



**Cork Line Level Crossings**  
**Outline Construction Environmental Management Plan**

March 2021

Iarnród Éireann



## Cork Line Level Crossings

Project No: 32111000  
 Document Title: Outline Construction Environmental Management Plan  
 Document No.: 20  
 Revision: A04  
 Date: March 2021  
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### Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
A01	April 2020	For Client Review	LMCG	HC	HC/RM	AB
A02	August 2020	Update following Client Comments	LMCG	HC	HC/RM	AB
A03	November 2020	Update following Comments	LMCG	HC	HC/RM	AB
A04	March 2021	For Issue to An bord Pleanála	LMCG	HC	HC/RM	AB

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## Table of Acronyms

Acronym	Meaning
BPM	Best Practicable Measures
CEMP	Construction Environmental Management Plan
CIÉ	Córas Iompair Éireann
CMP	Construction Management Plan
CTMP	Construction Traffic Management Plan
DMP	Dust Management Plan
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Policy
EMS	Environmental Management System
EPA	Environmental Protection Agency
FSAI	Food Safety Authority for Ireland
GI	Ground Investigation
HMP	Habitats Management Plan
IAQM	Air Quality Management
IÉ	Iarnród Éireann
I.S.	Irish Standards
ISO	International Standard
LEDs	Light Emitting Diodes
NMI	National Museum of Ireland
NMS	National Monuments Service
OPW	Office of Public Works
PEMP	Project Environmental Management Plan
PICP	Pollution Incident Control Plan
PPE	Personal Protection Equipment
PC&D	Preliminary Construction and Demolition
PWS	Private Water Supplies
RAMS	Risk Assessment and Method Statement
SWMPs	Site Waste Management Plans
SID	Strategic Infrastructure Development
SuDS	Sustainable Drainage Systems
TSS	Total Suspended Solids

WMP	Waste Management Plan
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# 1. Introduction

## 1.1 The proposed Project

Córas Iompair Éireann (hereafter referred to as (CIÉ) or 'the Applicant', is to applying An Bord Pleanála (ABP) for a Railway Order(RO) under the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) (the 2001 Act') to eliminate/upgrade seven public road level crossings on the Dublin-Cork Railway Line (hereafter referred to as the proposed Project). Whilst the application is being made on behalf of CIÉ it is Iarnród Éireann (IÉ) who has developed the proposed Project from concept to application stage.

The proposed Project is described in detail in Volume 2, Chapter 3: Project Description. The key elements of the proposed Project are identified in Table 1.1.

Table 1.1: Overview of Key Elements of proposed Project

Location	Proposed Infrastructure	Description
XC187- Fantstown	N/A.	Straight Closure: Alternative route along existing roads to existing road-over-rail bridge approximately 3km to the north east.
XC201- Thomastown	1 no. rail-over-road bridge.	New road-over-rail bridge: Tie in to existing local road to south and new junction on Regional Road R515 to north.  Carriageway widths are proposed to match existing widths for safety reasons. Following consultation with Limerick City and County Council Roads Department as well as submissions made by members of the public, the structure has been widened so that minimal works would be required to accommodate a future widened carriageway.
XC209- Ballyhay	CCTV solution	Replace the existing manned level crossing with a remote monitored CCTV solution.
XC211- Newtown	New access road.	New Access Road: Immediately east of the existing road-over-rail bridge to the north of XC211 Newton; tie in to existing Local road to the east of XC211 Newtown. Carriageway widths are proposed to match existing widths for safety reasons, with passing bays located in accordance with TII standards.  This alignment was chosen following public consultation and concerns raised about the initial proposal for a new access road tie in from the rear of the Beechwood Grove housing estate to the local road west of the XC211 Newtown level crossing.
XC212- Ballycoskery	1 no. road-over-rail bridge, 2no. retaining walls.	New road-over-rail bridge: Tie in to existing Local Road to East and West, new carpark proposed for existing school. Tie into Beechwood Housing Estate and Ballyhea National School to North and existing Local road to south.
XC215- Shinanagh	Tie into existing road-over-rail bridge.  Upgrade of existing junction on N20, closure of existing N20 junction at current level crossing location.  Resurfacing of section of existing local road.	New access road to tie into existing road-over-rail bridge approximately 1km to the north.

Location	Proposed Infrastructure	Description
XC219- Buttevant	1no. road-over-rail bridge, 1no. portal frame road over river bridge culvert, 1no. ditch box culvert, 1no.access road box culvert, 2no. retaining walls.	New road-over-rail bridge. Tie in to existing regional road to east and west.

## 1.2 The Purpose of the Outline Construction Environmental Management Plan

This Outline Construction Environmental Management Plan (hereinafter referred to as CEMP) has been prepared by Jacobs and CIÉ/IÉ. It presents the approach and application of environmental management and mitigation for the construction of the proposed Project. It aims to ensure that adverse effects from the construction phase of the proposed Project, on the environment and the local communities, are avoided or minimised. It does not describe mitigation measures relating to the operation and decommissioning of the proposed Project; these are provided in the mitigation sections of the EIAR Chapters at Volume 3 (Chapters 6 to 16) and Volume 5, Appendix 18A Schedule of Mitigation.

The outline CEMP has been prepared in accordance with IÉ Environmental Management Policy (EMP). CIÉ/IÉ along with the contractor will be required to produce a detailed CEMP prior to construction taking place.



### 1.3 Objectives

The objectives of this CEMP are to:

- provide a mechanism for ensuring the delivery of mitigation measures to reduce environmental effects identified in the EIAR;
- provide an outline of the content that will be supplied in the additional management plans (Table 1.2);
- ensure compliance with legislation and identifying where it will be necessary to obtain authorisation from relevant statutory bodies;
- provide a framework for compliance auditing and inspection to ensure the agreed environmental aims are being met; and
- ensure a prompt response to any non-compliance with legislative and Railway Order requirements/conditions, including reporting, remediation and any additional mitigation measures required to prevent a recurrence.

### 1.4 Supporting Plans

The CEMP also incorporates the plans and strategies shown in Table 1.2.

Table 1.2: Management Plans

Plan/Strategy	Description	Chapter/Appendix
Landscape Mitigation Plans	A plan for each site to identify landscape mitigation measures to be used to limit the effects on landscape and visual effects.	Volume 3, Chapter 13: Landscape and Visual (detailed further in section 3.8 of this CEMP)
Habitat Management Plan	A plan outlining the process to for the translocation of species rich grassland at Buttevant.	Volume 3, Chapter 7: Biodiversity (detailed further in Section 3.2 of this CEMP).
Preliminary Construction & Demolition Waste Management Plans (PC&D WMP)	A plan outlining the process for the management and disposal of waste produced by the scheme.	Volume 3, Chapter 14: Resource and Waste Management, Preliminary Construction and Demolition (PC&D) and Waste Management Plan Waste Management Plan (WMP) and detailed further in Section 3.9 of this CEMP.

Table 1.3 lists the site-specific plans that will be developed by the contractor for each stage of the proposed Project to set out in detail the management systems, procedures and approaches that will be implemented during construction to comply with the principles set out in this CEMP.

Table 1.3: Plans to be prepared by the Appointed Contractors

Plan/Strategy	Description
Construction Management Plan (CMP)	A detailed construction plan and schedule will be developed for the proposed Project to ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact. Detailed information in regard to the construction programme for the proposed Project is set out at Volume 2, Chapter 3: Project Description.
Safety and Health Plan	Details relevant safety and health information relating to all construction activities (detailed further at Section 2.2 of this CEMP).

Plan/Strategy	Description
Project Environmental Management Plan (PEMP)	Details the environmental mitigation measures that will be implemented during each stage of the construction works and will be in accordance with the CEMP.
Communications Strategy	Details who you need to communicate with, about what, how you're going to do it, and how often for each site before work commences on the site (detailed further in Section 1.9).
Construction Traffic Management Plan (CTMP)	Details the strategy and mitigation measures to be used to limit the impact on existing users of the public highway network. Volume 3, Chapter 11: Traffic and Transport (detailed further in 3.6 of this CEMP).
Travel Plan	Provides the mechanism to support and promote sustainable travel for staff, contractors and visitors travelling to the proposed Project sites (detailed further in section 2.12 of this CEMP).
Site Waste Management Plans (SWMPs)	An action plan for the management of waste which is likely to arise on each site during the construction phase of the proposed Project (detailed further in section 3.9 of this CEMP).
Dust Management Plan (DMP)	A plan for the management of dust which is likely to arise during the construction phase of the proposed Project, relevant to each site, where applicable. Volume 3, Chapter 15: Air Quality of the EIAR (detailed further in section 3.10 of this CEMP).
Pollution Incident Control Plan (PICP)	The PICP will detail the contractor's response in the event of any pollution incident on site.

## 1.5 Conformance with Corporate and Project Environmental Management Policies

CIÉ/IÉ is committed to adhering to the highest standards for environmental protection, in particular, IÉ has worked to achieve and maintain its certification of the international ISO standards for Environmental Management (ISO 40001:2015 and ISO 9001:2015).

In accordance with this proactive approach to sustainable design and construction CIÉ/IÉ and the appointed contractors will seek to maximise resource efficiency through reducing the amount of waste generated, minimising water consumption and making the most efficient use of energy.

The carbon footprint of the proposed Project will be minimised during construction by avoiding CO<sub>2</sub> emissions, as per Volume 3, Chapter 16: Cross Cutting Themes where possible through, for example, keeping construction vehicle movements to the minimum necessary.

CIÉ /IÉ maintains an EMP to provide a commitment within which to manage and reduce their effects on the environment. The CIÉ/IÉ EMP states that there is *"a commitment by IÉ to develop an Environmental Management System (EMS) with existing management systems (Quality, Energy, Safety, etc). for increment benefit"*. This CEMP complies with CIÉ/IÉ environmental policy and the commitments they make to managing and reducing the effects on the environment.

The contractors will prepare their own project-based EMS in accordance with CIÉ/IÉ's EMP and EMS prior to construction commencing. The contractors' EMS will detail their framework for managing the environment. CIÉ/IÉ will approve the contractors' EMS prior to construction.

The contractors' EMS will address:

- the environmental aspects identified in the Volume 3 (Chapters 6-16) and this CEMP;
- compliance with environmental consents and permits;

- overall compliance with environmental legislation, approved codes of practice and industry best practice as set out in each topic detailed in this CEMP;
- an action plan to deliver the CEMP, including roles and responsibilities;
- monitoring and review arrangements;
- emergency procedures that are defined and adopted; and
- appropriate training and information for personnel.

## 1.6 Conformance with the Environmental Impact Assessment Report

An Environmental Impact Assessment (EIA) has been undertaken for the proposed Project. The EIAR has been compiled in accordance with the Transport (Railway Infrastructure) Act 2001 (as amended and substituted) and Directive 2014/52/EU. Further details in regard to the statutory requirements for EIAR are set out in Volume 2, Chapter 4: EIA Process and Methodology. The EIAR is provided at Volume 2, Chapters 1 to 5 and Volume 3, Chapter 6-17. The EIAR includes assessments of the potential effects on the environment that are likely to be caused during the construction, operation and decommissioning phases of the proposed Project. The EIAR also describes the mitigation measures to reduce the significance of the adverse effects on the environment.

CIÉ/IÉ and its contractors will implement the mitigation measures identified in the EIAR and in the CEMP to avoid or minimise adverse effects on the environment from the construction of the proposed Project.

## 1.7 Compliance with Legislation, Standards and Guidance

There is a broad range of legislation covering the different aspects of environmental protection and requirements for avoidance or mitigation and these are referenced in the relevant topic chapters within the EIAR. These are supported by additional statutory guidance; 'standards', such as Irish Standards (I.S.) International Standards (ISO); and other 'best practice' guidance, including industry codes of practice. Where applicable, references to specific legislation, standards and guidance are included within each subsequent section of this CEMP.

This aspect of the CEMP will be kept under review and updated as required as a result of new or amended legislation, standards and guidance.

## 1.8 Involvement of Local Authorities and Other Statutory Bodies

CIÉ/IÉ has engaged with stakeholders, including local authorities and other statutory and non-statutory bodies, throughout the design evolution of the proposed Project, as is described in Volume 2, Chapter 1: Introduction.

Specifically, stakeholders have been invited to provide comment on the Preliminary Design Report and the EIA Screening & Scoping Report. Comments were received and have been considered in the design of the proposed Project, the EIAR and this CEMP.

Additional consents will be sought where required, for example permits from the Environmental Protection Agency (EPA).

## 1.9 Community Engagement and Public Information

A Communications Strategy has been developed to help CIÉ/IÉ and their contractors to fully understand stakeholder issues, from the outset of the proposed Project and as they arise to prevent their escalation. There has also been the development of a Public Consultation Plan which has outlined the detailed, tailored approach to engaging and communicating with communities, landowners and stakeholders, with a focus on the specific considerations of the seven manned level crossings.

A Communications Team will be appointed to provide dedicated community relations and external communication support. The community relations agency will work with the internal established communications teams at CIÉ/Iarnród Éireann. The Communications Team will ensure the details of any complaints are recorded

and all complaints are appropriately managed. Complaints will be investigated, and appropriate action will be taken. The investigation procedure is detailed at section 1.13.

Where a person from a community local to the works makes a complaint, it will be passed initially to the Communications Team. The Communications Team will liaise with the other members of the project team to investigate the complaint. Appropriate action will be taken by the project construction team.

A Property Liaison from Iarnród Éireann will also be provided to the affected landowners. The role of the Property Liaison is to provide landowners with a single point of contact throughout the project, and to endeavour to address any issues related to the project which may be of concern to individual landowners. They will liaise with all landowners along the seven level crossings right through to construction.

Throughout the development of the design, the Communications Team will ensure that precise explanation for the need to eliminate/upgrade these level crossings, the design process, the potential impacts on the local community and what is being done to mitigate the effects of potential issues.

### 1.10 Roles and Responsibilities

Establishing roles and responsibilities on site is important to ensure the successful construction of the proposed Project, including the implementation of the CEMP. The responsibilities of the personnel who will be responsible for implementing, monitoring, responding to, and updating the CEMP are described in Table 1.4.

Table 1.4: Responsibilities of the Likely Environmental Project Construction Team

Role	Responsibility
Project Supervisor	<ul style="list-style-type: none"> <li>▪ overall responsibility for ensuring conformance with the CEMP;</li> <li>▪ incident investigation;</li> <li>▪ reviewing risk assessments and method statements (RAMS);</li> <li>▪ manager of the Safety and Health Plan;</li> <li>▪ reviewing, updating and issuing the CEMP;</li> <li>▪ incident investigation;</li> <li>▪ liaison with the emergency services;</li> <li>▪ site inspection;</li> <li>▪ reviewing applications for environmental consents and permits; and</li> <li>▪ sensible monitoring.</li> </ul>
Environmental Clerk of Works (ECOW)	<ul style="list-style-type: none"> <li>▪ site inspection;</li> <li>▪ overseeing and monitoring the implementation of mitigation measures in this CEMP</li> <li>▪ preparing and submitting applications for environmental consents and permits;</li> <li>▪ liaison with third parties and licensing authorities;</li> <li>▪ organising environmental surveys;</li> <li>▪ sensible monitoring; and</li> <li>▪ discharging consent conditions</li> </ul>
Project Archaeologist	<ul style="list-style-type: none"> <li>▪ to supervise works in the vicinity of known archaeology (see detail within Section 12.6: Mitigation Measures of Volume 3, Chapter 12: Cultural Heritage and Section 3.7 of this CEMP).</li> </ul>
Waste Management Co-Ordinator	<ul style="list-style-type: none"> <li>▪ for the further development of the PC&amp;D WMP and the management and treatment of all waste materials generated during the duration of the proposed Project construction phase; and</li> <li>▪ to instruct all site personnel to comply with the specific provisions of the PC&amp;D WMP.</li> </ul>

### 1.11 Contractors

Appropriate contractors will be appointed for the proposed Project by CIÉ/IÉ (as appropriate). The contractors will be responsible for implementing the CEMP through contractual agreements with CIÉ/IÉ.

Prior to each phase of construction commencing, the contractors will prepare the management plans described at Table 1.3 of this CEMP. The contractors will also have consideration of safety, health and environmental management as outlined within this CEMP.

Environmental issues that arise during the construction of the proposed Project will be reviewed at the inaugural and subsequent regular meetings held by the contractors. Daily toolbox talks will be held by the contractors to inform the construction staff of any environmental issues and any changes to the CEMP.

CIÉ/IÉ and the contractors will ensure that all staff, including subcontractors are trained and competent in the management of environmental impacts to a level that is appropriate to their role.

## 1.12 Inspections

The contractors will undertake daily inspections, which will include monitoring conformance with the CEMP. Daily assessment forms will be completed during the daily checks. Checks on equipment will be undertaken to reduce the risk of incidents occurring (for example oil leaks). As a minimum the following equipment will be inspected:

- fencing;
- waste storage facilities;
- oil separators;
- chemical storage facilities;
- bund integrity;
- foul water storage facilities;
- silt traps;
- drainage ditches and watercourses;
- storage vessels (including pumps, gauges, pipework and hoses);
- secondary containment (for example, secondary skins for oil tanks);
- spill response materials; and
- equipment with potential to leak oils and other liquids, for example, compressors and transformers.

Weekly inspections will be undertaken by CIÉ/IÉ or their representatives and the contractors to ensure the daily checks are being undertaken correctly.

The inspections will also include:

- reviewing the daily risk assessment forms;
- ensuring that faults and defects are identified and rectified; and
- providing data for performance monitoring.

Immediate action including, if necessary 'stopping a job', will be taken should any incidents or non-conformance with the CEMP be found during inspection.

CIÉ/IÉ or their representatives and the contractors monitoring reports will be made available to statutory and non-statutory bodies on request.

## 1.13 Incident Procedure

### 1.13.1 Pollution Incident Control Plan (PICP)

Contractors will develop and implement a PICP which will detail their response in the event of any incident on site.

The following measures and information will be included and detailed further in the PICP to manage any incidents and limit adverse effects on the receiving environment:

- describe the procedure to be followed in the event of an incident (in accordance with the 'Incident Response' procedure below);
- describe the procedure for the notification of appropriate emergency services, authorities and personnel on the construction site;
- describe the procedure for the notification of relevant statutory bodies, environmental regulatory bodies, local authorities and local water and sewer providers;
- provide maps showing the locations of local emergency services facilities such as police stations, fire authorities, medical facilities, other relevant authorities, such as the EA and the address and contact details for each service and authority;
- provide contact details for the persons responsible on the construction site for pollution incident response;
- provide contact details of a competent spill response company which can be contacted at short notice for an immediate response;
- ensure that site drainage plans and flood risk management plans are available on site and are kept up-to-date; and
- ensure staff competence and awareness in implementing plans and using pollution response kit.

### 1.13.2 Incident Response

All incidents associated with the construction of the proposed Project, including environmental incidents and non-conformance with the CEMP, will be reported and investigated using the PICP (unless stated otherwise).

The following procedure will be followed in the event of an incident and will be detailed further in the PICP:

- works will stop;
- the Environmental Manager and SHESQ Manager will be contacted;
- the size of the incident will be assessed;
  - if the incident is controllable by staff on Site, remedial action will be taken immediately in accordance with the Pollution Incident Control Plan;
  - if the incident cannot be controlled by the staff on Site, emergency assistance will be sought;
- the appropriate enforcing authority will be contacted and informed, including:
  - the Environmental Protection Agency for incidents affecting rivers, groundwater and major emissions to atmosphere;
  - the local sewerage undertaker for incidents affecting sewers;
  - the Local Authority Environmental Health Department for incidents that could affect the public;

- the Food Safety Authority for Ireland (FSAI) for incidents that have the potential to affect food through deposition on crops or land used for grazing livestock;
- the Senior Project Supervisor will instigate an investigation into the occurrence of the incident;
- the findings will be sent to the appropriate enforcing authority where necessary; and
- an action plan will be prepared to determine why the incident occurred and whether any modifications to working practices are required to prevent a recurrence. If necessary, the CEMP and Safety and Health Plan will be updated (and any other plans as appropriate) and all workers will be notified.

### 1.14 Structure of the CEMP

The remainder of this CEMP is split into two sections:

- Section 2: describes the general principles that will be adopted on the construction site. The general principles cover the following elements:
  - health and safety;
  - construction hours;
  - site layout and appearance;
  - fencing and other means of enclosure;
  - lighting;
  - waste management;
  - security;
  - welfare;
  - pest control;
  - unexploded ordnance;
  - utility works;
  - clearance of the site on completion; and
  - consents and licences.
- Section 3 describes the mitigation measures that will be adopted during the construction of the proposed Project. The mitigation measures will be implemented to reduce risk on the following environmental aspects:
  - Population and Human Health;
  - Biodiversity;
  - Soils, Geology and Hydrogeology;
  - Water;
  - Noise and Vibration;
  - Traffic and Transport;

- Cultural Heritage;
- Landscape and Visual;
- Resource Use and Waste Management; and
- Air Quality.



## 2. General Site Operations

### 2.1 Objective

To construct the proposed Project having regard to the safety and security of the public and construction staff and to mitigate the impact of general site operations.

### 2.2 Health and Safety

CIÉ/IÉ are committed to ensuring the health and safety of persons working on projects and the protection of the environment is maintained in accordance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (amended 2019)) and the principles and philosophy behind them.

In accordance with health and safety legislation the contractors will prepare a Construction Phase Safety and Health Plan prior to construction works commencing. A Construction Phase Health and Safety Plan will be prepared by the contractors for each element of the proposed Project. The Plan will ensure that adequate arrangements and welfare facilities are in place to cover:

- the safety of construction staff;
- the safety of all other people working at or visiting the construction site;
- the protection of the public in the vicinity of the construction site;
- compliance with the Safety, Health and Welfare at Work (Construction) Regulations 2013 (amended 2019) and associated HSE guidance documents;
- emergency procedures being defined and adopted;
- appropriate training and information being provided to personnel;
- The contractors’ Construction Phase Safety and Health Plan will be reviewed and approved by CIÉ/IÉ prior to construction commencing. The Safety and Health Plan will be managed and implemented by the Project Supervisor;
- All staff, site visitors and delivery drivers will receive a relevant project induction by the contractors to ensure they are aware of site hazards and health and safety management requirements. Site staff will be briefed daily by the contractors prior to work commencing. Site-specific risk assessments will be carried out to ensure the risk strategy of the frequently changing workplace remains relevant. The contractors will be required to carry out audits and inspections throughout the proposed Project in accordance with section 1.13 of this CEMP; and
- A Communications Strategy will be developed to help assist the process of communicating between local stakeholders and the project team.

### 2.3 Construction Sequence

Indicative construction sequences are summarised in Table 2.1 to Table 2.5. These will happen in Phases as outlined. These are based on preliminary design solutions for the bridges being of earth ramp and pre-cast reinforced concrete beams with traditional concrete infill.

Table 2.1: Construction Phasing and Indicative Programme for XC201 Thomastown

XC201 Thomastown	Duration
Phase 1	

XC201 Thomastown	Duration
1. Strip/Excavate existing ground for new road formation	2 weeks
2. Form temporary road access to new bridge location for plant access (including temporary works crane mat)	2 weeks
3. Install temporary drainage and some permanent drainage where possible	1 week
<b>Phase 2</b>	
4. Install foundation piles and form capping beam	4 weeks
5. Install bridge support foundation using mobile crane	2 weeks
6. Install precast bridge beams and concrete infill during rail possession and apply bridge deck waterproofing	4 weeks
<b>Phase 3</b>	
7. Form new reinforced earth ramp approach roads on each side	17 weeks
8. Complete new road surface, marking and signage	7 weeks
9. Tie in new and existing roads	1 week
10. Level crossing to be decommissioned	1 week
11. Decant from site and open road to public	2 weeks
<b>TOTAL</b>	<b>41 weeks</b>

Table 2.2: Programme for XC211 Newtown

XC211 Newtown	Duration
<b>Phase 1</b>	
1. Strip/Excavate existing ground for new road formation	5 weeks
2. Close access Road to Residents	1 week
3. Install temporary drainage and some permanent drainage where possible	1 week
4. Form earthworks embankment for road construction	4 weeks
<b>Phase 2</b>	
5. Complete road surfacing	3 weeks
<b>Phase 3</b>	
6. Form new connection to tie into existing	2 weeks
7. Tie in new and existing roads	1 week
8. Level Crossing to be decommissioned	1 week

XC211 Newtown	Duration
9. Open new road	1 week
10. Decant from site and open road to public	2 weeks
TOTAL	20 weeks

Table 2.3: Programme for XC212 Ballycoskery

XC212 Ballycoskery	Duration
<b>Phase 1</b>	
1. Strip/Excavate existing ground for new road formation	4 weeks
2. Form temporary road access to new bridge location for plant access (including temporary works crane mat)	2 weeks
3. Install temporary drainage and some permanent drainage where possible	1 week
4. Construct Retaining Wall	4 weeks
<b>Phase 2</b>	
5. Install foundation piles and form capping beam	4 weeks
6. Install bridge support foundation using mobile crane	2 weeks
7. Install pre cast bridge beams and concrete infill during rail possession and apply bridge deck waterproofing	4 weeks
8. Demolish of Existing Buildings	2 weeks
<b>Phase 3</b>	
9. Form new reinforced earth ramp approach roads on each side	30 weeks
10. Complete new road surface, marking and signage	8 weeks
11. Tie in new and existing roads	1 week
12. Decant from site and open road to public	2 weeks
TOTAL	63 weeks

Table 2.4: Programme for XC215 Shinanagh

XC215 Shinanagh	Duration
<b>Phase 1</b>	
1. Strip/Excavate existing ground for new road formation	13 weeks

XC215 Shinagh	Duration
2. Close access Road to Residents	1 week
3. Install temporary drainage and some permanent drainage where possible	1 week
4. Form earthworks embankment for road construction	15 weeks
<b>Phase 2</b>	
5. Complete road surfacing	11 weeks
<b>Phase 3</b>	
6. Form new connection to tie into existing	1 week
7. Tie in new and existing roads	1 week
8. Decant from site and open road to public	2 weeks
9. Decommission level crossing	1 week
<b>TOTAL</b>	<b>44 weeks</b>

Table 2.5: Programme for XC219 Buttevant

XC219 Buttevant	Duration
<b>Phase 1</b>	
1. Strip/Excavate existing ground for new road formation	2 weeks
2. Form temporary road access for residents and access to buildings/fields	2 weeks
3. Form temporary road access to new bridge location for plant access (including temporary works crane mat)	2 weeks
3. Install temporary drainage and some permanent drainage where possible	1 week
<b>Phase 2</b>	
4. West Side Install culvert over stream	3 weeks
5. Form temporary road to bridge structure	2 weeks
6. Install retaining wall (East)	1 week
7. Install foundation piles and form capping beam	4 weeks
8. Install bridge support foundation using mobile crane	2 weeks
9. Install pre cast bridge beams and concrete infill during rail possession and apply bridge deck waterproofing	4 weeks
<b>Phase 3</b>	

XC219 Buttevant	Duration
10. Form new reinforced earth ramp approach roads on each side	25 weeks
11. Complete new road surface, marking and signage	5 weeks
12. Tie in new and existing roads	1 week
13. Level Crossing to be decommissioned	1 week
14. Decant from site and open road to public	2 weeks
TOTAL	56 weeks

## 2.4 Temporary Road

Temporary road or proprietary matting (such as EVE trackway) will be required at the enabling works stage. Indicative transport routes have been identified (See Table 2.6). There may be need or possibility to incorporate these junctions into the permanent design so they can be used later, i.e. for end-of-life deconstruction and removal.

Table 2.6: Indicative Construction Traffic Routes

Site / Crossing	Indicative Transport Routing (road designation/name)
XC201 – Thomastown	N20 - R515
XC209 - Ballyhay	N20 – B / local road Note near to Lidl distribution centre
XC211 – Newtown	N20 – L1533 + Dooleys Cross Roads Note -coordinate sequence with XC219 Buttevant
XC212 – Ballycoskery	N20 – L1533 + Dooleys Cross Roads Note -coordinate sequence with XC211 Newtown
XC215 - Shinanagh	N20 – L5507, L1320
XC219 - Buttevant	N20 - R522

### 2.4.1 Additional Site-Specific Construction Sequence

#### XC211 Newtown and XC212 Ballycoskery layout / proximity

Whilst each crossing location site can be treated as stand-alone project, it should be noted that at crossing XC212 Ballycoskery, this is in close proximity geographically south from XC211 Newtown (which is formed of a new road diversion) and the existing roads link the two sites / areas.

Phasing for these two sites will be considered during construction to minimise the effects on traffic coming into XC212 Ballycoskery (Ballyhea Village). Specifically, construction sequences proposed are to phase some of the worksite locations by dividing an 'east' and 'west' side to reduce impacts on local area and control vehicle movements / traffic management.

## 2.5 Construction Hours

It would be expected that the Contractor shall endeavour to undertake construction works between the following hours:

- 08:00 to 18:00 Monday to Friday; and
- 08:00 to 13:00 on Saturdays.
- Some limited night-time and / or weekend working may be required on occasion for activities such as tie in works or structural works at the bridge structures.

## 2.6 Construction Arrangements

Construction of the proposed Project is planned 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 ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact. Detailed information regarding the construction programme for the proposed Project is set out at Volume 2, Chapter 3: Project Description.

General construction arrangements are as follows:

- Based on 5 day working - 8 hr shift pattern;
- Assumed Statutory services/ESB relocated or decommissioned as part of enabling works prior to main construction phase - Contractor to carry out buried services search before breaking ground;
- Lifting method / installation of RC bridge beams by mobile road crane during possessions and night-time working;
- Each site setup establishment/install track side segregation fence;
- Carried out in advance 1 week; and
- Install if required track monitoring carried out in advance in line with rail procedures / access.

## 2.7 Construction Site Layout and Appearance including Construction Compounds and Working Areas

The layout, appearance and operation of the construction site, site offices and compounds will be detailed prior to construction commencing and will comply with the commitments in this CEMP.

The compounds would facilitate enabling works, site clearance, materials storage, welfare, structure installation and road surfacing.

The setups as a minimum would consist of:

- secure area;
- site offices;
- welfare facilities;
- changing facilities;
- suitable parking for site vehicles;
- secure storage areas, including COSHH;

- delivery areas;
- material lay down area / inspection area; and
- plant storage and refuelling zones.

In particular, the layout, appearance and operation of the construction site, site offices and compounds will be managed as follows:

- all working areas will be kept in a clean and tidy condition;
- smoking areas at site offices, compounds and construction sites will be equipped with containers for smoking waste and will not be located at the boundary of working areas or adjacent to neighbouring land;
- all necessary measures will be taken to minimise the risk of fire;
- workers will always maintain a reasonable and appropriate standard of dress and will not use foul language or display lewd or derogatory behaviour;
- appropriate measures, such as use of enclosed containers, will be employed to store waste susceptible to spreading by wind or liable to cause litter (see section 2.13 of this CEMP and the WMP);
- fencing and other means of enclosure will be inspected daily, repaired and repainted as necessary (see section 2.10 of this CEMP);
- adequate welfare facilities will be provided for all construction staff. All toilets will be serviced and kept clean (see section 2.15 of this CEMP);
- good personal hygiene will be promoted by the contractors for the workforce, particularly when using site canteens or mess facilities;
- site accesses, accesses to site compounds and roads in the vicinity of site access points will be maintained and kept clean as required (see section 2.4 for identified Construction Traffic Routes and 3.6 of this CEMP);
- commitments relating to noise and vibration (see section 3.5 of this CEMP);
- commitments relating to dust, odours and air pollution (see section 3.10 of this CEMP);
- commitments relating to the handling, storage and disposal of materials (see sections 2.13, 3.3, 3.4 and 3.9 of this CEMP);
- In addition, a section has been demarcated for potential mobile crane set up; like site compound areas, land would be cleared, and subbase laid and compacted. The Contractor will consult a temporary works engineer on the requirements for crane matting. It has been assumed an area of 10m by 10m would be sufficient to cater for a mobile crane; and
- A 'wheel washing' station at each site will be established as best practice to avoid unnecessarily soiling the local roads with mud/detritus from the site vehicles. Also, daily road cleaning may be required.

## 2.8 Land Acquisition and Demolition

All construction work would take place within the limit of the land made available (LMA) to the contractor as defined within the Railway Order Red Line Boundary (See Volume 4, Figures 2-8). The land to be compulsorily acquired for the proposed Project includes land necessary to construct, operate and maintain the proposed Project and associated infrastructure and to undertake essential environmental mitigation measures as outlined in Volume 3, Chapters 6-16.

## 2.9 Lifting Operations

The use of road mobile crane has been proposed. However, consideration will be given to the use of rail mounted crane (Kirov for example) dependant on availability / suitability. Access can be by via the existing level crossing point for materials, work-at-height equipment and operatives.

It is assumed no overhead electric line present on the railway line in terms of structural clearance and proximity for considerations to any lifting operations.

### 2.9.1 Craneage

Proposed mobile crane type/capacity has been assessed based on preliminary designs and self-weights of the individual pre-cast concrete beams. Crane location has been, where possible, positioned as near to the centre of the bridge (load).

This proposed method is indicative only; during detailed design, a full lifting plan and crane sizing / lifting method will be produced by an Appointed Person.

### 2.9.2 Buried services and overhead services

Third party buried services and utilities will be surveyed prior to commencement of the construction of the proposed Project. Overhead services will be stated and included in any method / lifting plans so they can be avoided.

The status of these services will be checked and verified from the utility owner and a certificate issued to confirm. If the infrastructure / cables of these services remain on site, appropriate safety notices and warnings will be displayed throughout the construction works. Where necessary a demarcation zone will be implemented to prevent operatives or plant coming into contact. Sufficient time will be allowed in the programme in advance of site works to allow such statutory authority searches / utility decommissioning or required diversions.

Specifically, at XC215 Shinanagh, an existing ESB overhead line is to be decommissioned (subject to agreement with ESB and consultation with other interested parties).

### 2.9.3 Rail Closures

The phasing of the rail line closures / possessions required for the bridge lift and installation will be considered and there will be early engagement with the possession access team to link the construction delivery programme to avoid unnecessary down time. All bridge construction works will be carried out during the limited night-time working schedule during non-disruptive possessions.

## 2.10 Fencing and Other Means of Enclosure

Fencing and other means of enclosure shall be removed and/or erected in accordance with IÉ Technical fencing specification (CCE-TRK-SPN-037) (See Appendix A of this CEMP). The general requirements for the erection of fencing and other means of enclosure are outlined below:

### General Requirements

- Fences shall be accurately set out and erected to provide a smooth alignment in plan and elevation and shall follow the profile of the ground along the length of the fence as closely as is practicable;
- The line of the fence shall follow the exact same line as the existing fence line that is to be removed, if it is not possible to achieve this then the contractor must seek written agreement from the IÉ Engineer, after consultation with the relevant property owner;
- The Contractor must satisfy him/herself that accesses are adequate at tender stage to execute the works in accordance with their method statements; and



- The contractor shall supply material data sheets (and samples, where practicable e.g. fencing wire) for all fencing materials to be installed to the IÉ Engineer, prior to works commencing.

## 2.11 Traffic Signs, Road Markings and Lighting

The traffic signs and road markings for the proposed Project would be prepared to the relevant legislation and design standards. The detailed design would be undertaken by the appointed contractor, and subject to compliance with the contract documents. As part of the design process, the contractor would consult with TII and with the roads Departments of Cork and Limerick County Councils.

Temporary site lighting during construction would be required as follows:

- at the contractor's compounds for security and safe movement of staff during winter mornings and evenings;
- along temporary access roads;
- at locations where there is currently no lighting, but lighting is required as a safety measure under temporary traffic management (e.g. at carriageway crossovers, contraflows etc); and
- for night-time activities or winter afternoon activities.

No stage of the authorised proposed Project shall commence until written details of any temporary or permanent external lighting to be installed during that stage, including measures to prevent light spillage, have been submitted to and approved by the relevant planning authority.

Lighting will be used only when required during core working hours, unless otherwise stated and will comprise lighting of work areas and access and egress with low level directional lighting.

Construction compounds will not be lit at night outside core working hours except for welfare and site security cabins that will include low level lighting. Motion sensor lighting will be used in areas of high security risk.

Other works required to be undertaken outside of the normal working hours may also require lighting.

The following measures will be implemented:

- lights installed will be of the minimum brightness and/or power rating capable of performing the desired function;
- light fittings will be used that reduce the amount of light emitted above the horizontal;
- light fittings will be positioned correctly and directed downwards;
- the direction of lights will seek to avoid spillage onto neighbouring properties;
- Light Emitting Diodes (LEDs) or similar which can be dynamically controlled according to traffic flows would be utilised; and
- unnecessary lights will be switched off.

## 2.12 Non-Motorised User (NMU) Provision

A construction specific Travel Plan (see Volume 3, Chapter 11: Traffic and Transport) will be prepared by the contractor to provide the mechanism to support and promote sustainable travel for staff, contractors and visitors travelling to the proposed Project sites. The Travel Plan would seek to eliminate the barriers preventing users of the site from accessing via sustainable travel modes, improving travel choices and managing single occupancy car use.

Any alternative routes will likely have to make use of the surrounding network. It will be paramount that any diversion route minimises delay and optimises safety for users. This will require avoiding/eliminating features that may pose a hazard to visually impaired users e.g. bollards, barriers or restrict access by infirm, disabled or other users e.g. gradients. This will also entail the incorporation of tonal contrast into the design where appropriate, which is particularly important for visually impaired users, as well as providing a suitable temporary signing strategy that is clear and conspicuous.

To minimise delay, optimise safety and mitigate any pedestrian amenity impact for all people walking and cycling, including disabled users, the level of provision of crossing facilities will have to be assessed taking anticipated traffic volumes into account, and will have to recognise existing good practice e.g. dropped kerbs flush with road surface, double transition kerbs, tactile surfaces etc.

## 2.13 Waste Management

CIÉ/IÉ and the contractors are responsible for managing waste arising from all activities in order to prevent pollution and to meet or exceed legal requirements.

The contractors will prepare and submit to CIÉ/IÉ Site Waste Management Plans (SWMP), for each of the sites to include their associated works, which will be in accordance with the following measures. For further information on waste management and the details to be included within the SWMPs (see Section 3.9.2 of this CEMP).

No stage of the authorised proposed Project will commence until, for that site, the SWMPs, have been submitted to, and approved by, the relevant planning authority or other relevant statutory body.

IÉ have also prepared a Preliminary Construction and Demolition Waste Management Plan (PC&D WMP) to ensure that waste arising on-site during the construction and demolition phased of the proposed Project will be managed and disposed of in a way that ensures the provisions of the Waste Management Act 1996-2001 and associated Regulations 1996 and 2001 are complied with and to ensure that the principles of the waste hierarchy are implemented. Reference to the PC&D WMP is further outlined in Section 3.9.2 of this CEMP.

## 2.14 Security

Construction sites will be controlled in accordance with The Safety, Health and Welfare at Work Act 2005 (the 2005 Act) to prevent unauthorised access to the site. Site-specific assessments of the security and trespass risk will be undertaken at each site and appropriate control measures implemented. The control measures are likely to include:

- use of high perimeter fencing or hoarding for site security and public safety, and placed so that PRow is maintained or appropriately diverted;
- use of site lighting at site perimeters, in accordance with section 2.11;
- use of appropriately trained and qualified security guards;
- consultation with Garda Síochána on security proposals for each site with regular liaison to review security effectiveness and response to incidents; and
- immobilisation of plant out of hours, removing or securing hazardous materials from site, securing fuel storage containers and preventing unauthorised use of scaffolding.

## 2.15 Welfare

No living accommodation will be permitted on the construction site. Onsite welfare facilities will be provided for all site workers and visitors. Welfare facilities will be kept clean and tidy, in accordance with section 2.15 of this CEMP.

Construction compound cabins would be single storey only.

## 2.16 Pest Control

Non-native invasive plant species were recorded at XC215 Shinanagh. Mitigation measures for controlling the non-invasive species at XC215 Shinanagh are identified in Section 3.2.2 below.

Otherwise the risk of infestation by pests or vermin at all other sites will be reduced by implementing appropriate storage and regular collection of putrescible waste. If infestation is found, removal and prevention measures will be implemented promptly. Any pest infestation of the construction site will be notified to the local authority as soon as is practicable.

## 2.17 Utility Works

Appropriate schedules will be provided by CIÉ/IÉ to the contractors identifying all known utility infrastructure and any proposed diversions. Where changes to utility infrastructure cannot reasonably be avoided, the contractors will agree arrangements with CIÉ/IÉ and the owner of the utility equipment for it to be relocated.

## 2.18 Reinstatement on Completion Condition Surveys

To facilitate the reinstatement of land, soil and banks, pre-condition surveys will be carried out of all land affected by the works. This will include a photographic record, written description and topographical survey, which will be used to ensure a complete and accurate reinstatement of land.

### 2.18.1 Reinstatement of Land and Soil

Reinstatement will include making good damage or disturbance to any soil structure, native or ornamental planting, grass, fencing, hard landscaping or structures, where in-situ reinstatement is possible.

Any land temporarily used for the construction of the proposed Project will be reinstated.

### 2.18.2 Reinstatement of Trees and Hedgerows

Where trees, tree groups or hedges are removed from working areas, construction compounds or temporary access routes, they will be replaced by new planting in-situ during reinstatement following completion of construction.

### 2.18.3 Reinstatement of banks

Reinstatement of any banks affected as a result of construction works for example, installation of culverts and bridges, particularly at XC219 Buttevant due to in-stream works.

## 2.19 Consents and Licences

Several sections of this CEMP reference consents, permits and licences that will be required during construction. A Consents Register will be maintained by the ECoW which will document all existing consent conditions, record all new applications made and the status of the applications.

### 3. Environmental Management and Construction Principles

This chapter of the CEMP describes the mitigation measures that will be implemented during the construction of the proposed Project to reduce adverse effects as identified in the Volume 3 (Chapters 6 to 16) and in IÉ environmental policy.

#### 3.1 Population and Human Health

Mitigation measures relevant to Population and Health are outlined in the chapters on which this topic depends including Volume 3, Chapter 10: Noise and Vibration, Chapter 11: Traffic and Transport, Chapter 13: Landscape and Visual and Chapter 15: Air Quality.

No significant impacts were identified for Population and Health; however, IÉ and its Contractor will work closely with the owners of agricultural land which has been acquired for temporary use during construction to minimise impacts post construction.

Where access to individual parcels of agricultural land is restricted as a result of the proposed Project, new access arrangements will be provided.

Community engagement and a complaints procedure will be adopted throughout the proposed Project as identified in section 1.9 of this document.

#### 3.2 Biodiversity

##### 3.2.1 Objective

To avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on biodiversity and, where appropriate, identify any proposed monitoring arrangements. A Mitigation Strategy and NIS (Volume 5, Appendix 7G & 7H) have also been developed which outlines mitigation measures to protect European sites identified.

##### 3.2.2 Mitigation Measures

###### Generic Mitigation Measures

A number of generic mitigation measures have been identified which will be applied across the proposed Project to avoid the impacts associated with pollution of watercourses. These measures have been outlined in Section 3.4.2 of this CEMP and include measures relating to the control of silt laden runoff; stockpiling of materials; storage of materials; the use of fuel tanks, drums, mobile bowzers and bunds; vehicles and plant; working in or near watercourses; and the use of concrete.

Generic mitigation measures associated with impacts to small mammal species, amphibians and breeding bird species are identified below. In addition to this, there are mitigation measures specific to the various proposed Project elements outlined further in this Section.

There will be a toolbox talk given to all site personnel to highlight any environmental sensitivities and the boundaries of sensitive habitats. During sensitive works e.g. instream works, an Ecological Clerk of Works (ECoW) will supervise the works. No sensitive works will be permitted until the ECoW has approved.

###### *Small Mammals*

- Removal and clearance of vegetation may affect small mammal species if present in these habitats. The following measures will be adhered to in order to avoid impacts to small mammal species:
- any excavations will be covered at night to prevent small mammals from falling in or becoming trapped;
- working at night will be prohibited;
- any lights will be turned off after working hours;

- noise levels will not exceed permissible levels for construction works (70dB(A)) based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004); and
- post construction, the site will be revegetated.

### ***Amphibians***

Removal and clearance of vegetation may affect amphibians if present in these habitats. The following measures will be adhered to in order to avoid impacts to amphibians:

- a pre-construction survey will identify whether amphibians are present, including frog/newt spawn during the breeding season (February – May) within the study area and if translocation is required then a suitable receptor habitat will be identified;
- a toolbox talk will be carried out to ensure all site personnel are aware of these protected species and their mitigation requirements;
- if found to be present during pre-construction surveys or during works, amphibians and/or spawn will be cleared by a suitably qualified and experienced ecologist under licence to displace any animals present within the works area prior to construction. In particular areas where soil heaps are to be placed will be checked. Any amphibians removed will be placed into alternative suitable receptor habitat in the locality;
- where practical in the context of construction, water levels will be maintained in any watercourses potentially used by amphibians; and
- habitat reinstatement will re-create, as far as is practicable, the former channels so that amphibians may use these post-construction.

### ***Breeding Birds***

#### BoCCI Amber and Green List Species

Vegetation (e.g. hedgerows, trees and scrub) will not be removed between the 1 March and 31 August, to avoid impacts on nesting birds. Where this seasonal restriction cannot be adhered to, then these areas will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance. Where nests are present, an ecologist will make a decision as to whether a licence is required for vegetation removal. Alternatively, the ecologist can demarcate a suitable buffer around an active nest and clearance within this area will be postponed until the chicks have fledged. A suitable exclusion zone will be established dependant on the species identified. Areas found not to contain nests must be cleared within three days of the inspection; otherwise repeat inspections will be required. If vegetation is to be cleared in the breeding season (under supervision of an ecologist) it will be chipped, removed or covered (ideally) on the same day to prevent birds from nesting.

### **Site Specific Construction Mitigation Measures**

#### ***XC201 Thomastown***

Site specific mitigation measures for this site relate to water quality only and are provided in Section 3.4.2 of this CEMP.

#### ***XC209 Ballyhay***

It is not anticipated that a significant volume of water will be dewatered from the trenches, however as part of the additional Ground Investigation proposed for prior to construction, groundwater samples will be taken. The groundwater quality samples will identify if there is any issue with groundwater quality. Based on the results, it may be possible to dewater and discharge to the Awbeg (Buttevant East) River following settlement; alternatively, if other contamination such as metals or hydrocarbons are detected, additional measures will be needed which could include additional treatment or disposal off site.

### ***XC211 Newtown and XC212 Ballycoskery***

Site specific mitigation measures for these two sites in relation to water quality are provided in Section 3.4.2 of this CEMP. Further mitigation measures in relation to designated sites and small mammal species, amphibians and breeding birds are identified below.

#### Designated Sites

Mitigation measures to protect European sites have been set out in the NIS, included in Volume 5, Appendix 7H. These measures have been developed to protect the River Blackwater (Cork/Waterford) SAC and Kilcolman Bog SPA. Kilcolman Bog pNHA has also been identified as a KER; this site is concurrent with the boundaries of, and is designated for the same QI as, Kilcolman Bog SPA and will therefore be protected by the mitigation measures set out in the NIS.

#### Fish

Mitigation measures for fish are in regards to water pollution control only and are as detailed in Section 3.4.2 of this CEMP. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction. Fish species present in the River Awbeg, downstream of the Newton River, will be protected by these mitigation measures.

Specific control measures are required for the installation of the proposed culvert to the west of the railway at Ballycoskery. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.

#### Invertebrates (white-clawed crayfish)

Mitigation measures for invertebrates are at this site in regards to water pollution control only and are detailed in Section 3.4.2 of this CEMP. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction. White-clawed crayfish present in the River Awbeg, downstream of the Newton River, will be protected by these mitigation measures.

Specific control measures are required for the installation of the proposed culvert to the west of the railway at Ballycoskery. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.

#### Wintering Birds

No infilling or direct discharge of pollutants will occur to the pond at Newton, which is used by several species of wintering birds. Pollution control measures are detailed above. These measures will ensure no disturbance or loss of habitat for wintering birds at Newtown.

### ***XC215 Shinanagh***

Site specific mitigation measures in relation to water quality are provided in Section 3.4.2 of this CEMP. Further mitigation measures in relation to designated sites and small mammal species, amphibians and breeding birds have been identified below.

#### Invasive Species

- The mitigation measures described below follow the recommendations set out in the *Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads* (National Roads Authority, 2010).

- a pre-construction survey will be carried to inform a change in the baseline;
- all staff will be informed of the presence of Japanese knotweed and any other invasive species through toolbox talks;
- exclusion zones will be established where necessary to prevent spread of invasive species;
- no machinery will be allowed within exclusion zones other than where necessary to undertake treatment measures;
- any plant material and soil containing plant material must be disposed of in accordance with the NRA (2010) guidelines; and
- care will be taken near watercourses to ensure that material that contains flower heads, seeds or cuttings of any invasive species will be disposed of correctly and not enter watercourses.

### Badger

The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Badgers during the Construction of National Road Schemes* (National Roads Authority, 2006).

The following lists mitigation measures which are to be undertaken during works:

- a pre-construction survey will be carried out to inform a change in the baseline;
- if badgers are found to be present any works within 30m of a sett will be supervised on-site and fulltime by a suitably qualified ecologist (extended to 50m during the breeding season);
- night-time working will be restricted as far as possible within 100m of a sett;
- the use of noisy plant and machinery in the vicinity of badger setts will cease before sunset;
- any excavations will be covered at night to prevent badger from falling in or becoming trapped;
- any borrow pits or spoil heaps will be sited at a minimum distance of 30m from setts; and
- chemicals shall not be used within 20m of a badger sett.

### **XC219 Buttevant**

Site specific mitigation measures in relation to water quality are provided in Section 3.4.2 of this CEMP. Further mitigation measures in relation to designated sites and small mammal species, amphibians and breeding birds have been identified below.

### Designated Sites

Mitigation measures to protect European sites have been set out in the NIS, included in Volume 5, Appendix 7H. These measures have been developed to protect the River Blackwater (Cork/Waterford) SAC and Kilcolman Bog SPA. Kilcolman Bog pNHA has also been identified as a KER; this site is concurrent with the boundaries of, and is designated for the same QI as, Kilcolman Bog SPA and will be protected by the mitigation measures set out in the NIS.

### Otter

The mitigation measures described below follow the recommendations set out in the *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (National Roads Authority, 2008).

The following list of mitigation measures which are to be undertaken during works:

- a pre-construction survey will be carried out to inform a change in the baseline;
- if otters are found to be present no works should be undertaken within 150m of any holts at breeding females or cubs are present;
- no wheeled or tracked vehicles should be used with 20m of active, but non-breeding, holts;
- light work, such as digging by hand or scrub clearance should not take place within 15m of such holts, except under licence;
- any excavations will be covered at night to prevent otter from falling in or becoming trapped;
- working at night will be prohibited;
- any lights will be turned off after working hours or angled away from watercourses;
- noise levels will not exceed permissible levels for construction works (70dB(A)) based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004);
- post construction, the site will be revegetated; and
- pollution control measures are detailed in Section 3.4.2 of this CEMP Implementation of these measures will avoid a reduction in water quality that could impact otter through reduced prey availability.

### Fish

Mitigation measures for fish as regards water pollution control are detailed in Section 3.4.2 of this CEMP. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.

Additional measures that will be undertaken at XC219 Buttevant to protect fish species:

- where culverts are to be installed the area will be dewatered to provide a dry working area. The Pepperhill River and the ditch at XC219 Buttevant will have culverts installed at separate times so that flows can be maintained downstream during the installation;
- the culverts will be pre-fabricated and clean, so as to avoid concrete washings contamination;
- netting, sandbags and/or dumpy-bags filled with rock will be installed upstream to prevent fish travelling downstream into the working area;
- fish will be removed from the working area through electrofishing and moved upstream of the dammed area;
- water will then be over pumped continually to ensure a dry working area. This must be pumped through a silt buster or onto the field to avoid sediment from becoming suspended within the watercourse;
- additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process; and
- once construction is completed the watercourse will be re-wetted under the direction of an Ecological Clerk of Works (EcoW). Water will be released slowly and silt mats, sediment traps and haybales will be used to avoid a sudden influx of sediment to the system. A silt buster will be used where required.

### Invertebrates (white-clawed crayfish)



Mitigation measures for invertebrates as regards water pollution control are detailed in Section 3.4.2 of this CEMP. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.

Additional measures that will be undertaken at X219 Buttevant to protect white-clawed crayfish:

- prior to dewatering of the Pepperhill River and ditch at XC219 Buttevant, hand searches will be conducted and any crayfish found will be removed and moved upstream of the dammed area. This will be carried out by the EcoW under licence; and
- mitigation measures listed above for fish species at XC219 Buttevant will also avoid impacts to white-clawed crayfish.

### Wintering birds

Where timing of works cannot be completed outside the critical period (October – March) measures must be implemented to mitigate the disturbance impacts to whooper swan foraging in the vicinity of XC219 Buttevant level crossing. The following measures would be required:

- the existing treeline along the R522 road at Buttevant must be retained in order to act as natural visual screen along the works area (as shown in Photograph 23 of Volume 3, Chapter 7: Biodiversity);
- if this treeline cannot be retained, then artificial screening must be in place. Non-transparent visual screening will be erected along the north of the works area to hide the construction works and the movement of machinery/ workforce to minimise disturbance to whooper swan;
- screening must be installed in early September to ensure the site/works are screened before the main migration period (October). Erection of fencing later than this could potentially cause further disturbance to the birds;
- the fencing should be of adequate height to screen the works area (2 – 3m) or as advised by an ecologist;
- this screening will remain in place for the duration of the works; and
- an EcoW will supervise the erection of the screening (if natural screening cannot be retained) and provide guidance to the appointed contractor(s) through a toolbox talk ensuring these measures are effective. The EcoW will make regular checks of the screening throughout the works to ensure it is maintained in good condition and working order.

## 3.3 Soils, Geology and Hydrogeology

### 3.3.1 Objective

To undertake the construction activities whilst reducing risks from contamination. The escape of stored materials, in particular liquids and hazardous materials, presents a risk to the environment. Storage, handling facilities and procedures will be designed to minimise that risk.

### 3.3.2 Mitigation Measures

The following measures will be implemented during the construction of the proposed Project to reduce the risk of contamination cause by construction activities.

### 3.3.3 Prior to construction activities

#### Contaminated Land

No contaminated land site has been identified other than the existing railway and road infrastructure however, in the absence of local GI, leakage of heavy metals and hydrocarbons cannot be discounted and the potential

presence of other local made ground cannot be discounted either. The proposed GI will provide further clarity of these aspects and includes soil testing. The outcome of the GI should be interpreted, and additional mitigation measures may be proposed as a result.

Appropriate health and safety and waste management procedures for working with potentially contaminated soils will be established prior to construction.

Waste management on site will be carried out in accordance with the measures set out in Volume 3, Chapter 14: Resource Use and Waste.

The principles of risk assessment, including the concept of the source-pathway-receptor linkage, have been adopted by the Environmental Protection Agency (EPA) for the assessment of Environmental Liabilities 11 and Unregulated Waste Disposal Sites 12. These procedures will be implemented as appropriate during construction.

To maximise the reuse of site-won materials on-site (and minimise the need for disposal of waste in line with the principles of the "Waste Hierarchy") whilst ensuring that no risks are posed to human health nor the water environment, a soil reuse assessment will be undertaken prior to construction. The soil reuse assessment will identify any potential risks posed to both human health and the water environment from potentially contaminated soils reused throughout the proposed Project.

If excavated soils are deemed unsuitable for reuse, they will be assessed in line with the 'Guidance on Soil and Stone By-products' (in the context of article 27 of the European Communities (Waste Directive) Regulations 2011 (Environmental Protection Agency, June 2019) prior to disposal to determine whether they are hazardous or non-hazardous. This will establish the most appropriate and cost-effective waste stream for the waste materials.

Where concrete materials are proposed to be used, appropriate guidance such as 'I.S. EN 206-1' will be followed to ensure that ground conditions are appropriate for the use of concrete at each given location.

### **Construction Activities**

Risks to construction and maintenance staff working with/near contaminated land will be mitigated by the implementation of the above in combination with the adoption of appropriate systems of work, including personal protective equipment (PPE) as a last resort. In the event that unrecorded contamination is encountered, works will be stopped, and the working procedures reassessed to confirm the working methods remain appropriate.

Appropriate training of personnel involved in earthworks activities to implement a watching brief to identify potential presence of previously unidentified contamination.

To prevent cross contamination and pollution from piling works, the Contractor will develop a Piling Risk Assessment and adhere to appropriate guidance including the 'Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, National Groundwater and Contaminated Land Centre Report NC/99/77'.

### **Hydrogeology**

Prior to construction, further survey of Private Water Supplies (PWS) will take place to determine with more accuracy of selected PWS identified at potential risk. The PWS risk assessment will be updated on the basis of the information gathered during these surveys as well as the understanding of groundwater levels at each proposed location following the completion of the proposed GI. Should potential impacts on PWS be confirmed, additional mitigation measures will be put in place. These are likely to range from monitoring PWS yield and/or quality before and during construction for potential moderate significance of impacts to providing an alternative water supply to the property affected in case of substantial potential impact or confirmed impact.

In addition, following completion of the GI, a settlement analysis will be undertaken for the proposed Project at XC209 Ballyhay. Should the settlement analysis raise any concerns additional mitigation measures will be implemented for existing rail and road infrastructure and nearby small buildings.

The backfilling of the trenches in XC209 Ballyhay which fall within the wet grassland area should be backfilled with the material that was dug out to prevent any preferential pathways being created.

### **Storage**

Storage of excavated soils and made ground will be minimised on site (spatially and in duration) and all storage areas will be appropriately lined, with adequate drainage management in place. This is to ensure that no polluted water percolates into the ground and minimise run-off and suspended solids.

In addition to the measures identified above, detailed mitigation within Volume 3, Chapter 9: Water and outlined below in Section 3.4 will offer additional protection in relation to potential impacts associated with geology, soils, contaminated land and groundwater. For example, mitigation measures designed to protect the surface water environment will also protect groundwater receptors while air quality mitigation measures will avoid the creation of a statutory nuisance associated with dust and air pollution when working with contaminated land.

## **3.4 Water**

### **3.4.1 Objective**

To comply with relevant statutory provisions including any consents required in respect of the water environment; to protect both physical habitat and morphology and to avoid unacceptable adverse effects including changes to flows, water levels and water quality due to construction.

### **3.4.2 Mitigation Measures**

In general, a hierarchical approach to mitigation will be adopted for the proposed Project, which seeks to avoid adverse impacts in the first instance. In areas where avoidance is not possible, measures will be proposed to prevent or reduce potentially significant adverse impacts.

Although each potentially significant adverse impact requires mitigation, many impacts will be addressed using generic mitigation including the application of best practice in detailed design and the construction and operational management of the proposed Project. However, there will be site specific construction mitigation at XC201 Thomastown, XC209 Ballyhay, XC211 and XC212 Newton and Ballycoskery, XC215 Shinanagh and XC219 Buttevant, as identified below.

### **Construction Sequencing**

In order to protect water bodies from potential impacts such as increased flood risk, increased volumes of runoff, silty water and accidental spills, it is proposed, as far as is possible, to install the permanent drainage elements in at the outset, prior to full site clearance.

For roadways, the footprint for the proposed swales would be excavated, the perforated pipes laid, soil back-filled and the topsoil seeded. These are positioned either side of the new highways and would then receive any runoff following the rest of the site clearance. The swales at this point would not be connected into local drainage systems, they would be blocked and a small inspection/pumping chamber or pit left open to allow for visual inspection and either the controlled release of clean water to the local drainage system or, if still slightly silty, pumping out to a settlement tank or silt-buster before being discharged. This also allows the rate of flow to be controlled to prevent any increase in flood risk during the construction phase.

Once the highways and bridge structures are almost completed, the swales will be accessed further from those highways to finish their construction and open up permanent connection to outfall points at each site. Then the roads will be finished. On this basis, and with this management plan in place, no operational effect is expected.

### **Generic Mitigation Measures**

Several Generic Mitigation Measures have been identified which will be applied across the proposed Project. These are set out below.

***Pollution Control***

Measures set-out herein will be implemented to ensure that there will be no pollution of surface water during the Construction Phase of the proposed Project. These measures have been designed with reference to the following guidelines:

- Construction Industry Research and Information Association (CIRIA) C648 Control of Water Pollution from Linear Construction Projects: Technical Guide (Murnane et al., 2006a);
- CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane et al., 2006b);
- CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams et al., 2001); and
- Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016).

***Control of Silt Laden Runoff***

Specific measures to control silt are planned to be implemented at each of the proposed Project infrastructure sites. Surface water runoff at the construction sites will be managed to prevent flow of silt laden surface water flowing into surface water receptors;

If a discharge to a watercourse is necessary, the water will be treated and controlled in accordance with any conditions imposed by regulatory authorities such as the relevant Local Authority, the EPA and/or OPW. It is anticipated that the levels of suspended solids in any discharge will be not greater than 25mg/l and flows will be controlled to levels appropriate to the receiving water. It is possible that such a discharge may require a licence under the Water Pollution Acts 1977 & 1990, as amended and the Arterial Drainage Act 1945 & 1995, as amended. The Contractor will liaise with the regulatory authorities at an early stage to determine the necessity for licences and include the appropriate application time required in any construction programme.

Silt fences will be erected along the boundary of water bodies to prevent any silt laden runoff from impermeable surfaces, temporary or permanent, as well as spoil heaps within the construction working width.

Reinstatement of any banks affected as a result of silt laden run off during construction will be reinstated back to pre-development conditions.

***Stockpiling of Materials***

The following measures will be put in place by the Contractor with regard to stockpiling of material:

- temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 10m of a watercourse;
- for watercourse crossings, stockpiles will not be located anywhere within the crossing working area;
- management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required with the final measures to be determined by the Contractor. These will include the following measures or equivalent measures:
  - allowing the establishment of vegetation on the exposed soil;
  - providing silt fences or straw barriers at the toe of the stockpile to mitigate runoff during rain events;
  - surrounding stockpiles with cut-off ditches to contain runoff;

- directing any runoff to the site drainage system or filter drains along the Construction Working Width and to the settlement pond (or other) treatment systems; and
- providing bunds or another form of diversion to keep runoff from entering the stockpile area.

### ***Storage of Materials***

The following measures will be implemented across the site for the storage of materials:

- all oil and diesel storage facilities will be at least 30m from any watercourse including surface water drains;
- spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed;
- storage areas for solid materials, including waste soils, will be designed and managed to prevent deterioration of the materials and their escape (via surface runoff or wind blow);
- storage areas will be kept secure to prevent acts of vandalism that could result in leaks or spills; and
- all containers of any size will be correctly labelled indicating their contents and any hazard warning signs.

### ***Fuel Tanks, Drums, Mobile Bowsers and Bunds***

The following measures will be implemented across the site for the prevention of spills:

- Fuel tanks, drums and mobile bowsers (and any other equipment that contains oil and other fuels) will have a secondary containment, for example, double skinned tanks.
- All tanks, drums and mobile bowsers will be located in a sealed impervious bund with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest;
- storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas;
- fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain;
- where fuel is delivered through a pipe permanently attached to a tank or bower:
  - the pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use;
  - the pump or valve will be fitted with a lock;
  - the pipe will be fitted with a lockable valve at the end where it leaves the tank or bower;
  - the pipework will pass over and not through bund walls;
- tanks and bunds will be protected from vehicle impact damage;
- tanks will be labelled with contents; capacity information and hazard warnings;
- all valves, pumps and trigger guns will be turned off and locked when not in use. All caps on fill pipes will be locked when not in use;
- suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including:
  - each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and

- containers and equipment will be stored on a firm, level surface.
- for deliveries and dispensing activities, the Contractor will ensure that:
  - site-specific procedures are in place for bulk deliveries;
  - delivery points and vehicle routes are clearly marked; and
  - emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits.

### ***Vehicles and Plant***

The use of vehicles and plant poses similar risks to those posed by storage of liquids. Fuel and oil may leak from such equipment which may enter drains and/or watercourses, as well as contaminating the ground itself. The following measures will be implemented to reduce this risk:

- vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency, and will be regularly inspected to ensure they are free from leaks;
- sufficient spill kits will be carried on all vehicles;
- vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order;
- vehicles and plant will not park near or over drains; and
- refuelling of vehicles and plant will be carried out on hard standing, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas.

### ***Working in or Near Watercourses***

The following control measures will be implemented during the construction of the proposed Project in or adjacent to a watercourse:

- works within and adjacent to watercourses will be conducted during forecast low flow periods where possible;
- in-stream works will not be carried out in watercourses frequented by salmon or trout during the Annual Close Season. The duration of the season varies regionally within the period from the beginning of October to the end of February inclusive (IFI, 2016). River and brook lamprey spawn during the period March-April; translocation and instream works should be undertaken outside of the spawning season. The timing of works will be considered on a site-specific basis and in agreement with the IFI because some rivers have late spawning salmonids;
- operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of in-stream works;
- the design of the outfalls and settlement ponds and the construction method statements for their installation will be agreed with IFI prior to construction;
- the area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the outfall;
- any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system;
- sediment mats / silt traps or similar will be located immediately downstream of the works within and adjacent to the minor watercourse. These will be inspected daily, maintained and cleaned regularly during

the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September (IFI, 2016) or as agreed with the IFI;

- small check dams will be constructed in the cut-off watercourse to trap any sediment, and a sediment trap will be provided immediately downstream of the diversion to the existing watercourse; and
- where in-stream bed material is to be removed, coarse aggregates, if present, will be stockpiled at least 10m away from the watercourse for replacement following reinstatement of a watercourse channel.

Reinstatement of any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions.

### ***Use of Concrete***

The use and management of concrete in or close to watercourses shall be carefully controlled to avoid spillage. Where the use of concrete near water cannot be avoided, the following control measures will be employed:

- when working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable oils shall be used;
- placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW);
- there will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately, and runoff prevented from entering the watercourse;
- concrete waste and wash-down water will be contained and managed on-site to prevent pollution of all surface watercourses; and
- washout from concrete lorries will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer).

### ***Construction Compounds typical Construction Compounds Site Establishment Measures***

The following measures will avoid or reduce impacts on the surface water environment:

#### **Site Establishment**

The topsoil, and upper level of subsoil, will be stripped and stockpiled over the Construction Working Width. Any existing land drains crossing the works area will be culverted.

The Contractor will be required to provide a temporary geogrid mattress overlain in stone for trafficking within the Construction Compound.

Other developments proposed to occur within the site include the laying of interceptor traps in a demarcated area for refuelling, and drainage works associated with plant cleaning and service areas.

#### **Drainage**

Generally, the site will be pervious as it is overlain in stone. Those areas with impervious pavement will be graded to a fuel / oil separator for collection of any surface water runoff contaminants.

Both the bunded refuelling and plant servicing areas will incorporate a forecourt separator for any potential spillages which may occur during vehicle refuelling and road tanker delivery.

The retained contents of the separators will be collected for disposal by a licensed operator to a licensed waste disposal / recovery facility.

Construction Compounds will be provided with a Sustainable Drainage System (SuDS) designed storage and soakaway system for storm water running directly off of site buildings, and pavement such as access and site roads. Storage compounds will have stoned areas for the clean storage of materials.

### **Construction Monitoring Measures**

Continuous monitoring of water quality will take place at the outlets from attenuation areas along the pipeline and the settlement lagoons and surface water attenuation ponds at the Key Infrastructure Sites. If hydrocarbons are observed or other water quality parameters are exceeded, discharges will be suspended until the quality of the water is of a standard acceptable for discharge.

During the Construction Phase, the Contractor will monitor the levels of Total Suspended Solids (TSS), turbidity, pH, temperature, Dissolved Oxygen (DO) and hydrocarbons at the same locations up and down stream of watercourses in close proximity to the works, or at crossing points where relevant, once a week for the duration of the following works:

- site clearance works, earthworks movements and stockpiling;
- excavations including those associated with the provision of drainage works; and
- construction works within and adjacent to watercourses.

The Construction Phase monitoring results will be compared with those results established in pre-construction monitoring. In the event of an elevation above pre-construction levels an investigation will be undertaken by the Contractor and remediation measures will be put in place.

In addition, daily visual inspections of the surface drainage and sediment control measures and the watercourses will be undertaken by the Contractor. Indicators that water pollution may have occurred include the following:

- change in water colour;
- change in water transparency;
- increases in the level of silt in the water;
- oily sheen to water surface; and
- floating detritus, or scums and foams.

These inspections will be recorded. In the event that such indicators are observed, works will cease, and sampling will immediately be undertaken as described for the weekly monitoring, and an investigation of the potential cause will be undertaken by the Contractor.

Where the works are identified as the source causing the exceedance the following will apply:

- works capable of generating sediment and all discharges shall be stopped immediately; and
- the Contractor will be required to take immediate action to implement measures to ensure that such discharges do not re-occur.

This monitoring will alert the Contractor to any detrimental impacts that construction activities could have on water quality such that appropriate remedial action can be taken as quickly as possible. This will also allow the Contractor to demonstrate the success of the mitigation measures employed in maintaining any sediment release within the 'trigger' value established.

### **Site Specific Construction Mitigation Measures**

#### ***XC201 Thomastown***



All impacts associated with the construction activities will be reduced through the adoption of good working practice, as outlined in this CEMP.

The hydraulic design of the culvert will be such that the risk of overtopping, backing up and increased flood levels is minimised. As well as this, the structure will be able to convey 1% AEP flood event with an allowance for climate change and where applicable include a suitable blockage freeboard.

#### ***XC209 Ballyhay***

It is not anticipated that a significant volume of water will be dewatered from the trenches, however as part of the additional GI proposed prior to construction, groundwater samples will be taken. The groundwater quality samples will tell whether there is any issue with groundwater quality. Based on the results, it may be possible to dewater and discharge to the Awbeg (Buttevant) (East)\_020 following settlement; alternatively, if other contamination such as metals or hydrocarbons are detected, additional measures will be needed which could be additional treatment or disposal off site.

#### ***XC211 & XC212 Newton & Ballycoskery***

Most of the impacts associated with the construction activities will be reduced through the adoption of good working practice, as outlined in this CEMP.

In addition, specific control measures are required for the installation of the proposed culvert to the west of the railway line. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation of sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.

#### ***XC215 Shinanagh***

All impacts associated with the construction activities highlighted will be reduced through the adoption of good working practice, as outlined in this CEMP.

#### ***XC219 Buttevant***

Most impacts associated with the construction activities will be reduced through the adoption of good working practice, as outlined in this outline CEMP.

In addition, specific control measures are required for the installation of the proposed culverts to the west of the railway. The culverts will be pre-fabricated and clean, so as to avoid concrete washings contamination. The water bodies will be dammed, and the water pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process. The culverts will be embedded, and the natural beds of the waterbodies allowed to re-establish naturally following installation and the removal of the upstream dam.

### **3.5 Noise and Vibration**

#### **3.5.1 Objective**

To undertake the construction of the proposed Project whilst minimising noise and vibration on sensitive receptors.

#### **3.5.2 Mitigation Measures**

##### **Noise**

It should be noted that the construction assessment performed is based on plant / equipment and working methods given at the time of writing. The construction methodology may change, and it is up to the appointed

contractor to ensure that any change in methodology can still achieve the noise impacts presented in this EIAR or better.

All work would be undertaken to the guidance detailed in BS 5228-1 and BS 5228-2. It is anticipated that the following mitigation measures would be employed on site to ensure that noise levels are adequately controlled (all of which are considered to be examples of Best Practicable Means (BPM)):

- appropriate selection of plant and equipment, construction methods and programming. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise or vibration emissions would be used. Construction plant would be maintained in good condition with regards to minimising noise and vibration emission;
- the Contractor will obtain Prior Consent from the Environmental Departments at both Limerick and Cork County Councils prior to undertaking particularly noisy or high vibratory works;
- the contractor will communicate to local residents, details of the construction programme together with notice of any particularly noisy works. Liaison with Ballyhea National School is important due to the high construction noise levels predicted here;
- plant would be operated and maintained appropriately, with due regard for manufacturer recommendations. All vehicles, plant and equipment would be switched off when not in use;
- use of appropriate noise abatement site hoardings and screens, where appropriate, particularly at XC212 Ballycoskery and XC219 Buttevant where noise levels during construction were predicted to be over 90 dB at the closest receptors. Where noise screens are not practicable then noise insulation in the form of additional glazing at individual properties should be considered;
- where practicable, gates (to compounds and construction areas) would not be located opposite noise sensitive receptors;
- careful selection of routes and programming for the transport of construction materials, spoil and personnel so as to reduce the risk of increased noise and vibration impacts during construction;
- vehicle and mechanical plant/ equipment used for the purpose of the works will be fitted with effective exhaust silencers, to be maintained in good working order and operated in such a manner so as to minimise noise emissions;
- the positioning of construction plant and activities to minimise noise at sensitive locations;
- equipment that breaks concrete by pulverising or similar, rather than by percussion, would be used where practicable;
- mufflers shall be used on pneumatic tools;
- the use, where necessary, of effective sound reducing enclosures;
- establish agreement with the local authorities on appropriate controls for undertaking significantly noisy works or vibration-causing operations close to receptors; and
- programming works so that the requirement for working outside normal working hours is minimised.

It would be expected that the Contractor shall endeavour to undertake construction works between the following hours:

- 08:00 to 18:00 Monday to Friday; and
- 08:00 to 13:00 on Saturdays.

Some limited night-time and / or weekend working may be required on occasion for activities such as tie in works or structural works at the bridge structures. The night-time and weekend periods are more sensitive than daytime, as baseline noise levels are lower during these periods. Significant effects are more likely during such periods; therefore, night time and weekend working should be minimised. Where works during such periods are required, the appointed contractor should consider obtaining Prior Consent from the Environmental Departments at Limerick and Cork County Councils prior to undertaking such works. In order to achieve this, the appointed contractor should demonstrate that BPM has been applied to the required works and potential significant effects have been mitigated as much as reasonably practicable.

If feasible the noisiest construction activities at XC212 Ballycoskery should be undertaken during school holidays due to the presence of Ballyhea National School. Good communication with the school is particularly important to agree working times and programme due to the high construction noise levels predicted.

## **Vibration**

### ***Site Specific***

Potential significant adverse vibration effects have been identified for sensitive receptors close to the XC212 Ballycoskery and XC219 Buttevant sites.

The following measures will be implemented at each location:

- selection of low vibratory or non-vibratory plant when working in close proximity to a vibration sensitive receptor;
- starting up and turning off vibratory equipment as far away from sensitive receptors as is possible; and
- engagement with the local community and anyone living or working in close proximity of vibratory works to pre-warn them of the activity, timings, and what is being done to control vibration.

The construction appointed contractor will undertake an updated construction assessment, once working methods, the plant and equipment to be used and the construction programme have been sufficiently finalised, in order to determine the most appropriate form of mitigation measure(s) to implement in each location.

It should be stated that it is not possible to quantify the reduction in noise and vibration levels as a result of the mitigation measures but if the recommendations are put in place then noise and vibration effects could be reduced as much as is reasonably practicable.

## **3.6 Traffic and Transport**

### **3.6.1 Objective**

To undertake the construction of the proposed Project whilst minimising disruption to public travel and effects on the condition of the highways, a Construction Traffic Management Plan (CTMP) has been considered as a form of mitigation to mitigate the potential effects of construction traffic on local communities and the environment. The CTMP will describe the mitigation measures that will be implemented during the construction of the proposed Project.

### **3.6.2 Mitigation Measures**

Construction traffic will use the trunk road network to the junction nearest to each site, at which point it must deviate to reach the relevant construction compound.

Where practical, construction traffic will use national primary or secondary roads, with little or no traffic calming or traffic management measures, constructed to accommodate significant HGV composition and only deviating where necessary.

### Construction Traffic Management Plan

Prior to commencement of construction, the appointed contractor will prepare a CTMP for the proposed Project as part of the mitigation measures. The purpose of the CTMP is to set out management and mitigation measures to prevent or minimise the transport impacts during the Construction Phase of the proposed Project.

The CTMP will include details of the following:

- regulated site working hours i.e. construction traffic will, where practicable, avoid heavy volumes of movement during peak periods, particularly in the morning and evening peak hours when general traffic levels will be higher than normal;
- communication to all staff and contractors the appropriate and safe routes to and from the proposed Project and will through consultation with Cork County Council and Limerick City and County Council;
- confirmation of routeing for HGV traffic;
- timing of HGV movements to take place outside of peak flow hours, where practicable, in order to minimise disruption to general traffic flows on the road network;
- appropriate warning signs to be erected to warn other road users of the presence of HGVs and general Construction Phase related traffic;
- where appropriate, additional warning and speed control signs will be installed to warn other road users of the presence of HGVs and general Construction Phase related traffic, whether temporarily or otherwise, with the agreement of the Roads Authority;
- a wheel wash facility and road sweeper shall be provided to minimise any mud and debris on the surrounding public road network and prevent the introduction of non-native or invasive plant material onto the site;
- the temporary closure of public rights of way to facilitate construction activity will be discussed with local council Access Officer(s) at an early stage and suitable diversions agreed. All rights of way will be reinstated to their original state and some will be improved as a result of the proposed Project. Considering the potentially long-term nature of some closures, suitable consideration will be given to providing alternatives, which may necessitate due consideration of suitable crossing facilities, to existing standards, that minimise delay and optimise safety for all users;
- at some locations the potential for conflict on the road may be mitigated by the stationing of a "Stop-Go" banksman with appropriate communications between the two and the construction vehicle drivers;
- development of a Traffic Management Plan detailing ways to reduce the construction traffic effect, including:
  - Avoiding transit at school arrival and departure times;
  - A communications protocol to avoid delays with emergency vehicle traffic;
  - A diary of proposed delivery movements to liaise with the communities to avoid key dates such as festivals etc;
  - Notices will be published, and advice given to the public and employers in the area of the likely increased driver delay as a result of the works. Drivers will be encouraged to reduce their need to travel where possible, particularly during the peak periods when delays will be most pronounced;
  - Working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic; and

- development of a Traffic Management Plan which would seek to eliminate the barriers preventing users of the site from accessing via sustainable travel modes, improving travel choices and managing single occupancy car use.

It is proposed that the CTMP shall provide for regular inspections to be carried out to ensure that agreed mitigation measures, as outlined above, are being undertaken.

### **Pedestrian and Cycle Routes**

See section 2.12 further above regarding Non-Motorised User (NMU) Provision.

### **Abnormal Loads and Construction Routes**

The proposed pre-cast concrete beams will be reviewed alongside the logistics and transport options. At approx. 20m long, these are designated as 'abnormal loads' and require prior notice to local authority/police for the movement of these items. It is proposed to deliver and store the pre cast beams locally to each site, that can be called off just in time for the possession / lifting installation.

Sourcing of import material required for the bulk earth ramps and the transport required will be coordinated with the overall proposed Project programme as it is a key element in the delivery phase. The routing from source to site and return journeys will be monitored to ensure traffic is controlled and there is not a queue at site or congestion of local roads. Also, times of such deliveries will be considered and/or any local restrictions at peak times or school drop off/pick up times.

Transport routes as outlined in Table 1.6 above will be used for construction traffic during the construction phase.

## **3.7 Cultural Heritage**

### **3.7.1 Objective**

To undertake the construction of the proposed Project whilst avoiding, preventing, reducing or, if possible, offsetting any identified significant adverse effects on the environment and, where appropriate, identify any proposed monitoring arrangements.

### **3.7.2 Mitigation Measures**

Measures to avoid, prevent, reduce or, if possible, offset identified significant adverse effects on cultural heritage have been considered throughout the design process and incorporated into the detailed design of the proposed Project. The following additional mitigation measures shall be undertaken for cultural heritage prior to the commencement of the development under the Schedule of Environmental Commitments and in accordance with the mitigation strategy agreed with the National Monuments Service (see Volume 5, Appendix 12C):

- i. At XC201 Thomastown, a programme of archaeological testing shall be carried out by a licensed archaeologist to establish whether any subsurface archaeological features survive based on the results of the geophysical survey. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised in these matters by the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage.
- ii. Archaeological monitoring of groundworks by a suitably qualified, licensed archaeologist shall be carried out at XC211 Newtown. Should significant archaeological features be identified during monitoring, all works which might affect elements of the archaeological heritage shall stop on the advice of the monitoring archaeologist. The exposed archaeological material shall be recorded, and further mitigation will be undertaken as required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.

- iii. Archaeological test excavations shall be carried out by a licensed archaeologist at XC212 Ballycoskery to investigate the potential archaeological features identified through field walking and geophysical survey including the potential enclosure (AY026), possible leat adjacent to the moated site (AY020a) and former road and field boundaries (AY044). The test-trench layout shall be informed by the results of the geophysical surveys. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised in these matters by the NMS.
- iv. The two areas of archaeology identified during field walking, geophysical survey and testing at XC215 Imphrick/Shinanagh to the north of Imphrick Church (AY036 and AY045) shall be subject to full open-area excavation. The excavation shall be carried out according to best archaeological practice by a suitably qualified, licensed archaeologist in consultation with the NMS. Adequate funds shall be made available for all required archaeological works including but not limited to finds retrieval, conservation, storage and analysis of all artefacts and ecofacts, post-excavation analyses, specialist reports, reporting and dissemination of findings. A programme of more intensive archaeological testing shall also be carried out along the rest of the route between the two areas designated for excavation.
- v. Additional archaeological test excavations shall also be carried out at XC215 Imphrick/Shinanagh to the east, southeast and south of Imphrick Church and graveyard to investigate the archaeology in this area (AY035). Where significant archaeological features are recorded during testing, further mitigation will be undertaken as required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.
- vi. At XC219 Buttevant, archaeological test excavations shall be carried out by a licensed archaeologist to investigate the potential archaeological features identified through geophysical survey (AY047 and AY048) and monitoring of geotechnical investigations (AY046). Test excavations shall also be carried out at Buttevant station (AH020) to identify and record any remnants of former railway infrastructure surviving below the ground surface. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.

In addition, the following shall also be undertaken pre-construction:

- vii. Standard test excavations over approximately 12% of testable greenfield areas shall also be undertaken in the remaining portions of the development where there is a potential for currently unrecorded subsurface archaeology to be present.
- viii. An underwater archaeological assessment shall be undertaken at the stream crossings at XC219 Buttevant (AY043) prior to construction. The aim of this assessment shall be to ascertain the existence, location, extent and condition of any water-related archaeological features/deposits or objects within the stream crossings and to appropriately mitigate the impact on such remains in consultation with the NMS and NMI.
- ix. Archaeological monitoring shall be carried out where there is still a potential for construction to impact archaeology and/or upstanding built heritage (e.g. in the vicinity of the burial ground at Ballyhay Church (AY025) where there is a potential for skeletal material to be encountered). Such monitoring shall be carried out in consultation with the NMS and NMI under an excavation licence. Vibration monitoring shall be undertaken during construction for any vulnerable built heritage assets (e.g. the goods shed at Buttevant, AH019). Periodic monitoring shall also be carried out post-construction to verify that the residual impacts have been accurately assessed and reported and that mitigation measures have been adequately employed.
- x. Potential accidental impacts during construction on known cultural heritage sites, in particular the moated site at Ballycoskery (AY020), Imphrick church and graveyard (AY029 & AY030) and the potential earthworks at Buttevant (AY041 & AY042) shall be avoided through the erection of construction barriers.

- xi. Detailed building recording shall be carried out on all architectural heritage features that are to be removed or otherwise impacted by the development. This includes the former gatekeeper's house at Ballycoskery (AH013/IH-7); all built heritage features impacted at Buttevant including the former train station (AH020), 'Bregoge New Bridge' (AH022) and kerbstones (AH021); Shinanagh railway bridge (AH015) and associated walling; and any curtilage features impacted at Ballyhay Church (AH010/AY025), Ballyhay parochial house (AH011) and farmhouse (AH012). This building recording shall include, but not be limited to, written descriptions, measured drawings and the compilation of photographic and documentary archives as necessary and oral history where possible. In the case of the gatekeeper's house (AH013), building recording shall include the interior of the building. The aim of the building recording will be to compile a comprehensive written and illustrated record of architectural heritage features which are within the lands acquired for construction of the project and which are being directly impacted.
- xii. Detailed recording shall also be carried out on the level crossings to be closed and removed (IH-2, IH-3, IH-4, IH-5, IH-6, IH-8 and IH-9) and adjoining sections of the Cork–Dublin rail line (IH-1). The aim of the recording will be to compile a comprehensive written, drawn and photographic record of these crossings before their closure, and it shall include the collection and recording of oral history specific to these crossings. The information gathered shall be compiled into an archive or suitable publication that shall be accessible to the community and others with an interest in the history of the railway.
- xiii. Townland boundary surveys shall be carried out in relation to those sections of townland boundaries impacted by the development, namely the townland boundaries between Thomastown and Effin (TB-2), between Imphrick and Ballynageragh (TB-9) and between Creggane and Bregoge (TB-10). The aim of the townland boundary surveys will be to compile a comprehensive written and illustrated record of those historic boundaries which are within the lands acquired for construction of the project and which are being directly impacted.
- xiv. Operational impacts on the setting of identified cultural heritage assets shall be mitigated through screening and landscaping as appropriate.

## 3.8 Landscape and Visual

### 3.8.1 Objective

To undertake construction mitigation measures so that adverse effects on landscape and visual amenity are reduced as far as practicable during the construction of the proposed Project.

### 3.8.2 Mitigation Measures

Mitigation measures in this instance are employed to assimilate all of the proposed Projects into their immediate landscape setting whilst also enhancing ecological corridors that already exist within the surrounding hedgerows and heavily vegetated areas. The main mitigation by avoidance measure employed in this instance is the minimisation of elevated, engineered structures and embankments insofar as possible to reduce the footprint and overall visibility of the overpasses.

Areas of existing vegetation at all sites of the proposed Project will be retained and enhanced insofar as possible. Retention of existing hedgerow boundaries within and surrounding the proposed alignments prevents a sense of disregard, aids visual screening and maintains existing fields patterns. Where hedgerows or trees need to be removed to facilitate the footprint of the proposed Project, these will be offset with areas of additional planting.

It is also proposed to bolster areas of existing hedgerows with under-planting and inter-planting of whip transplants (i.e. Hedgerow Type 1 - see Volume 3, Chapter 13: Landscape and Visual) in order to ensure dense and consistent screening of the proposed structures and traffic in perpetuity. Advanced nursery stock in the form of 8-10cm girth trees will be used to fill any noticeable gaps and plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance.

It is also proposed to plant new 'Hedgerow Type 2' (See Volume 3, Chapter 13: Landscape and Visual), with whips and a high proportion of advanced nursery stock (c.3m planted height), along all of the proposed timber post and

rail fencing that encircles the proposed Projects (refer to Table and individual Project landscape mitigation plans for site specific landscape measures). Areas where hedgerows have been removed and are to be reinstated will also be planted as per 'Hedgerow Type 2'. This landscape measure will be allowed to mature up to a maintained height of 3-4m to provide screening of the proposed alignments from nearby dwellings whilst still maintaining any distant views afforded of hills and ridges.

A low shrub mix will carpet the lower portions of the proposed engineered embankments which will soften their appearance and aid in visually blending them with their immediate landscape context. Once mitigation planting is fully established, this landscape measure will also contribute to screening moving vehicles, their lights and lower anthropogenic elements such as road signage and safety barriers from the view of nearby receptors. The low shrub species mix will comprise of Low-canopy: Sub-dominants (<10%), Understorey and Fringe: High-Shrubs (40-50%) and Understorey and Edge: Lower-Shrubs (40-50%). Planting on embankments will be allowed to grow to reach maturity and will be concentrated on the lower portions of the embankments so as not to generate any further sense of enclosure at nearby dwellings and local roads. Any residual space between the landscape measures identified above will be planted with a wild grass seeding mix of local provenance.

As there will also be some areas of habitat loss, a number of ecological mitigation measures are outlined for the proposed Projects. Some of these are highlighted on the landscape mitigation plans (refer to Volume 5, Appendix 13A) and are described in further detail in Volume 3, Chapter 7: Biodiversity and Volume 5, Appendix 7G Mitigation Strategy.

**Site Specific Landscape Mitigation Plans**

Each of the proposed Projects has specific landscape measures which are identified on each of the separate landscape mitigation plans and are described below in Table 3.1.

Table 3.1: Outline Description of Project Specific mitigation measures.

Project Site	Site Specific Mitigation Measures
XC201 – Thomastown	Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary.  Areas of hedgerow removed to facilitate sightlines at the northern end of the proposed project are to be reinstated as per 'Hedgerow Type 2' to the rear of the identified sightlines.  Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing.  A corridor of low shrub mix will straddle the proposed alignment and the lower portions of the proposed engineered embankments.
XC211 – Newtown	Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary.  Areas of hedgerow removed to facilitate sightlines at the northern and southern intersections with the existing local roads are to be reinstated as per 'Hedgerow Type 2' to the rear of the identified sightlines.  Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing.



Project Site	Site Specific Mitigation Measures
XC212 – Ballycoskery	<p>Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary. The dense mature tree lined hedgerow situated on the southern verge of the L1533 local road south of the Beechwood residential estate to be retained in so far as possible.</p> <p>Areas of hedgerow removed/trimmed back to facilitate construction works to be reinstated as per Hedgerow Type 2 in so far as possible.</p> <p>Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing.</p> <p>A corridor of low shrub mix will straddle the proposed embankments on both sides of the Dublin-Cork Railway Line. Specific landscape measures to be implemented to north-facing embankments to the front of the national school to include areas of amenity planting (may include non-native species) creating year round visual interest.</p> <p>Street trees planted along proposed footpaths south of the National school and surrounding the proposed parking spaces.</p> <p>Native Ivy to be planted at the base of retaining concrete walls.</p> <p>Section of native hedgerow planted as per Hedgerow Type 2 and a row of street trees planted on the eastern boundary of the existing railway corridor.</p>
XC215 – Shinanagh	<p>Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary.</p> <p>Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing.</p> <p>An area of low shrub mix to be planted along the proposed east facing embankment at the northern end of the proposed alignment. The proposed low shrub mix to be planted along the lower portions of the embankment.</p>
XC219 – Buttevant	<p>Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary. Hedgerow vegetation to be retained and supplemented in so far as possible along the southern and northern verge of the R522 regional road on the western side of the Dublin-Cork Railway Line.</p> <p>Areas of hedgerow removed/trimmed back to facilitate construction works to be reinstated as per Hedgerow Type 2 in so far as possible.</p> <p>Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing.</p> <p>A corridor of low shrub mix to straddle the lower slopes of proposed embankments on both sides of the Dublin-Cork Railway Line.</p> <p>Native Ivy to be planted at the base of retaining concrete walls.</p>

### 3.9 Resource Use and Waste Management

#### 3.9.1 Objective

To reduce overall quantities of materials to be used and waste arising.

#### 3.9.2 Mitigation Measures

##### Sustainable Waste Management Principles

The design of the proposed Project will seek to maximise resource efficiency, reducing the amount of waste generated, minimising water consumption and making the most efficient use of energy. This will be adhered to also in the development of the Site Waste Management Plans (SWMPs) (See below) that will be produced for each site by the contractor prior to commencement but post consent, in accordance with local planning policy objectives. The approach to resource use and waste management for the proposed Project will follow sustainable waste management principles which incorporates the European Union 'waste hierarchy'. This includes:

- prevent: The SWMPs will consider the application of the Guidelines for Designing out Waste for Civil Engineering Projects to reduce materials use as well as waste arisings. Both will be monitored as part of the SWMPs' review process.
- reuse: Opportunities for reusing 'waste' before recycling, recovery or disposal will be considered. Site set up will involve stripping vegetation and topsoil for some of the construction areas. Surface vegetation, topsoil and subsoils will be stored separately for re-use and handled in accordance with good practice methods.
- recycle: General construction waste may be produced, such as wood, plastics and cardboard packaging. These will be segregated and stored for short periods on site in secure designated areas prior to removal from site to a recycling facility.
- recover: Stripped vegetation and removed trees (with landowner agreement except where this is identified for re-use or recycling) and general food waste will be taken to a composting, anaerobic digestion or biomass plant.
- disposal: The disposal of waste from the proposed Project to landfill will be regarded as a last resort. All other options, as described above, will be considered prior to considering disposing of waste to landfill. If required, disposal will be undertaken in a safe and responsible manner ensuring that all waste carriers and management facilities are appropriately licensed, in accordance with the procedures outlined in this document.

## Standards

A set of standard measures will be employed for the management of waste and are listed below:

- the treatment of recyclable waste materials from the proposed Project will be undertaken off-site at an appropriate facility. Waste materials will be recovered and sorted on site for transportation and taken from site to the recycling facility;
- material will be stored for short periods on site in secure designated places in the identified construction working areas until taken away for recycling;
- all waste materials shall be stored securely on site in order to prevent their escape and protect them against vandalism, vermin or outside interference;
- hazardous waste (e.g. paints, solvents, sealants) will be segregated on-site to avoid contaminating other material and waste streams;
- all waste management contractors carrying waste shall be authorised to do so and all sites that receive the waste shall be authorised to do so;
- a sample of waste management routes will be subject to an annual audit to confirm that waste is being managed correctly;
- quantities of waste generated will be recorded and monitored. Records will be kept for a minimum of three years;
- an authorised waste management contractor will deal with the disposal of any fly-tipped materials discovered. Any fly-tipping will be reported as an environmental incident and notified to the local authority and/or EPA to enable them to investigate the incident;
- all employees and contractors involved with the handling and managing of waste will have the relevant training and be assessed as competent and training records retained;
- all waste containers shall be labelled to indicate the types of waste that may be deposited in them;

- all staff and contractors working on the proposed project shall understand which waste should be deposited where, and that they are not allowed to use the facilities for the disposal of domestic waste. This will be delivered by toolbox talks; and
- a SWMP shall be produced for all sites.

### Storage of Waste

Waste may be stored at construction compounds for a limited amount of time to help to limit the number of vehicle movements to and from site as far as possible to minimise effects on the local roads.

- waste will be stored in secure designated areas, in enclosures or containers to prevent material being dispersed by the wind;
- designated areas will be sited at least 10m away from drains and watercourses to limit risk of escape and contamination of water courses;
- waste storage containers will be labelled with their waste type and their LoW code; any labelling will be consistent with Industry Best Practice at the time construction commences and reviewed annually;
- waste containers will be covered to prevent dust emissions and potential nuisances;
- the burning of any waste is prohibited;
- liquid wastes will be stored in containers within bunded zones with secondary containment of at least 110% capacity of the largest container or at least 25% of the total tank capacity inside the bunded zone (whichever is the greatest); and
- incompatible or hazardous wastes will be stored and handled in accordance with Hazardous Wastes Regulations.

### Waste Management Plan

A Preliminary Construction and Demolition Waste Management Plan (PC&D WMP) has been developed to ensure that waste arising on-site during the construction and demolition phase of the proposed Project will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts, 1996-2011 and associated Regulations 1996 and 2001 are complied with and to ensure that the principles of waste hierarchy are implemented.

The Construction and Demolition Waste Management Plan (C&D WMP) which is developed prior to construction must contain (but not be limited to) the following information:

- site preparation such as the extent of an area to be cleared and the potential types and volumes of arisings, the location of any structures to be demolished, statutory requirements and specific environmental requirements and seasonal requirements, e.g. in respect of bats, birds and salmonids;
- details of waste storage (e.g. skips, bins, containers) to be provided for different waste and collection times;
- details of where and how materials are to be disposed of, i.e. landfill or other appropriately licensed waste management facility;
- details of storage areas for waste materials and containers;
- details of how unsuitable excess materials will be disposed of, where necessary; and,
- details of how and where hazardous wastes such as oils, diesel and other hydrocarbon or other chemical waste are to be stored and disposed of in a suitable manner.

## Site Waste Management Plan

SWMPs will be produced for each site. The SWMPs shall record the following information:

- proposals for managing the waste following the Waste Hierarchy to ensure that waste arisings are minimised, including 'designing out waste' and waste prevention measures;
- details of any decisions taken before the SWMP was drafted to minimise the quantity of waste produced on site;
- a description of each type of waste expected to be produced in the course of the proposed project;
- an estimate of the quantity of each waste type that will be produced;
- identification of the waste management action proposed for each waste type, including reusing, recycling, recovery and disposal;
- a detailed action plan for the management of the waste, including roles and responsibilities, data collection and reporting procedures;
- details of any site waste storage facilities including the requirements of environmental permits and pollution control measures; and
- a declaration that material will be handled efficiently, and waste managed appropriately.

## 3.10 Air Quality

### 3.10.1 Objective

To undertake the construction of the proposed Project whilst minimising emissions of dust and other pollutants to avoid effects on air quality.

### 3.10.2 Regular Review

The air quality provisions of the CEMP will be reviewed on a regular basis, at least annually throughout the duration of the proposed Project's construction period, to ensure that the mitigation measures proposed remain adequate, effective and reflect advances in best practice, including but not necessarily limited to the guidance published by the Institute of Air Quality Management (IAQM).

### 3.10.3 Mitigation Measures

Good practice mitigation would be required to control the effects of dust emissions and pollutant emissions from construction plant and machinery during construction at those level crossings where construction activities are required (See Volume 3, Chapter 15: Air Quality for further details). A suite of good practice mitigation measures recommended by the IAQM guidance (IAQM, 2016) is set out below.

These are based on the highest risk level identified in the Scoping Report (i.e. 'medium risk') and those which were specified as 'Highly Recommended' in the IAQM guidance for medium risk sites. The risk levels at some of the proposed Project's construction sites (e.g. XC201) or on sections of new roads which are remote from receptors, are likely to represent a lower risk and the mitigation for low risks sites as set out in the IAQM guidance may be more appropriate and applied on a site by site basis.

- develop and implement a stakeholder communications plan that includes community engagement before work commences on the site;
- display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. this may be the environment manager/engineer or the site manager;

- display the head or regional office contact information;
- develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk, and will include, as a minimum, the highly recommended measures in this assessment. The desirable measures will be included as appropriate for the site (desirable rather than highly recommended for low risk sites);
- record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken;
- make the complaints log available to the local authority when asked;
- record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site, and the action taken to resolve the situation in the logbook;
- carry out regular site inspections to monitor compliance with the DMP (or equivalent), record inspection results and make an inspection log available to the local authority when asked;
- increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions;
- where considered necessary, agree dust deposition/dust flux monitoring locations with the local authority;
- plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible;
- where practicable, erect solid screens or barriers around dusty activities or operations;
- avoid site runoff of water or mud;
- keep site fencing, barriers and scaffolding clean using wet methods (desirable rather than highly recommended for low risk sites);
- remove materials that have a potential to produce dust from the site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below (desirable rather than highly recommended for low risk sites);
- cover, seed or fence stockpiles to prevent wind whipping (desirable rather than highly recommended for low risk sites);
- ensure all vehicles switch off engines when stationary – no idling vehicles;
- avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable;
- where required or practicable, produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials (not required for low risk sites);
- where applicable, only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. "suitable local exhaust ventilation systems";
- ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate;
- where applicable, use covered skips for storage of dusty wastes or materials;

- minimise drop heights from loading shovels and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate;
- ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods (desirable rather than highly recommended for low risk sites);
- avoid dry sweeping of large areas (desirable rather than highly recommended for low risk sites);
- inspect any on-site haul routes for integrity and instigate any necessary repairs to the surface as soon as reasonably practicable (not required for low risk sites);
- where required, record all inspections of haul routes and any subsequent action in a site logbook (desirable rather than highly recommended for low risk sites);
- avoid bonfires and burning of waste materials;
- ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place (desirable rather than highly recommended for low risk sites);
- use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site(s) (desirable rather than highly recommended for low risk sites);
- ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport;
- if applicable, implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud) prior to leaving the site(s) where reasonably practicable (desirable rather than highly recommended for low risk sites);
- ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits (not required for low risk sites); and
- where practicable, access gates to be located at least 10m from receptors where possible (not required for low risk sites).

## 4. References

Arterial Drainage Act 1945 & 1995, as amended.

BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise (BSI, 2014)

BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration (BSI, 2014)

Construction (Design and Management) Regulations 2015

Directive 2014/52/EU (2011 EIA Directive Article 5(1) As Amended)

Environmental Protection Agency (2007) Environmental Risk Assessment for Unregulated Waste Disposal Sites

Environmental Protection Agency (2011) Environmental Liability Regulations

European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018

Guidance on Soil and Stone By-products' (in the context of article 27 of the European Communities (Waste Directive) Regulations 2011 (Environmental Protection Agency, June 2019)

Guidelines for Designing out Waste for Civil Engineering Projects

I.S. EN 206-1 – Concrete Specification

ISO 40001:2015 Environmental Management Systems – Requirements with Guidance for Use

ISO 9001: 2015 Quality Management

Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, National Groundwater and Contaminated Land Centre Report NC/99/77

The Management of Health and Safety at Work Act 1999, Health and Safety Executive

Safety, Health and Welfare at Work (Construction) Regulations 2013 (amended 2019))

The Safety, Health and Welfare at Work Act 2005

Transport (Railway Infrastructure) Act 2001 S39

Water Pollution Acts 1977 & 1990

## Appendix A - IÉ Technical fencing specification (CCE-TRK-SPN-037)



Reference No.	CCE-TRK-SPN-037
Version	1.5
Operative Date	31/01/2020
Status	LIVE
Prepared by	Sharon Callanan
Checked by	Cathal Mangan
Approved by	Éamonn Ballance

CCE DEPARTMENT

TECHNICAL SPECIFICATION

CCE-TRK-SPN-037

Fencing Specification

This CCE Department Technical Document sets out the requirements for the provision of fencing on the Iarnród Éireann network.

This CCE Department Technical Document is mandatory.

The principles in this Technical Specification are approved by the Head of Department and therefore constitute mandatory standard practices, which apply throughout the CCE Department.

Signed



Chief Civil Engineer

This technical specification, along with all CCE Department Technical Documents, is available on the CCE Website. Electronic copies of the documents are controlled and live. Holders of printed copies of the document are responsible themselves for ensuring that they have the most up to date version as appropriate.

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## 1 Scope and Principles

### 1.1 Scope

1.1.1 This specification details the requirements of Iarnród Éireann with respect to the manufacture, supply and installation of various types of new fencing required adjacent to the railway track in urban and rural areas.

### 1.2 Principles

1.2.1 This specification applies from the operative date and supersedes all existing Iarnród Éireann fencing specifications.

1.2.2 Iarnród Éireann reserves the right to modify or amend this specification.

1.2.3 Unless otherwise stated in this specification, the manufacture, supply and installation of all types of fencing must be in accordance with the following documentation:

1.2.3.1 S 148 March 2013 Minimum Specification for Farm Fencing (Department of Agriculture, Food and the Marine).

1.2.3.2 I.S. 436: 2007 Farm Fencing – Timber Post and Wire.

1.2.3.3 I.S. 437: 2008 Horse and Stud Fencing- Timber Post and Rail.

1.2.3.4 I.S 136: 1982 Concrete Fence Posts.

1.2.3.5 EN ISO 1461 Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods.

1.2.3.6 I.S. EN 10230-1 2000. Steel wire nails loose nails for general applications.

1.2.3.7 I.S.105-1: 1977 Wire and Cut Nails for Building Purposes.

1.2.3.8 I.S EN 10244-2: 2009 Steel Wire and Wire Products - Non-ferrous Metallic Coatings on Steel Wire - Part 2: Zinc or Zinc Alloy Coatings.

1.2.3.9 I.S. 126: 1982 Galvanised Fencing Wire.

1.2.3.10 I.S. EN 10223-1: 2012 Steel Wire and Wire Products for Fences - Part 1: Zinc and Zinc-alloy Coated Steel Barbed Wire.

1.2.3.11 I.S. EN 10223-2: 2012 Steel Wire and Wire Products for Fencing and Netting - Part 2: Hexagonal Steel Wire Netting for Agricultural, Insulation and Fencing Purposes.

1.2.3.12 I.S. EN 10223-5: 2012 Steel Wire and Wire Products for Fencing and Netting - Part 5: Steel Wire Woven Hinged Joint and Knotted Mesh Fencing.

1.2.3.13 I.S. EN 10223-6: 2012 Steel Wire and Wire Products for Fences - Part 6: Steel Wire Chain Link Fencing.

1.2.3.14 I.S. EN 206-1: 2002 Concrete - Part 1: Specification, performance, production and conformity.

1.2.3.15 BS 3692: 2001 ISO metric precision hexagon bolts, screws and nuts. Specification

1.2.3.16 BS 4320: 1968. Specification for metal washers for general engineering purposes. Metric series.

1.2.3.17 BS 4102: 1998. Specification for steel wire for general fencing purposes.

1.2.3.18 BS 1722: 2006 Fences.

## 2 Implementation

### 2.1 General Requirements

#### 2.1.1 General

- 2.1.1.1 Fences shall be accurately set out and erected to provide a smooth alignment in plan and elevation and shall follow the profile of the ground along the length of the fence as closely as is practicable.
- 2.1.1.2 The line of the fence shall follow the exact same line as the existing fence line that is to be removed, if it is not possible to achieve this then the contractor must seek written agreement from the Iarnród Éireann Engineer, after consultation with the relevant property owner.
- 2.1.1.3 The Contractor must satisfy him/herself that accesses are adequate at tender stage to execute the works in accordance with their method statements.
- 2.1.1.4 The contractor shall supply material data sheets (and samples, where practicable e.g. fencing wire) for all fencing materials to be installed to the Iarnród Éireann Engineer, prior to works commencing.

#### 2.1.2 Site Clearance

- 2.1.2.1 In general, and in line with the mandatory statutory obligations of IÉ to provide a safe boundary between the railway and adjacent lands, the Contractor shall clear all vegetation including any tree / bush growth and other obstructions when the fence is being erected and must remove all vegetation down to ground level from the running rail to 5m the field side of the boundary.
- 2.1.2.2 Special consideration may be given to placement of the fence on the inside of existing hedgerow boundaries subject to the agreement of this with the landowner and providing it allows sufficient space for the inspection and maintenance of, and access to, this fence. This must be approved by IÉ in advance of commencement of works.
- 2.1.2.3 Where an existing fence is present, the contractor shall remove the existing fence before the installation of new fencing.
- 2.1.2.4 A definite plan by the contractor is to be agreed with the Iarnród Éireann Engineer and the property owner in relation to the construction of the fence so that animals/people trespass are catered for during construction.
- 2.1.2.5 Should a request be made to leave existing hedgerows in place, this will be considered by IÉ, in the context of our statutory obligations and in the interest of railway safety. Any arrangements to this effect must be agreed in writing with the Iarnród Éireann Engineer prior to works commencing.
- 2.1.2.6 Where there is a stone wall all vegetation from around the wall must be removed and **the fence erected on the property owner's side of the stone wall taking care not to damage the existing wall as the existing boundary must be maintained.**
- 2.1.2.7 The contractor must take due care when removing vegetation and levelling the ground so as not to damage any Iarnród Éireann Infrastructure. If infrastructure is damaged, the contractor must bring this to the attention of the Iarnród Éireann Engineer, in writing and the contractor shall repair the infrastructure and bear the associated costs.
- 2.1.2.8 If it is not possible to remove the trees stumps/hedge row without compromising the formation, the Iarnród Éireann Engineer must be notified in writing and confirmation must be sought by the contractor in writing.
- 2.1.2.9 All remaining tree stumps must be treated with a Department of Agriculture approved Herbicide, as per the manufacturers guidelines, to ensure the leaves and root system are destroyed, preventing regrowth.
- 2.1.2.10 The contractor must saw cut all remaining tree stumps that are greater than 150mm diameter and remain jagged, prior to treating with herbicide as per cl 2.1.2.8.
- 2.1.2.11 Where boundary drains exist along the fence line, they shall be cleaned by removing vegetation from the bottom and sides of the drain.

- 2.1.2.12 The contractor shall prepare the ground by levelling with an excavator, after vegetation has been removed and the drain has been cleaned.
- 2.1.2.13 Once the ground along where the fence is to be erected is cleared and levelled the new fence can be erected.
- 2.1.2.14 If property owner restricts the contractor from erecting any element of the fencing or cutting any vegetation on Iarnród Éireann boundary/property, Iarnród Éireann engineer must be immediately notified in writing of the situation.
- 2.1.3 Disposal of Material/Vegetation
- 2.1.3.1 The Contractor shall legally dispose off-site, any existing fencing materials removed as part of the Scope of Works.
- 2.1.3.2 No tree/undergrowth removed by the contractor is to remain on Iarnród Éireann property.
- 2.1.3.3 No tree/undergrowth removed by the contractor is to remain on a landowners property, unless agreed in writing between the contractor and the landowner.
- 2.1.3.3.1 The contractor must agree a location to stockpile the vegetation with the landowner that is clear of the railway boundary (greater than 20m from the fence line).
- 2.1.3.3.2 If the landowner is offered any timber/trees the contractor must saw them into manageable lengths (2.5m) and stack in the agreed location.
- 2.1.3.4 A copy of this agreement must be provided to the Iarnród Éireann Engineer.
- 2.1.3.5 All undergrowth is to be mulched by use of a mulching head attachment to a suitable machine and shall be removed off site prior to completion of works.
- 2.1.3.6 Due care is to be taken by the Contractor with regard to the use of mulching heads when used near livestock and people.
- 2.1.3.7 The contractor must tidy up after mulching takes place to the satisfaction of the Iarnród Éireann Engineer, ensuring all vegetation and vegetation fragments are removed from site and disposed of legally in accordance with relevant legislation.
- 2.1.3.8 On completion of works the site must be left clean and tidy, to the satisfaction of the Iarnród Éireann Engineer.
- 2.1.4 Arrangements with Third Parties
- 2.1.4.1 Contractor to liaise directly with all third parties in relation to carrying out these works including ESB, Local Authorities/County Councils, Bord Gais, Eircom, Property Owners and any others as required before, during and after the works.
- 2.1.4.2 Contractor to ensure that all services are identified prior to commencement of work, contractor must exercise due care in relation to working around these services.
- 2.1.4.3 Contractor must agree terms and conditions with all property owners prior to entry onto their property. These terms and conditions are entirely between the contractor and the property owner and not Iarnród Éireann.
- 2.1.4.4 All access used by the contractor are to be made good and returned to original condition or better (the contractor must take photographs as proof of condition of access prior to works commencing)
- 2.1.4.5 The contractor to make good and bare the associated costs for any damage caused by the works to the property, both Irish Rail and property owners, this includes any reseeding required as a direct result of the fencing works.
- 2.1.4.6 **It is the contractor's responsibility to determine if traffic management is required and if so they shall bare the associated costs and execute the works in accordance with Chapter 8 of the Traffic Signs Manual.**
- 2.1.5 Unauthorised Access during Works
- 2.1.5.1 Temporary fences are to be provided by the contractor, where livestock need to be contained for the duration of the fencing works.

- 2.1.5.2 As soon as the Contractor is placed in possession of the site he shall immediately close and secure the area to the public. Such arrangements shall be made so as pedestrians in the area shall be unable to access the worksite at any time, day or night.
- 2.1.6 Adjoining Fences, Walls, Structures
  - 2.1.6.1 Fences shall be effectively terminated at existing fences, walls and other structures to provide a complete barrier to persons or animals as appropriate.
  - 2.1.6.2 Fencing shall not continue across or within a water course, fencing shall be returned to the structure both sides, providing a complete barrier to persons or animals as appropriate.

## 2.2 Concrete Post and Wire

### 2.2.1 General

2.2.1.1 Concrete Post and Wire fencing shall be of the type detailed in the following clauses and as shown in appendix A, drawing A.1 and shall comply with all other statutory requirements and other specified requirements.

### 2.2.2 Precast Concrete Posts and Struts

2.2.2.1 Precast concrete fence posts and struts shall conform with the requirements of I.S. 136 : 1982 in all aspects other than length.

2.2.2.2 The minimum length of posts and struts, shall be as follows:

2.2.2.2.1 The minimum overall length of the intermediate post shall be 1990 mm.

2.2.2.2.2 The minimum overall length of the straining post shall be 2270 mm.

2.2.2.2.3 The minimum overall length of the strut shall be 2140 mm.

2.2.2.3 The minimum cross sections of posts and struts, in accordance with I.S.136: 1982, shall be as follows:

2.2.2.3.1 The cross section of the intermediate post shall be 100mmx100mm at the base and 100mmx75mm at the top.

2.2.2.3.2 The cross section of the straining post shall be 125mmx125mm at the base and 125mmx125mm at the top.

2.2.2.3.3 The cross section of the strut shall be 125mmx100mm at the base and 125mmx100mm at the top.

2.2.2.4 Posts shall be holed to the appropriate size to allow the fixing of the line wire specified in section 2.2.3 below.

2.2.2.5 Heads of posts shall be half rounded in order to prevent the lodgment of water.

2.2.2.6 Any section of concrete post fencing (including branches or spurs) shall start with a straining post and shall end with a straining post.

2.2.2.7 Straining posts should be provided at the beginning and end of every length of fencing, at gaps or openings, at every change of direction where the angle is greater than 30° and to accommodate any significant change in gradient.

2.2.2.8 On straight sections of fence, straining posts shall be spaced at a distance not greater than 70 metres. In these cases, the wire must be tensioned at these posts by one of the means outlined in clause 2.2.3.6 below, then continue the fencing with another length of 70m.

2.2.2.9 The spacing between intermediate posts or between an intermediate post and a straining post, measured centre to centre of posts, shall not be greater than 3.5 metres.

2.2.2.10 Struts shall be fitted to all straining posts in the direction of the line of fencing and shall be securely fastened together.

### 2.2.3 Fencing Wire

2.2.3.1 All wire (line, sheep, barbed, tying) shall conform to IS EN 10223 and be galvanized, complying with I.S. EN 10244-2 (Class A) and I.S 126: 1982.

2.2.3.2 Line wire shall be as specified and detailed on drawing A.1 within appendix A and shall meet the following requirements:

2.2.3.2.1 Line wire shall consist of 10 s.w.g. (3.15 millimetre diameter) high tensile steel wire complying with I.S. 126: 1982.

2.2.3.2.2 There are to be seven strands of line wire and each strand shall pass through each of the holes in the post.

- 2.2.3.2.3 The height of the top strand of line wire from the ground is to be 1420mm.
- 2.2.3.2.4 Spacing of line wire shall be as detailed on drawing within appendix A and in accordance with I.S. 136:1982.
- 2.2.3.3 Sheep wire shall be as specified and detailed on drawing A.1 within appendix A and shall meet the following requirements:
  - 2.2.3.3.1 Sheep wire shall be HT8/80/15.
  - 2.2.3.3.2 Sheep wire shall be manufactured to IS EN 10223-5 with a minimum class 'medium 2M' high tensile steel and galvanized to IS EN 10244-2 (Class A)
  - 2.2.3.3.3 The maximum opening size at the bottom of the sheep wire shall not exceed 150mm x 75mm, while the maximum opening at the top of the sheep wire shall not exceed 150mm x 150mm.
  - 2.2.3.3.4 Sheep wire is to be fixed to the field side of the fence, 100mm above ground level and shall be fixed to the line wires adequately with tying wire or ring staples at a minimum of three locations per line between posts (see clauses 2.2.4.6 and 2.2.4.7 for tying wire and staples specification).
- 2.2.3.4 Barbed wire shall be as specified and detailed on drawing A.1 within appendix A and shall meet the following requirements:
  - 2.2.3.4.1 Heavy gauge high tensile
  - 2.2.3.4.2 Barbed wire shall be constructed of two number 2 mm high tensile line wires, to I.S. EN 10223-1:2012.
  - 2.2.3.4.3 Shall be galvanized to comply with I.S. EN 10244-2 (Class A).
  - 2.2.3.4.4 There shall be five strands of barbed wire and barb spacings shall comply with I.S. EN 10223-1
  - 2.2.3.5 The top two strands of barbed wire shall be adequately attached (with tying wire or ring staples at a minimum of three locations per line between posts) to the top two strands of line wire and the third adequately attached to the top of the sheepwire, the fourth adequately attached to the fifth from the top strand of linewire and the fifth to the bottom strand of line wire. See drawing A.1 within appendix A.
  - 2.2.3.6 Each line wire and barbed wire shall be strained tightly and secured to each straining post by one of the following means:
    - 2.2.3.6.1 Winding brackets shall be attached to the post with fixing bolts.
    - 2.2.3.6.2 Eyebolt strainers shall be passed through a hole in the post and secured with a nut and washer.
    - 2.2.3.6.3 Eyebolt strainers fixed to intermediate posts shall, in addition, be fitted with ring nuts; in this case the wire attached to the eye of the eyebolt strainer shall be tensions before the ring nut is fixed.
  - 2.2.3.7 Wire shall be erected on the property owner side of the posts.
- 2.2.4 Ancillary Items (fixings)
  - 2.2.4.1 Eye bolt strainers, winding brackets and fixing bolts and nuts shall be hot dipped galvanised in accordance with EN ISO 1461 with a minimum average coating weight of 610 g/m<sup>2</sup> (or minimum average coating of 85 microns).
  - 2.2.4.2 Eye bolt strainers shall consist of bolts of 250 mm overall length and not less than 9.5 mm diameter with a welded eye at one end. They shall be threaded and fitted with nuts and washers.
  - 2.2.4.3 Two-way eye bolt strainers shall be fitted with ring nuts.
  - 2.2.4.4 Winding brackets intended for attachment to a post shall be manufactured from mild steel flat not less than 45mm x 2mm and shall be fitted with a winding bolt of 12 mm minimum diameter and with a friction type ferrule or ratchet winder. One end of the winding bracket shall be provided with a hole for the attachment of the line wire.



2.2.4.5 The Contractor shall ensure that connectors are designed to match the diameter and type of line wire used. One connector is adequate for terminating a line wire at a straining post, two connectors are required to join two line wires in a continuous run.

2.2.4.6 Tying wire shall be 1.6mm diameter galvanized mild steel to I.S 126. The galvanizing shall comply with I.S. EN 10244-2 (Class A).

2.2.4.7 Staples shall be galvanized or zinc/aluminum coating, minimum 40mm x 3.55mm round standard or barbed wire to I.S 105-1. The coating shall comply with I.S. EN 10244-2.

## 2.2.5 Foundations

2.2.5.1 Minimum sizes of excavated holes for each post and strut shall be as follows:

Straining post	-	900mm deep x 450mm square
Intermediate post	-	600mm deep x 300mm square
Strut	-	750mm x 300mm x depth to suit (min 450mm)

2.2.5.2 Concrete for surrounding the bases of posts and struts shall be batched concrete to at least ST2 concrete to IS EN 206. The concrete shall be placed in position before the commencement of the initial set.

2.2.5.3 The contractor must make available concrete samples for cube tests if requested by the Iarnród Éireann Engineer at any stage.

2.2.5.4 Excavated holes for posts and struts shall have vertical sides except that it shall be permissible for the side of a strut hole adjacent to the post to be sloped.

2.2.5.5 After insertion of the post or strut, the hole shall be filled with concrete and well rammed as the filling proceeds. After the concrete has hardened, the remainder of the hole (75mm as per drawing A.1) shall be filled with an approved good quality material (topsoil) which shall be finished proud of the surrounding ground.

## 2.2.6 Installation

2.2.6.1 The fence shall be erected so that on completion the posts are located along the designated fencing line and the tops of the posts follow a smooth alignment. The finished fence shall follow approximately the profile of the ground. The top of the fence shall follow approximately the level of the ground along the line of the fence. The finished fence shall be true in line and the tops of the posts shall show a smooth form.

2.2.6.2 When erecting a strained wire fence, straining posts shall first be sighted and set. At corner posts, struts should be positioned in line with the fence and in the direction of the thrust exerted by the completed fence.

2.2.6.3 When the straining posts are set, the lowest wire in the fence should be attached and lightly strained to enable the position of the intermediate posts to be located. The bottom wire shall then be slackened and the holes for the intermediate post dug. After re-straining the bottom wire the top wire shall be attached and also strained. During straining the top wire shall be propped to lessen the pressure caused by sagging.

2.2.6.4 The intermediate posts shall then be set in the ground using both the strained wires and a boning rod as a guide. Following this, tension of the wires shall be tested by drawing the wires down into the hollows and away from the posts. When the required tension is obtained the wires shall be attached to the intermediate posts.

2.2.6.5 Struts shall be fitted to all straining posts in the direction of each line of fencing. See mid and intermediate corner detail on drawing A.1

## 2.3 Timber Post and Wire

### 2.3.1 General

2.3.1.1 Timber post and wire fencing shall conform with the requirements of the most current Department of Agriculture and Food Minimum specification for Farm Fencing and also to the specific requirements as detailed in the following clauses and as shown in appendix A.

### 2.3.2 Timber Posts and Struts

2.3.2.1 The minimum length of posts and struts, shall be as follows:

2.3.2.1.1 The minimum overall length of the intermediate post shall be 2100mm.

2.3.2.1.2 The minimum overall length of the straining post shall be 2500mm.

2.3.2.1.3 The minimum overall length of the strut shall be 1800 mm.

2.3.2.2 The minimum cross sections of posts and struts, in accordance with I. S. 436: 2007, shall be as follows:

2.3.2.2.1 The cross section of the intermediate post shall be 125mm diameter (circular or octagonal) octopost (or similar approved).

2.3.2.2.2 The cross section of the straining post shall be 150mm diameter (circular or octagonal) octopost (or similar approved).

2.3.2.2.3 The cross section of the strut shall be 100mm.

2.3.2.3 Posts shall be scots pine (*Pinus Sylvestris*) or similar approved, grading in accordance with table 2A of the Department of Agriculture and Food minimum specification for Farm Fencing, full pressure impregnated with Creosote classified and approved in accordance with European directive 94/60EC, penetration class P8 and retention demand Post Class A and shall have a moisture content not exceeding 28% when measured in accordance with I. S. 436 and shall be certified in accordance with ISO 9002 and ISO14001.

2.3.2.4 **The requirements for the length of posts have been related to 'normal' ground conditions.** In soft ground it may be necessary to increase the specified lengths of posts to provide the necessary **stability**. **Where ground conditions are other than 'normal'**, approval shall be obtained, in advance, in writing, from the Iarnród Éireann Engineer on what modifications are required.

2.3.2.5 Strainers should be provided at the beginning and end of every length of fencing, at gaps or openings, at every change of direction where the angle is greater than 30° and to accommodate any significant change in gradient.

2.3.2.6 On straight sections of fence, straining posts shall be spaced at a distance not greater than 150 metres. In these cases, the wire must be tensioned at these posts by one of the means outlined in clause 2.3.3.5, then continue the fencing with another length of 150 metres.

2.3.2.7 The spacing between intermediate posts or between an intermediate post and a straining post shall not be greater than 3.5 metres.

2.3.2.8 Struts shall be fitted to all straining posts in the direction of the line of fencing, at a point within one half and two thirds up the straining post measured from ground level and shall be securely fastened together. See mid and corner detail on drawing A.2-1 and A.2-2.

### 2.3.3 Fencing Wire

2.3.3.1 All wire (sheep, barbed, tying) shall conform to IS EN 10223 and be galvanized, complying with I.S. EN 10244-2 (Class A).

2.3.3.2 Sheep wire shall be as specified and detailed on drawing A.2 within appendix A and shall meet the following requirements:

- 2.3.3.2.1 Sheep wire shall be HT8/80/15.
- 2.3.3.2.2** Sheep wire shall be manufactured to IS EN 10223-5 with a minimum class 'medium 2M' high tensile steel and galvanized to IS EN 10244-2 (Class A).
- 2.3.3.2.3 The maximum opening size at the bottom of the sheep wire shall not exceed 150mm x 75mm, while the maximum opening at the top of the sheep wire shall not exceed 150mm x 150mm.
- 2.3.3.2.4 Sheep wire is to be fixed to the field side of the fence, 100mm above ground level and shall be fixed to the posts with five number staples at each post, staples as specified in section 2.3.4.7.
- 2.3.3.2.5 To prevent splitting of the post, staples shall be driven at an angle and staggered along the length of the post. Staples shall not be driven home fully as this will inhibit movement of the barbed wire and will damage the galvanising coating.
- 2.3.3.3 Barbed wire shall be as specified and detailed on drawing A.2 within appendix A and shall meet the following requirements:
  - 2.3.3.3.1 Heavy gauge high tensile.
  - 2.3.3.3.2 Barbed wire shall be constructed of two number 2 mm high tensile line wires, to I.S. EN 10223-1:2012.
  - 2.3.3.3.3 Shall be galvanized to comply with I.S. EN 10244-2 (Class A).
  - 2.3.3.3.4 There shall be five strands of barbed wire and barb spacings shall comply with I.S. EN 10223-1
  - 2.3.3.4 The third strand of barbed wire from the top shall be adequately attached (with tying wire or ring staples at a minimum of three locations per line between posts) to the top of the sheepwire, the fourth strand of barbed wire shall be adequately attached to middle of the sheepwire and the fifth strand of barbed wire shall be adequately attached to the bottom of the sheepwire. See drawing A.2-1 and A.2-2 within appendix A.
  - 2.3.3.5 Each line of barb wire shall be strained tightly around each straining post using a suitable straining tool. Once strained the free end of the wire shall be secured to the main length by means of a wire connector and shall be secured and maintained at the required height with a staple driven into the post.
  - 2.3.3.6 Wire shall be erected on the adjacent landowner side of the fence.
- 2.3.4 Ancillary Items (fixings)
  - 2.3.4.1 The Contractor shall ensure that connectors are designed to match the diameter and type of barb wire used. One connector is adequate for terminating a barb wire at a straining post, two connectors are required to join two barb wires in a continuous run.
  - 2.3.4.2 Tying wire shall be 1.6mm diameter galvanized mild steel to I.S 126. The galvanizing shall comply with I.S. EN 10244-2 (Class A).
  - 2.3.4.3 Staples shall be galvanised or zinc/aluminum coating, minimum 40mm x 3.55mm round standard or barbed wire to I.S 105-1. The coating shall comply with I.S. EN 10244-2.
- 2.3.5 Foundations
  - 2.3.5.1 1350mm of the post shall be above ground.
  - 2.3.5.2 Posts with pointed ends shall be driven into the ground to the following depths:
    - 2.3.5.2.1 For intermediate posts 750mm.
    - 2.3.5.2.2 For straining posts 1150mm.
  - 2.3.5.3 Posts with flat ends shall be placed by excavation and set in concrete (see alternative foundation drawing A.2-2, if this arrangement has been specified by the Iarnród Éireann Engineer in advance).

### 2.3.6 Installation

- 2.3.6.1 The fence shall be erected so that on completion the posts are located along the designated fencing line and the tops of the posts follow a smooth alignment. The finished fence shall follow approximately the profile of the ground. The top of the fence shall follow approximately the level of the ground along the line of the fence. The finished fence shall be true in line and the tops of the posts shall show a smooth form.
- 2.3.6.2 Timber posts with pointed ends shall be driven into the ground. If timber posts with square cut ends or steel posts fitted with baseplates are specified by the Iarnród Éireann Engineer, they shall be set in concrete, as specified for concrete posts in Clause 2.2.5 of this Specification.
- 2.3.6.3 When erecting a strained wire fence, straining posts shall first be sighted and set. At corner posts, struts should be positioned in line with the fence and in the direction of the thrust exerted by the completed fence.
- 2.3.6.4 When the straining posts are set, the lowest wire in the fence should be attached and lightly strained to enable the position of the intermediate posts to be located. The bottom wire shall then be slackened and the holes for the intermediate post dug. After re-straining the bottom wire the top wire shall be attached and also strained. During straining the top wire shall be propped to lessen the pressure caused by sagging.
- 2.3.6.5 Struts shall be fitted to all straining posts in the direction of each line of fencing (see cl 2.3.2.7 above).
- 2.3.6.6 The intermediate posts shall then be set in the ground using both the strained wires and a boning rod as a guide. Following this, tension of the wires shall be tested by drawing the wires down into the hollows and away from the posts. When the required tension is obtained the wires shall be attached to the intermediate posts.

## 2.4 2.4m Security Purpose (SP) Palisade Fencing

### 2.4.1 General

- 2.4.1.1 Palisade fencing shall be in accordance with BS1722-12: 2006 and as shown in appendix A, drawing A.3-1 and shall comply with all other statutory requirements and other specified requirements.
- 2.4.1.2 The type of fencing shall be a 2.4m (i.e. the top of the fencing pales shall be 2.4 metres above ground level) steel security palisade (SP) in accordance with B.S. 1722 : Part 12 : 2006 and shall meet the specific requirements as set out in the following clauses.
- 2.4.1.3 Materials and strength requirements shall be in accordance with SP fencing requirements as detailed in Section 3 and 4 of B.S. 1722 : Part 12 : 2006, unless otherwise stated.
- 2.4.1.4 All steel palisade fencing components shall be of steel grade S275 to BS EN 10025:1993, in accordance with table 7 of BS1722-12: 2006, unless otherwise specified.
- 2.4.1.5 After fabrication of fencing components, including the punching or drilling of any holes and all welding, the fencing shall be hot dip galvanized with a minimum average coating weight of 610 g/m<sup>2</sup> (or minimum average coating of 85 microns) and shall be polyester powder coated green (Ral6005) in accordance with BS EN ISO 1461 or BS EN 10240 unless otherwise specified by Iarnród Éireann Engineer.
- 2.4.1.6 The fence shall be inspected after erection and any damaged areas found in the hot dipped galvanized coating and green powder coating (if specified) shall be repaired in accordance with BS EN ISO 1461:1999.
- 2.4.1.7 The zinc content of any such paint shall be in accordance with BS 4652 (i.e. at least 80% in the dry film). The coating thickness in the repaired area shall exceed that of the local galvanized coating layer.
- 2.4.1.8 On delivery, the contractor shall provide the Iarnród Éireann Engineer with a certificate confirming that the fence is manufactured in accordance with Iarnród Éireann instructions and BS 1722-12:2006.

### 2.4.2 Pales

- 2.4.2.1 Pales shall be 3.0mm thick corrugated, **with a 'W' profile.**
- 2.4.2.2 The tolerance on the length of the pale shall be  $\pm 5$ mm.
- 2.4.2.3 The pale head shall be the triad top (or triple pointed, splayed and returned) type.
- 2.4.2.4 Pales shall be secured to the rails at every intersection by full profile 3mm fillet welds of minimum length 30mm on each side of the pale.
- 2.4.2.5 All welding operation shall be carried out in accordance with BS EN 1011-1 and BS EN 1011-2, by suitable personnel qualified in accordance with BS EN 287-1.
- 2.4.2.6 The maximum spacing of pales, centre to centre, shall be 155mm.
- 2.4.2.7 The minimum face to view (width) shall be 70mm.
- 2.4.2.8 By exception and where it has been agreed in advance with the Iarnród Éireann Engineer, riveted pales may be used only if the pales are then tack welded on site and coated with an anti-rust coating.
- 2.4.2.9 Riveted pales shall be secured with fixings of minimum diameter 8mm. The heads of all fastening shall have the minimum possible projection beyond the face of the pale to minimize tampering and footholds.

### 2.4.3 Posts

- 2.4.3.1 The posts shall be to the minimum requirements of BS type SP30 in Table 2 of B.S. 1722 : Part 12 (127x76x13kg/m UB).
- 2.4.3.2 The post head shall be pointed type to match the specified pales.
- 2.4.3.3 The maximum centre of posts shall be 2.75 metres.

- 2.4.3.4 The posts shall be set in concrete in the ground to a minimum depth of 750mm.
- 2.4.3.5 **The requirements for the length of posts have been related to 'normal' ground conditions.** This specification does not cover situations where the ground is very firm or stiff or where the ground is soft when it may be necessary to modify the specified lengths of posts and the respective foundation sizes. Where ground conditions are other **than 'normal', approval shall be obtained** in advance from the Iarnród Éireann Engineer on what modifications are required.
- 2.4.4 Rails
  - 2.4.4.1 A minimum of two number horizontal rails shall be installed.
  - 2.4.4.2 The rails shall be to the minimum requirements of BS type SP30 in Table 2 of B.S. 1722 : Part 12, as shown on drawing (50x50x6 RSA)
  - 2.4.4.3 The oversail shall be as per SP30 in Table 2 of B.S. 1722 : Part 12. The oversail from the centre of the upper rail fixing to the top of the pales shall be 475mm. The oversail from the centre of the lower fixing to the bottom of the pales shall be 380mm.
- 2.4.5 Post to Rail Connections
  - 2.4.5.1 Rails shall be secured to posts with connector plates fitted to the web of the post. The diameter of the bolt shall be 12mm as per SP30 in table 2 of BS1722-12:2006.
  - 2.4.5.2 Provision shall be made for thermal expansion by providing slotted holes at the rail to plate connection.
  - 2.4.5.3 Plates shall be a minimum of 6mm thick, and of sufficient section to give a minimum distance of 9mm to the edge of the hole.
  - 2.4.5.4 Connector plates shall be connected to the post by welding at the clear and rail end interface (not at the bolts) with 5mm full profile fillet welds of minimum length 30mm, this should be carried out when the fencing has been lined, levelled and bolts tightened and the concrete bases set.
- 2.4.6 Ancillary Items (Fixings)
  - 2.4.6.1 All bolts shall comply with BS3692 and shall be strength grade 8.8. Nuts shall be strength grade 8 for grade 8.8 fasteners and washers shall conform to BS4320.
  - 2.4.6.2 Panel fixing bolts shall be cup square headed.
  - 2.4.6.3 Bolts for pales shall have special formed heads to suit pale profiles and shall be tamper resistant i.e. not easily removed using simple tools
  - 2.4.6.4 All bolts, nuts and washers shall be hot dipped galvanised in accordance with EN ISO 1461.
  - 2.4.6.5 On completion all fixings shall be vandal proof (secure and tamper resistant).
- 2.4.7 Foundations
  - 2.4.7.1 Excavated holes for each post shall be formed with vertical sides, with a dimension in plan of either 350mmx350mm square or 450mm diameter round and to a depth of 800mm.
  - 2.4.7.2 The posts shall be set in concrete in the ground to a depth of 750mm.
  - 2.4.7.3 The hole for the post shall be filled to ground level with concrete which shall be rammed as the filling proceeds and the top of the concrete weathered.
  - 2.4.7.4 The top of the concrete shall have a raised profile to aid in drainage around the post.
  - 2.4.7.5 Concrete for post foundations shall be 30N20 concrete to IS EN 206 and shall be placed in position before commencement of the initial set.

2.4.7.6 The requirements for the foundation sizes have been related to 'normal' ground conditions. This specification does not cover situations where the ground is very firm or stiff or where the ground is soft when it may be necessary to modify the specified lengths of posts and the respective foundation sizes. Where ground conditions are other than 'normal', approval shall be obtained in advance from the Iarnród Éireann Engineer on what modifications are required.

#### 2.4.8 Gates

2.4.8.1 Gates, if specified, shall be in accordance with section 7 of BS1722-12:2006 and shall be of comparable quality and provide a comparable degree of security to the adjacent fence.

#### 2.4.9 Additional Security Measures

2.4.9.1 When the Iarnród Éireann Engineer considers a section of fencing to be at risk from burrowing the contractor shall provide one of the additional security measures as outlined in Section 6.2 of B.S. 1722 : Part 12 : 2006 the method of which shall be agreed in advance with the Iarnród Éireann Engineer.

2.4.9.2 If specified, in areas where increased resistance to pale removal is required, the contractor shall provide an additional rail which shall be attached to the lower part of each pale. This additional rail shall be fixed to the pales 100mm from the bottom of the pales.

#### 2.4.10 Installation

2.4.10.1 The steel palisade fencing shall follow the site gradients and special panels shall be fabricated to suit.

2.4.10.2 The contractor shall prepare the ground to provide a fully compacted level gradient.

2.4.10.3 The contractor shall ensure the finished palisade fence the bottom of the fence shall not be more than 50mm above mean ground level or concrete sill level.

2.4.10.4 The contractor shall carry out the necessary surveys in each section where a gradient occurs to enable special fencing panels be fabricated to fit to the gradient.

2.4.10.5 To reduce the final amount of deflection in the fence rails, during the installation of palisade fences the bottom horizontal rail shall be supported so that, after propping, tightening of the bolts, aligning and plumbing to the fence and before placing concrete to posts surround, there is a slight upward chamber. The temporary props to the bottom rail shall be removed only after the concrete has set.

## 2.5 2.4m General Purpose (GP) Palisade Fencing

### 2.5.1 General

- 2.5.1.1 Palisade fencing shall be in accordance with BS1722-12: 2006 and as shown in appendix A, drawing A.3-2 and shall comply with all other statutory requirements and other specified requirements.
- 2.5.1.2 The type of fencing shall be a 2.4m (i.e. the top of the fencing pales shall be 2.4 metres above ground level) steel general purpose palisade (GP) in accordance with B.S. 1722 : Part 12 : 2006 and shall meet the specific requirements as set out in the following clauses.
- 2.5.1.3 Materials and strength requirements shall be in accordance with GP fencing requirements as detailed in Section 3 and 4 of B.S. 1722 : Part 12 : 2006, unless otherwise stated.
- 2.5.1.4 All steel palisade fencing components shall be of steel grade S275 to BS EN 10025:1993, in accordance with table 7 of BS1722-12: 2006, unless otherwise specified.
- 2.5.1.5 After fabrication of fencing components, including the punching or drilling of any holes and all welding, the fencing shall be hot dip galvanised with a minimum average coating weight of 610 g/m<sup>2</sup> (or minimum average coating of 85 microns) and shall be polyester powder coated green (Ral6005) in accordance with BS EN ISO 1461 or BS EN 10240 unless otherwise specified by Iarnród Éireann Engineer.
- 2.5.1.6 The fence shall be inspected after erection and any damaged areas found in the hot dipped galvanized coating and green powder coating (if specified) shall be repaired in accordance with BS EN ISO 1461:1999.
- 2.5.1.7 The zinc content of any such paint shall be in accordance with BS 4652 (i.e. at least 80% in the dry film). The coating thickness in the repaired area shall exceed that of the local galvanized coating layer.
- 2.5.1.8 On delivery, the contractor shall provide the Iarnród Éireann Engineer with a certificate confirming that the fence is manufactured in accordance with Iarnród Éireann instructions and BS 1722-12: 2006.

### 2.5.2 Pales

- 2.5.2.1 **Pales shall be 3.0mm thick corrugated, with a 'W' profile.**
- 2.5.2.2 An alternative 'D' profile, 3.0mm thick, may be used for general purpose palisade pales, however this shall be specified in advance by the Iarnród Éireann Engineer.
- 2.5.2.3 The tolerance on the length of the pale shall be  $\pm 5$ mm.
- 2.5.2.4 The pale head shall be the triad top (or triple pointed, splayed) type.
- 2.5.2.5 Pales shall be secured to the rails at every intersection by full profile 3mm fillet welds of minimum length 30mm on each side of the pale.
- 2.5.2.6 All welding operation shall be carried out in accordance with BS EN 1011-1 and BS EN 1011-2, by suitable personnel qualified in accordance with BS EN 287-1.
- 2.5.2.7 The maximum spacing of pales, centre to centre, shall be 155mm.
- 2.5.2.8 The minimum face to view (width) shall be 65mm.
- 2.5.2.9 By exception, where it has been agreed in advance with the Iarnród Éireann Engineer, riveted pales may be used only if the pales are then tack welded on site and coated with an anti-rust coating.
- 2.5.2.10 Riveted pales shall be secured with fixings of minimum diameter 8mm. The heads of all fastening shall have the minimum possible projection beyond the face of the pale to minimize tampering and footholds.



### 2.5.3 Posts

- 2.5.3.1 The posts shall be to the minimum requirements of BS type GP24 in Table 1 of B.S. 1722 : Part 12:2006 (Rolled steel joists (I section) 102x44x7.5kg/m)
- 2.5.3.2 The post head shall be pointed type to match the specified pales.
- 2.5.3.3 The maximum centre of posts shall be 2.75 metres.
- 2.5.3.4 The posts shall be set in concrete in the ground to a minimum depth of 750mm.
- 2.5.3.5 **The requirements for the length of posts have been related to 'normal' ground conditions.** This specification does not cover situations where the ground is very firm or stiff or where the ground is soft when it may be necessary to modify the specified lengths of posts and the respective foundation sizes. Where ground conditions are other than 'normal', approval shall be obtained in advance from the Iarnród Éireann Engineer on what modifications are required.

### 2.5.4 Rails

- 2.5.4.1 A minimum of two number horizontal rails shall be installed.
- 2.5.4.2 The rails shall be to the minimum requirements of BS type GP24 in Table 1 of B.S. 1722 : Part 12, as shown on drawing (45x45x6 RSA)
- 2.5.4.3 The oversail shall be as per GP24 in Table 1 of B.S. 1722 : Part 12:2006. The oversail from the centre of the upper rail fixing to the top of the pales shall be 300mm. The oversail from the centre of the lower fixing to the bottom of the pales shall be 210mm.

### 2.5.5 Post to Rail Connections

- 2.5.5.1 Rails shall be secured to posts with connector plates bolted to the vertical leg of the rail. The diameter of the bolt shall be 12mm as per GP24 in table 1 of BS1722-12: 2006.
- 2.5.5.2 Provision shall be made for thermal expansion by providing slotted holes at the rail to plate connection.
- 2.5.5.3 Plates shall be a minimum of 6mm thick, and of sufficient section to give a minimum distance of 9mm to the edge of the hole.
- 2.5.5.4 Connector plates shall be connected to the post by welding at the clear and rail end interface (not at the bolts) with 5mm full profile fillet welds of minimum length 30mm, this should be carried out when the fencing has been lined, levelled and bolts tightened and the concrete bases set.

### 2.5.6 Ancillary Items (Fixings)

- 2.5.6.1 All bolts shall comply with BS3692 and shall be strength grade 4. Nuts shall be strength grade 4 for grade 4.6 fasteners and washers shall conform to BS4320.
- 2.5.6.2 Panel fixing bolts shall be cup square headed.
- 2.5.6.3 Bolts for pales shall have special formed heads to suit pale profiles and shall be tamper resistant i.e. not easily removed using simple tools
- 2.5.6.4 All bolts, nuts and washers shall be hot dipped galvanised in accordance with EN ISO 1461.
- 2.5.6.5 On completion all fixings shall be vandal proof (secure and tamper resistant).

### 2.5.7 Foundations

- 2.5.7.1 Excavated holes for each post shall be formed with vertical sides, with a dimension in plan of either 350mmx350mm square or 450mm diameter round and to a depth of 800mm.
- 2.5.7.2 The posts shall be set in concrete in the ground to a depth of 750mm.
- 2.5.7.3 The hole for the post shall be filled to ground level with concrete which shall be rammed as the filling proceeds and the top of the concrete weathered.
- 2.5.7.4 The top of the concrete shall have a raised profile to aid in drainage around the post.

- 2.5.7.5 Concrete for post foundations shall be 30N20 concrete to IS EN 206 and shall be placed in position before commencement of the initial set.
- 2.5.7.6 The requirements for the foundation sizes **have been related to 'normal' ground conditions**. This specification does not cover situations where the ground is very firm or stiff or where the ground is soft when it may be necessary to modify the specified lengths of posts and the respective foundation sizes. Where ground conditions are other **than 'normal', approval shall be obtained in advance** from the Iarnród Éireann Engineer on what modifications are required.
- 2.5.8 Gates
- 2.5.8.1 Gates, if specified, shall be in accordance with section 7 of BS1722-12:2006 and shall be of comparable quality and provide a comparable degree of security to the adjacent fence.
- 2.5.9 Additional Security Measures
- 2.5.9.1 When the Iarnród Éireann Engineer considers a section of fencing to be at risk from burrowing the contractor shall provide one of the additional security measures as outlined in Section 6.2 of B.S. 1722 : Part 12 : 2006 the method of which shall be agreed, in advance with the Iarnród Éireann Engineer
- 2.5.9.2 If specified, in areas where increased resistance to pale removal is required, the contractor shall provide an additional rail which shall be attached to the lower part of each pale. This additional rail shall be fixed to the pales 100mm from the bottom of the pales.
- 2.5.10 Installation
- 2.5.10.1 The steel palisade fencing shall follow the site gradients and special panels shall be fabricated to suit.
- 2.5.10.2 The contractor shall prepare the ground to provide a fully compacted level gradient.
- 2.5.10.3 The contractor shall ensure the finished palisade fence the bottom of the fence shall not be more than 50mm above mean ground level or concrete sill level.
- 2.5.10.4 The contractor shall carry out the necessary surveys in each section where a gradient occurs to enable special fencing panels be fabricated to fit to the gradient.
- 2.5.10.5 To reduce the final amount of deflection in the fence rails, during the installation of palisade fences the bottom horizontal rail shall be supported so that, after propping, tightening of the bolts, aligning and plumbing to the fence and before placing concrete to posts surround, there is a slight upward chamber. The temporary props to the bottom rail shall be removed only after the concrete has set.

## 2.6 Deer Proof Fencing

### 2.6.1 General

2.6.1.1 Deer Proof fencing shall conform with the requirements of the most current Department of Agriculture and Food Minimum specification for Farm Fencing and also to the specific requirements as detailed in the following clauses and as shown in appendix A, drawing A.4-1.

2.6.1.2 Fencing using rectangular wire mesh shall be HT17/190/15, 2m high, formed of 17 horizontal wires, with suitably graded spaces becoming smaller nearer the ground. There shall be a maximum space of 150mm between the vertical wires.

### 2.6.2 Timber Posts and Struts

2.6.2.1 Timber fence posts and struts shall conform with the requirements of I.S. 436 : 2007.

2.6.2.2 The minimum length of posts and struts, shall be as follows:

2.6.2.2.1 The minimum overall length of the intermediate post shall be 3000 mm.

2.6.2.2.2 The minimum overall length of the vertical post within H Frame shall be 3000mm.

2.6.2.2.3 The minimum overall length of the straining post shall be 3000 mm.

2.6.2.2.4 The minimum overall length of the strut (horizontal post) for H Frame shall be 2100 mm.

2.6.2.3 The minimum cross sections of posts and struts, in accordance with I.S.436:2007, shall be as follows:

2.6.2.3.1 The cross section of the intermediate post shall be 125mm diameter.

2.6.2.3.2 The cross section of the vertical post within the H Frame shall be 125mm diameter.

2.6.2.3.3 The cross section of the straining post shall be 225mm diameter.

2.6.2.3.4 The cross section of the strut shall be 125mm diameter.

2.6.2.4 H-frames or straining frame shall be constructed at each end of a run of deer fencing, at each acute change of direction (more than 30°), and as interval frames in any run exceeding 200 metres.

2.6.2.5 The vertical posts within H frames shall be positioned at least 2m apart.

2.6.2.6 The horizontal post shall be securely fixed to the verticals by either galvanised steel rods, or by a rebated joint.

2.6.2.7 Straining posts may be used for changes in the direction of the fence of less than 30°.

2.6.2.8 Intermediate posts shall be spaced at a maximum distance of 3.5 metres for standard fencing.

2.6.2.9 In rough terrain, the distances between posts should be appropriately reduced and in agreement with the Iarnród Éireann Engineer in advance of works commencing.

### 2.6.3 Fencing Wire

2.6.3.1 Rectangular wire mesh shall be HT/17/190/15, formed of zinc-coated high tensile horizontal line wires with a minimum diameter of 2.5mm, and zinc-coated mild steel vertical wires with a minimum diameter of 2.5mm. It shall comply with EN10223-2 (Galvanised to Class A).

2.6.3.2 Joint knotting shall either be hinged-joint or tight-lock knotting.

### 2.6.4 Foundations

2.6.4.1 Posts with pointed ends shall be driven into the ground to a minimum depth of 1000mm.

2.6.4.2 Posts with flat ends shall be placed by excavation and set in concrete in accordance with section 2.2.5 of this specification (see drawing A.4-2 for this alternative post foundation if specified).

- 2.6.4.3 Vertical posts within H-Frame shall be driven 1000mm into the ground or placed in an augered hole
- 2.6.4.4 Straining posts shall be driven 1m into the ground or placed in an augered hole.
- 2.6.4.5 Intermediate posts shall be driven 1m into the ground or placed in an augered hole.
- 2.6.5 Installation
  - 2.6.5.1 Horizontal line wires as specified above shall be securely fixed to the outer post of the H-frame. Each line wire shall be taken round this post and fastened to itself either by tying, or by a pre-formed fenced connector.
  - 2.6.5.2 The entire fence shall then be strained and stapled in accordance with the specifications of the mesh manufacturer.
  - 2.6.5.3 The diagonal tensioning wire of the H-frame shall be 3.15mm diameter, and meet the requirements of BS 4102.

## 2.7 Horse Fencing

### 2.7.1 General

- 2.7.1.1 Horse fencing shall conform with the requirements of the most current Department of Agriculture and Food Minimum specification for Farm Fencing and also to the specific requirements as detailed in the following clauses and as shown in appendix A.
- 2.7.1.2 All posts shall be four-way pointed and all rail ends shall be cut square. In addition all retaining board ends and top board ends shall be cut square.
- 2.7.1.3 Wire mesh fence to be constructed using pressure creosoted timber octoposts (or similar approved) and a top board to make the fence visible to horses.
- 2.7.1.4 The type of horse fencing shall be specified by the Iarnród Éireann Engineer.

### 2.7.2 Timber Post and Rail

#### 2.7.2.1 Materials

- 2.7.2.1.1 Posts shall be scots pine (*Pinus Sylvestris*) or similar approved, grading in accordance with table 2A and 2B of the Department of Agriculture and Food minimum specification for Farm Fencing, full pressure impregnated with Creosote classified and approved in accordance with European directive 94/60EC penetration class P8 and retention demand Post Class A and shall have a moisture content not exceeding 26% when measured in accordance with I.S. 437 and shall be certified in accordance with ISO 9002 and ISO14001.
- 2.7.2.1.2 Posts shall be, at least, 150 mm x 75 mm, and shall be, at least, 1.95 m long.
- 2.7.2.1.3 The posts shall be erected with at least 600 mm below ground and 1350mm above ground.
- 2.7.2.1.4 The maximum spacing of posts shall be 2.4 m.
- 2.7.2.1.5 Rails shall be, at least, 100 mm x 47 mm where the posts are spaced at 2.4 m centres and 100 mm x 44 mm where the posts are spaced at 2.1 m centres.
- 2.7.2.1.6 Where 3 rails are used they shall be spaced at no more than 400 mm centres.
- 2.7.2.1.7 Where 4 rails are used they shall be spaced at 300 mm centres.
- 2.7.2.1.8 Rails shall be on the paddock side of the fence.
- 2.7.2.1.9 Nails shall be at least 100mm long and 4.2mm diameter steel nails to IS EN 10230-1.

#### 2.7.2.2 Installation

- 2.7.2.2.1 Rails and top boards shall be fixed to the field side of posts. The top of the rail should always finish flush with the top of the post.
- 2.7.2.2.2 Rail and top board joints shall be staggered so that only alternate joints occur on one post. They shall be butt jointed along the centreline of each of the posts.
- 2.7.2.2.3 Each rail or top board shall be fixed to each post with two nails driven in on the skew by hand or mechanical means.
- 2.7.2.2.4 Rails or top boards which split during railing are not permitted. Where splitting of the rails or top boards is encountered, it is recommended that all remaining rails and top boards shall be pre-drilled.

### 2.7.3 Specialised Horse V Mesh Fence

#### 2.7.3.1 Posts

**2.7.3.1.1 Intermediate posts for specialised horse wire fencing shall be at least 2100 mm long and a minimum of 125mm diameter (or equivalent area) timber creosoted Octopost (or similar approved see cl 2.7.2.1.1).**

2.7.3.1.2 For intermediate posts a minimum of 1500 mm shall be above ground and a minimum of 600 mm shall be below ground.

2.7.3.1.3 The maximum spacing of intermediate posts shall not exceed 2.7 metres where a top board is fitted.

2.7.3.1.4 Strainer posts shall be at least 2700 mm long, and shall be at least 200 mm diameter (or equivalent area) timber creosoted Octopost (or similar approved see cl 2.7.2.1.1).

2.7.3.1.5 For strainer posts a minimum of 1500 mm shall be above ground and a minimum of 1200 mm shall be below ground.

2.7.3.1.6 Strainer posts shall be spaced at a maximum of 150m.

2.7.3.1.7 In soft ground, the strainer length may have to be increased to provide the necessary stability.

2.7.3.1.8 Strainers shall be provided at the beginning and end of every length of fencing, at gaps or openings, at every change of direction where the angle is greater than 30° and to accommodate any significant change in gradient.

2.7.3.1.9 Where rock or other obstructions are encountered the post shall be set in concrete. The concrete base shall be 750 mm deep for boundary and paddock fencing and 900 mm deep for lunging and turnout areas.

#### 2.7.3.2 Fencing Wire

2.7.3.2.1 Horizontal line wires to consist of 2-ply wire of at least 2.7mm diameter diameter high tensile galvanised or zinc / aluminium coating wire, galvanised or zinc / aluminium coating to I.S. E.N 10244-2 (Galvanised to Class A using a Galfan type alloy) steel wires galvanized at 100mm spacing, see drawing A2. Appendix A.

2.7.3.2.2 Vertical wires shall have a V formation to create a small opening which does not allow horses or foals to put their legs through or get caught in the wire.

2.7.3.2.3 Vertical wires shall consist of at least 2.7mm diameter galvanized steel.

2.7.3.2.4 Vertical wires shall be securely wrapped around each horizontal wire run diagonally to make a diamond pattern.

2.7.3.2.5 The Specialised Horse wire shall have closely spaced, 50mm x 100mm diamond-mesh construction.

2.7.3.2.6 The height of the wire is to be 1.2m and erected on the field side of the post.

2.7.3.2.7 The specialised horse wire which shall be fixed to the field side of the fence, shall be brought up from ground level to 25mm min past the bottom of the top board as shown in drawing A3 in appendix A.

2.7.3.2.8 The top and bottom members are recommended to be at least 3.5mm diameter galvanised or zinc / aluminum coating steel wires.

2.7.3.2.9 Specialised Horse Wire shall be fixed to the posts with galvanised or zinc / aluminium coating staples 5No. at each Post.

2.7.3.2.10 To prevent splitting of the post, staples should be driven at an angle and staggered along the length of the post. Staples should not be driven home fully as such staples will inhibit movement of the fencing wire and will damage the galvanised or zinc / aluminium coating.

2.7.3.2.11 Staples shall be minimum 40 mm x 3.55 mm round standard or barbed wire to I.S. 105-1. The coating shall comply with I.S. EN 10244-2.

### 2.7.3.3 Top Boards

2.7.3.3.1 All top boards to be pressure creosoted timber.

2.7.3.3.2 Top boards shall be at least 5400mm long and at least 175 mm x 40mm. The top board shall be located to the field side of the fence posts.

### 2.7.3.4 Installation

2.7.3.4.1 The maximum spacing of intermediate posts shall not exceed 2700 mm where a top board is fitted.

2.7.3.4.2 If specified in advance by the Iarnród Éireann Engineer, that the top board is to be replaced by 2.5 mm high tensile wire, the intermediate post spacing may be increased to 4m. This must be agreed in writing, in advance, with the Iarnród Éireann Engineer.

2.7.3.4.3 Strainer posts shall be spaced at a maximum of 150m.

2.7.3.4.4 In soft ground, the strainer length may have to be increased to provide the necessary stability.

2.7.3.4.5 Strainers shall be provided at the beginning and end of every length of fencing, at gaps or openings, at every change of direction where the angle is greater than 30° and to accommodate any significant change in gradient. Top boards shall be at least 5400mm long and at least 175 mm x 40 mm.

2.7.3.4.6 Fixing of top boards to posts - Top boards shall be fixed to the field side of the posts. They shall be butt jointed along the centreline of each of the posts. Top boards to be pre-drilled to prevent splitting. Each top board shall be fixed to each post with two 100mm Galvanised Screws, screwed in on the skew by hand or mechanical means. Top boards which split during railing must be replaced.

2.7.3.4.7 The top board shall be located at the top of the fence posts, and the specialised horse wire, as described in clause 2.3.7, shall be brought up from ground level to within 225mm of the top rail.

## 2.8 Post and Chain-link Fence Specification

### 2.8.1 General

2.8.1.1 The Chief Engineer's requirements concerning concrete post and Chain-link fencing in addition to all other statutory requirements (Irish Standards, British Standards and any others specified) and other specified requirements, as shown in appendix A, drawing A.6-1 must include the following:

(a) There are to be seven strands of line wire, see appendix A, drawing A.6-1 for positioning of wire.

(b) Chain Link 1500mm High 2.24/3.15mm Galvanised & PVC Coated (RAL6005).

### 2.8.2 Precast concrete posts

2.8.2.1 Precast concrete fence posts and struts shall conform with the requirements of I.S. 136:1982 in all aspects other than length.

2.8.2.2 The minimum overall length of the intermediate post shall be 1990 millimetres (6 feet, 6 inches). The minimum overall length of the straining post shall be 2270 millimetres. The minimum overall length of the strut shall be 2140 millimetres.

2.8.2.3 Any length of concrete post fencing (including branches or spurs) shall start with a straining post and shall end with a straining post.

2.8.2.4 The spacing between intermediate posts or between an intermediate post and a straining post shall not be greater than 3.0 metres.

2.8.2.5 On straight lengths of fence, straining posts shall be spaced at a distance not greater than 70 metres. In these cases the wire must be tensioned at these posts using ratchets, then continue the fencing with another length of 70m.

### 2.8.3 Fencing Wire

2.8.3.1 The galvanising shall comply with I.S. EN 10244-2 (Class A) and B.S. 443 : 1982. The line wire shall consist of 10 s.w.g. (3.15 millimetre diameter) high tensile steel wire complying with I.S. 126:1982.

2.8.3.2 The line wire shall pass through each of the holes in the post.

2.8.3.3 Eye bolt strainers shall consist of bolts of 250 mm overall length and not less than 9.5 mm diameter with a welded eye at one end. They shall be threaded and fitted with nuts and washers.

2.8.3.4 Two-way eye bolt strainers shall be fitted with ring nuts. Eye bolt strainers shall be hot dipped galvanised in accordance with BS 729:1971 (1994) with a minimum average coating weight of 610 g/m<sup>2</sup> (or minimum average coating of 85 microns).

2.8.3.5 Winding brackets intended for attachment to a post shall be manufactured from mild steel flat not less than 45mm x 2mm and shall be fitted with a winding bolt of 12 mm minimum diameter and with a friction type ferrule or ratchet winder. One end of the winding bracket shall be provided with a hole for the attachment of the bull wire.

2.8.3.6 Winding brackets, fixing bolts and nuts shall be hot dipped galvanised in accordance with BS 729 : 1971 (1994) with a minimum average coating weight of 610 g/m<sup>2</sup> (or minimum average coating of 85 microns).

2.8.3.7 The Contractor shall ensure that connectors are designed to match the diameter and type of bull wire used. One connector is adequate for terminating a bull wire at a straining post, two connectors are required to join two bull wires in a continuous run.

2.8.3.8 Chain-link shall meet the following requirements: Chain-link fencing wire shall comply with BS443. Chain-link to be galvanised and PVC Coated (RAL 6005). The galvanising shall comply with I.S. EN 10244-2 (Class A or Class B using Galfan alloy). Chain-link wire shall consist of 2.24/3.15mm diameter wires. The Chain-link fence shall be 1500mm high and the maximum mesh aperture shall not exceed 50mm x 50mm.



2.8.3.9 Chain-link shall be fixed to the concrete post bull wires adequately with stirrup wire. The Chain-link is to be fixed to the field side of the fence. Tying wire shall be 1.6 mm diameter galvanised mild steel wire to I.S. 126. The galvanising shall comply with I.S. EN 10244-2 (Class A).

#### 2.8.4 Foundations

2.8.4.1 Concrete for surrounding the bases of posts and struts shall be 20N20 Ready-mix. The concrete shall be placed in position before the commencement of the initial set. The contractor must make available concrete sample for cube test if requested by IE Engineer at any stage.

2.8.4.2 Excavated holes for posts and struts shall have vertical sides except that it shall be permissible for the side of a strut hole adjacent to the post to be sloped.

2.8.4.3 The following are the minimum sizes of excavated holes for each post and strut:

Straining post	-	900mm deep x 450mm square
Intermediate post	-	600mm deep x 300mm square
Strut	-	750mm x 300mm x depth to suit (min 450mm)

2.8.4.4 After insertion of the post or strut, the hole shall then be filled to the top with concrete (As specified above in section 2.8.4.1), which shall be well rammed as the filling proceeds. After the concrete has hardened, the concrete shall be covered with an approved good quality material which shall be finished proud of the surrounding ground.

#### 2.8.5 Erection

2.8.5.1 The fence shall be erected so that on completion the posts are located along the designated fencing line and the tops of the posts follow a smooth alignment. The finished fence shall follow approximately the profile of the ground. The top of the fence shall follow approximately the level of the ground along the line of the fence. The finished fence shall be true in line and the tops of the posts shall show a smooth form.

2.8.5.2 Straining posts shall be provided at all ends and corners and at changes of direction or acute variations in level.

2.8.5.3 Struts shall be fitted to all straining posts in the direction of each line of fencing.

2.8.5.4 Intermediate posts shall be provided at intervals, measured centre-to-centre of posts, not exceeding 3.0 metres.

2.8.5.5 When erecting a strained wire fence, straining posts shall first be sighted and set. At corner posts, struts should be positioned in line with the fence and in the direction of the thrust exerted by the completed fence. When the straining posts are set, the lowest wire in the fence should be attached and lightly strained to enable the position of the intermediate posts to be located. The bottom wire shall then be slackened and the holes for the intermediate post dug. After re-straining the bottom wire the top wire shall be attached and also strained. During straining the top wire shall be propped to lessen the pressure caused by sagging. The intermediate posts shall then be set in the ground using both the strained wires and a boning rod as a guide. Following this, tension of the wires shall be tested by drawing the wires down into the hollows and away from the posts. When the required tension is obtained the wires shall be attached to the intermediate posts.

### 3 Revision History

Version No and Date	Section No and Reason for Change
1.0 – 11 March 2014	New document, replacing all existing fencing specifications.
1.1 – 15 October 2014	Includes standard detail drawings for all fence types Concrete Post and Chain link included.
1.2 – 30 March 2015	Minor amendments and clarifications to clauses and drawings.
1.3 – 07 July 2015	Minor amendments to clause 2.1.1.4 and clauses 2.1.2.7-2.1.2.9 (removal of ecoplugs reference). Amendments to Section 2.6 Deer Fencing (clause 2.6.1.2, clause 2.6.2.8 and clause 2.6.3.1 amended, clause 2.6.1.3 removed).
1.4 – May 2019	Review of document undertaken to ensure fitness for purpose with regard to the type, quality and standard of fencing being used
1.5 – 31 <sup>st</sup> January 2020	Updates on site clearance following third party engagements.  Correction to typo error in the specification reference number. CCE-TMS-SPN-037 replaced with CCE-TRK-SPN-037.

End of Technical Specification

## Appendix A Fencing Standard Details





















