.

Aggregate potential maps indicate that the crossing site is located within an area with moderate potential for crushed rock aggregate potential. No granular aggregate potential is indicated for this location.

Hydrogeology

Mapping suggests that the bedrock at the crossing site and within 500m is classed as a locally important aquifer, described as moderately productive only in local zones. No superficial aquifers are indicated as present.

Recharge maps suggest that the area is located within an area with moderate permeability subsoil overlain by poorly drained gley soil. The average recharge at this location is indicated as approximately 137mm/yr.

Available maps do not indicate any karst landforms.

Currently available data suggests that there is potential for wells and springs to be located within 500m of the crossing site. There is a potential well located approximately 330m north east of the crossing site, drilled in 1967. The yield from this is noted as poor. It is not known if this is in use. In addition, there are potentially another seven boreholes, dug wells or springs located within 500m of the crossing site. The exact location of these are not known, as the boreholes and springs are displayed as located anywhere within a 1km area; these 1km areas overlap with the 500m radius surrounding the crossing location.

There is potential that additional PWS may be located in proximity to the crossing site. At this stage, this is an unknown and will be clarified through consultation with local authorities.

The crossing site is not located within a source protection area (SPA) or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

A ground investigation will be completed at the crossing location. This will provide more detailed, site specific information on the local ground conditions, including

the depth and thicknesses of the soils and geology, and potential presence of Made Ground. It will also aim to inform on local groundwater conditions, with groundwater monitoring due to take place. Groundwater level monitoring data will also be used to discuss any potential likelihood of groundwater flooding to occur.

In addition, land owners in the vicinity of the crossing will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk.

10.3.3 XC209 - Ballyhay

Desktop Study

Historic maps

Historic maps dated from 1837 to 1842 show that the rail line and surrounding roads are present at this time. No industrial land use is indicated at the site nor within the surrounding areas. Land is shown as vacant and presumed as used for agricultural purposes. There are a number of smaller dwellings shown as located sporadically in the area. Based on historic and current land use, there are no anticipated additional sources of potential contamination, other than materials used during the construction of the existing rail line.

Soils

Available soil mapping suggests that the soil type at the crossing site is likely to comprise Alluvium. Within 500m, additional soil type of the Howardstown association is anticipated. These are described as comprising clayey drift with limestones.

Geology

Geological maps show that the bedrock at the crossing location is likely to comprise the Copstown Limestone Formation. The bedrock to the north of the crossing location is likely to comprise the Visean Limestone (undifferentiated).

A number of superficial deposits are shown as present in the vicinity of the crossing. Alluvium is expected at the crossing location itself. Within 500m, additional deposits of Gravels (which have been derived from Limestones), Till derived from Limestones and Till derived from sandstones are anticipated to be encountered.

There is a thrust fault shown trending NE-SW, located approximately 110m north of the crossing location.

There are no active quarries or pits within 500m of the crossing.

Available aggregate potential maps show that the crossing is located within an area with low, moderate and high potential for crushed rock aggregate, located close together. There is a moderate to high potential for granular aggregate at the crossing location, and very high potential areas located within 500m.

Hydrogeology

The bedrock in this area is classed as a locally important aquifer, described as being moderately productive only in local zones. No other bedrock aquifer types are anticipated within 500m of the crossing location.

No designated superficial aquifers are shown as present both at the crossing location and within 500m.

Information pertaining to groundwater recharge is varied at the crossing location and in the surrounding areas, with average annual recharge varying between 46 and 200mm/year, with soil ranging from low permeability subsoil, to high permeability subsoil sand and gravels overlain by well drained soils.

No mapped karst features are located within 500m of the crossing. However, a spring is mapped as present at a distance of approximately 720m south west of the crossing.

There are no mapped groundwater wells and springs shown as located within 500m of the crossing location.

However, it is possible that additional PWS may be identified within this area which are at this stage unknown. Liaison with local authorities will provide this detail.

The crossing site is not located within a source protection area (SPA) or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

A ground investigation will be completed at the crossing location. This will provide more detailed, site specific information on the local ground conditions, including the depth and thicknesses of the soils and geology, and potential presence of Made Ground. It will also aim to inform on local groundwater conditions, with groundwater monitoring due to take place. Groundwater level monitoring data will also be used to discuss any potential likelihood of groundwater flooding to occur.

In addition, land owners in the vicinity of the crossing will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk.

10.3.4 XC211 Newtown & XC212 Ballycoskery

Desktop Study

Historic maps

Historic maps dated from 1837 to 1842 show that the rail line and road network are present at this time. No industrial land use is indicated at the crossing location or within 500m. There are a number of small dwellings shown as located sporadically within the surrounding areas. Surrounding land is indicated as vacant and presumed as used for agricultural purposes. Therefore, based on land use, it is unlikely that there will be additional potential sources of contamination other than the materials used during the construction of the existing rail line.

Soils

Soil mapping shows that the soil type likely to be encountered at the crossing location is the Howardstown association, described as comprising clayey drift with limestones. Additional maps classify these as comprising glaciofluvial sands and gravels, and Till.

There is potential to encounter additional soil types within 500m of the crossing, including Alluvium to the west.

Geology

Geological maps show that the bedrock at the crossing locations is expected to comprise the Ballysteen Formation of limestone. Within 500m, to the south of the crossings, the Ballymartin Formation and the Lower Limestone Shale are expected to be encountered. Additional bedrock types are located immediately

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beyond 500m, including the Kiltorcan Formation to the south and the Copstown Limestone Formation to the north.

Superficial deposits at crossing XC211 - Newtown are expected to comprise gravels derived from limestones, whereas at XC212 - Ballycoskery these are expected to comprise Till, derived from sandstones. Within 500m additional deposits of Alluvium are likely to be encountered to the west of the crossings.

Mapping also indicates that faulting is prevalent in the surrounding areas, one such fault is likely to fall within 500m of crossing XC211 - Newtown. This fault is unnamed.

There are no active quarries or pits within 500m of the crossings.

Aggregate potential maps show that the crossings are both located within areas where there is moderate potential for crushed rock aggregate. However, within 500m are areas classed as having very low, low, high and very high potential for crushed rock, evidence of the area being highly. Crossing XC211 - Newtown is located in an area with very high potential for granular aggregate; there is no data mapped at crossing XC212 - Ballycoskery. Within 500m of both of the crossings area areas with a high potential for granular aggregate.

Hydrogeology

The crossings are located within an area designated as a locally important aquifer, where the bedrock is classed as moderately productive only in local zones. Within 500m, to the north west of crossing XC211 - Newtown is a localised area of locally important aquifer – karstified. A bedrock aquifer fault is also shown trending approximately south west north east, located approximately 350 to 400m to the north of crossing XC211 - Newtown. Approximately 400m south east of crossing XC212 - Ballycoskery is an area of poor aquifer, where the bedrock is generally unproductive except for local zones.

There are no gravel aquifers indicated at the crossing locations nor within 500m.

Groundwater recharge maps show that the average recharge at the crossing locations varies between 155 and 200mm/year. The hydrogeological setting at crossing XC211 - Newtown is described as high permeability subsoil, sand and gravels overlain by well-drained soil. The setting at crossing XC212 - Ballycoskery is described as moderate permeability subsoil overlain by poorly drained gley soils.

There are no karst features mapped as present at the crossing locations nor within 500m.

No groundwater wells or springs are mapped as present at the crossing locations, nor within 500m.

However, it is possible that additional PWS may be identified within this area which are at this stage unknown. Liaison with local authorities will provide this detail, and these will be assessed further once identified.

The crossings are not located within a source protection area (SPA) or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

A ground investigation will be completed at the crossing locations. This will provide more detailed, site specific information on the local ground conditions, including the depth and thicknesses of the soils and geology, and potential presence of Made Ground. It will also aim to inform on local groundwater conditions, with groundwater monitoring due to take place. Groundwater level monitoring data will also be used to discuss any potential likelihood of groundwater flooding to occur.

In addition, land owners in the vicinity of the crossings will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk.

10.3.5 [XC215 - Shinanagh](#)

Desktop Study

Historic maps

Historic maps dated between 1837 and 1842 indicate that the existing rail line and road networks were present at this time. The surrounding areas of the crossing location are indicated as largely vacant, presumed as used for agricultural purposes. No historic industrial sites are indicated at the crossing location nor within 500m. Therefore, aside from potential materials associated with the construction of the existing rail line,

there are unlikely to be any additional sources of contamination.

Soils

Soil maps show that the crossing is located in an area where the Howardstown soil association is likely to be encountered, which is described as clayey drift with limestones. To the west and south, areas of River alluvium are shown. Additional soil maps show this is mapped as Till, derived mainly from sandstones. Within 500m, to the north of the crossing, are small areas described as bedrock at the surface, comprising shallow well drained mineral.

Geology

Geological maps show that the bedrock at the crossing location is expected to comprise the Kiltorcan Formation. There are additional bedrock deposits located within 500m of the crossing location. To the west and continuing south of the crossing, the following deposits are mapped as present: Lower Limestone Shale, the Ballymartin Formation, and the Ballysteen Formation.

Superficial deposits are expected to comprise Till, derived from sandstones, at the location of the crossing. Within 500m, to the south and west of the crossing, there is potential to encounter Alluvium. To the north of the crossing are two localised areas described as bedrock outcrop or subcrop.

Some structural geology features such as faults are mapped in the surrounding region; however, these are beyond 500m from the crossing location. Geological maps show an anticlinal axis approximately 350m north of the crossing.

There are no active quarries or pits within 500m of the crossing.

Aggregate potential maps show that the crossing is located within an area with very low potential for crushed rock aggregates. The surrounding areas within 500m however are shown to have low, moderate, high and very high potential. No data is available regarding the granular aggregate potential at the crossing location itself, but within 500m are areas with a moderate to high potential for granular aggregates.

Hydrogeology

Available mapping shows that the bedrock underlying the crossing location itself is classed as a regionally important aquifer – fissured bedrock. Within 500m of

the crossing location, the Lower Limestone Shale is classed as a poor aquifer, where the bedrock is generally unproductive except for local zones, and both the Ballymartin Formation and the Ballysteen Formation are classed as locally important aquifers, where bedrock is moderately productive only in local zones.

No gravel aquifers are mapped as present in this area.

Recharge maps show that average recharge at the crossing location is approximately 400mm/year. Within 500m, this varies to 100mm/year.

There is one karst spring, named as St Declas Well, located approximately 110m north of the crossing location. No other features are mapped as present within 500m of the crossing.

There are no groundwater wells or springs mapped as present at the crossing location itself. However, there is one borehole (named BH3) shown as located approximately 480m west of the crossing, which is indicated as installed to a depth of 76.2m. The exact location of this is not known, as the boreholes and springs are displayed as located anywhere within a defined larger area. No other wells or springs are indicated on currently available maps.

However, there is potential for additional private water supplies to be located within this area, which are at this stage unknown. These will be identified through consultation with local authorities and further assessed once known.

The crossing site is not located within a source protection area or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

A ground investigation will be completed at the crossing location. This will provide more detailed, site specific information on the local ground conditions, including the depth and thicknesses of the soils and geology, and potential presence of Made Ground. It will also aim to inform on local groundwater conditions, with groundwater monitoring due to take place. Groundwater level monitoring data will also be used to

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discuss any potential likelihood of groundwater flooding to occur.

In addition, land owners in the vicinity of the crossing will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk.

10.3.6 XC219 - Buttevant

Desktop Study

Historic maps

Available historic maps are dated between 1837 and 1842. These show the current roads and rail line are present at this time. The crossing is shown as located in an otherwise vacant area, adjacent to a water course, with land presumed as used for agricultural purposes. There are some small dwellings located in the surrounding area, with a school and Buttevant Castle shown as present, but greater than 500m from the crossing location. No industrial land uses are indicated within 500m. Therefore, no potential sources of contaminated land, other than the materials used during the construction of the rail line, are anticipated to be encountered at this stage.

Soils

Available soil maps show that the crossing is located within an area where the soils are expected to comprise Alluvium, with the Howardstown soil association (described as clayey drift with limestone) indicated adjacent to these deposits and continuing into the surrounding areas.

Geology

Geological maps show that the crossing is located within the Hazelwood Limestone Formation. To the south of the crossing location, within 500m, the Caherduggan Limestone Formation is indicated as present.

Superficial deposits at the crossing location are shown to comprise Till, derived from sandstones and shales. Immediately west and north of the crossing, deposits of Alluvium are indicated. There are small, localised areas of bedrock outcrop or sub-crop indicated to the south of the crossing.

There is a thrust fault indicated immediately north of the crossing location, trending roughly east-west, and a

series of other un-named faults both within 500m of the crossing and in the surrounding region.

There are no active quarries or pits within 500m of the crossing.

Aggregate potential maps show that the crossing is located within an area with very high potential for crushed rock aggregates, with the surrounding area having a high potential. No data is mapped regarding the granular aggregate potential at the crossing location itself, but within 500m are areas with moderate to high potential for granular aggregates.

Hydrogeology

Hydrogeological maps show that the crossing is located within an area defined as a regionally important aquifer, which is karstified (diffuse). No other bedrock aquifer types are indicated within 500m of the crossing.

There are no gravel aquifers indicated as present at the crossing location nor within 500m.

No karst features have been mapped within 500m of the crossing location.

Only one potential groundwater well or spring is indicated on current maps within 500m of the crossing, however the locational accuracy of this borehole is 2km, therefore the exact location and distance from the crossing is uncertain. This borehole is shown to be installed to a depth of 21.3m. The exact location of this is not known, as the boreholes and springs are displayed as located anywhere within a defined larger area.

In addition, there is potential for additional private water supplies (PWS) to be located within this region. The presence and location of any PWS has not been determined at this stage, and therefore additional stages may identify additional groundwater dependent water supplies which may be impacted by the construction and operation of the crossing.

The crossing site is not located within a source protection area (SPA) or zone of contribution.

Survey Requirements

There are no groundwater dependent terrestrial ecosystems (GWDTEs) anticipated in this area, based on the current land use and available information regarding designated sites. Should the ecological surveys identify otherwise, then surveys will be undertaken, and potential impacts assessed.

A ground investigation will be completed at the crossing location. This will provide more detailed, site specific information on the local ground conditions, including the depth and thicknesses of the soils and geology, and potential presence of Made Ground. It will also aim to inform on local groundwater conditions, with groundwater monitoring due to take place. Groundwater level monitoring data will also be used to discuss any potential likelihood of groundwater flooding to occur.

In addition, land owners in the vicinity of the crossing will be contacted to determine if there are any private water supplies in the area and private water supply surveys will be carried out as required if a supply is deemed at potential risk.

10.4 Potential Impacts

10.4.1 Construction Phase

At XC187 - Fantstown and XC209 - Ballyhay, the proposed solutions are for closure, and no earthwork or demolition work is envisaged. As a result, no impact is expected on the soils, geology and hydrogeology of the area.

At the remaining sites, potentially construction of overbridges and roads are proposed. Typical effects on soils, geology and hydrogeology are described which would be similar for each of these sites.

The construction works would likely involve excavation of topsoil and subsoil deposits, and, dependent on the depth and thicknesses of underlying bedrock strata (which is not well understood at this stage), there is potential to intercept bedrock. This is also dependent on the depth to which any foundations will be required to. However, the local geology does not include any sensitive receptors, and therefore construction impacts on the geology are unlikely to be significant.

The proposed Project could also pose a constraint or limit to potential commercial exploitation of mineral resources. However, given the footprint of the proposed Project this impact is unlikely to be significant.

Impacts on groundwater at this stage are not clear based on limited information regarding likely groundwater levels at the site. However, impacts during construction may generally arise from any dewatering activities that may be required, dependent on the depth of local groundwater. A dewatering effect would be local and could impact on groundwater flow directions. It has the capacity to impact indirectly on environmental

receptors located at proximity, such as any potential groundwater supplies, surface water features, groundwater dependent ecological receptors or other ecosystems that interact with groundwater by reducing their baseflow components.

The proposed overbridges are likely to involve foundations; the specific detail regarding the depth and type of foundation and whether piling is required will be determined at later design stages. Foundations have the potential to impede groundwater flow systems, if shallow groundwater conditions exist. Once the design is finalised, potential impacts on groundwater flow will be assessed further to determine any likely impacts and potential interactions with groundwater.

There is also potential for contamination to occur during construction arising from accidental spillages from construction plant, machinery and any stored fuels on the site. Spillages could cause contamination of both soils and groundwater, by migrating through the unsaturated zone towards the groundwater table, thereby degrading groundwater quality. Contamination of soils may also occur which, depending on any pathways identified, could impact additional receptors. The likelihood of this occurring would be reduced by employing best practice mitigation measures.

Additional impacts on any private water supplies may also be incurred during construction; the number of private water supplies will be determined during field surveys. Potential contamination and changes to the groundwater system as a result of dewatering may impact these supplies. This will be assessed in more detail once more information is available pertaining to the numbers and locations of private water supplies.

No sensitive ecological receptors have been identified or are anticipated at this stage. Ecological surveying will better inform on this, and where any receptors are identified, further assessment will be undertaken.

10.4.2 Operational Phase

At XC187- Fantstown and XC209 - Ballyhay, the crossings are proposed for closure, and therefore no operational phase effects are anticipated.

At the remaining sites, during the operational phase of the proposed Project, some impacts would be similar to those described for the construction phase, such as the impacts that foundations may have on groundwater flow mechanisms. However, the impacts during the operational phase will be generally of a lower magnitude.

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In addition to the above impacts, increased runoff, ~~which may have increased concentrations of pollutants~~ including road salts and fuel, may occur as a result of the new overbridge; however, it is likely that drainage systems are already in place for the existing rail line and surrounding road network, into which the crossing is likely able to be integrated into. This will be determined during late design stages and included in the assessment in the EIAR as increased and potentially contaminated surface water runoff could impact on groundwater quality where it is able to infiltrate through the subsoil towards the groundwater table.

11. Water

11.1 Study Area

The seven sites fall within two hydrological catchments; the Shannon South Estuary in Limerick flowing generally north and west; and the Blackwater (Munster) in Cork, flowing generally south.

In accordance with the TII Guidelines, the study area will be set at a minimum of 250m beyond the land take boundary for each of the sites. This has been extended to 1km for the scoping stage to ensure that no water body that may be hydrologically connected to the sites is excluded.

The scope is further extended to include any site designated for biodiversity that may be hydrologically connected to the water bodies identified within 1km which are within 10km (downstream) of the proposed Project.

11.2 Legislation, Policy & Guidelines

11.2.1 Legislation

Appendix C includes key legislation and policy that will be taken into consideration as part of the water assessment.

11.3 Proposed Methodology

11.3.1 Assessment

The following method for the assessment of impacts has been adapted from the TII Guidelines, which outline how impact quality, type, magnitude, significance and duration are considered relative to the importance of the hydrological attribute.

The sensitivity of surface water receptors and their 'attributes', that could potentially be affected by the proposed Project will be determined with reference to their relative importance or 'value' (e.g. whether features are of national, regional or local value) and by using professional judgment and the TII Guidelines.

The scale or magnitude of potential impacts (both beneficial and adverse) depends on both the degree and extent to which the proposed Project may impact the surface water receptors during the Construction and Operation phases. The generic method outlined in Appendix D will be used to determine the magnitude of impacts.

The generic method outlined in Appendix D will be used to determine the significance of effects.

11.3.2 Desk Top Study

The following data sources will be referred to during the assessment:

- Ordnance Survey of Ireland - current and historic mapping;
- The Shannon RBMP 2009-2015, the South Western RBMP 2009-2015, their associated Water Management Unit Action Plans (various) and the 2nd Cycle National River Basin Management Plan 2018-2021;
- EPA Shannon South Estuary Catchment Assessment 2010 – 2015;
- The EPA Blackwater (Munster) Catchment Assessment 2010 – 2015;
- County and Regional Development Plans for the Benefitting Counties in the study area; and
- Online interactive maps:
 - EPA maps: www.epa.ie
 - WFD maps: www.catchment.ie
 - General maps: www.geohive.ie
 - Statistical maps: www.cso.ie

11.4 Baseline Information

The following sub-sections provide baseline conditions for the two catchments within which the proposed Project is based, detailing the condition of the water bodies risk within the study area. See Figure 11.1

Figure 11.1 Shannon Estuary South and Blackwater Munster catchments

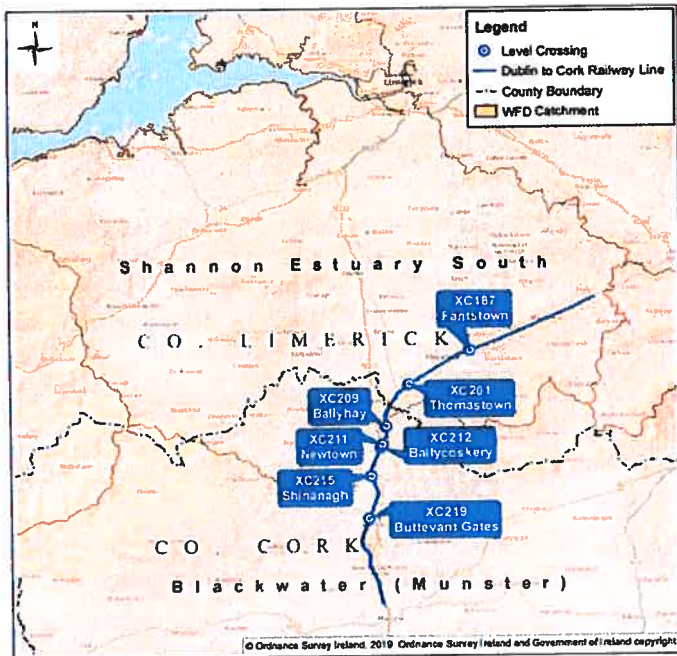


Table 11.1 Baseline Conditions of Water Bodies in Shannon Estuary South

Sub-catchment	Water Body	Sites within 1km	Status	WFD Pressure	Flood Risk
Maigue_SC_020	LOOBAGH_030 IE_SH_24L 010600	XC201	good	Nutrient and organic pollution	low
Maigue_SC_020	BALLYSAL LAGH_010 IE_SH_24B 670530	XC201	Unassigned (assumed good)	Agriculture pressure: nutrient pollution	low ^a
Maigue_SC_020	LOOBAGH_020 IE_SH_24L 010400	XC187	good	No pressure data available	low
Maigue_SC_020	FAIRYFIEL D_GLEBE_010	XC187	Unassigned (assumed good)	Agriculture pressure: nutrient pollution	low

11.4.1 Shannon Estuary South

This catchment includes the area drained by the Rivers Deel and Maigue and all streams entering tidal water in Shannon Estuary between Kilconly Point and Thomond Bridge, Limerick, draining a total area of 2,033km².

The Fantstown and Thomastown crossings are within the Shannon Estuary South catchment and are both located within the Maigue_SC_020 sub-catchment.

Table 11.1 provides a summary of the condition of waterbodies within the study area.

11.4.2 Blackwater (Munster) Catchment

The Blackwater (Munster) Catchment includes the area drained by the River Blackwater and all water bodies between East Point and Knockaverry, Youghal, Co. Cork, draining a total area of 3,310km².

The Buttevant, Shinanagh, Ballycoskerky and Newton railway crossings are all within the Blackwater (Munster) catchment, with the Buttevant and Shinanagh sites located within the Awbeg[Buttevant]_SC_020 sub-catchment, and the Ballycoskerky, Newton and Ballyhay sites within the Awbeg[Buttevant]_SC_010 sub-catchment.

Table 11.2 provides a summary of the baseline conditions of water bodies within the study area.

Table 11.2 Baseline Conditions of Water Bodies in Blackwater (Munster) Catchment

Sub-catchment	Water Body	Sites within 1km	Status	WFD Pressure	Flood Risk
Awbeg [Buttevant] SC_020	AWBEG (Buttevant)_0 20 Code: IE_SW_18A0 50700	XC209	Poor	Urban	high
		XC215	Hydrologically linked to Blackwater River (Cork/Waterford) SAC	Waste Water- Urban Run-off Diffuse Sources Run-Off	
		XC219			
Awbeg [Buttevant] SC_010	AWBEG (Buttevant)_0 10 IE_SW_18A0 50550	XC215	Poor	Hydro-morph	mod
		XC212	Hydrologically linked to Blackwater River (Cork/Waterford) SAC	Agricultural	
		XC211			

11.4.3 Survey Requirement

A walkover of the site will be carried out and will be sufficient survey to inform the assessment.

11.4.4 Consultation

Consultation on the surface water impact assessment will be undertaken with the following organisations:

- Environmental Protection Agency (EPA);
- Water Policy Advisory Committee (Department of Environment, Community and Local Government);
- The National Parks and Wildlife Service (NPWS);
- The Electricity Supply Board (ESB);
- The Office of Public Works (OPW);
- Water Service Departments of the County Councils in the study area;
- Irish Water;
- National Federation of Group Water Schemes;
- Inland Fisheries Ireland (IFI);
- Waterways Ireland;
- Environmental Impact Statement (EIS) Scoping Report;
- 161103WSP1_EIS Scoping Report 67; and

- Local Authorities Water & Communities Office

Note: the above list is not exhaustive and additional bodies/organisations may be contacted as deemed appropriate.

11.5 Potential Impacts

11.5.1 Construction Phase

Water bodies and WFD Status

At XC187 – Fantstown and XC209 - Ballyhay, no construction works are proposed, therefore there would be no effects on surface water receptors at these locations.

For the remaining sites, the construction of overbridges and roads has the potential to cause effects on surface water receptors and typical effects are described which would be similar for each site.

During the construction phase there is potential for an impact on surface water receptors from:

- Silty water run-off: surface water and dewatered groundwater containing high loads of suspended solids from construction activities. This includes the stripping of topsoil during site preparation; the construction of access roads; the dewatering of excavations and the storage of excavated material. In the absence of mitigation there could be effects on the surface water quality of local watercourses;
- Run-off being contaminated by a spillage or leakage of oils and fuels stored on site or direct from construction machinery; In the event of a spillage, there is a high likelihood of groundwater contamination. the slopes created by overbridging may increase the likelihood of surface water pollution from a spill.
- Change in the natural hydrological regime due to an increase in discharge as a result of dewatering. This may include changes to surrounding groundwater flow, or contaminated soil from previous land uses being disturbed causing pollutants such as heavy metals to enter ground and surface waters;
- Discharges of contaminated water from tunnelling and or excavations;
- High alkalinity run-off as a result of concrete works; and

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- Potential for disrupting local drainage systems due to diversions required to accommodate the construction works.

Without mitigation there is the potential for significant impacts to the affecting surface water receptors during the Construction phase of the proposed project.

Flood Risk

A separate Flood Risk assessment has been carried and is provided alongside this scoping report; Table 11.3 provides a summary of the findings for ease of reference.

Table 11.3 Summary of Flood Risk Assessment

Crossing	Potential Flood risk
XC187 - Fantstown	There is unlikely to be an increase in flood risk to or from the proposed Project during the construction phase.
XC201 - Thomastown	There is unlikely to be an increase in flood risk to or from the proposed Project during the construction phase; any construction works close to the existing drain will ensure this remains free flowing and clear of blockage at all times. The proposed Project will not intrude on any existing watercourse and will not create a significant obstruction to flow within the floodplain network.
XC209 - Ballyhay	There is unlikely to be an increase in flood risk to or from the proposed Project during the construction phase.
XC211 - Newtown & XC212 - Ballycoskery	The location of the proposed works could be proximate to Flood Zone meaning there is a potential impact on existing water levels in a flood event. However, at this stage it appears any impact would be negligible as there are no works proposed within Flood Zone A or B, and no mitigation measures are envisaged.
XC215 - Shinanagh	The proposed works could be within or proximate to an area of pluvial flood risk as identified by the PFRA mapping. The construction within a greenfield site and likely increase in impermeable area have the potential to result in increased surface runoff and an associated increase in fluvial flooding downstream. However, given the size of the floodplain and relatively low contribution to fluvial flows at this location, it is likely that any impact on fluvial flood risk elsewhere will be negligible. A localised increase in pluvial flooding is a greater concern.

Crossing	Potential Flood risk
XC219 - Buttevant	The location of the proposed works could be within Flood Zone A meaning there is a potential impact on existing water levels in a flood event. Upstream and downstream receptors include a few properties, the R522 itself, local roads, and agricultural land. The nature of the works and the potential impact will require a Justification test supported by a Stage 3 Flood Risk Assessment. Mitigation measures will likely be required and are likely to include bridges, culverts or compensatory flood storage.

11.5.2 Operational Phase

For XC187 - Fantstown and XC209 - Ballyhay there would be no effect on surface water receptors as a result of the closure of the crossings.

For the remaining sites, the new road infrastructure presents the potential for an impact on the hydrological regime from the following:

- There is potential for discharge being contaminated by a spill/leakage of oil or fuels, or from gritting activities, with the changes in levels potentially resulting in an exacerbation of transported material; and
- Potential for on-going discharge from dewatering at some locations.

12. Air Quality

12.1 Legislation, Policy & Guidelines

12.1.1 Legislation

Appendix C includes key legislation and policy that will be taken into consideration as part of the air quality assessment.

12.2 Proposed Methodology

12.2.1 Approach to Baseline

With regard to the potential impacts associated with the proposed Project, the primary pollutants of concern include:

- nitrogen dioxide (NO₂) from road traffic and other combustion processes; and
- fine particulates (PM₁₀ and PM_{2.5}) from road traffic, dust from construction activities and burning of solid or liquid fuels.

Other pollutants such as sulphur dioxide (SO₂) and carbon monoxide (CO) are also emitted from combustion processes. However, these are not relevant for the assessment of this type of scheme given the very low rural background concentrations and low potential for emissions from sources associated with the scheme to lead to measurable or significant increases at nearby sensitive locations.

The Air Quality in Ireland Report 2017 and associated Appendix A (available at <http://www.epa.ie/air/quality/>) provides a summary of the measurements of pollutants undertaken at 29 monitoring locations across Ireland that formed the National Ambient Air Quality Monitoring Network in 2017. Although the National Ambient Air Quality Monitoring Programme was expanded in 2018 to include new stations and upgrades to existing stations, these data are not yet available for use. The monitoring data are split into four different zones based on monitoring location, with Zone D representing Rural Ireland (i.e. locations which are not located in Dublin, Cork or other urban areas including cities and towns).

Although there are no national monitoring stations close to the proposed Project sites, the measurements at other rural locations in Ireland would be representative of the existing rural baseline conditions in the vicinity.

The Air Quality in Ireland Report 2017 and associated appendix were reviewed to obtain the data for rural (i.e.

Zone D) measurements of NO₂, PM₁₀ and PM_{2.5} across Ireland. The data for these pollutants are summarised in Table 12.1. The air quality limit values as specified in the Air Quality Standards Regulations 2011 are also included in Table 12.1.

Table 12.1 Summary of annual mean monitoring data for Zone D monitoring stations, 2017 data

Pollutant	Zone D Monitoring Stations	Annual mean Conc'n range (µg/m ³)	Annual mean limit value (µg/m ³)	Other limit values
Nitrogen dioxide (NO ₂)	Emo Court, Castlebar and Kilkitt	2.3 – 7.4	40	No exceedances of the one-hour mean limit value of 200µg/m ³ recorded.
PM ₁₀	Castlebar, Claremorris and Kilkitt	7.8 – 11.2	40	One exceedance of the 24-hour mean limit value of 50µg/m ³ recorded at Castlebar and Claremorris (35 exceedances are permitted per year).
PM _{2.5}	Claremorris and Longford	5.6 – 9.2	20	N/A

These data are used for each of the seven sites as there is no data specific to each.

There were no exceedances of the one-hour mean limit value of 200µg/m³ for NO₂. Two of the monitoring locations recorded one exceedance of the 24-hour mean PM₁₀ limit value of 50µg/m³ in 2017 (Castlebar and Claremorris). However, 35 exceedances of the limit value are permitted in any one calendar year.

Concentrations of other pollutants in Zone D (Zone C for CO) associated with combustion of fuels such as SO₂ and CO were also reported to be well below the relevant limit values.

12.2.2 Proposed Assessment Methodology

Dust Emissions (Construction)

IAQM, 2016 (UK) provides a structured process by which the risk from construction activities can be identified for a specific project. The risk is then used to identify the appropriate level of dust control and mitigation that should be applied during the construction phase to reduce the potential for significant effects to occur at nearby sensitive locations in relation to dust soiling and increases in PM₁₀ (and PM_{2.5}) concentrations.

Road Traffic Emissions

The TII Guidelines, 2011 recommend a quantitative assessment of road traffic emissions should be undertaken when the project leads to a 10% increase in the AADT. However, this is designed for National Primary Roads and National Secondary Roads where the AADTs would be expected to be a minimum of 10,000. However, using this criterion for regional and local roads would not be appropriate for the seven sites of the proposed Project, either in isolation or in combination, as the traffic flows are likely to be considerably lower than 10,000 and a 10% increase in AADT would represent a negligible change. DMRB HA207/07 identifies affected roads (i.e. where there is the potential for changes in traffic flows to lead to non-negligible increases in pollutant concentrations) as a road that meets the following traffic flow criteria:

- Daily traffic flows (two-way) will change by more than 1,000 annual average daily traffic (AADT) or more; and
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more.

Roads which meet the above criteria and alignment change is greater than 5m will be taken forward for local air quality assessment using the DMRB screening tool or detailed dispersion modelling.

If predicted traffic flows exceed the criteria above, an assessment would be undertaken in accordance with the DMRB guidance and associated Interim Advice Notes (IANs) and the UK's LAQM.TG(16). The assessment would use the latest information on vehicle emissions and related road traffic emissions assessment tools provided by Defra. The approach would be consistent with the relevant requirements for air quality assessments of road traffic emissions set out in the NRA Guidelines for the Treatment of Air Quality During the Planning and Construction of National Roads Schemes.

Desktop Study

As part of an initial desktop study undertaken to inform this Screening and Scoping Report, the following data sources have been reviewed:

- mapping of the local area supplied by OSi;
- preliminary design drawings for the overbridge proposals;
- traffic flow information at each level crossing; and
- air quality data and reports produced by the Environmental Protection Agency (EPA).

Survey Requirements

Based on the information presented, there is sufficient existing air quality data to demonstrate that air quality in the vicinity of each of the proposed crossings is likely to be good and concentrations of pollutants are well within the relevant air quality standards. Therefore, specific baseline air quality surveys are not required. With regard to dust deposition, this could be undertaken prior to construction activities commencing if baseline data are considered to be required.

12.3 Baseline Conditions

12.3.1 XC187 - Fantstown

The XC187 - Fantstown level crossing is located approximately 3km to the east of Kilmallock in the townland of Fantstown, County Limerick. The level crossing is in a rural setting with a small number of individual residential properties located nearby. The nearest non-local road is the R515 which is approximately 400m to the south of the level crossing.

The available traffic flow information indicates a very low number of vehicles crossing the Dublin-Cork rail line via the XC187 - Fantstown level crossing. The survey in June 2011 recorded a total of 15 cars/light goods vehicles (LGVs) and two motorcycles (or pedal cycles) using the level crossing over the period of 24 hours.

Although there are no specific measurements of dust deposition in the vicinity of the XC187 - Fantstown level crossing, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.3.2 XC201 - Thomastown

Within the study area, there is potential to affect a local single-lane road which connects to the R515 which has considerably lower traffic flows than National Roads.

Although there are no specific measurements of dust deposition in the vicinity of the XC201 - Thomastown level crossing, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.3.3 XC209 - Ballyhay

Within the study area, there is potential to affect a local single-lane road which connects to the N20 and has considerably lower traffic flows than National Roads.

There are no specific measurements of dust deposition near the XC209 - Ballyhay level crossing, however, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.3.4 XC211 - Newtown & XC212 - Ballycoskery

The XC211 - Newtown level crossing is located approximately 11.6km southwest of Kilmallock and approximately 5km south of Charleville and 8.8km north of Buttevant in the townland of Newtown, County Cork. The level crossing is in a rural setting with a small number of individual residential properties located nearby. The nearest non-local road is the N20 which is approximately 0.4km to the west of the level crossing.

The available traffic flow information indicates a low number of vehicles crossing the Dublin-Cork rail line via the XC211 - Newtown level crossing. The survey in June 2011 recorded a total of 93 total vehicles using the level crossing over the period of 24 hours.

As noted above, construction activities may generate emissions of dust, which could deposit on surfaces causing annoyance. Although there are no specific measurements of dust deposition in the vicinity of the XC211 - Newtown and XC212 - Ballycoskery level crossing, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.3.5 XC 215 - Shinanagh

The XC215 - Shinanagh level crossing is located approximately 8.3km south of Charleville and approximately 5.4km north of Buttevant in the townland

of Shinanagh, County Cork. The level crossing is in a rural setting with a small number of individual residential properties located nearby. The nearest non-local road is the N20, which is approximately 20m to the east of the level crossing.

The available traffic flow information indicates a very low number of vehicles crossing the Dublin-Cork rail line via the XC215 - Shinanagh level crossing. The survey in June 2011 recorded a total of 981 cars/light goods vehicles (LGVs), 52 heavy goods vehicles (HGVs) and 19 motorcycle (or pedal cycles) using the level crossing over the period of 24 hours.

There are no specific measurements of dust deposition in the vicinity of the XC215 - Shinanagh level crossing, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.3.6 XC219 - Buttevant

The XC219 - Buttevant level crossing is located approximately 1.1km northwest of Buttevant and approximately 13km south of Charleville in the townland of Buttevant, County Cork. The level crossing is in a rural setting with a small number of individual residential properties located nearby. The nearest non-local road is the N20, which is approximately 0.9km to the east of the level crossing.

The available traffic flow information indicates a very low number of vehicles crossing the Dublin-Cork rail line via the XC219 - Buttevant level crossing. The survey in June 2011 recorded a total of 1958 cars/light goods vehicles (LGVs), 209 heavy goods vehicles (HGVs) and 18 motorcycle (or pedal cycles) using the level crossing over the period of 24 hours.

There are no specific measurements of dust deposition in the vicinity of the XC219 - Buttevant level crossing, it is anticipated that existing dust deposition levels would be typical of rural levels (i.e. generally relatively low and well below the level which could affect amenity).

12.4 **Potential Impacts**

12.4.1 Construction Phase

For crossings XC187 - Fantstown and XC209 - Ballyhay, the closures of the existing level crossings will require no construction works and therefore have no impacts.

For the remaining sites, the construction of overbridges and roads may result in a number of impacts relating to

dust and construction traffic. Typical potential effects which would be similar at each site are described.

Dust Emissions

The construction activities are likely to comprise earthworks, material stockpiling and the construction of new embankments, road carriageways, road surfaces and culverts/bridge structures. There is the potential for these construction activities to generate dust emissions which could adversely affect amenity at nearby locations through depositing on surfaces. Dust emissions from the proposed construction activities could also lead to an increase in PM₁₀ and PM_{2.5} concentrations at nearby locations, which could affect health.

Considered in isolation, the proposed construction of overbridges and adjoining road links are relatively small-scale. Appropriate good practice mitigation for the control of dust emissions and plant and machinery emissions during the construction phase would be taken forward for inclusion in an appropriate dust or emissions management plan during the construction phase and appropriately secured through the Railway Order Application process. These will be based on best practice guidance (IAQM, 2016), which sets out a suite of recommended dust and emissions mitigation measures and management techniques commensurate with the level of risk associated with the construction activities.

Generic Dust Mitigation

Appropriate good practice mitigation for the control of dust emissions and plant and machinery emissions during the construction phase would be taken forward to the EIAR and appropriately secured through the Railway Order Application process. These will be based on best practice guidance (IAQM, 2016), which sets out a suite of recommended dust and emissions mitigation measures and management techniques commensurate with the level of risk associated with the construction activities. Those relevant dust mitigation measures for a medium risk site would be taken forward for inclusion in an appropriate dust or emissions management plan during the construction phase.

In accordance with the IAQM guidance, this would ensure there would be no significant effect and as a result, dust emissions are scoped out of the Air Quality assessment.

Road Traffic Emissions

Additional road traffic on the local and wider road network (e.g. N20 and connected regional roads) during the construction period (e.g. construction workers travelling to and from the site, material / plant deliveries etc) would lead to emissions of NO₂, PM₁₀ and PM_{2.5} from vehicle exhausts.

Any proposed alignment changes are not considered to be an appropriate pre-cursor for scoping in an air quality assessment given the low AADT flows currently using the level crossings. The additional road traffic on the local road network associated with the construction of the overbridges and adjoining road sections (i.e. construction staff and visitors, material and consumables deliveries and plant deliveries) is considered unlikely to exceed the thresholds on any of the road links leading to or from the sites. Taken together the construction works required for the all of the level crossings it is unlikely that the cumulative traffic flows would exceed the criteria on any of the local roads or regional and national roads (e.g. R515, R518, R522 and N20) leading to the level crossings. Therefore, the changes to pollutant concentrations at receptor locations close to the local road network would be negligible.

Notwithstanding this, there is potential for a large number of lorry movements to deliver materials to the sites for some of the emerging options. As a result, road traffic emissions will be considered in the EIAR Air Quality assessment.

Construction Plant Emissions

There would also be exhaust emissions from diesel-powered construction plant and machinery operating within the construction site boundary. These could lead to increases in concentrations at locations such as residential properties close to the local road network.

A relatively low number of these diesel plant items (i.e. fewer than 10) are anticipated to be in operation simultaneously on-site during the construction. IAQM guidance (IAQM, 2016) specifies the following in relation to the assessment of emissions to air from construction plant and machinery:

'Experience of assessing the exhaust emissions from on-site plant (also known as Non-Road Mobile Machinery or NRMM) and site traffic suggests that they are unlikely to make a significant impact on local air quality, and in the vast majority of cases they will not need to be quantitatively assessed.' (Section 4.1)

Based on the relatively low number of plant and machinery items anticipated to operate simultaneously on-site and the low background air quality concentrations of NO₂, PM₁₀ and PM_{2.5}, the potential effect on local air quality at human receptors in the vicinity of the site would be negligible.

On this basis, and in line with the IAQM guidance, an assessment of the emissions from construction plant and machinery emissions is not required and is scoped out. Although there is the potential for some variations in the plant types or plant numbers from those presented above, these would not alter the above conclusion.

Furthermore, mitigation which is considered to represent good practice for the control of emissions from plant and machinery would be applied during the construction.

Examples of mitigation measures relating to controlling emissions from plant and machinery are provided below:

- no idling engines;
- use lower power settings where practicable;
- using mains electricity or battery-powered equipment where practicable to avoid the use of petrol or diesel generators;
- all NRMM to comply with the relevant emissions standards; and
- maintenance of construction plant and machinery in accordance with the manufacturers' instructions to reduce the risk of elevated emissions due to poor engine/emissions abatement performance, and to ensure that any malfunctions are swiftly repaired.

As noted previously, it is anticipated that the proposed mitigation measures would be approved by the relevant stakeholders prior to construction works commencing via an appropriate condition or through the Railway Order application process.

12.4.2 Potential Operational Phase Impacts

Changes in the emissions of pollutants (NO₂, PM₁₀ and PM_{2.5}) and resulting concentrations at local receptors could occur due to:

- Physical alterations to the horizontal and/or vertical alignment of the road carriageway (e.g. where this leads to the road being closer to existing residential properties than the current situation); or

- Changes to the traffic flow, traffic flow composition and vehicle speed on the local road network.

A review of the emerging proposed solution and traffic flow information for the XC187 - Fantstown and XC209 – Ballyhay level crossings indicates that significant adverse impacts associated with the operation of the proposed Project would not occur for the following reasons.

- The traffic flows on the local road upon which the existing crossings are located are small or very small in places. The proposed Project would be unlikely to lead to considerable changes in traffic flows on the local road (or any other roads) and therefore any changes would be well below the relevant criteria for identifying when an assessment would be required. This would also apply to the in-combination effects on traffic flows across the wider road network of when the proposed changes to the other six level crossings are implemented. Notwithstanding this will be reviewed following the receipt of the traffic impact assessment.
- For XC187 - Fantstown, the distance between the proposed road diversion are further from nearby receptors (or no nearer) than the existing situation.
- For XC201 Thomastown, XC212 - Ballykoskery, XC215 - Shinanagh and XC219 - Buttevant, the potential distance between any proposed new road and bridge structures within the vicinity of the existing level crossings is likely to be further from nearby receptors (or no nearer) than the existing situation for the majority of receptors affected.
- The emerging preferred solution including a diversion at level crossing XC211 - Newtown will introduce more traffic to an existing cul-de-sac. However, as stated above the flows are low and unlikely to change as a result of the scheme.
- The existing concentrations of NO₂, PM₁₀ and PM_{2.5} are well below the relevant limit values and large increases in concentrations would be required to result in a potentially significant adverse effect (i.e. comparable to the emissions from several thousand vehicles).

A quantitative assessment of road traffic emissions for the operational phase of the Project is unlikely to be required and air quality effects are likely to be negligible, however road traffic emissions will be included in the Air Quality Assessment in the EIAR to confirm these expectations once the Traffic Impact Assessment is completed.

13. Noise & Vibration

13.1 Legislation, Policy & Guidelines

Appendix C includes key legislation and policy that will be taken into consideration as part of the noise and vibration assessment.

13.2 Proposed Methodology

13.2.1 Assessment

The NRA Guidelines prescribe the use of CRTN for the calculation of road traffic noise levels, which is a valid method where daily traffic flows exceed 1000 vehicles per day. The roads affected by some elements of the proposed Project have flows of less than 1000 vehicles per day, therefore changes in traffic noise between the Do-Minimum and Do-Something scenarios shall be determined by estimating the change in noise level due to changes in road alignment. Additional changes in noise at receptors due to changes in traffic flow shall then be estimated using the 'Basic Noise Level' defined on Chart 3 of CRTN.

A change in road traffic noise of 1 dB(A) in the short-term is the smallest that is considered perceptible. In the long term, a 3 dB(A) change is considered perceptible. The classification of noise impact in terms of magnitude, from HD 213/11 (Highways Agency, 2011) shall be used to classify the noise impact in the short term and long term respectively.

The likely levels of noise and vibration due to the construction works will be predicted in accordance with BS 5228-1: 2009+A1 2014 and BS 5228-2:2009+A1:2014. The noise predictions will be prepared based on typical construction activities and heavy plant associated with highway construction projects. The significance of the predicted construction noise levels will be assessed using the 'ABC' method detailed in Annex E of BS 5228-1:2009+A1 2014. It is considered reasonable to assume that baseline noise at this location is sufficiently quiet to adopt Category 'A' threshold values.

Vibration predictions will be compared against relevant thresholds for human disturbance and building damage contained in BS 5228-2:2009+A1 2014.

13.2.2 Desktop Study

As part of an initial review desktop study undertaken to inform this Screening and Scoping study, the following data sources have been reviewed:

- Mapping of the local area supplied by OSI;
- Preliminary design drawings; and
- Preliminary traffic flow information.

13.2.3 Survey Requirement

The National Roads Authority Guidelines for the Treatment of Noise and Vibration in National Roads Schemes (TII (formerly NRA) 2004) states the following in relation to noise surveys:

'Noise surveys should be conducted in order to quantify the existing noise environment on both the existing (to be bypassed) and proposed routes. The noise surveys should be conducted generally in accordance with the guidance set out in ISO1996-1: 1982: Part 16.' (Section 6.3)

It is however recognized that this guidance is primarily intended for the assessment of noise and vibration from National Primary Routes and National Secondary Routes for which the National Roads Authority (NRA) are responsible. The roads affected by the scheme proposals have considerably lower traffic flows and speeds than National Routes.

The noise change at local properties would be determined through the comparison of calculated Do-Minimum and Do-Something noise levels, and measured noise levels would not be required to inform the assessment of operational traffic noise.

Therefore, the requirement for a baseline noise survey shall be evaluated when the proposed Project design, and traffic flow parameters for the Do-Minimum and Do-Something scenarios have been finalised. A survey of local noise levels shall be undertaken only if the scheme could give rise to an increase in traffic noise of 1dB(A) or greater at any local receptor (any increase less than this would not be perceptible). The outcome of this review shall then be discussed and agreed with Limerick/Cork County Councils in advance of preparation of the EIA.

13.2.4 Consultation

No specific consultation in relation to noise and vibration has been undertaken to inform this scoping report.

13.3 Baseline Conditions

For the most part, the seven crossings are located in rural areas dominated by farmland and with occasional, scattered residential properties. A noise survey has not

been undertaken at this stage though the main noise sources are expected to be from road traffic on the R515, the N20, R522 and R580 and surrounding roads, railway noise on the Dublin-Cork line and noise from agricultural machinery.

Table 13.1 shows the number of residential receptors within 600m of each of the crossings. Two of the sites have non-residential receptors: at XC211 – Newtown & XC212 - Ballycoskery, there is a school, pre-school and church; at XC219 - Buttevant there is a school.

Table 13.1 Receptors within 600m

Distance from scheme	Residential receptors					
	XC187	XC201	XC209	XC211 & XC212	XC215	XC219
0-50m	3	3	1	2	1	0
50-100m	1	2	0	20	0	2
100-150m	0	0	0	14	0	0
150-200m	1	1	1	11	0	2
200-300m	1	0	1	8	0	1
300-600m	21	15	9	26	15	32
Total	27	21	12	81	16	37

13.4 Potential Impacts

13.4.1 Construction Phase

Construction noise impacts are likely to be associated with various construction activities including earthworks, demolition, breakout of existing road surfaces, and the creation of new road surfaces and structures, and increased traffic on the local road network during the construction period. Vibration effects could be associated with demolition, piling works, and ground compaction works. Potential effects are summarised for each site in Table 13.2.

Table 13.2 Potential Impacts Construction Phase

Crossing	Potential Effects
XC187 Fantsown	- The emerging preferred solution seeks to divert traffic along existing roads, so at present, no realignment works may be required at this location therefore no construction impacts are expected.

Crossing	Potential Effects
XC201 Thomastown	- There are noise sensitive receptors within about 300m of the emerging preferred solution which are likely to experience an increase in noise levels during construction. Therefore, there is the potential for temporary noise and vibration impacts during the construction phase.
XC209 Ballyhay	- There is no construction phase to the proposed Project at this location and so there will be no effects from construction.
XC211 Newtown & XC212 Ballycoskery	- There are noise sensitive receptors within around 300m of the emerging preferred solution which are likely to experience an increase in noise levels during construction. Therefore, there is the potential for temporary noise and vibration impacts during the construction phase.
XC215 Shinanagh	- There are noise sensitive receptors within about 300m of the emerging preferred solution which are likely to experience an increase in noise levels during construction. Therefore, there is the potential for temporary noise and vibration impacts during the construction phase.
XC219 Buttevant	- There are noise sensitive receptors within approximately 300m of the emerging preferred solution which are likely to experience an increase in noise levels during construction. Therefore, there is the potential for temporary noise and vibration impacts during the construction phase.

13.4.2 Operational Phase

Changes in operational road traffic noise at local receptors could occur due to either:

- Physical alterations to the carriageways' horizontal and/or vertical alignment;
- Changes in flow parameters of traffic using the local road network (e.g. speed, daily traffic movements, of the percentage of heavy vehicles); or
- Changes in the road surface.

Potential effects during the operational phase for each site are summarised in Table 13.3.

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Table 13.3 Potential Impacts Operational Phase

Crossing	Potential Effects
XC187 - Fantstown	The emerging preferred solution seeks to be diverted along existing roads there is the potential for an increase in traffic flows along the existing road network. However, based on the preliminary review of the available information for XC187 - Fantstown, it is considered unlikely that increases in road traffic noise of 1dB(A) or greater could occur at any noise sensitive receptor.
XC201- Thomastown	The emerging preferred solution for XC201 - Thomastown realign the road by around 100m to the south-west of the existing road thereby reducing noise levels at receptors located around the existing crossing. The emerging preferred solution brings the traffic noise source closer to some receptors on the R515. However, based on the preliminary review of the available information for XC201 - Thomastown, it is considered unlikely that increases in road traffic noise of 1dB(A) or greater could occur at any noise sensitive receptor.
XC209 - Ballyhay	No effects are anticipated during operation as a result of the changes proposed at this location.
XC211 - Newtown & XC212 - Ballycoskery	<p>The emerging preferred solution XC211 - Newtown links Beechwood Grove to an unnamed road north of the existing crossing so there is potential for an increase in traffic volumes on Beechwood Grove and therefore an increase in traffic noise levels at receptors in Beechwood Grove.</p> <p>The emerging preferred solution for XC212 - Ballycoskery seeks to realign the road to the south of the existing road by around 30m, thereby potentially reducing noise levels at receptors in this area which includes Ballyhea National School.</p> <p>In terms of noise mitigation opportunities, the use of best practice construction methodology will be required. The road should also be kept road as far from noise sensitive receptors as possible and there is potential for an earth bund between the road and the school in order to screen noise.</p>

Crossing	Potential Effects
XC215 - Shinanagh	The emerging preferred solution for XC215 - Shinanagh seeks to realign the existing road bringing it closer to some receptors, thereby potentially resulting in traffic noise increases at the closest receptors.
XC219 - Buttevant	The emerging preferred solution for XC219 - Buttevant seeks to realign Station Road around 50m to the south of the existing road thereby resulting in potential noise increases at the closest receptors.

14. Traffic & Transport

14.1 Legislation, Policy & Guidelines

Appendix C includes key legislation and policy that will be taken into consideration as part of the traffic and transport assessment.

14.2 Proposed Methodology

For the purposes of this assessment and in accordance with the criteria set out within the IEMA guidelines, the scale (magnitude) of any increase in traffic flows on a particular section of the road network as a result of the proposed Project construction activities will determine the significance of any effects associated with such increases. For example, an increase in traffic flows of more than 90% on a particular section of the road network, will likely have a major effect on the road section being assessed.

The IEMA Guidelines identify that the following environmental effects may be considered when assessing the traffic related to developments:

- Accidents and safety;
- Air pollution;
- Driver delay;
- Dust and dirt;
- Hazardous loads;
- Noise;
- Pedestrian amenity;
- Pedestrian delay;
- Severance (of communities);
- Heritage and conservation;
- Visual effects;
- Ecological effects; and
- Vibration.

The impact of the proposed Project construction activities in relation to the above environmental effects will be considered within the assessment.

14.2.1 Traffic Impact Assessment

The potential traffic effects of the proposed Project will be assessed utilising the following approach:

- The road sections likely to be affected by the proposed Project will be identified;

- The existing character of the road network will be determined;
- Existing traffic levels on the road network will be determined;
- The additional traffic generated by the proposed Project will be estimated;
- The effect of the additional traffic will be assessed; and
- An appropriate mitigation strategy will be prepared in order to ensure that any potential traffic effects are kept to a minimum.

The proposed level crossing replacements are not predicted to have a perceivable increase in traffic e.g. where a level crossing is removed and replaced by an overbridge that maintains vehicular access across the railway line.

In the cases where the number of crossings are being rationalised and existing roads are being stopped up the proposed crossing of the railway line may carry higher levels of daily traffic than the baseline level. Similarly, any stopped up roads will no longer be through roads and therefore carry lower levels of traffic than the baseline level. This will be considered for the proposed Project where relevant.

The volume of construction traffic added to the baseline may be significantly higher than that associated with daily operational traffic therefore the assessment of impacts is predicted to focus on the construction element of the proposed Project.

The traffic effects of the additional traffic generation associated with the proposed Project can be categorised as:

- Additional traffic volumes associated with the proposed Project construction programme travelling on the existing road network;
- Delays to non-development related journeys as a result of slow-moving vehicles i.e. abnormal loads; and
- Changes to traffic volumes (additional and reductions) due to the rationalisation of level crossings.

The assessment will aim to identify the types of vehicle needed to transport loads associated with the construction activities and potential transportation routes, where possible. The volume of all construction traffic movements will then be quantified along with the projected schedule of movements. This will then be used to determine daily vehicle numbers.

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Until supply contracts have been placed for the materials needed on site, details of the origin of construction vehicles and the route they will take will not be known for certain unless stipulated by the client. To account for this, robust assumptions will be made regarding the proportion of construction vehicles using any particular route, most notably that 100% of construction traffic will pass all assessed locations on the local road network.

Construction vehicle volumes will then be assessed against existing baseline traffic levels, the data for which will be obtained from local authority traffic surveys and commissioned traffic surveys, if required. This will be used to determine the impact of the traffic associated with construction of the proposed Project in terms of increases in traffic flows on the local road network.

Survey Requirements

The June 2011 Traffic Counts will be updated as part of the EIAR but do provide a baseline in the absence of updated counts. The June 2011 counts took place over a 24-hour period.

Receptors

The key benefit of the proposed Project is that it requires minimal works due to the level crossing being closed and a diversion being put in place. Sensitive receptors that will need to be considered for the EIAR include nearby dwellings.

14.3 Baseline Conditions

14.3.1 XC187 - Fantstown

Desktop Study

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 15 following a 24-hour traffic count in June 2011 (see Table 14.1)

Table 14.1 XC187 - Fantstown 2011 Traffic Counts

	Description	North bound	South bound	Total / Average
Pedestrians	Adult	2	0	2
	Children	0	0	0
	Total	2	0	2
Vehicles	PCL/MCL	0	2	2
	Cars and LGVs	7	6	13

	Description	North bound	South bound	Total / Average
	HGVs	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

14.3.2 XC201 - Thomastown

Desktop Study

The Average Annual Daily Traffic (AADT) usage of the level crossing was calculated at 31 following a 24-hour traffic count in June 2011. See Table 14.2

Table 14.2 XC201 - Thomastown 2011 Traffic Counts

	Description	North bound	South bound	Total / Average
Pedestrians	Adult	6	9	15
	Children	0	1	1
	Total	6	10	16
Vehicles	PCL/MCL	1	0	1
	Cars and LGVs	16	14	30
	HGVs	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

14.3.3 XC209 - Ballyhay

Data shown in Table 14.3 is from a 24 hour traffic count carried out in June 2011.

Table 14.3 24 hour Traffic Count June 2011

#P	Description	East bound	West bound	Total / Average
Pedestrians	Adult	8	5	13
	Children	0	0	0
	Total	8	5	13
Vehicles	PCL/MCL	1	1	2
	Cars and LGVs	160	141	301
	HGVs	9	14	23
	Buses	0	0	0
	Total AADT	170	156	326
Speeds	Max	62.1	62.4	62.25
	Min	0.0	15.0	7.5
	Mean	40.7	40.0	40.35
	85% Speed	50.0	48.2	49.1

14.3.4 XC211 - Newtown & XC212 - Ballycoskery

Desktop Study

A desktop study has been undertaken. The traffic counts that took place in 2011 (see Table 14.4) and will be updated as part of the EIAR process.

Table 14.4 XC211- Newtown & XC212 - Ballycoskery Traffic Counts 2011

	Description	East bound	West bound	Total / Average
Pedestrians	Adult	23	16	39
	Children	45	1	46
	Total	68	17	85
Vehicles	PCL/MCL	4	4	12
	Cars and LGVs	478	458	936
	HGVs	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

Receptors

Sensitive receptors for XC211 - Newton that will need to be considered for the EIAR include the residential properties at Ballyhea village. While for XC212 - Ballycoskery, the residential properties at Ballyhea village along with Ballyhea National School and St Mary's Roman Catholic Church will need to be considered.

Survey Requirements

The October 2010 Traffic Counts will be updated as part of the EIAR but do provide a baseline in the absence of updated counts. The October 2011 counts took place over a 24hour period and included a total of 80 northbound and 80 southbound vehicular movements at the level crossing.

14.3.5 XC215 - Shinanagh

Desktop Study

A desktop study has been undertaken. The traffic counts took place in 2011 and will be updated as part of the EIAR process (see Table 14.5).

Table 14.5 24 hour Traffic Counts 2011

	Description	East bound	West bound	Total / Average
Pedestrians	Adult	0	1	1
	Children	0	0	0
	Total	0	1	1
Vehicles	PCL/MCL	12	7	19
	Cars and LGVs	478	503	981
	HGVs	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

14.3.6 XC219 - Buttevant

Desktop Study

A desktop study has been undertaken. The traffic counts took place in 2011 and will be updated as part of the EIAR process (see Table 14.6).

Table 14.6 24 Hour Traffic Counts June 2011

	Description	East bound	West bound	Total / Average
Pedestrians	Adult	0	0	0
	Children	0	0	0
	Total	0	0	0
Vehicles	PCL/MCL	10	8	18
	Cars and LGVs	956	1002	1958
	HGVs	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

14.4 Potential Impacts

14.4.1 As set out in Section 3.3 further above, the 2019 IE Feasibility Study included an options appraisal which considered that the proposed Project has the potential to increase transport efficiency on both the rail and road networks by removing delays. There are potential impacts during construction and operation on journey times for pedestrians and on the local road network, all of these impacts will be assessed in the EIAR. XC187 - Fantstown

Potential Construction Phase Impacts

There is no construction phase to the proposed Project at this location and so there will be no effects from construction.

Potential Operational Phase Impacts

Operational issues include increased distance on route and associated journey times due to diversion however, impacted traffic flow is very low.

14.4.2 XC201 - Thomastown

The benefits associated with the emerging preferred solution are that it is separated from nearby properties. Traffic can still access same roads with new alignment. Rerouting is unlikely and there would be no delays at level the crossing.

Potential Construction Phase Impacts

The majority of construction associated with the emerging preferred solution will take place 'offline' i.e. off the public road, which will reduce impact to the road network. There is potential for some disruption/delays when tying into existing roads. Also, increased volume of traffic and HGVs will bring temporary environmental impacts.

Potential Operational Phase Impacts

Traffic will still be able to access the same roads as existing with the proposed alignment; rerouting is therefore unlikely and there will be reduced traffic delays through the removal of the level crossing. Potential adverse impacts could occur as a result of the additional junction formed on the R515 which has the potential to increase conflict risk.

14.4.3 XC209 - Ballyhay

Potential Construction Phase Impacts

There is no construction phase to the proposed Project at this location and so there will be no effects from construction.

Potential Operational Phase Impacts

There is unlikely to be a significant change in traffic as a result of changing this crossing to being CCTV controlled.

14.4.4 XC211 - Newtown & XC212 - Ballycoskery

No additional junctions will be required at XC211 - Newtown, while at XC212 - Ballycoskery, the emerging preferred solution seeks to rationalise Dooley's crossroads to a safer right to left stagger. Rerouting is unlikely and there should be no delays at this level crossing.

Potential Construction Phase Impacts

Likely construction impacts at XC211 - Newtown for consideration within the EIAR include the majority of the construction associated with the emerging

preferred solution being offline thereby reducing impacts to the road network. In addition, there is potential for some disruption/delays when tying into existing roads. The works are likely to be done in conjunction with XC212 - Ballycoskery to reduce impacts and delays. Furthermore, increased traffic and HGVs bring temporary environmental impacts.

At the XC212 - Ballycoskery crossing, likely construction impacts of the emerging preferred solution for consideration within the EIAR include the majority of construction being offline thereby reducing impacts to the road network. In addition, there is potential for some disruption/delays when tying into existing roads. The works are likely to be done in conjunction with XC211 - Newtown to reduce impacts and delays. Furthermore, increased traffic and HGVs bring temporary environmental impacts as well as dangers associated with proximity to the school.

Potential Operational Phase Impacts

At the XC212 - Ballycoskery the emerging preferred solution could cause operational issues in that a Link road would result in traffic routing via existing residential area with frontage (Beechwood Grove) however, traffic flows are low. In addition, there is an increased distance of route due to diversion. No significant operational issues are anticipated at the XC212 - Ballycoskery site

14.4.5 XC215 Shinanagh

Potential Construction Phase Impacts

Likely construction impacts for consideration within the EIAR as a result of the emerging preferred solution include the majority of construction being offline thereby reducing impacts to the road network. There is potential for some disruption/delays when tying into existing roads. In addition, increased traffic and HGVs bring temporary environmental impacts. In regard to the N20 tie in, there is likely disruption/delays as construction works change the alignment to the existing road.

Potential Operational Phase Impacts

The emerging preferred solution seeks to improve the road network and alignment as well as the use of the current overbridge. In regard to the N20 tie in, this will improve the junction with better alignment and safety. Operational adverse impacts include a significant increase in the distance of route due to diversion (potentially approx. 2km). Also, increased traffic at the existing overbridge/N20 tie-in.

14.4.6 XC219 - Buttevant

The emerging preferred solution is in close proximity to the existing crossing. Rerouting is unlikely and there would be no delays at the level crossing.

Potential Construction Phase Impacts

Likely construction impacts for consideration within the EIAR include the majority of construction being offline thereby reducing impacts to the road network. There is potential for some disruption/delays when tying into existing roads. In addition, increased traffic and HGVs bring temporary environmental impacts.

Potential Operational Phase Impacts

Operational issues include the potential requirement for three crossings (one railway and two watercourses).

15. Cultural Heritage

15.1 Proposed Methodology

The proposed methodology for the assessment of the likely effects on cultural heritage is outlined below. This methodology will be agreed in consultation with NMS, National Museum of Ireland (NMI) and the Local Authority as required. Key elements of the methodology include:

- Desktop study to obtain and analyse more detailed baseline information including but not limited to the Sites and Monuments Record (SMR) of the Archaeological Survey of Ireland, National Museum of Ireland Topographical Files, historical maps, aerial photography, documentary sources and the findings of previous archaeological assessments/built heritage surveys undertaken (Flynn 2010; Flynn 2011; Goodbody 2012);
- An archaeological survey to be carried out by a suitably qualified and experienced archaeologist in order to confirm the existence, location, extent and condition of previously recorded archaeological sites that may be affected by the proposed works, in particular enclosure LI048-001, and to identify any previously unrecorded sites or features. The aims of this survey should be to:
 - ascertain the character, condition and extent of any archaeological features/deposits or objects likely to be affected by the proposed works, including any associated temporary works, and the likely impact of the proposed works on these remains;
 - accurately locate these archaeological features/deposits or objects and present the findings in map form;
 - describe same and discuss their likely provenance;
 - recommend appropriate measures for the avoidance of these remains or, where this cannot be achieved, measures to mitigate the impact of the works; and
 - incorporate all of the above into the cultural heritage chapter of the EIAR.
- An underwater archaeological assessment may be required within the stream if it is determined there is a potential for underwater archaeological remains to be significantly impacted. Such assessments should be carried out by a suitably qualified and experienced underwater

archaeologist under licence from the NMS where required;

- A geophysical survey of the land affected by the proposed works, to be carried out by a suitably qualified and experienced specialist under licence from the DCHG;
- Archaeological test trenching by a suitably qualified and experienced archaeologist under licence from the DCHG and in line with an agreed method statement informed by the results of the geophysical survey;
- An architectural heritage survey by a suitably qualified and experienced specialist to identify and ascertain the significance of any buildings, structures or features of architectural heritage interest that may be affected;
- Assessment of the likely cultural impacts including direct and indirect effects, both positive and negative during construction and operational phases, in line with the EIA methodology; and
- Development of mitigation measures to be included in the Schedule of Commitments accompanying the EIAR to avoid, reduce and/or remedy likely significant effects on cultural heritage.

Consultation

The consultation process for the EIA is outlined in Chapter 7. The statutory consultees with respect to heritage include the Department of Culture, Heritage and the Gaeltacht (DCHG) which will be consulted in relation to the archaeological matters and requirements via the National Monuments Service (Planning and Licensing Unit) and for architectural heritage the Architectural Heritage Advisory Unit (AHAU). The Architectural Conservation Officer/Heritage Officer of Limerick County Council will also be consulted in relation to architectural heritage.

15.2 Baseline Conditions

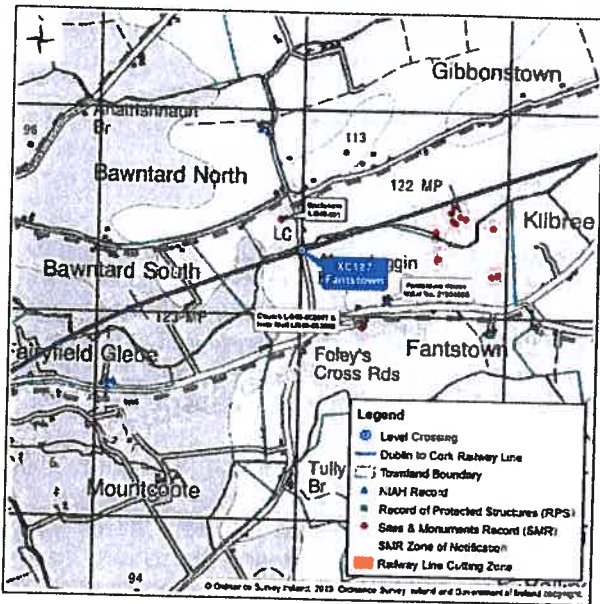
15.2.1 XC187 - Fantstown

Desktop Study

There is an enclosure (LI048-001) in close proximity to the existing crossing XC187 - Fantstown in Gibbonstown townland (see Figure 15.1). This monument is listed on the Record of Monuments and Places (RMP) for Co. Limerick and is protected under Section 12 of the National Monuments (Amendment) Act 1994. The Zone of Notification (ZoN) for this

monument is approximately 57m to the north of the proposed works. There is also a church (LI048-002001) and a holy well (LI048-002002) listed on the RMP approximately 300m to the southeast. There is a relatively high potential for the presence of previously unrecorded aboveground and subsurface archaeological remains in greenfield areas within the scheme design extents.

Figure 15.1 Cultural Heritage Points of Interest in the vicinity of XC187 - Fantstown



Fantstown House, which is located approximately 450m to the southeast of XC187 - Fantstown, is included on the National Inventory of Architectural Heritage (NIAH 21904808). There are no other previously recorded architectural heritage sites in close proximity to XC187. However, the existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossing itself may be of, and/or have features that are, of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Historical maps dating to around the turn of the twentieth century depict a named bridge (Ahnagluggin Bridge) and various other structures in the vicinity of the crossing. There are also townland boundaries in the vicinity of the crossing dividing the townlands of Fantstown, Gibbonstown, Bawntard North, Bawntard South and Mountcoote.

Survey Requirements

An archaeological survey is required to confirm the location and extent of the upstanding remains of

enclosure LI048-001 and to identify any other visible archaeological features within or in close proximity to the proposed works. Given the close proximity of a Recorded Monument, a geophysical survey followed by archaeological test trenching will be carried out as part of the EIA. An underwater archaeological assessment (wade survey) may also be necessary for the stream. These requirements will be confirmed following consultation with the National Monuments Service (NMS) of the Department of Culture, Heritage and the Gaeltacht (DCHG).

An architectural heritage survey will also be required to determine whether the railway cutting/embankments, the level crossing, Ahnagluggin Bridge and any other structures in the vicinity of the crossing are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

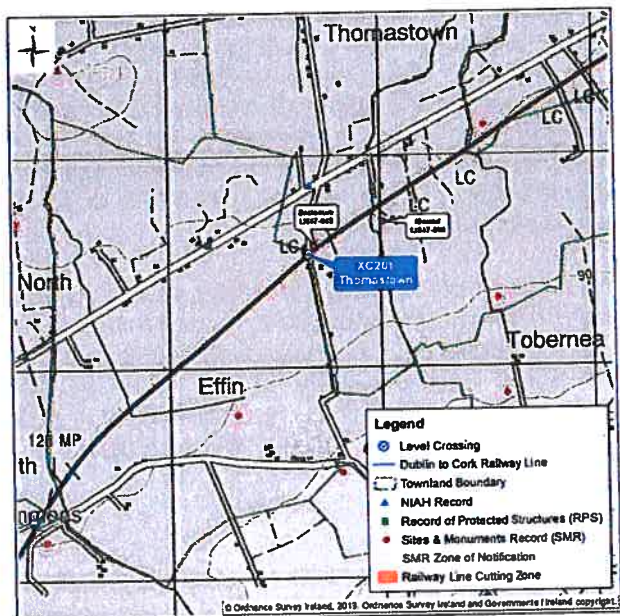
15.2.2 XC201 - Thomastown

Desktop Study

The emerging preferred solution at XC201 - Thomastown encroaches on the constraints area/Zone of Notification (ZoN) for an enclosure (LI047-045) listed on the Record of Monuments and Places (RMP) for Co. Limerick. This Recorded Monument is protected under Section 12 of the National Monuments (Amendment) Act 1994. There is also a mound (LI047-046) listed on the RMP approximately 90m to the east of the proposed works. There is a relatively high potential for the presence of previously unrecorded aboveground and subsurface archaeological remains in greenfield areas within the scheme design extents. See Figure 15.2.

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Figure 15.2 Cultural Heritage in the vicinity of XC201 - Thomastown



There appears to be a Protected Structure (RPS No. 38 thatched dwelling) in proximity to the works, if it is the same structure as that listed on the National Inventory of Architectural Heritage (NIAH) as NIAH 21904709 approximately 480m to the west of XC201. The NIAH also lists a water pump (NIAH 21904708) located 14m from the proposed works opposite the tie-in with the existing road.

There are no other previously recorded architectural heritage sites in close proximity to XC201 - Thomastown. However, the existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossing itself may be of, and/or have features that are, of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Historical maps dating to the mid-nineteenth and turn of the twentieth century indicate that the railway line directly impacted enclosure LI047-045 and depict a number of structures in the vicinity of the crossing. The crossing also lies on the townland boundary between Thomastown and Effin.

Survey Requirements

An archaeological survey is required to confirm the location and extent of the upstanding remains of enclosure LI047-045 and to identify any other visible archaeological features within or in close proximity to the proposed works. Given the close proximity of a Recorded Monument, a geophysical survey followed

by archaeological test trenching will be undertaken as required. These requirements will be confirmed following consultation with the National Monuments Service (NMS) of the Department of Culture, Heritage and the Gaeltacht (DCHG).

An architectural heritage survey will also be carried out to confirm the location, extent and condition of the thatched dwelling (RPS No. 38/NIAH 21904709) and water pump (NIAH 21904708) and to determine whether the railway cutting/embankments, the level crossing and any other buildings, structures or features in the vicinity of the crossing are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

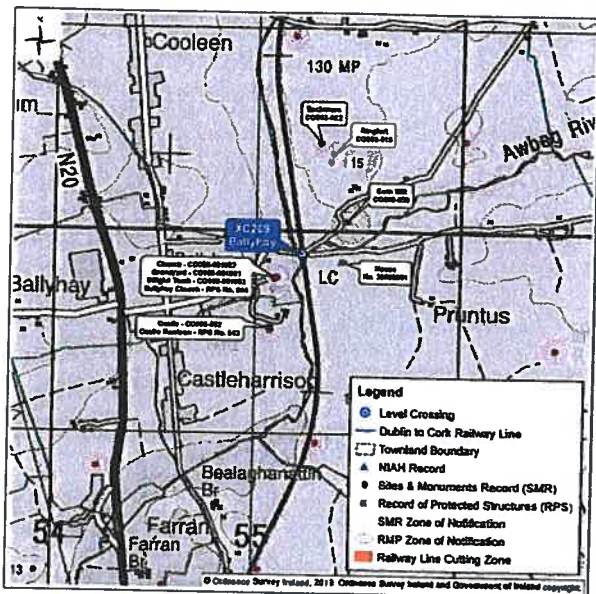
15.2.3 XC209 - Ballyhay

Desktop Study

There are six previously recorded archaeological sites within approximately 500m of XC209 including a castle (CO008-002), church (CO008-001002) and graveyard (CO008-001001) with effigial tomb (CO008-001003), a corn mill (CO008-059), a ringfort (CO003-019) and an enclosure (CO003-022) (see Figure 15.3).

There are two Protected Structures within approximately 500m of XC209- Ballyhay: Castle Harrison (RPS No. 843) and Ballyhay Church (RPS No. 844). There is also a house listed on the NIAH (20900801) in Pruntus townland approximately 165m to the east of XC209 - Ballyhay.

Figure 15.3 Heritage Assets in the vicinity of XC209 – Ballyhay



The existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossing itself may be of, and/or have features that are, of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Historical maps dating to the mid-nineteenth and turn of the twentieth century depict a number of structures and features of potential heritage interest in the vicinity of the crossing, including a millrace/tailrace for the mill (CO008-059) and areas of marsh which could be areas of archaeological potential for burnt mounds and other features.

There are several townland boundaries in the vicinity of XC209 - Ballyhay separating the townlands of Rahmorgan, Cooleen, Ballyhay, Castleharrison and Pruntus.

Survey Requirements

The emerging preferred solution at XC209 – Ballyhay comprises a technical upgrade to a CCTV controlled level crossing and therefore limited ground disturbance will be required. Archaeological and architectural heritage site inspections will, however, be undertaken to confirm the location and extent of previously recorded sites, monuments and structures surrounding the crossing and to determine whether the railway cutting/embankments, the level crossing and any other structures in the vicinity of the crossing are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

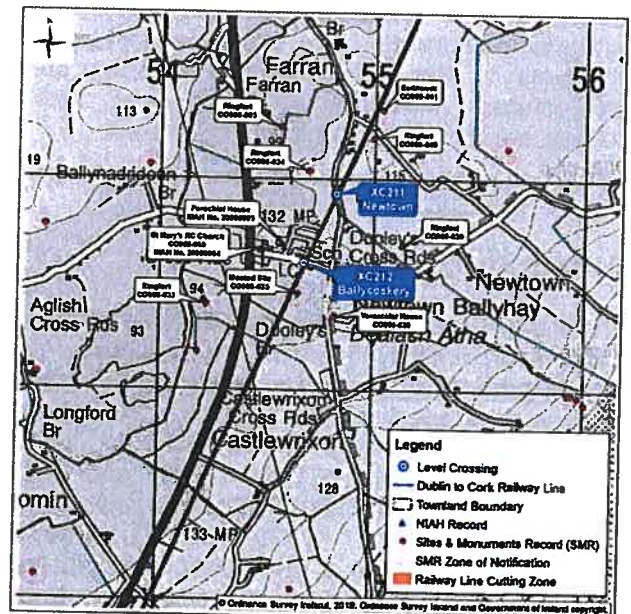
15.2.4 XC211 - Newtown & XC212 - Ballycoskery

Desktop Study

There are nine previously recorded archaeological sites within approximately 500m of XC211 - Newtown & XC212 - Ballycoskery, including five ringforts (CO008-005, CO008-033, CO008-034, CO008-039, CO008-040), a moated site (CO008-035), a vernacular house (CO008-036), Saint Mary's RC Church (CO008-069) and an earthwork (CO008-041). See Figure 15.4.

The proposed works for XC212 - Ballycoskery extend into the constraints area/Zone of Notification (ZoN) for the church CO008-069, which is listed on the Record of Monuments and Places (RMP) for Co. Cork. This Recorded Monument is protected under Section 12 of the National Monuments (Amendment) Act 1994. Saint Mary's Church is also listed on the National Inventory of Architectural Heritage (NIAH) as NIAH 20900804, along with the parochial house (NIAH 20900805). The design is also in close proximity to the RMP constraints area for the moated site (CO008-035) and vernacular house (CO008-036). There is a relatively high potential for the presence of previously unrecorded aboveground and subsurface archaeological remains in greenfield areas within the scheme design extents.

Figure 15.4 Heritage Assets in the vicinity of XC211 - Newtown and XC212 - Ballycoskery



The existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossings themselves may be of, and/or have features that are,

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of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. For example, there is a house at crossing XC212 - Ballycoskery that may be associated with the railway. Historical maps dating to the mid-nineteenth and turn of the twentieth century indicate that the railway line directly impacted the moated site (CO008-035) and depict a number of structures and features in the vicinity of the crossings that, if still extant, may be of heritage interest including a signal post, signal box, milestone and Ordnance Survey benchmarks.

XC211 - Newtown lies on the townland boundary between Newtown and Ballycoskery.

Survey Requirements

An archaeological survey is required to identify any visible archaeological features within or in close proximity to the proposed works. Given the close proximity of a number of Recorded Monuments, a geophysical survey followed by archaeological test trenching will be undertaken as required. These requirements will be confirmed following consultation with the National Monuments Service (NMS) of the Department of Culture, Heritage and the Gaeltacht (DCHG).

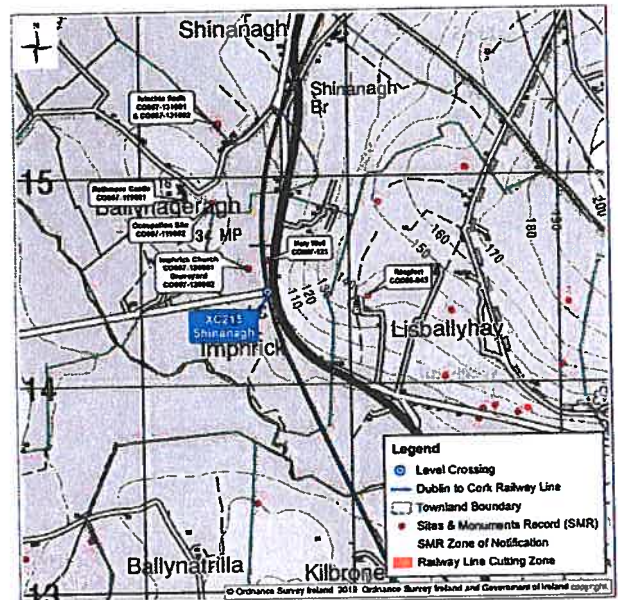
An architectural heritage survey will also be required to establish whether any architectural features associated with St Mary's Catholic Church extend into the works area, and to determine whether the railway cutting/embankments, the level crossing and any other structures in the vicinity of the crossing are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

15.2.5 XC215 - Shinanagh

Desktop Study

There are 8 previously recorded archaeological sites within approximately 500m of the proposed Project including the site of Rathmore Castle (CO007-119001), an occupation site discovered nearby in the 1980s and subsequently excavated (CO007-119002), Imphrick church and graveyard (CO007-120001 and CO007-120002), a holy well (CO007-121), two *fulachta fiadh* (CO007-131001 and CO007-131002) discovered during the construction of Bruff-Mallow gas pipeline in 1988, and a ringfort (CO008-045). See Figure 15.5.

Figure 15.5 Heritage assets in the vicinity of XC215 - Shinanagh



The emerging preferred solution includes a new access road and junction onto the L1320 traverses the RMP constraints area/Zone of Notification (ZoN) for the church and graveyard (CO007-120001 and CO007-120002) and the holy well (CO007-121), which are Recorded Monuments listed on the Record of Monuments and Places (RMP) for Co. Cork and protected under Section 12 of the National Monuments (Amendment) Act 1994. Given the concentration of recorded sites and monuments in the area, and proximity of a watercourse and marshland (which have the potential to contain further *fulachta fiadh* or burnt mound sites as well as other site types), there is a relatively high potential for unrecorded archaeological remains to exist within greenfield areas of the scheme design both above and below the surface.

There are no Protected Structures or buildings, or structures listed on the National Inventory of Architectural Heritage (NIAH) in close proximity to the proposed works. The nearest NIAH listing is a house in Castlewrixson South which is located approximately 540m north of the works. However, the railway bridge in XC215 - Shinanagh (OBC 306), although not currently listed on the RPS or NIAH, could be of architectural heritage interest. The existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossing itself may be of, and/or have other features that are, of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Historical maps dating to the mid-

nineteenth and turn of the twentieth century depict a number of other structures and features in the vicinity of the rail line that, if still extant, may be of heritage interest including mileposts and a level crossing in the location of the Option 1 design.

The proposed design overlies the townland boundaries between Shinanagh, Ballynageragh and Imphrick.

Survey Requirements

An archaeological survey is required to confirm the location and extent of the previously recorded sites and monuments and to identify any other visible archaeological features within or in close proximity to the proposed works. Given the close proximity of several Recorded Monuments, including a church and graveyard (CO007-120001 and CO007-120002) and holy well (CO007-121), and the demonstrated archaeological potential of the area as evidenced by the *fulachta fiadh*, a geophysical survey followed by archaeological test trenching will be undertaken in consultation with the National Monuments Service (NMS) of the Department of Culture, Heritage and the Gaeltacht (DCHG).

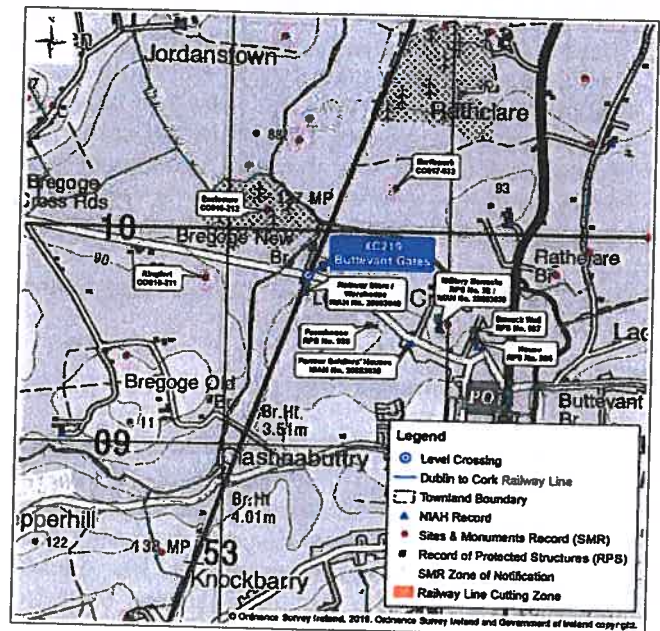
An architectural heritage survey will also be carried out to assess the architectural heritage values of the railway bridge in XC215 - Shinanagh (OBC 306) and to determine whether the railway cutting/embankments, the level crossings and any other structures or features in the vicinity are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

15.2.6 XC219 - Buttevant

Desktop Study

There are 3 previously recorded archaeological monuments within approximately 500m of XC219 - Buttevant comprising a ringfort (CO016-211, approximately 125m to the west of the design), an enclosure (CO016-212, approximately 190m to the north) and an earthwork (CO017-032, approximately 450m to the northeast) (See Figure 15.6). The Zone of Archaeological Potential (ZAP) for the historic town of Buttevant (CO017-053) lies approximately 645m to the southeast. Given the existence of these known sites, coupled with the proximity of a watercourse and marshland (which have the potential to contain *fulachta fiadh* or burnt mound sites as well as other site types), there is a potential for unrecorded archaeological remains to exist within greenfield areas of the scheme both above and below the surface.

Figure 15.6 Heritage Assets in the vicinity of XC219 - Buttevant



There are several Protected Structures within approximately 500m of XC219 - Buttevant, including a military barracks (RPS 52/NIAH 20803030), barrack wall (RPS No. 987), house (RPS No. 986) and farmhouse (RPS No. 988), which is the nearest Protected Structure at approximately 150m southeast of the design. The railway store/warehouse to the south of XC219 - Buttevant is listed on the National Inventory of Architectural Heritage (NIAH 20803040), as is a terrace of 26 former soldiers' houses (NIAH 20803039) located approximately 295m to the southeast of the design.

The railway store/warehouse (NIAH 20803040) is just one element of the nineteenth-century station complex that survives. Other surviving elements include boundary walls, the remains of a second goods shed on the western side (within which are a number of cast iron columns), the station platforms, a passenger shelter, a small single-storey structure (former post office) attached to the now-demolished station house, a signal box and the remains of an iron footbridge. The existing rail line follows the nineteenth-century Great Southern and Western Railway and the railway cutting/embankments and the level crossing itself may be of, and/or have features that are, of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. Historical maps dating to the mid-nineteenth and turn of the twentieth century depict a bridge labelled 'Bregoge New Bridge' on the historical OS maps located approximately 115m to the

west of XC219 - Buttevant that may be of architectural heritage interest, though it is not currently listed on either the RPS or NIAH.

There is also a memorial to the victims of the Buttevant Rail Disaster, which occurred at Buttevant Railway Station on 1 August 1980, and was one of Ireland's worst ever rail accidents. The memorial comprises a bronze sculpture in the shape of two crossing train tracks set within a small area of partly walled public open space with seating, bollards and landscaping.

The proposed design crosses the townland boundary between Bregoge and Creggange.

Survey Requirements

An archaeological survey is required to identify any visible archaeological features within or in close proximity to the proposed works. A geophysical survey followed by archaeological test trenching may also be required. These requirements will be confirmed following consultation with the National Monuments Service (NMS) of the Department of Culture, Heritage and the Gaeltacht (DCHG).

An architectural heritage survey will be carried out to confirm the location, extent and condition of surviving elements of the nineteenth-century railway station, Bregoge Bridge and any other buildings, boundary walls, structures or architectural features in the vicinity of the crossing that are of potential architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

15.3 Potential Impacts

15.3.1 XC187 - Fantstown

Potential Construction Phase Impacts

No construction works are proposed, therefore there would be no effects on cultural heritage receptors during the 'construction phase' of the proposed Project at this location.

Potential Operational Phase Impacts

Potential operational impacts could occur as a result of the introduction of any new infrastructure into the setting of enclosure LI048-001, the church (LI048-002001) and holy well (LI048-002002), and Fantstown House (NIAH 21904808). The significance of such impacts will be assessed during the EIA.

15.3.2 XC201 - Thomastown

Potential Construction Phase Impacts

The emerging preferred solution has the potential to directly impact surface and subsurface archaeological remains associated with enclosure LI047-045, as well as currently unknown sites and features if any exist. The potential effect of this impact could be significant. The archaeological surveys outlined above would aim to provide further clarity on this potential. There could also be an impact on the townland boundary between Thomastown and Effin, though the effect is not predicted to be significant.

The emerging preferred solution could also have direct and indirect negative impacts on structures or features of architectural heritage interest, which could include the railway cutting/embankment and level crossing itself. The significance of such impacts will be assessed during the EIA following the architectural heritage survey.

Potential Operational Phase Impacts

Potential operational impacts could occur as a result of the introduction of any new infrastructure into the setting of enclosure LI047-045, the mound (LI047-046), thatched dwelling (RPS No. 38/NIAH 21904709) and water pump (NIAH 21904708). The significance of such impacts will be assessed during the EIA.

15.3.3 XC209 - Ballyhay

Potential Construction Phase Impacts

No significant impacts are predicted to known archaeological or architectural heritage sites from the proposed upgrade to a CCTV controlled level crossing. However, if ground disturbance is required (e.g. new service trenches for electrical cables), there may be the potential for subsurface archaeological remains to be impacted.

Potential Operational Phase Impacts

At this stage, no significant impacts are predicted to cultural heritage during the operational phase. This will be confirmed as the design progresses as part of the EIA.

15.3.4 XC211 - Newtown & XC212 - Ballycoskery

Potential Construction Phase Impacts

The emerging preferred solution has the potential to directly impact surface and subsurface archaeological remains and architectural features associated with Saint Mary's RC Church (CO008-069), potentially resulting in an impact of moderate significance. The Recorded Monuments located in this area, including a moated site (CO008-035) and several ringforts, collectively reflect a concentration of settlement since at least the Middle Ages, and there is a relatively high potential for further remains to be encountered. The archaeological surveys outlined above would aim to provide further clarity on this potential. However, the significance of such impacts cannot be determined at this stage.

There would potentially be an impact on the townland boundary between Newtown and Ballycoskery; however, this is not predicted to be significant.

The emerging preferred solution could also have direct and indirect negative impacts on structures or features of architectural heritage interest, which could include the house at crossing XC212 - Ballycoskery, the railway cutting/embankment and level crossings themselves, as well as Saint Mary's Church (NIAH 20900804). The significance of such impacts will be assessed during the EIA following the architectural heritage survey.

Potential Operational Phase Impacts

Potential operational impacts could occur as a result of the introduction of any new infrastructure into the setting of built heritage features such as Saint Mary's RC Church (CO008-069/NIAH 20900804), parochial house (NIAH 20900805), moated site (CO008-035) and other monuments. The significance of such impacts will be assessed during the EIA.

15.3.5 XC215 - Shinanagh

Potential Construction Phase Impacts

The emerging preferred solution to the north of XC215 - Shinanagh has the potential to directly impact surface and subsurface archaeological remains associated with the church and graveyard (CO007-120001 and CO007-120002) and holy well (CO007-121), and to directly impact a railway bridge which may be of architectural heritage interest, resulting in moderate to very significant adverse effects. Both options have the potential to directly impact currently unknown sites and

features, including subsurface archaeological remains. The archaeological and architectural heritage surveys outlined above would aim to provide further clarity on this potential. However, the significance of such impacts cannot be accurately determined at this stage. There may also be a slight negative impact on the townland boundaries between Shinanagh, Ballynageragh and Imphrick.

Potential Operational Phase Impacts

Potential operational impacts could occur as a result of the introduction of any new infrastructure into the setting of Imphrick church and graveyard (CO007-120001 and CO007-120002), the holy well (CO007-121) and Shinanagh railway bridge (OBC 306). In the case of the bridge, this impact could be positive as it would remove traffic from the bridge, reducing the risk of potential accidental damage and allowing better appreciation of its architectural values.

15.3.6 XC219 - Buttevant

Potential Construction Phase Impacts

The emerging preferred solution would have no direct impacts on any previously recorded archaeological sites or monuments. However, there is a potential to directly impact currently unknown archaeological sites and features, including surface and subsurface remains. The significance of such impacts cannot be determined at this stage. There could potentially be a slight negative impact on the townland boundary between Bregoge and Cregganee.

There could also potentially be impacts on the railway store/warehouse (NIAH 20803040), Bregoge Bridge and other buildings and features associated with Buttevant Station. Such impacts could be significant to very significant in the event that a structure(s) of architectural heritage significance cannot be retained, and every effort will be made in the design to avoid such an outcome. There would be no direct impact to the Buttevant Rail Disaster memorial.

Potential Operational Phase Impacts

Potential operational impacts could occur as a result of the introduction of any new infrastructure into the setting of Buttevant Station and the Protected Structures located to the southeast. In the case of 'Bregoge New Bridge', a positive impact could potentially occur through removal of traffic from the bridge, reducing the risk of accidental damage and allowing better appreciation of its architectural value, if any.

16. Landscape

16.1 Landscape

16.1.1 Legislation, Policy & Guidelines

Appendix C includes key legislation and policy that will be taken into consideration as part of the landscape and visual impacts assessment.

In line with the guidance at Appendix C, the assessment will cover potential impacts from a landscape and visual perspective and will describe the existing conditions and the likely potential impacts associated with the construction and operation of the proposed Project. The impact assessment process will involve:

- Assigning landscape sensitivity and visual receptor sensitivity;
- Identifying and characterising the magnitude of landscape impacts and visual impacts separately; and
- Assessing the significance of any residual landscape effects and visual effects after mitigation.

16.2 Proposed Assessment Methodology

16.2.1 Data Collection, Research and Baseline Establishment

- Review of Limerick County Development Plan, particularly in relation to the county Landscape Character Assessment and designated scenic routes and views.
- The study area from which to examine the landscape and visual impacts of the proposed Project will be determined on the extents of likely visibility of the various aspects of the Project (1km radius around crossing sites);
- Identify sensitive visual receptors potentially affected by the proposed Project;
- Develop a project specific landscape character assessment (finer scale than county based LCA);
- Review of the Zone of Theoretical Visibility (ZTV) map, which indicate areas from which the proposed Project is potentially visible in relation to the terrain which the study area;

- Selection of potential Viewshed Reference Points (VRPs) from key visual receptors to be investigated during fieldwork to determine actual visibility and sensitivity; and
- Preparation of an initial VRP selection map.

16.2.2 Fieldwork, Viewshed Reference Point Selection and Photo Capture

- Investigate potential VRP locations selected at the desk study stage and confirm those that are to be used for the visual impact appraisal.
- Prepare a Viewshed Reference Point (VRP) selection report, which will outline the rationale for selecting or rejecting every VRP that was investigated during fieldwork. This will be used for consultation with the planning authorities to ensure they are satisfied with the final set of VRPs to be used for the appraisal.
- Capture of high resolution, panoramic photography with grid reference coordinates for all VRP locations to be used for the preparation of panoramic photography and/or photomontages.
- Record site notes in relation to the general landscape within the study area and in relation to the views afforded from each VRP.

16.2.3 Appraisal of Landscape and Visual Impacts

- Description of the geographic location and landscape context of the Project.
- General landscape description concerning essential landscape character and salient features of the study area, discussed with respect to:
 - Landform and drainage;
 - Vegetation and land use;
 - Centres of population and houses;
 - Transport routes; and
 - Tourism, heritage and amenity and facilities.
- Discussion of any design guidance as well as the planning context and relevant landscape designations.
- Appraisal of the significance of predicted landscape impacts (physical impacts on landform and land cover as well as impacts on landscape character). This will be done using professional judgement and in accordance with the *'Guidelines for Landscape and Visual Impact assessment'*

(2013)'. Significance is determined on balance of receptor sensitivity versus the magnitude of landscape impact.

- Appraisal of predicted visual impacts using the ZTV map and the photomontages prepared from each of the selected VRP locations. Again, this will be done using professional judgement and in accordance with the '*Guidelines for Landscape and Visual Impact assessment (2013)*'. Significance is determined on balance of receptor sensitivity versus the magnitude of visual impact.
- Description and discussion of proposed mitigation measures.
- Appraisal of residual landscape and visual impacts following the implementation and establishment of mitigation measures.

Appraisal of cumulative impacts in relation to any existing or future developments within the study area that might be relevant to the Project. This will be done using professional judgement and in accordance with the '*Guidelines for Landscape and Visual Impact Assessment (2013)*'. Significance is determined on balance of receptor sensitivity versus the magnitude of cumulative impact.

16.3 Baseline Conditions

16.3.1 Desktop Study

Desktop baseline studies will involve a comprehensive review of the Limerick County Development Plan, policy documents and map data. In terms of the landscape baseline, this will principally focus on the Limerick Landscape Character Assessment.

Zone of Theoretical Visibility (ZTV) maps will be produced in relation to permanent built structures to identify from where in the surrounding landscape of the study area views of the project are potentially afforded (bare-ground scenario).

Visual baseline studies will focus on designated scenic views, settlements, major transport routes and amenity areas. This will inform the later selection of representative viewpoints from which photomontages will be prepared to aid the visual impact appraisal. An initial viewpoint selection map will be generated for use during fieldwork where viewpoint selection will be refined.

An on-line and literature review of the area will also be undertaken in order to identify important tourist and amenity features within the area. This will include the

provision of the likes of way-marked walking trails and tourist facilities.

16.3.2 Survey Requirements

Following the desktop phase, fieldwork will be undertaken to inform the project specific landscape character assessment. Fieldwork will also be used to identify sensitive landscape features and visual receptors and to refine the viewpoint set that will form the basis of the visual impact appraisal. High quality 360° photography will be captured during clear viewing conditions for use in the preparation of photomontages.

16.3.3 Consultation

It is considered that consultation on the landscape and visual impact assessment will be undertaken with the Local Authority, Limerick County Council, along with local residents.

16.3.4 Study Area

For all the sites, the immediate context of the site and its wider surrounds is that of a rural landscape comprising of flat to gently undulating terrain and therefore the proposed Project is likely to be difficult to discern beyond approximately 500m – 1000m due to screening afforded by intervening vegetation. Even if discernible from greater distances it is not likely to give rise to significant landscape or visual impacts beyond this threshold. As a result, a 1km radius study area is used in this instance. Nonetheless, there will be a particular focus on local receptors contained within 500m of the site.

16.4 Potential Impacts

16.4.1 Construction Phase

At crossing XC187 - Fantstown and XC209 - Ballyhay, no construction works are proposed, therefore there would be no effects on landscape and visual receptors during the 'construction phase' of the proposed Project at this location.

At the remaining crossings, there would be construction of overbridges and roads and a number of typical effects could occur. These are described and would apply to all of the sites.

The following is a list of potential construction phase impacts relevant to the Landscape and Visual Assessment;

Environmental Impact Assessment Screening & Scoping Report

- Visual impacts from the movement of traffic and machinery along site access points surrounding the proposed Project;
- Landscape and visual impacts arising from the movement of construction materials;
- Landscape and visual impacts arising from ancillary construction requirements; for example, power and lighting, construction fencing/hoarding, site facilities, etc.; and
- The duration of landscape and visual impacts from construction.

16.4.2 Operational Phase

Typical landscape and visual impacts for Transport Infrastructure Projects

- Landscape and visual impacts arising from permanent buildings/structures;
- Landscape and visual impacts – both positive and negative – arising from the implementation of any landscape screening proposals surrounding the proposed crossing;
- Visual impacts arising from additional signage and lighting; and
- Visual impacts arising from the movement of traffic at a higher elevation than the existing roadway, including privacy issues for residential properties relating to views from new elevated roads.

Site Specific Impacts

For XC187 - Fantstown and XC209 - Ballyhay, the closure of the existing crossing means there would be very few effects on the landscape or views; there are potential visual effects as a result of additional signage and lighting.

XC201 - Thomastown

- Landscape and visual impacts arising from the emerging preferred solution including the proposed road alignments new intersection with the R515 regional road;
- Landscape and visual impacts arising from the potential loss of existing hedgerow vegetation along existing agricultural field boundaries;

- Landscape and visual impacts arising from any the proposed crossings associated elevated roadside embankments; and
- Landscape and visual impacts arising from the nearest dwellings to west of the emerging preferred solution along the R515 regional road and nearest residential dwellings along the local road to the east of the proposed road alignment.

XC211 - Newtown & XC212 - Ballycoskery

- Landscape and visual impacts arising from the emerging preferred solutions proposed slip road connecting to local road at Newton at archaeological feature to the northwest of proposed alignment.
- Landscape and visual impacts arising from any potential loss of mature vegetation and sections of hedgerow bordering the L1533 local road and hedgerows/treelines along the existing railway line corridor.
- Landscape and visual impacts arising from the proposed crossing for the emerging preferred solution and associated embankment at nearest dwellings in Beechwood Residential Estate north of any proposed overbridge on the western side of the existing railway line and at local school and residential dwellings on the eastern side of railway line.
- Landscape and visual impacts arising from the emerging preferred solution crossing at Kilmallock Cycle Hub Route 1 located along local roads immediately east of proposed crossing.

XC215 - Shinanagh

- Landscape and visual impacts arising from the emerging preferred solution along sections of Ballyhoura Way national waymarked trail that occur immediately north and west of proposed alignment.
- Landscape and visual impacts arising from the emerging preferred solution at dwellings along local road to the west.
- Landscape and visual impacts arising from the emerging preferred solution at new intersection with N20 – potential for minor loss of vegetation.
- Landscape and visual impacts arising from the emerging preferred solution at archaeological feature (Imphrick church and graveyard ruins) situated northwest of intersection of L1320 local road at N20.

XC219 - Buttevant

- Landscape and visual impacts arising from emerging preferred solution crossing and associated embankments at nearest dwellings north of the emerging preferred solution on the western side of existing railway line.
- Landscape and visual impacts arising from emerging preferred solution and associated embankments at nearest dwelling to the east of the proposed alignment.
- Landscape and visual impacts arising from any loss of mature hedgerow vegetation along R522 regional road and loss of vegetation along existing railway line embankments.

17. Cross-cutting Themes

17.1 Overview

A number of environmental aspects are considered to be 'cross-cutting' and complex as such are best addressed as a single assessment for all seven sites.

Included within these for the proposed Project are the following topics, assessment for which follow:

- Risk of major accidents and disasters;
- Material Assets;
- Resource Use and waste; and
- Climatic factors.

17.2 Risk of Major Accidents & Disasters

17.2.1 Introduction

This section describes the scope of work and methods to be applied in the identification and assessment of the effects on the environment arising from the vulnerability of the proposed Project to the risk of major accidents and disasters. A high-level overview of the baseline conditions is included, together with the proposed methodology and a scope of work likely to be required to undertake such an assessment of the proposed Project.

Policy, Plan and Guideline Context

The assessment will require a comprehensive policy, plan and strategy review, including (but not limited to) the documents listed in Chapter 3, and the EIA Directive (2014/52/EU) lists the factors which must be assessed with respect to environmental impact in Paragraph 1. Paragraph 2 of Article 3 states:

'The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.'

Annex III of the directive lists the characteristics of a project to be considered as part of the EIAR, including:

'(f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge.'

Description of the Study Area

The study area for the purposes of identifying risk of major accidents and disasters is the proposed Project extent, as well as any haul routes to and from the proposed Project during the construction phase. The assessment will look at the current risk profile with respect to natural disasters, transportation accidents, construction accidents, and security.

Regard will also be had to sites that have potential for major accident hazard under the Chemical Act (Control of Major Accident Hazards involving Dangerous Substances) Regulations 2015 9S.I. No.209 of 2015).

Ireland does not tend to experience many of the most destructive types of natural disasters that are seen in some other countries. Ireland is volcanically inactive, relatively stable seismically, and does not tend to experience frequent destructive weather events such as hurricanes or tornadoes. The most common type of natural disaster which is experienced in Ireland is flooding. Flood risk assessment for the proposed Project will be presented in the EIAR.

With respect to the railway safety baseline for Ireland, the Commission for Railway Regulation (CRR) is responsible for regulating Ireland's railways. According to the CRR's *'Railway Safety Performance in Ireland Report 2017'*, there were no major accidents or fatalities recorded in 2016 (the last year reported on), except for incidences of apparent self-harm. This was true across all railway types for which the CRR are responsible, namely heavy rail, light rail, public highway interfaces with industrial rail systems, and heritage railways. According to the Railway Safety in the European Union Safety Overview 2017 Report (European Union Agency for Railways 2017), Ireland has reported a zero passenger fatality risk for the whole ten year reporting period from 2006 to 2015. With respect to road safety, Ireland is currently ranked 4th safest EU country and is targeting a further 22% reduction in road deaths by 2020.

With respect to current safety trends in the construction sector, the HSA publishes annual statistics in their Summary of Workplace Injury, Illness and Fatality Statistics report (HSA 2017). The most recent of these was published in 2017 and provides statistics for the period of 2015-2016. In 2016, the construction sector reported the second highest number of fatalities after the agriculture, forestry and fishing sector, with nine fatalities recorded.

In 2016 there were also 601 reported injuries related to the construction sector. Since 2009, there have been 69 fatalities recorded in the construction sector.

With respect to Ireland's safety and security, the threat of terrorism is categorised as possible but unlikely. Ireland is ranked 10th place on the Global Peace Index 2018, and 6th in Europe. This is an annual ranking of 163 independent states and territories based on 23 qualitative and quantitative indicators including relations with neighbouring countries, role in conflicts, political instability, level of perceived criminality, level of violent crime, impact of terrorism, and ease of access to small arms.

17.2.2 Baseline Information

Baseline information for the purposes of this assessment will be largely informed by the other chapters, in particular climate, population and human health, socio-economics, biodiversity, traffic and transport, hydrology, hydrogeology, and land, soils and geology.

Desktop Study

The assessment will be entirely desk-based, with the other assessments being carried out as part of the EIA to inform the assessment of risk to the environment as a result of accidents or disasters. Documentation will be reviewed including:

- National Risk Assessment 2017 Overview of Strategic Risks (Department of the Taoiseach 2017);
- Guidance on Assessing and Costing Environmental Liabilities (EPA 2014a);
- A Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage and Local Government (DoEHLG) 2010);
- A Guide to the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015 (S.I. No. 209 of 2015) (HAS 2015);
- Railway Safety Performance in Ireland (CCR 2017);
- Iarnród Éireann Safety Report 2016 (Iarnród Éireann 2017);

- Flood Risk Management Plans for Shannon Estuary South River Basin (UOM24) and Blackwater (Munster) River Basin (UOM18) (OPW 2018); and
- A National Risk Assessment for Ireland 2017 (Department of Defence (DoD) 2017).

17.2.3 Survey Requirements

Sufficient information will be obtained from desktop studies and surveys completed for other chapters to inform the assessment.

17.2.4 Consultation

The development of the EIAR will be informed by comprehensive consultation that will be undertaken with statutory consultees (prescribed bodies), other stakeholders and the public. Specific consultation will be undertaken as required with the following bodies:

- Health and Safety Authority (HAS);
- Office of Public Works (OPW);
- Commission for Railway Regulation (CRR); and
- Major Emergency Planning Units for Cork and Limerick County Councils.

Further details of consultation can be found in Chapter 5 of this report.

17.2.5 Potential Impacts

For the purposes of the assessment of risk of major accidents and disasters, the assessment will assume a worst-case scenario.

Potential Construction Phase Impacts

Key risks during construction in the absence of any mitigation measures could include occurrences such as:

- Damage to high voltage lines which cross the proposed Project;
- Fire in any works areas during construction;
- Flooding; and
- Road traffic collisions involving construction vehicles or as a result of temporary traffic

management measures put in place as a result of construction activities, or vehicular collisions within the construction sites.

Potential Operational Phase Impacts

Key risks during operation of the proposed Project could include:

- Fire within the trains;
- Loss of power to the rolling stock causing operation to halt;
- Train derailment or collision; and
- Security incidents occurring on trains.

17.2.6 Proposed Methodology and Assessment

It is proposed that the risk assessment will be carried out in three stages:

- Identification and Screening – identify potential unplanned risks that the proposed Project may be vulnerable to, and screen them with respect to whether they are already addressed elsewhere (e.g. other EIAR chapters, within the design or covered by legislation), or where the incident cannot be plausibly linked to the proposed Project (e.g. volcanic activity).
- Risk Classification – evaluation of each identified risk with regard to the likelihood of occurrence (as per Table 2 of DoEHLG 2010). and the potential impact (as per Table 3 of DoEHLG 2010). As per those tables, the likelihood is ranked from 1 (extremely unlikely) to 5 (very likely), and potential impact is ranked from 1 (minor) to 5 (catastrophic).
- Risk Evaluation – risks will be subject to a risk matrix to determine the level of significance of each risk based on the multiplication of their likelihood and impact rankings, grouped into three categories, high risk (score from 15 to 25), medium risk (score of 8 to 12), and low risk (score of 1 to 6).

Following identification, classification and evaluation of each identified risk; mitigation will be proposed for any occurrences which are categorised as medium or high risk. New scoring for the likelihood and consequence post-mitigation will be assessed in order to give a post-mitigation score.

17.3 Material Assets

17.3.1 Overview

The EIA Regulations (S.I. No. 296, 2018) require the inclusion of an assessment of the effects of a project on 'Material Assets'. There is no definition of this term in the legislation, either at a national or EU level.

EU Guidance on information to be included in EIARs provides some guidance as follows:

Section 2: Description of Environmental Factors likely to be affected by the Project

Have any material assets in the area that may be affected by the Project been described? (including buildings, other structures, mineral resources, water resources)

Section 3: Description of the likely Significant Effects of the Project

Have the direct, primary effects on material assets and depletion of natural resources (e.g. fossil fuels, minerals) been described?

For the most part, these aspects of the environment are assessed as part of the topic-specific assessments, in particular:

- Traffic & Transport: road and rail infrastructure;
- Water: water resources, flood defences;
- Cultural heritage: cultural and archaeological assets;
- Population & Health: land use, property, amenity;
- Soils & Geology: soils and minerals, private and public water supplies, public and private wastewater treatment systems;
- Resource Use & Waste Management: materials use;
- Climatic factors: energy consumption;
- Landscape & Visual: above ground structures, e.g. electricity and telecommunications lines, being moved or altered.

Information on investigative works into third party utilities will be included in the EIAR as part of the Project Description chapter, specifically in relation to the works required during the construction phase of the proposed Project. This will include any mitigation required to minimise effects on said utilities.

17.4 Resource Use and Waste

17.4.1 Introduction

This section describes the scope of work and methods to be applied in the identification and assessment of impacts with respect to resource and waste management associated with the proposed Project. In this context, the term 'waste' refers to unusable or unwanted materials that may arise during the active construction of infrastructure and operation of the proposed Project.

17.4.2 Policy & Plan Context

The examination of policy and plan context in terms of construction waste management will involve a combination of local and national policy documents. The following documents will be referred to:

- The EU Waste Framework Directive (2008/98/EC);
- Waste Management Act 1996 (No.10 of 1996) as amended;
- National Hazardous Waste Management Plan 2014- 2020 (EPA 2014b);
- Southern Region Waste Management Plan 2015-2021;
- Relevant County Development Plans; and
- Relevant Local Area Plans.

17.4.3 Study Area

This proposed Project covers an extensive study area made up of 7 locations at each of the railway crossings concerned including, XC187 - Fantstown and XC201 - Thomastown in Co Limerick, and XC209 - Ballyhay, XC211 - Newtown, XC212 - Ballycoskery, XC215 - Shinanagh and XC219 - Buttevant in Co. Cork.

The study area for the purposes of waste management is the footprint of the proposed Project including associated soil storage areas and compound sites. The study area also expands to the wider Southern Region (and beyond if required) for the purposes of identifying suitable materials and waste management facilities and locations. The assessment will encompass all materials used and waste generated as a result of the proposed Project.

17.4.4 Baseline Information

A desktop study will be undertaken to identify materials and wastes that will be used and produced and potentially require management as a result of the proposed Project once outline design information is available. Management plans for materials and waste will identify opportunities to minimise materials use and waste production and will also identify suitable re-use opportunities for the materials (as a by-product) as well as waste management facilities licensed by the EPA and facilities holding waste facility permits or certificates of registration from Local Authorities. Documentation pertaining to the above-mentioned facilities will be studied to estimate capacity and usability of the facility for the proposed Project.

Desktop Study

The latest waste statistics for Ireland available are from 2014. EPA reported 3,314 ktonnes of construction & demolition waste were finally treated (recovered or disposed) in 2014; soil & stones accounted for 74% of the total quantity and mineral waste (concrete, bricks, gypsum) accounted for 12% of the total quantity.

Under the Waste Framework Directive (2008/98/EC) there is a target for Member States to achieve 70 per cent material recovery of non-hazardous, non-soil & stones C&D wastes by 2020. Ireland achieved 68 per cent recovery in 2014. The Waste Framework Directive target only applies to a portion of all Construction & Demolition wastes generated, as hazardous wastes and soil & stones wastes are excluded from the calculation.

17.4.5 Survey Requirements

Sufficient information will be obtained from desktop studies and surveys completed for other chapters e.g. ground investigations to inform the assessment.

17.4.6 Proposed Methodology & Assessment Scope

It is proposed that an assessment of waste generation will be carried out in accordance with the EPA's current EIS guidance documents as well as the below guidelines and established best practice, and will be tailored accordingly based on professional judgement and local circumstance:

- The Management of Waste from National Road Construction Projects (TII 2017a);
- 'Guidance on Soil and Stone ByProducts' (EPA 2019) (Guidance on classification and notification of soil and stone as a by-product in the context of

article 27 of the European Communities (Waste Directive) Regulations 2011 (EPA 2017a);

- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Waste Projects (DoEHLG, 2006); and
- CIRIA publication 133 Waste Minimisation in Construction (CIRIA 1997).

In line with the above guidance, the assessment will cover potential impacts of waste generation and will describe the existing conditions and the likely potential impacts associated with the construction and operation of the proposed Project. The impact assessment process will involve:

- Assigning the receptor sensitivity;
- Identifying and characterising the magnitude and significance of any potential impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts; and
- Assessing the significance of any residual effects after mitigation.

This assessment will cover potential impacts with respect to resource and materials / waste management and will describe the existing conditions and the likely potential effects associated with the construction and operation of the proposed Project. The assessment process will aim to identify and quantify the following:

- The types and quantities of materials required for the proposed Project;
- The quantities of material to be generated during the construction and operational phase of the proposed Project;
- The types and quantities of waste arising from the proposed Project, including the identification of any potentially hazardous wastes;
- Opportunities for re-use of materials within the proposed Project;
- Waste requiring treatment and/or disposal off site;
- The impacts that will arise in relation to the generation, re-use and disposal of materials and waste;
- Measures to mitigate and monitor these impacts; and
- Significance of any residual effects after mitigation.

The assessment will identify whether impacts are positive or negative, permanent or temporary, and direct or indirect. Professional judgement will be used with regard to assessing significance of resource and waste management effects, taking into account the volumes of materials used and the properties of any wastes.

17.4.7 Potential Impacts

The majority of the waste to be produced by the proposed Project will be through the excavation for the construction of bridges. It is anticipated that the majority of this will be clean, uncontaminated soil and stone material, which will be suitable for reuse, recycling or recovery. However, there may be areas of contaminated land in which excavation will be required, which will not be suitable for reuse, and will require handling and disposal in accordance with current legislative requirements and best practice.

Potential Construction Phase Impacts

Potential impacts during construction may include:

- Production of additional spoil material, arising from excavating material unsuitable for reuse such as vegetation, and contaminated soils;
- Debris and waste from the site could be a source of nuisance to neighbouring communities as well as having a negative impact on the appearance of the site;
- Excavation of possible contaminated lands and materials which would require disposal off site at a suitably licensed facility;
- Waste generation from construction may cause a number of direct and indirect impacts on other environmental topics such as air quality (dust, odours), traffic, noise, soils (contaminated land), geology, water, health, etc.; and
- Surplus materials and waste may occur where material supply exceeds material demand.

Potential Operational Phase Impacts

It is envisaged that, once the proposed Project is operational, the only waste types expected to be developed are quantities of mixed municipal waste, mixed dry recyclables, and food waste from public and staff using the route daily, as well as waste associated with maintenance activities at the crossings, depots, stations and bridges. The operational phase waste will be insignificant in comparison to the likely construction phase waste quantities.

17.4.8 Mitigation

In accordance with the waste hierarchy principle and best practice, the proposed Project will operate in accordance with the requirement of preventing the generation of waste where possible. Measures to be implemented across the site to achieve these aims will include, but are not limited to, the following:

- Re-use of excavated materials on site where possible;
- Ordering of appropriate quantities of materials using the 'just in time' philosophy;
- Appropriate storage facilities for materials will be identified and provided on site;
- Appropriate handling procedures for materials will be developed to prevent damage; and
- Co-ordination between contractors in the supply of materials and services to avoid repeated and/or redundant deliveries or excavations.

Measures that will be taken to ensure the site and surroundings are maintained to a high standard of cleanliness, include but are not limited to the following:

- A regular program of site tidying will be established to ensure a safe and orderly site;
- Debris netting to be erected to prevent materials and equipment being scattered by the wind; and
- Food waste will be strictly controlled on all parts of the site.

In the event of any litter or debris escaping the site, it will be collected immediately and removed to storage on site, and subsequently disposed of in the normal manner.

Materials Management Plan (MMP) should set out the objectives relating to the use of the materials and should accompany the Design Statement. It should bring together all the relevant information to demonstrate that all following four key factors will be met:

- Protection of human health and protection of the environment;
- Suitability for use;
- Certainty of Use;
- Quantity of Material.

The MMP should include a tracking system and contingency arrangements. A Verification Plan will be

set out in the Materials Management Plan identifying how the placement of materials will be recorded and the quantity of material to be used. Once the proposed Project has been completed a Verification Report must be produced that demonstrates that the materials have been located in the correct place within the proposed Project or dealt with appropriately.

An appropriate Waste Management Plan will be developed and will assist in the development of waste management policies and procedures for the overall proposed Project. This will include details on the management of staff (canteen waste), waste materials generated by the proposed Project, packaging waste, off cuts etc. The plan will describe methods for the storage, segregation and reuse/recovery of waste materials where possible. Prior to the works commencing, any by-product to be produced should be accounted for and accurately described in the plan. The EPA should be notified of the by-product decision made by an economic operator. A register of by-product notifications will be maintained and will be available for public inspection online to include details of origin and destination sites for soil and stone by-product.

Waste streams arising from the construction and operational phases of the proposed Project will be identified in addition to identifying required waste management measures for each waste stream. Significant volumes of excavated material will be generated during the construction phase of the main infrastructure sites. The volumes of excavated material and construction waste material will be calculated and the potential and options for re-use of the material will be assessed, with a view to maximising re-use on site. In the event that material is not suitable for reuse, recommendations for disposal will be provided. The permitting and licensing requirements under the Waste Management Acts 1996 – 2011 will be considered and adhered to.

17.5 Climatic Factors

17.5.1 Introduction

The approach to the inclusion of the Climate change, or 'climatic factors' as it is described in the legislation, in EIA has been varied. This is because climate change is a cross-cutting and complex issue and to include it in EIA requires the consideration of both the causes of climate change and the resultant effects of a changing climate.

Directive 2014/52/EU¹ Article 13 sets out the required approach:

'In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change'

The EPA² describe it thus:

'impacts of climate change on a project as well as impacts of a project on climate change'

The causes of climate change are well documented and associated with the emissions of greenhouse gases; this is generally referred to as 'Climate Mitigation'. The consequences of climate change are wider ranging and have the potential to affect not only the project under assessment but the future baseline of all environmental aspects being assessed within an EIA. This is generally referred to as 'Climate Adaptation'.

17.5.2 Climate Change Impacts and Ireland's Climate

The Department of Communication, Climate Action and the Environment (DCCA)³ describes the state of the climate of Ireland.

'Research at national level has shown that changes in Ireland's climate are in line with global trends. Even if GHG emissions fall to levels required to stop the worst impacts of climate change some changes are still likely to occur. This is because the climate system is slow to react, and some changes are already locked in.'

For Ireland, climate change impacts are expected to increase over the coming decades and could include the following;

- sea level rise;
- more intense storms and rainfall events;
- increased likelihood and magnitude of river and coastal flooding;
- water shortages in summer;
- increased risk of new pests and diseases
- adverse impacts on water quality; and

- changes in distribution and phenology (the timing of lifecycle events) of plant and animal species on land and in the oceans.

17.5.3 Baseline Conditions

Study Area

Due to the nature of climatic effects, if significant emissions occur they will have the potential to impact Ireland's commitments and targets under various EU Climate Agreements and other international agreements.

Therefore, the study area can be classed as Ireland in terms of GHGs; however, the impacts of Climate change are experienced at a local as well as global level. For the proposed Project, it is anticipated that flooding will be a key issue affecting the study area. Some of the sites are within areas of existing and potential future flooding as a result of climate change. Further details of the flood extents will be shown in the Flood Risk Assessment (FRA) which will accompany the EIAR.

Greenhouse Gas Emissions

Ireland has signed up to several Climate agreements including the '2030 Climate and Energy Policy Framework' (EC 2014) which aims to reduce GHG emissions by 40% compared with 1990 levels by 2030.

In 2017, total emissions of greenhouse gases in Ireland, including indirect emissions from solvent use were 60,743.73 kt CO₂ equivalent, which is 9.6 per cent higher than emissions in 1990⁴.

The National Inventory Report describes the trends in greenhouse gases since 1990. There was a steady rise from 1990 to 2001, with a 27% rise in the total emissions from the GHG reported upon, from 55,417.1 kt CO₂ eq in 1990 to 70,475.3 kt CO₂ eq. 2001 represents the highest level of GHG emissions ever reported in Ireland.

Following the peak in 2001, emission levels plateaued somewhat, until 2008 when began a sharp decrease to 56,989.2 kt CO₂ eq in 2011. Emissions then plateaued again between 2011 and 2014.

¹ Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.

² Guidelines on the Information to be contained in Environmental Impact assessment reports. Draft August 2017. EPA Ireland.

³ <https://www.dccae.gov.ie/en-ie/climate-action/Pages/default.aspx>

⁴ Ireland's National Inventory Report 2019. Greenhouse Gas emissions 1990-2017. EPA. April 2019.

There was a rise in emissions between 2014 and 2015 of 3.7 per cent and there was a further increase between 2015 and 2016 of 3.5 per cent which is the third largest annual growth rate ever reported in Ireland.

Total emissions in 2017 were 9.6 per cent higher than in 1990, although 13.8 per cent lower than the peak level in 2001.

The changing trends are largely a result of changing economic growth and employment. While Ireland had been in compliance with its EU 2020 target for a number of years, the Climate Change Advisory Council has now advised in their Annual Review 2018 that Ireland is not on track to meet its 2020 targets (20% reduction by 2020 compared to 2005 levels) or its 2030 targets, due to greenhouse gas emissions rising, rather than falling (Climate Change Advisory Council 2018).

Climate Change Adaptation

Ireland's first statutory National Adaptation Framework (NAF) was published January 2018. The NAF:

'sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.'

The NAF was developed under the Climate Action and Low Carbon Development Act 2015. It identifies a number of sectoral impacts as a result of Climate Change; those of relevance to the proposed Project are summarised as follows:

- **Agriculture:** The main impacts will result from changes in air and soil temperatures, changes in rainfall patterns and extreme events. Key impacts could include water stress for crops, heat stress for animals, plant diseases which are currently rare may occur more frequently and the mobility of machinery on fields may be affected due to increased levels of winter rainfall.
- **Biodiversity:** Increasing temperatures will impact on the geographical range and phenology (the timing of lifecycle events) of native species. Projected shifts in climate, temperature and precipitation, may result in the increased occurrence of invasive species and competitive pressures for Ireland's native species.
- **Critical infrastructure:** Water, energy, communications, transport, emergency services are at risk from a range of projected changes including sea level rise, increasing temperatures, changing rainfall patterns and extreme weather

events. Ireland's ports will be placed at increased risk due to storm surges.

- **Water management:** Climate change will pose significant risks to water management and will exacerbate existing pressures in terms of water supply, quality and flooding.

In the past four years, Ireland has seen its:

- *'wettest winter in Ireland in a time series from 1850'* (2015/16), resulting in an €8 million cost for rail network: speed restrictions were imposed and in some places rail lines were closed due to flooding. There were instances of fallen trees and debris blocking railway tracks and high winds caused problems with automatic level crossings barriers.

And, in contrast:

- One of the hottest, driest summers on record (2018). The Met Éireann records show:
 - 32.0°C recorded at Shannon Airport, Co Clare in June 2018, the highest temperature ever recorded at a synoptic station in Ireland.
 - 109.5mm, total summer rainfall for Cork Airport, driest summer for 56 years;
 - Absolute drought conditions recorded at 21 Met Éireann stations between May and July 2018.

In response to these conditions and the consequential risks to the transport system in Ireland, the transport sector has produced its own adaptation strategy. The Draft Statutory Climate Change Adaptation Plan for the Transport Sector Public Consultation July 2019 was published in July 2019, and states:

The transport sector must... put in place adaptation measures to address the unavoidable consequences and associated costs of climate change, as well as maximising any potential opportunities, by facilitating the development of climate resilience within key transport networks, infrastructure and services.

Adaptation measures should enable continued services and maintained infrastructure as well as safeguarding new assets from longer term impacts by ensuring that current design specifications will adequately address future infrastructure needs

17.5.4 Proposed Method and Approach

Overview

It is proposed that an assessment of climate will be carried out in accordance with the EPA guidance as well as the following guidance and established best practice and will be tailored accordingly based on professional judgement and local circumstance. The following guidelines will be employed:

- Transport Infrastructure Ireland document entitled Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes (NRA 2011).
- Assessing Greenhouse Gas emissions and Evaluating their Significance (IEMA. 2017).
- Guidelines on the Information to be contained in Environmental Impact assessment reports. Draft August 2017 (EPA 2017).

In line with the above guidance, the assessment will cover potential impacts to climate and will describe the existing conditions and the likely potential impacts associated with the construction and operation of the proposed Project.

In general, the impact assessment process will involve:

- Identifying and characterising the magnitude and significance of any potential impacts;
- Incorporating measures to avoid and mitigate (reduce) these impacts; and
- Assessing the significance of any residual effects after mitigation.

Greenhouse Gas Emissions

In determining the potential GHG emissions that could be produced and/or reduced or avoided as a result of the proposed Project, the following stages are considered (in accordance with IEMA 2017):

- Before:
 - Pre-construction stages
 - Product stage
 - Construction process stage
- Use;
- End of life; and
- Beyond asset: benefits and loads beyond the system boundary.

Activities within these stages, associated with the proposed Project, will be identified and GHG emissions calculated.

In terms of determining significance, current guidance (IEMA 2017) is that all GHG emissions are considered to be significant and the proposed Project will be designed to address any occurrence by taking mitigating action.

Climate Effects and Adaptation

Each of the environmental topics within the EIAR will include a consideration of Climate Change, both in terms of the future baseline for that topic and the requirement from EIA regulations to consider the likely future evolution of the baseline without the proposed Project, and in terms of the effects of Climate Change on and from the proposed Project. The proposed Project represents critical infrastructure and as such it is required to be designed so as to be resilient to a changing climate. This will be considered as part of each topic, as appropriate.

17.5.5 Potential Impacts

Construction Impacts

Construction traffic is expected to be the dominant source of GHG emissions as a result of the proposed Project. GHG emissions from construction traffic will increase Ireland's GHG emissions potentially having a climate change effect. These will be calculated and assessed in the EIAR to determine whether there is a significant effect during construction.

The construction phase is temporary and is unlikely to have a significant effect on adaptation. However, there may be climate change related weather effects to manage during the construction phase. The potential for these and the consequential effects, for example of flooding and increased silty water runoff, will be considered in the relevant topics.

Operational Impacts

It is likely that GHG emissions from local traffic will not change as result of the proposed Project; the replacement of a level crossing with a bridge is unlikely to change the number of vehicles making the crossing to any significant degree. There is potential for an effect from the diversions being put in place; this will be assessed in the EIAR following completion of the Traffic Impact Assessment.

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At a macro level, GHGs may be reduced during the operational phase due to an increased use of the rail network as travel times between the major cities are reduced following the removal of the level crossings. The planned eventual electrification of the Dublin-Cork line will also benefit from the removal of the level crossings. This will be considered as part of the assessment.

The new bridges and diverted accesses will need to be resilient to climate change and not affect the ability of their 'host communities' to adapt. The design of the proposed Project will be assessed to determine its potential effects in these regards.

18. Interactions and Cumulative Impacts

18.1 Introduction

The EPA (EIA Guidance 2017) define cumulative impacts as:

'The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.'

This chapter will look at the total impact of the proposed Project arising from the following:

- Interactions or Secondary effects (i.e. combined effect with another topic);
- Intra-project effects (i.e. combined effects of the seven sites); and
- Inter-project effects (i.e. in combination with other development activities nearby).

EPA guidance states that the EIAR must consider... *'the potential for cumulative significant effects to arise from multiple non-significant effects.'* A minor impact caused by the proposed Project could have a more significant effect when combined with the same impact from another development in the same geographical area. It is therefore not only important to look at the impacts caused specifically by the project being assessed, but also the impact in the wider context of similar impacts from unrelated projects in the area.

The cumulative impact section of the EIAR will be prepared in accordance with the *'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions'*, prepared for the European Commission (EC 1999). Cumulative impacts will take consideration of all existing and/or approved projects which will be deemed to be likely to cause cumulative impacts.

18.1.1 Policy & Plan Context

The EC Directive (85/337/EEC) (as amended) sets the requirements for assessing cumulative impacts.

- Article 3 states the *'environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case and in accordance with the Articles 4 to 11, the direct and indirect effects of a project on the following factors:*
 - *human beings, fauna and flora,*

- *soil, water, air, climate and the landscape,*
- *material assets and cultural heritage,*
- *the inter-action between the factors mentioned in the first and second indents.'*

- Annex III Selection Criteria Referred to in Article 4 (3) states *'the characteristics of projects must be considered having regard in particular to:*
 - *the size of the project,*
 - *the cumulation with other projects,*
 - *the use of natural resources;*
 - *the production of waste;*
 - *pollution and nuisances;*
 - *risk of accidents, having regard in particular to substances or technologies used.'*
- Annex IV Information Referred to in Article 5 (1) 3 states *'a description of the aspects of the environment likely to be significantly affected by the proposed project... should cover the direct effects and any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the project.'*

The examination of policy and plan context in terms of cumulative impacts will involve a combination of relevant guidelines for each environmental topic and European and national guidance documents. The following documents will be referred to:

- European Union, (1999). Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions;
- Planning Inspectorate, (2015). Advice Note 17. Cumulative Effects Assessment; and
- Guidelines on Information to be contained in an EIAR Draft August 2017. EPA

18.1.2 Study Area

This proposed Project covers an extensive study area made up of 7 locations at each of the railway level crossings concerned including, XC187 - Fantstown and XC201 - Thomastown in Co Limerick, and XC209-Ballyhay, XC211 - Newtown, XC212 - Ballycoskery, XC215 - Shinanagh and XC219 - Buttevant in Co. Cork. The study area for the purposes of the cumulative impacts is dictated by the study area set for each environmental topic.

18.1.3 Baseline Information

Interactions

For each environmental aspect there will be certain interactions or interdependencies with other environmental topics. These interactions will become evident following the assessment of impacts for each environmental topic.

Intra-project Cumulative Impacts between the seven sites

There may be combined impacts on the same receptor or overall environmental topics as a result of activities at two or more of the proposed sites. These in combination impacts will become evident following the assessment of impacts at each site.

Cumulative Impacts with Other Projects

Initially a desktop exercise to identify all other relevant projects in proximity to the proposed Project will be conducted in order to determine the developments with the potential to cause cumulative effects.

Sufficient information will also have been obtained from desktop studies, surveys and assessments completed for other chapters to inform the assessment of cumulative impacts.

18.2 Potential Impacts

Cumulative Impacts result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. For example, the European Commission has identified some examples of potential impacts in its Guidelines:

- Incremental noise from a number of separate developments during construction;
- Combined effect of individual impacts, e.g. noise, dust and visual, from one development on a particular receptor;
- Several developments with insignificant impacts individually but which together have a cumulative effect, e.g. development of a golf course may have an insignificant impact, but when considered with several nearby golf courses there could be a significant cumulative impact on local ecology and landscape.

18.3 Proposed Methodology & Assessment Scope

Cumulative Impact Assessment will involve the following:

- Identifying where cumulative impacts will potentially occur;
- Identifying the pathway of each impact;
- Determining the magnitude and significance of the impacts;
- Developing mitigation measures to address the impacts; and
- Developing monitoring programmes to measure the impacts and monitor the adequacy of mitigation developed.

The scope of cumulative impact assessment is an iterative process. As the proposed Project develops from feasibility to outline detailed design and development of mitigation measures, the potential for cumulative impacts will be reviewed as required. Further cumulative impacts may become apparent during the project planning with more research, speaking to stakeholders during consultation stages or as mitigation measures are designed and resultant indirect impacts may become evident.

19. Conclusion

An Environmental Impact Assessment Report (EIAR), Appropriate Assessment Screening and potentially a Natura Impact Statement (NIS) will be prepared for the proposed Project which will present the findings of the described assessments and will accompany the Railway Order Application to An Bord Pleanála in Q1/Q2 2020. It will be subject to a period of statutory consultation during which the public is afforded the opportunity to provide comments or feedback. Following this period, the An Bord Pleanála will determine whether consent should be granted.

CIÉ and IÉ are now inviting submissions on the issues and methodologies outlined in this EIA Screening and Scoping Report, or any other issues which they deem relevant to the EIA process. The consultation period will run for 10 weeks from Tuesday 12th November 2019 until Tuesday 21st January 2020. We welcome all relevant submissions on the proposed Project.

To make a submission please use the following contact details:

Email: CLLC@irishrail.ie

Postal Address: Cork Line Level Crossings Project, c/o Jacobs Engineering, Mahon Industrial Estate, Cork, T12 HY54

Website: www.irishrail.ie/CorkLineLevelCrossings

Appendix A. Acronym List

Acronym	Meaning
AADT	Annual Average Daily Traffic
AC	Alternating Current
ATO	Automatic Train Operation
ATP	Automatic Train Protection
ATS	Automatic Train Supervision
BOD	Biological Oxygen Demand
BSI	British Standard Institution
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
C&D	Construction and Demolition
CBTC	Communications-Based Train Control
CCTV	Closed Circuit Television
CFRAM	Catchment Flood Risk Assessment and Management
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
COD	Chemical Oxygen Demand
CRR	Commission for Railway Regulation
CSO	Central Statistics Office
DAHG	Department of Arts, Heritage and the Gaeltacht
DAHGI	Department of Arts, Heritage, Gaeltacht & the Islands
DART	Dublin Area Rapid Transit
DC	Direct Current
DCC	Dublin City Council
DCCAE	Department of Communications, Climate Action & Environment
DCHG	Department of Culture, Heritage & the Gaeltacht
DCU	Dublin City University
DECHLG	Department of Environment, Community & Local Government
DEFRA	Department of Environment, Food and Rural Affairs
DEIA	Digital Environmental Impact Assessment
DHPLG	Department of Housing, Planning and Local Government
DLRCC	Dún Laoghaire - Rathdown County Council
DoD	Department of Defence
DoEHLG	Department of Environment, Heritage and Local Government
DPER	Department of Public Expenditure and Reform
DTTS	Department of Transport, Tourism and Sport
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMC	Electromagnetic Compatibility
EMF	Electromagnetic Field
EMI	Electromagnetic Interference
EMRA	Eastern & Midlands Regional Assembly

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Acronym	Meaning
EMWMR	Eastern-Midlands Waste Management Region
EPA	Environmental Protection Agency
EPR	Emerging Preferred Route
ERBD	Eastern River Basin District
ERM	Eastern Regional Model
ESB	Electricity Supply Board
ETS	Emissions Trading System
FCC	Fingal County Council
FRA	Flood Risk Assessment
GDA	Greater Dublin Area
GHG	Greenhouse Gas
GI	Ground Investigation
GIS	Geographical Information System
GSI	Geological Survey of Ireland
GWB	Groundwater Body
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HGV	Heavy Goods Vehicle
HAS	Health & Safety Authority
HSE	Health Service Executive
IAQM	Institute of Air Quality Management
ICNIRP	International Commission on Non-Ionising Radiation Protection
IEMA	Institute of Environmental Management and Assessment
IFI	Inland Fisheries Ireland
IGI	Institute of Geologists of Ireland
IPH	Institute of Public Health
ISO	International Organisation for Standardisation
LA	Local Authority
LAP	Local Area Plan
LAQM	Local Air Quality Management
LGV	Large Goods Vehicle
MRI	Magnetic Resonance Imaging
NACE	Nomenclature Statistique des Activités Économiques
NHA	Natural Heritage Area
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NTA	National Transport Authority
O&M	Operations & Maintenance
OCS	Overhead Contact System
OPW	Office of Public Works
OSI	Ordnance Survey Ireland
PFRA	Preliminary Flood Risk Assessment
pNHA	proposed Natural Heritage Area

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Acronym	Meaning
PPHPD	Passengers Per Hour Per Direction
PRAI	Property Registration Authority of Ireland
PSD	Platform Screen Door
RF	Radiofrequency
RMP	River Management Plan
RPA	Railway Procurement Agency
RSES	Regional Spatial Economic Strategy
SCADA	Supervisory Control and Data Acquisition
SCL	Sprayed Concrete Lining
SEA	Strategic Environmental Assessment
SEM	Scanning Electron Microscope
STMP	Scheme Traffic Management Plan
TA	Transport Assessment
TBM	Tunnel Boring Machine
TDS	Total Dissolved Solids
TII	Transport Infrastructure Ireland
TKN	Total Kjeldahl Nitrogen
TPH	Trains Per Hour
TSS	Total Suspended Solids
VOC	Volatile Organic Compound
WFD	Water Framework Directive
WHO	World Health Organisation
Zoi	Zone of Influence

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- European Union (2014). (Water Policy) Regulations S.I. No. 350 of 2014
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Appendix C. Policy

C1. National, Regional and Local legislation, Policies and Transport Programmes

This section provides a high-level assessment of supporting national, regional and local legislation and policies for the project. The National Development Plan and other policy documents highlighted below demonstrate the Government's commitment to support investment in gaining the sort of service and journey time efficiencies within the rail network that the de-manning of the seven level crossings will deliver.

C1.1 Legislation & Guidance

The assessment of environmental impacts has been completed in accordance with, but not limited to, the following legislation and guidance:

- Planning and Development Act 2000 - 2018;
- Planning and Development Regulations 2001 - 2019;
- Transport (Railway Infrastructure) Act 2001, as amended;
- S.I. 296 of 2018 European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018;
- Directive 2014/52/EC amending Directive 2011/92/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment;
- Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions (European Commission (EC) 1999);
- Guidance on Scoping (EC 2017b);
- Guidance on the EIA Report (EC 2017c);
- Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment (EC 2013);
- The Planning Inspectorate, Advice Note Seventeen; Cumulative Effects Assessment Relevant to Nationally Significant Infrastructure Projects (December 2015);
- Guidelines on the information to be contained in Environmental Impact Statements (EPA 2002);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EIS) (EPA 2003) and draft revised notes (September 2015) (EPA 2015); and
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017).

Key documents that inform the examination of all environmental areas include:

- Project Ireland 2040: National Planning Framework;
- National Development Plan 2018 – 2027;
- National Mitigation Plan (2017);
- Draft Regional Spatial and Economic Strategy for the Southern Region;
- Regional Planning Guidelines for the South West and Mid West (2010 – 2022);
- Relevant Metropolitan Area Strategic Plans (MASPs);
- Cork County Development Plan (CCDP) 2014;
- Limerick County Development Plan (LCDP) 2010-2016; and
- Relevant Local Area Plans.

Relevant Iarród Éireann and railway infrastructure plans, and strategies include:

- 2030 Rail Network Strategy Review;
- Draft Cork Metropolitan Area Transport Strategy (CMATS) 2040;
- Building on Recovery: Infrastructure and Capital Investment 2016 – 2021;
- Rail Review: 2016 Report;
- Iarnród Éireann Safety Report 2017;
- Commission for Railway Regulation (CRR) in the Statement of Strategy 2018 – 2020; and
- Smarter Travel: A Sustainable Transport Future: Anew Transport Strategy for Ireland 2009 -2020.

C1.2 National Planning Policy Context

C1.2.1 Project Ireland 2040: National Planning Framework (NPF)

The NPF is the overarching national spatial policy and planning framework for social, economic and cultural development, and was formally adopted on the 29th May 2018. The NPF outlines broader policy principles and priorities to plan, in a more strategic, sustainable and coordinated manner, for future population and economic growth over the next 20 years.

The NPF vision highlights 'Enhanced Regional Accessibility', 'Strengthened Rural Economies and Communities' and 'Sustainable Mobility' as three of the 10 National Strategic Outcomes (NSO2, NSO3 and NSO4) (p.14);

- **NSO 2- Enhanced Regional Accessibility:** Increased accessibility between key urban population centres and their regions, ensuring they have a high degree of accessibility to Dublin and to each other. The proposed Project will contribute to the delivery of this NSO by delivering efficiencies in the transport network, thereby improving accessibility between Limerick, Cork and Dublin.
- **NSO 3- Strengthened Rural Economies and Communities:** Improved connectivity is highlighted as a pillar for strengthening rural economies and communities by ensuring the countryside remains and improves as a living and working community. The removal of the seven manned crossings will contribute towards achieving this by improving overall permeability throughout the countryside, providing better through-access for local road users.
- **NSO 4- Sustainable Mobility:** As Ireland moves towards the introduction of electric and hybrid traction systems for public transport fleets, it is considered essential to ensure that the long-term effective operation of such vehicles is facilitated through the optimisation of the existing rail network. The proposed Project removes line-speed bottlenecks in the effective operation of the rail network and provides an element of 'future-proofing', contributing towards achieving this aim. NSO 4 also notes the potential to develop 'the existing good quality rail links between Dublin and Belfast and Cork into an island rail spine through line speed and service enhancements'. (P.142)

The NPF targets 50% growth within five key cities including Cork and Limerick. In regard to the Southern Region eight key policy priorities are outlined which range from enhancing the efficiency and effectiveness of transport links between cities and ongoing investment in transport.

Specifically, in regard to Cork a key 'future growth enabler' includes 'Improved rail journey times to Dublin and consideration of improved onward direct network connections.' (NPF, P.49)

In regard to Limerick the key future growth enablers include among others enhanced regional connectivity and development of public transport and infrastructure.

C1.2.2 National Development Plan (NDP) 2018 – 2027

The National Development Plan (NDP) is a detailed capital investment plan which aims to drive the country's long-term economic, environmental and social progress over the next decade, and is integrated and aligned with the NPF and its objectives. It identifies the strategic important priorities and seeks to invest €116 billion over a ten-year period for public capital investment that will underpin the successful implementation of the NPF.

The review of the 2015 capital plan identified transport as a priority area, with the maintenance/upgrade of public transport being cited as necessary to, 'protect asset quality and value, meet demand forecast, ease congestion and to meet climate action objectives' (NDP, p.14) The document also aligns with the ten NPF National Strategic Outcomes through specific investment priorities relating to each. A significant priority will be to maintain the existing network of road, rail and bus infrastructure to ensure acceptable levels of service to transport users given several years of under-investment. Funding for the inter-urban network linkages between Belfast, Dublin and Cork are a particular priority (NDP, p.41) and the Dublin–Limerick Junction/Cork rail lines will be subject to an examination to move to higher speeds leading to improved connectivity to regional cities through improved rail journey times.

C1.2.3 National Mitigation Plan (2017)

Published in 2017 by the Department of Communications, Climate Action and Environment the National mitigation Plan aims to set out a pathway to achieve decarbonisation of the economy to the level required by the Climate Action and Low Carbon Development Act (S.I. No.46 of 2015). The National Mitigation Plan contains measures to cover short-term goals to 2020, as well as beginning the process of developing medium and longer term options for addressing the climate change challenge. Chapter 5 of the National Mitigation Plan includes decarbonisation of transport, with Mitigation Measure T1; Public Transport Investment stating that investment in high quality public transport allow a modal shift and reduction in emissions (NMP, p.102). The eventual electrification of the Dublin-Cork Railway Line will help to meet this goal and the proposed Project is an ancillary part of that objective.

C1.3 Regional Planning Policy Context

The following are regional level planning policy documents which are of relevance to the proposed Project.

C1.3.1 Draft Regional Spatial & Economic Strategy (RSES) for the Southern Region

Three new Regional Assemblies came into effect on 1st January 2015; the Southern Regional Assembly, the Eastern and Midland Regional Assembly and the Northern and Western Regional Assembly. The Southern Regional Assembly has prepared a draft RSES for the Southern Region for the period 2019-2031. The RSES is at material amendments stage with adoption of the strategy expected in the fourth quarter of 2019.

The RSES supports the implementation of the NPF, it provides key principles for environmental, economic and social of the region resulting in Regional Planning Objectives (RPO). In regard to rail infrastructure it sets out 'The management, maintenance and improvement of the regions transport infrastructure is a key consideration to ensure that the safety, capacity and efficiency of the networks are maintained and factored into the capital funding process.' (P.162). In addition to the above, RPO 162 outlines the following objective: 'To strengthen investment in the maintenance, improvement and strengthening of rail networks in the region...' (RSES, p.162) This includes wide ranging investment priorities from rail network optimisation to improving journey times to modernisation of infrastructure.

RPO 151 (Steady State Investment) includes the objective: 'To strengthen Steady State Investment in our existing regional transport networks to ensure that existing networks are maintained to a high level to ensure quality levels of safety, service, accessibility and connectivity to transport users.' (RSES, P.152).

In regard to the Role of Transport in the Southern Region, it outlines principles to inform the integration of land use and transport planning over the period of the RSES. This includes (inter alia):

- 'The strategic capacity and safety of the regions transport network should be protected'; and
- 'The safe travel requirements of all people irrespective of age or mobility should be met.' (RSES, P.142)

The strategy aims to encourage improved connectivity, RPO 162 highlights the need to move the Dublin-Limerick Junction/Cork rail lines to higher speeds to improve connectivity to regional cities through improved rail journey times (RSES, p.163).

C1.3.2 South-West and Mid-West Regional Planning Guidelines (RPG) 2010 – 2022

The Regional Planning Guidelines were adopted in 2010, with the Mid-West RPG covering the counties Limerick, Clare and the northern part of Co. Tipperary and the South-West RPG covering Cork and Kerry. The RPG set out

recommendations to local authorities linked to national investment priorities. The RPGs generally support investment in public transport and improvement of mainline rail journey times.

The Mid-West RPG cites the need to improve rail linkages, particularly with regard to the Limerick to Cork section on the Dublin-Cork line. The South-West RPG emphasises the importance of continuing investment in the upgrade of railway tracks and infrastructure to improve mainline rail journey times and to compete with private cars.

Regional authorities were dissolved in 2014 with the formation of the Southern Regional Assembly, however the guidelines remain extant until the Regional Spatial & Economic Strategy (RSES) for the Southern Region comes into force.

C1.3.3 Draft Cork Metropolitan Area Strategic Plan (MASP)

The NPF requires that Metropolitan Area Spatial Plans (MASPs) be prepared for Dublin and Cork and their wider city regions, as well as the Limerick, Galway and Waterford Metropolitan areas. MASPs are high level strategic visions which identify priorities for the delivery of growth. The 2018 draft RSES for the Southern Region contains a draft MASP for the Cork and Limerick-Shannon metropolitan areas.

In line with the NPF, improved rail journey times to Dublin and consideration of improved onward direct network connections are identified as a key enabler for Cork. Cork MASP Policy Objective 8 states that a key strategic priority will be *'to enhance the commuter rail service by, inter alia, 'improving intercity journey times and the electrification of the fleet'* (RSES, p.225).

C1.3.4 Draft Limerick Shannon Metropolitan Area Strategic Plan (MASP)

The Draft Limerick MASP identifies the development and promotion of existing intercity rail and commuter links from Limerick to Dublin, Cork and Galway as a key sustainable transport objective under Policy Objective 6 (RSES, p.263).

C1.4 Local Planning Policy Context

C1.4.1 Cork County Development Plan (CCDP) 2014

The CCDP was published by Cork County Council (CCC) and was adopted in December 2014, coming into effect on 15th January 2015. It sets out the Council's planning and sustainable development strategy and associated planning policies for Cork County.

CCDP Objective TM 2-5 (Rail Transport) sets out that: *'The County Council will support and prioritise the following key rail transport initiatives (inter alia):*

- a) *Encourage the enhance of service provision in tandem with planned population and employment growth;*
- b) *Encourage greater use of the suburban rail network; support other agencies in delivering an appropriate integrated land-use and transportation framework in the hinterland of rail stations in the Cork City area including park and ride facilities.'* (CCDP, p.156)

C1.4.2 Limerick County Development Plan (LCDP) 2010-2016

The LCDP came into effect in 2010 with the stated aim of setting out a framework for the proper planning and sustainable development of the County.

Policy IN P6 (Protection of public transport assets and facilitation of public transport) states, *'It is Council policy to protect strategic public transport assets; to facilitate accessibility by public transport in development layouts; and to support the enhancement of public transport infrastructure and use through initiatives such as park and ride.'* (LCDP, p. 8-7).

Objective IN O5 (Protection of Rail Infrastructure) sets out a commitment to protect rail infrastructure within the county from inappropriate development that would, *'compromise their safe operation or long-term development'* (LCDP, p. 8-8).

Objective IN 06 (Improvement of Rail Infrastructure) outlines that it is an objective of the Council to, *‘where feasible, work with Iarnród Éireann to promote improvements to extend the reach of passenger and commuter train services to more areas within the County and outlines three priorities involving railway infrastructure enhancement.’* (LDCP, p. 8-9).

C1.5 Iarnród Éireann & Other Strategies/Reports

C1.5.1 2030 Rail Network Strategy Review

In 2011, Iarnród Éireann conducted a review of future development requirements of the Iarnród Éireann InterCity Network (ICN) and regional services. It sets out a broad strategic goal for the rail network, as follows: *‘To provide safe, accessible and integrated rail services that contribute to sustainable economic and regional development in an efficient manner.’* (RNSR, p.IX)

The review states that the Dublin-Cork corridor is the *‘dominant corridor on the rail network’* and this is due to the *‘significant level of inter-city movements.’* (RNSR, p.IX)

The document further outlines under the heading *‘rehabilitation of infrastructure and other key investments’* (RNSR, p. 31) that major rehabilitation works have been carried out and the closure or upgrading of level crossings has formed an important part of the investment programme.

With regard to the Dublin-Cork line, the document states that *‘a total of €232m will need to be spent on the Cork line over the next 20 years with a €23m required after this period.’* (RNSR, p.194)

Section 12.4.2 (Structures and Level Crossings) sets out that *‘Level crossings represent the single biggest rail safety risk. They also impact on journey times. Recent investment has seen a reduction in the number of level crossings from 2,000 to 1,100. Continuous investment is required to manage the safety risk associated with these assets and to provide more competitive journey times.’* It goes on to further state: *‘It is envisaged that expenditure on level crossing of €10m per annum for the next ten years will be required, with €5m thereafter, giving a total of €150m over twenty years, rising to €180m when overheads are included.’* (RNSR, p.192)

C1.5.2 Draft Cork Metropolitan Area Transport Strategy (CMATS) 2040

The National Transport Authority (NTA) produced the draft CMATS in 2019 and it is currently under public consultation.

Dublin-Cork is highlighted as being the top performing InterCity line in the country for passenger numbers (CMATS, p.63). The strategy reiterates the proposed improvements in the National Development Plan (NDP) and Rail Review Report, including improvements in journey times and investment in high-speed rail, electrification and improving the journey time between Dublin and Cork to 2 hours. Building on Recovery: Infrastructure and Capital Investment 2016-2021.

This Capital Plan presents the Government’s €42b framework for infrastructure investment in Ireland over the period 2016-2021, with such investment being identified as an important enabler of economic growth. The plan highlights the importance of transport in driving the economy, It sets out that, *‘It is therefore essential that road, rail and public transport networks are developed and maintained to the standard required to ensure the safe and efficient movement of people and freight.’* (CMATS p.22)

C1.5.3 Iarnród Éireann Rail Review: 2016 Report

The 2016 Rail Review Report examined the network in terms of meeting travel demand and environmental objectives as well as operational funding for the existing network. A passenger demand and elasticity analysis indicated that improving Dublin-Cork journey time to at least 2 hours would significantly strengthen rail as a travel option and improve consistency and transparency. The report also states that for a relatively small investment, journey time gains can easily be delivered in the short term.

C1.5.4 Commission for Railway Regulation (CRR) Statement of Strategy 2018 – 2020

The Commission for Railway Regulation (CRR) was established in January 2006. The CRR is the National Safety Authority (NSA) for the railway sector in Ireland. It is an independent regulatory agency with oversight of the safety of all heavy and light rail organisations. The Statement of Strategy sets out the mandate, mission, vision and key priorities of the CRR to the end of 2020.

C1.5.5 Draft Integrated Implementation Plan 2019-2024

The National Transport Authority (NTA) published the Draft Integrated Implementation Plan in December 2018. This sets out an infrastructure investment programme as well as key objectives and outputs to be pursued by the NTA over the period of the plan. This includes important objectives such as the continued investment in the closure of level crossings.

C1.5.6 Smarter Travel, A Sustainable Transport Future: A New Transport Strategy for Ireland 2009-2020

The 2009 Smarter Travel strategy document by the then Department of Transport, currently Department of Transport, Tourism and Sport (DTTAS), sets out 49 actions to be taken with the aim of achieving sustainable transport in Ireland. These 49 actions are split into four overarching goals, two of which are aimed at providing alternatives to the private car through public transport and improving fuel efficiency in the current fleet (Smarter Travel, p.13).

C1.6 Chapter 8 - Population & Human Health - Legislation, Policy and Guidelines

- 'European Union (planning and development) (Environmental Impact assessment) Regulations 2018' (S.I. no. 296 of 2018);
- 'Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development, Ireland' (2019);
- Cork County Development Plan 2014;
- Cork 2050 – Delivering a Bright Future for Cork (CCC);
- Limerick County Development Plan 2010 to 2016; and
- Limerick 2030 – An Economic and Spatial Plan for Limerick.

C1.6.1 Guidelines

The method to be applied for the amenity assessment draws upon existing sector-specific guidelines, relevant planning policy, and existing industry best practice, including examples from other nationally significant infrastructure projects, as well as available literature on ex-post (after the event) effects.

The method for the wider effects' assessment will be informed by the following documents (a number of which are guidance for roads, the principles of which can will be applied to this site specific and linear project):

- Guidelines on Information to be Contained in Environmental Impact assessment Reports (Draft), EPA, August 2017;
- Guidelines and Principles for Social Impact Assessment (*Environmental Impact Assessment Review 15.1* (1995));
- Health Impact Assessment in EIA (UK), (IEMA, 2018); and
- Design Manual for Roads and bridges Volume 11 (UK) (1993).

C1.7 Chapter 9 - Biodiversity - Legislation, Policy and Guidelines

- The Habitats Directive 92/43/EEC;

- The Birds Directive 2009/147/EC;
- The Water Framework Directive 2000/60/EC;
- The EIA Directive (2014/52/EU);
- Environmental Liabilities Directive (2004/35/EC);
- European Communities (Birds and Natural Habitats) Regulations 2011 S.I. 477 of 2011;
- The Wildlife Act 1976 as amended by the Wildlife (Amendment) Act, 2000 (as amended);
- The Flora (Protection) Order 2015 S.I 356 of 2015;
- Relevant fisheries legislation up to and including the Inland Fisheries Acts 1959 - 2010, as amended;
- Objectives relevant to ecology and biodiversity in the Cork County Development Plan 2014 – 2020 published in 2015;
- Bird species of medium and high conservation concern listed in the publication Birds of Conservation Concern in Ireland 2014 – 2019; and
- National Biodiversity Plan 2017-2021 produced by the Department of Culture, Heritage and the Gaeltacht.

C1.7.1 Guidelines

Surveys will have regard for best practice guidelines including but not limited to:

- Collins. (2016). Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London;
- Fossitt, J. (2000). Guide to Habitats in Ireland. The Heritage Council;
- Hundt, L. (2012). Bat Surveys: Good Practice Guidelines, 2nd edition;
- National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority; and
- Scottish Fisheries Co-ordination Centre (SFCC) (2007). Salmonid Fish Habitat. Available at <http://www.sfcc.co.uk/resources/habitat-surveying.html>.

For the other sites, the methodology used to assess and mitigate potential impacts to biodiversity will be based on established best practice and as per the following guidelines:

- The Chartered Institute of Ecology and Environmental Management's (CIEEM) 2018 Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal and Marine; and
- The National Roads Authority (NRA) 2009a Guidelines for Assessment of Ecological Impacts of National Road Schemes.

In summary, in accordance with the 2018 CIEEM guidance, impacts will only be assessed for *'important ecological features'* (i.e. habitats, species or ecosystems,) that may be affected, with reference to a geographical context in which they are considered important. The identification of such features will be informed by the NRA's 2009 guidance, which identifies features warranting impact assessment as those *'both of sufficient value to be material in decision making [i.e. local value or higher], and likely to be affected significantly'*.

C1.8 Chapter 10 - Soils, Geology & Hydrogeology - Legislation, Policy and Guidelines

- CIRIA 5522: Contaminated Land Risk Assessment – A guide to good practice (CIRIA 2001).

C1.9 Chapter 11 - Water - Legislation, Policy and Guidelines

- EU Water Framework Directive (WFD) (2000/60/EC);
- S.I. No. 722 of 2003, European Communities (Water Policy) Regulations, as amended;
- S.I. No. 792 of 2009, European Communities Environmental Objective (Surface Water) Regulations 2009 as amended;
- S.I. No. 350 of 2014, European Union (Water Policy) Regulations 2014;
- The EU Floods Directive 2007/60/EC;
- S.I. No. 122 of 2010 European Communities (Assessment and Management of Flood Risks) Regulations; and
- S.I. No. 81 of 1988, European Community Environmental (Quality of Surface Water Intended for Human Consumption) Regulations 1984 as amended.

C1.9.1 Policy

- Cork County Development Plan 2014;
- Limerick County Development Plan 2010 – 2016¹;
- River Basin Management Plan 2018-2021; and
- The Shannon RBMP 2009-2015, the South Eastern RBMP 2009-2015, and the Eastern RBMP 2009-2015 and their associated Water Management Unit Action Plans (various).

C1.9.2 Guidelines

- Guidelines on Procedures for Assessment and treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII (then NRA), 2009b)² (TII Guidelines); and

Guidelines on the information to be contained in environmental impact statements. Draft (EPA, 2017).

C1.10 Chapter 12 - Air Quality - Legislation, Policy and Guidelines

- Air Quality in Ireland Report 2017
- National Roads Authority (NRA) Guidelines for the Treatment of Air Quality During the Planning and Construction of National Roads Schemes (NRA (now Transport Infrastructure Ireland (TII)), 2011)
- UK Institute of Air Quality Management (IAQM) guidance on the assessment of dust from demolition and construction (IAQM, 2016)
- UK Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 1 HA207/07 Air Quality (DMRB HA207/07) (2007)
- UK Department for Environment, Food and Rural Affairs (Defra) Local Air Quality Management Technical Guidance (LAQM.TG(16)) (Defra, 2018)
- Air Quality Standards Regulations 2011

¹ https://www.limerick.ie/sites/default/files/media/documents/2018-04/Limerick%20County%20Development%20Plan%202010-2016%20with%20variation%201-3%2C%205%266%29_0.pdf

² The TII Guidelines¹ have been used to inform the scoping of this assessment; in the absence of specific guidance in relation to the assessment of the effects of railway projects on hydrology, the TII Guidance for roads schemes is considered to be a suitable alternative.

C1.11 Chapter 13 - Noise & Vibration – Legislation, Policy and Guidelines

- National Roads Authority Guidelines for the Treatment of Noise and Vibration in National Roads Schemes (TII (formerly NRA) 2004);
- Good Practice for the Treatment of Noise during the Planning of National Road Schemes (TII (formerly NRA) 2014);
- ISO 1996-1:2016: Acoustics – Description, Measurement and Assessment of Environmental Noise – Part 1: Basic Quantities and Assessment Procedures;
- BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise (BSI, 2018a);
- BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Vibration (BSI, 2018b);
- Calculation of Road Traffic Noise (CRTN). London: Her Majesty's Stationery Office (Department for Transport and the Welsh Office 1988);
- Environmental Noise Regulations 2006 (S.I. No. 1401 of 2006); and
- Environmental Noise Guidance for Local Authority Planning & Enforcement Departments. Association of Acoustic Consultants of Ireland June 2019

Where relevant, the guidance in the National Roads Authority Guidelines for the Treatment of Noise and Vibration in National Roads Schemes (TII (formerly NRA) 2004) and the Good Practice for the Treatment of Noise during the Planning of National Road Schemes (TII (formerly NRA) 2014) shall be used for the assessment of road traffic noise impacts.

C1.12 Chapter 14 - Traffic & Transport - Legislation, Policy and Guidelines

- Institute of Highways and Transportation (IHT) '*Guidelines for Traffic Impact Assessment*' (1994); and
- the Institution of Environmental Management and Assessment's (IEMA) '*Guidelines for the Environmental Assessment of Road Traffic*' (2005).

The impact of any increases in traffic flows associated with the proposed Project construction activities will be assessed in relation to the thresholds provided within the Institute of Environmental Management and Assessment (2005) Guidelines for the Environmental Assessment of Road Traffic. Two broad principles outlined within the IEMA guidelines are advised for use as a screening process to limit the scale and extent of the assessment. These are to:

- '*include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)*'; and
- '*include any other specifically sensitive areas where traffic flows will increase by 10% or more.*'

C1.13 Chapter 16 - Landscape - Legislation, Policy and Guidelines

- Environmental Protection Agency (EPA) Guidelines on the Information to be contained in the Environmental Impact Statement (EPA, 2002) and will follow all future revisions or finalised EIA guidelines as appropriate (draft published in 2017);
- EPA Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003) and will follow all future revisions or finalised EIA guidelines as appropriate (draft published in 2015); and
- Landscape Institute and the Institution of Environmental Management and Assessment publication entitled Guidelines for Landscape and Visual Impact Assessment (GLVIA-2013).

Appendix D. EIA Method

D1.1 Methodology

D1.1.1 Generic EIA Method and Approach

Each environmental topic has its own bespoke method for assessment, in accordance with published professional guidelines, details of which are provided within each Topic Chapter. Generic methods for EIA will also apply and the assessments will be conducted in accordance with the following EPA Guidance:

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017c); and
- Draft Advice Notes for Preparing Environmental Impact Statements (EPA 2015).

In addition to the applicable EIA legislation and guidance, all EU Directives and national legislation relating to the specialist areas will also be considered as part of the process.

The purpose of the EIAR is to describe *'likely significant effects on the (environmental) factors'*. This description needs to cover *'direct effects, and any indirect, secondary, cumulative, transboundary, short-term, medium term and long term, permanent and temporary positive and negative effects of the proposed Project'* (S.I. no. 296 of 2018, Schedule 6).

The significance attributed to impacts (or effects) is generally understood to mean the importance of the consequence of the change to the baseline condition. Professional judgement by competent experts, as well as professional guidelines, has a role in determining significance. The EPA Guidelines (EPA 2017c) provides guidance on determining significance. This is reproduced in Table D1.1 and will form the basis of all topic assessments in the EIAR.

Table D1.1: Reproduction of Table 3.3 Description of Effects from the Draft EPA Guidelines (EPA 2017c)

Assessment Criteria	
Quality of Effects	
It is important to inform the non-specialist reader whether the effect is positive, negative or neutral.	<ul style="list-style-type: none"> Positive Effects A change which improves the quality of the environment (for example, by increasing species diversity or improving the reproductive capacity of an ecosystem; or removing nuisances; or improving amenities)
	<ul style="list-style-type: none"> Neutral Effects A change which does not affect the quality of the environment
	<ul style="list-style-type: none"> Negative / Adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing a nuisance)
Significance of Effects	
'Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for the different topics the following definitions may be useful.	<ul style="list-style-type: none"> Imperceptible An effect capable of measurement but without noticeable consequences
	<ul style="list-style-type: none"> Not significant An effect which causes noticeable changes in the character of the environment but without noticeable consequences
	<ul style="list-style-type: none"> Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	<ul style="list-style-type: none"> Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends
	<ul style="list-style-type: none"> Significant Effects An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	<ul style="list-style-type: none"> Very Significant Effects An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment
	<ul style="list-style-type: none"> Profound Effects An effect which obliterates sensitive characteristics
Extent and Context of Effects	
Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	<ul style="list-style-type: none"> Extent Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	<ul style="list-style-type: none"> Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Probability of Effects	
Descriptions of effects should establish how likely it is that the predicted effects will occur – so that the CA can take a view of the balance of risk over advantage when making a decision.	<ul style="list-style-type: none"> Likely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
	<ul style="list-style-type: none"> Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration and Frequency of Effects	
'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	<ul style="list-style-type: none"> Momentary Effects Effects lasting from seconds to minutes
	<ul style="list-style-type: none"> Brief Effects Effects lasting less than a day
	<ul style="list-style-type: none"> Temporary Effects Effects lasting less than a year
	<ul style="list-style-type: none"> Short-term Effects Effects lasting one to seven years
	<ul style="list-style-type: none"> Medium-term Effects Effects lasting seven to fifteen years
	<ul style="list-style-type: none"> Long-term Effects Effects lasting fifteen to sixty years
	<ul style="list-style-type: none"> Permanent Effects Effects lasting over sixty years
<ul style="list-style-type: none"> Reversible Effects Effects that can be undone, for example through remediation or restoration 	

In addition to the use of these criteria, the most common method employed to determine significance of effects is to compare the magnitude of the predicted effect with the sensitivity of the receiving environment. In this approach 'magnitude' and 'sensitivity' are used as descriptors of a wide range of different factors. 'Magnitude' includes the

spatial extent of the effect; the time period over which the effect will occur; and whether the effect is permanent or reversible. Sensitivity describes the value or importance placed upon a 'receptor'. The matrix shown in Table D1.2 is provided in the EPA Guidance (2017) as a method of combining magnitude and sensitivity to achieve a decision on significance. The use of these approaches improves the transparency and robustness of the professional judgement employed.

Table D1.2 Significance Matrix

		Magnitude of Impact			
		Negligible	Low	Medium	High
Sensitivity of Receptor	Extremely High	Not significant	Significant	Very significant	Profound
	Very High	Not significant	Moderate	Very Significant	Profound
	High	Not significant	Moderate	Significant	Very Significant
	Medium	Not significant	Slight	Moderate	Significant
	Low	Imperceptible	Slight	Slight	Moderate

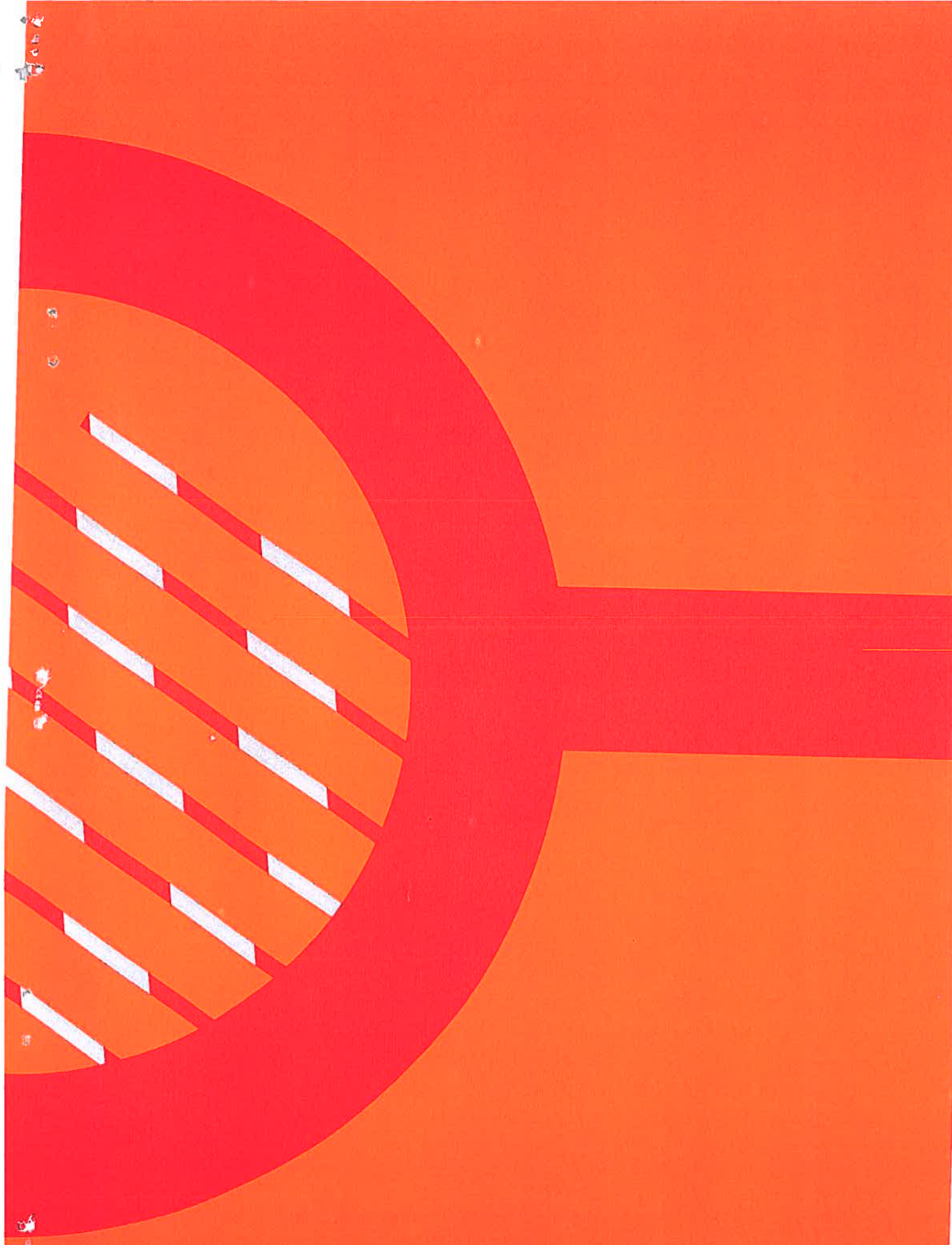
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