Bonneagar Iompair Éireann
Transport Infrastructure Ireland

GALWAY
NATIONAL ROADS
PROJECT OFFICE

Comhairle Chontae na Gaillimhe
Galway County Council

Galway County Council

N17 Milltown to Gortnagunned Realignment Scheme

Outline Erosion and Sediment Control Plan

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1	27/06/2019	First Issue
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3	09/09/2021	Third Issue

N17 Milltown to Gortnagunned

Outline Erosion & Sediment Control Plan

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Executive Summary

The purpose of this Environmental Operating Plan (EOP) is to define the system for managing environmental issues on the project. The aims of this plan are to reduce the potential for any adverse impact on the environment for the duration of the works and to ensure compliance to the requirements of the recognised standards. This Environmental Operating Plan is a live document that will be developed, reviewed and updated as the works progress on site. This plan reflects any known information at this stage. A continual review of environmental procedures will be undertaken as works progress. Each revision will be reissued as required.

1 Introduction

1.1 Scheme Description

Galway County Council is planning a 3km upgrade of the N17 National Primary Route, to a Type 1 single carriageway between the townlands of Milltown and Gortnagunned.

The project involves realignment and upgrade of the existing road to remove the substantially deficient bends on this section of the route and in so doing, will improve aspects such as safety, sight distance, cross sectional width and drainage.

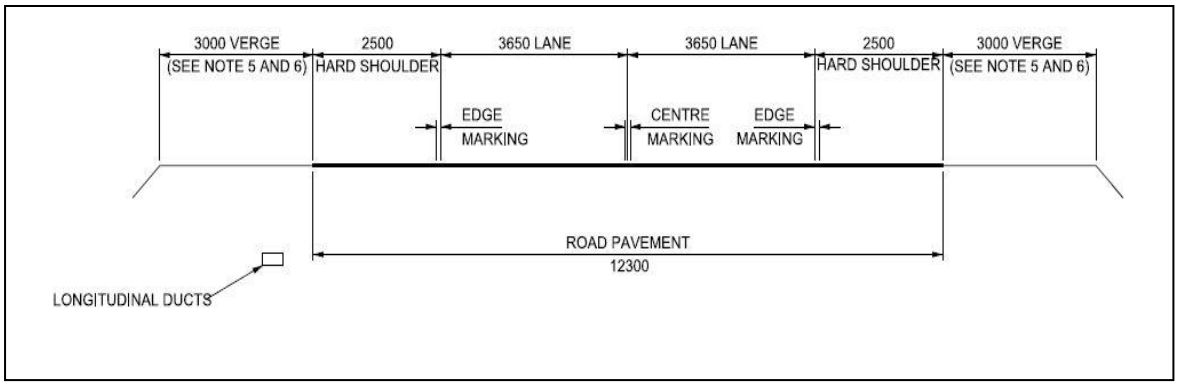
The proposed scheme will tie-in on the Northern end with an existing section of the N17 which has already been upgraded and is of a higher standard complying with TII Standards and on the Southern end will tie in with the town of Milltown.

Figure 1.1: Location map showing realignment

1.2 Proposed Cross Section

The route consists of a Type 1 single carriageway and is designed in accordance with TII Rural Road Link Design, DN-GEO-03031. The road will consist of two lanes of 3.65m, a hard shoulder 2.5m wide for each carriageway and a verge of 3m on the right-hand side with a verge of 5m on the left-hand side incorporating a shared footpath/cycle track. This cross section shall extend from Ch 0m to Ch 2+560m of the scheme. The footpath/cycle track will move off line to utilise the old road corridor where possible. The design speed of 100km/h will be adopted for the Type 1 section of the scheme from chainage Ch 0m to Ch 2+180m and a design speed of 85km/h from chainage Ch 2+180m to Ch 2+560m, which is consistent with National Roads. The Urban section of the scheme is designed in accordance with DMURS and TII Publications and drawing CC-SCD-00013 with a design speed of 60km/h to be adopted. The Urban single carriageway with footway and cycleway on each side of the carriageway commences at chainage Ch 2+560m to Ch 2+945m. The road will consist of two lanes of 3.5m, a footway of 2.5m and cycleway of 2.0m on each side of the carriageway.

Figure 1.2: Type 1 Single Carriageway



1.3 Outline Erosion and Sediment Control (OESC) Plan

This Outline Erosion and Sediment Control (OESC) Plan has been prepared as a method of water quality mitigation to offset potential Construction Stage pollution impacts from the N17 Milltown Realignment Road Project to adjacent watercourses including various tributaries of the Clare River.

The Plan is intended to be a working document and has been prepared to inform the Construction Stage Erosion and Sediment Control Plan, which, in turn, will form an integral part of the Environmental Operating Plan for the Project. The mitigation, control, monitoring and emergency measures for the Project in relation to Erosion and Sediment Control are described in this document. The Plan is also used to:

(i) Inform the Hydrological & Hydro-geological and in turn the Biodiversity Impact Assessments; and

(ii) Ensure sufficient lands have been included on a permanent and temporary basis within the CPO to treat sediment runoff during the Construction Stage for the project;

Numerous references are contained herein. However, the main body of this report is guided by the technical guidance documents: *Control of water pollution from linear road projects*, and *Environmental Good Practice on Site Design (Fourth Edition),* published by CIRIA (C648 and C741 respectively).

The main activities likely to give rise to sediment pollution include; the construction of earthworks, crossings over streams or drain crossings.

1.4 Principals of Erosion and Sediment Control

The principles of erosion and sediment control during the construction stage of a Roads Project as outlined in CIRIA C648 include.

(i) Erosion control (preventing runoff) is much more effective than sediment control in preventing water pollution. Erosion control is less subject to failure from high rainfall, requires less maintenance and is also less costly;

(ii) Plan erosion and sediment control at the design stage, as far as practicable, so that requirements can be built into the design and land requirement for the project and to inform the details of the Construction Stage Erosion and Sediment Control Plan;

(iii) Minimise erosion and potential for soiled water to be generated by minimising runoff;

(iv) Install drainage and runoff controls before starting site clearance and earthworks;

(v) Minimise the area of exposed ground;

(vi) Prevent runoff entering the site from adjacent ground, as this creates additional polluted water;

(vii) Provide appropriate control and containment measures on site;

(viii) Monitor and maintain erosion and sediment controls throughout the project;

(ix) Establish vegetation as soon as practical on all areas where soil has been exposed.

1.5 Contents of Outline Plan

The plan contains the following information.

(i) An identification of existing land use and the nature of the receiving environment;

(ii) An outline of the main construction activities likely to be relevant in relation to erosion and sediment generation.

(iii) An outline of the relevant Source-Pathway-Receptor (SPR) linkage which may cause potential sediment pollution

Table 1.1: Source – Pathway - Receptor

SPR	Description
Source (S)	The construction activities which are likely to generate sediment runoff.
Pathway (P)	The potential pathways for the above-mentioned pollution to reach sensitive areas
Receptor (R)	Areas which are considered sensitive in terms of sediment laden runoff

(iv) An outline of available site information which allows for an appreciable understanding for the sediment runoff which is likely to be generated and risks which may be encountered in specific areas;

(v) An outline of the controls determined at the current plan stage for incorporation and expansion within the detailed ESCP;

(vi) An overview of Monitoring and Audit Requirements; and

(vii) Emergency Procedures

2 Project Context

2.1 General

The following gives a general overview of the site characteristics which are relevant in terms of Erosion and Sediment Control.

2.2 Landscape Character

The topography within the study area is dominated by low lying green field sites and wetland vegetation. A contributory stream to the Clare River lies South East to the Realignment. The Clare River catchment area extends to Lough Corrib. There is a disused Western Railway Corridor (the Claremorris to Tuam railway line) which crosses through the existing N17 at the townland of Drum. The proposed realignment will need to cross this railway line at grade.

2.3 Agriculture in the Study Area

In terms of land use, the area is used primarily for agriculture. Farming enterprises in the study area are predominantly involved in sheep and beef production with some dairy farming practices occurring to the North of the study area. South of the study area is used for commercial and residential use on the outskirts of Milltown Town.

The agriculture land cover in the study area is defined by the Gortnagunned, Drum, and Milltown topography. A summary of the soil associated and land uses are shown in Map and defined in **Table 2.**1 below (starting from North to South).

Figure 2.1: Study area soils map (Teagasc)

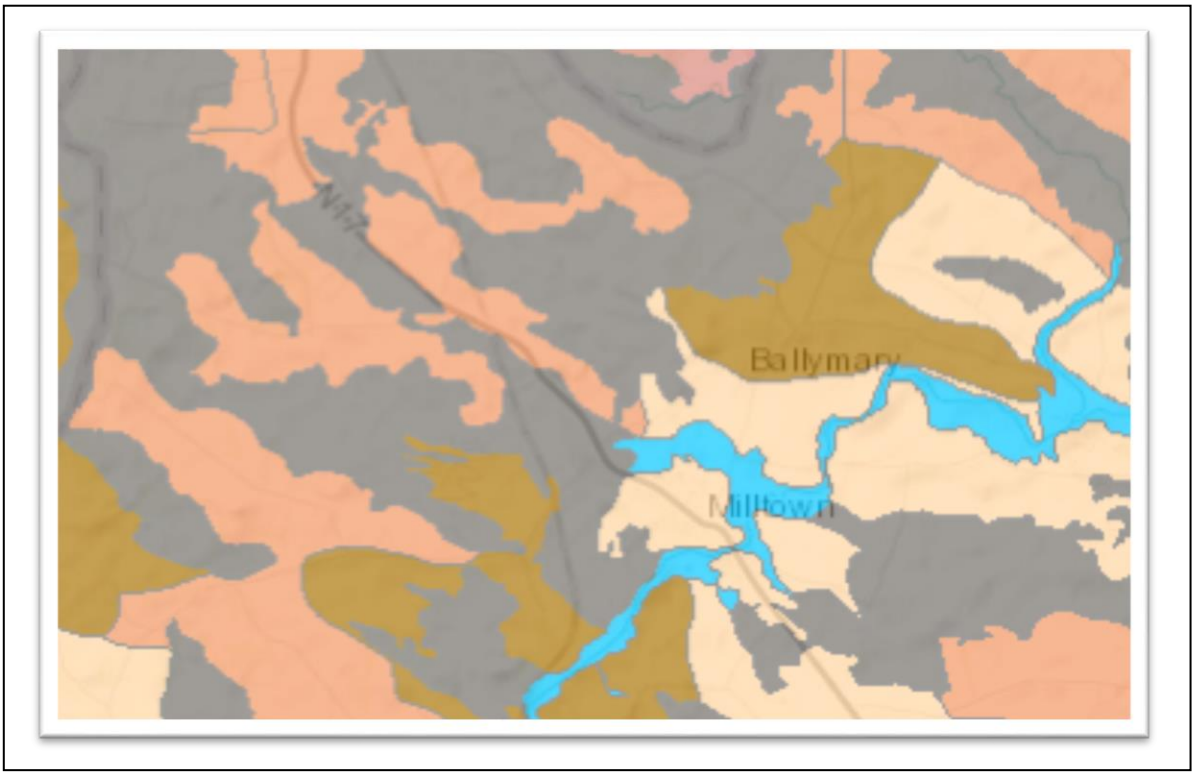


Table 2.1: Soil Classification occurring in the Study Area based on GIS mapping

Soil Association	Map Colour Code	Land Use	Description
Elton	Dark Orange	Agriculture	Fine loamy texture and derived from limestone drift
Peat	Dark Grey	Agriculture, Forestry, Wetland Vegetation	Dark texture, soft ground
River Alluviun	Blue	Currently used for Agriculture	Soil derived from Silty River Alluvium Realignment is as per existing road at this location.
Mullabane	Pale Orange	Forestry and Agriculture	Coarse loamy texture and derived from limestone drift.

2.4 Bedrock Geology

A summary of the geological sequence and main rock types likely to be encountered along the route from North to South are shown in **Table 2.2**. These are based on the available information on the 1:100,000 scale Geological Survey of Ireland map of the area.

Table 2.2: Geological Formation occurring in the Study Area

Period	Formation	Rock Types
Carboniferous (Dinantian)	Visean Limestone (Undifferentiated Limestone)	Dark fine Limestone and Calcareous Shale
Calcarenites (Dinantian)	Cong Canal Formation	Pale grey calcite limestone

2.5 Drainage Features

The existing drainage systems in the area can be described as poor both in terms of hydrology and water quality. New land open drainage will be connected to existing land open drainage and kept separate of the road drainage system. Dredging of existing open drainage system will be carried out as required. The existing road network does not provide any form of attenuation or pollution control. The existing drainage connects with the Clare River to the south of the proposed scheme.

The Clare River forms part of the Corrib-Mask catchment which covers an area of 3,056km^2. The Clare River catchment is approximately 1,036km^2 or approximately 30% of the Corrib catchment. River Corrib is the main river channel discharging waters from the Corrib-Mask catchment via Lower Lough Corrib and the Corrib river channel which flows from the lower lake to the sea at Galway Bay. Refer to EPA Catchment Mapping **Figure 2.2** below.

Road crossings of watercourses will be provided by culverting. It is expected that general culverting will suffice from a flood conveyance perspective. There are no major culverts in this scheme.

Figure 2.2: Catchment Map (EPA)

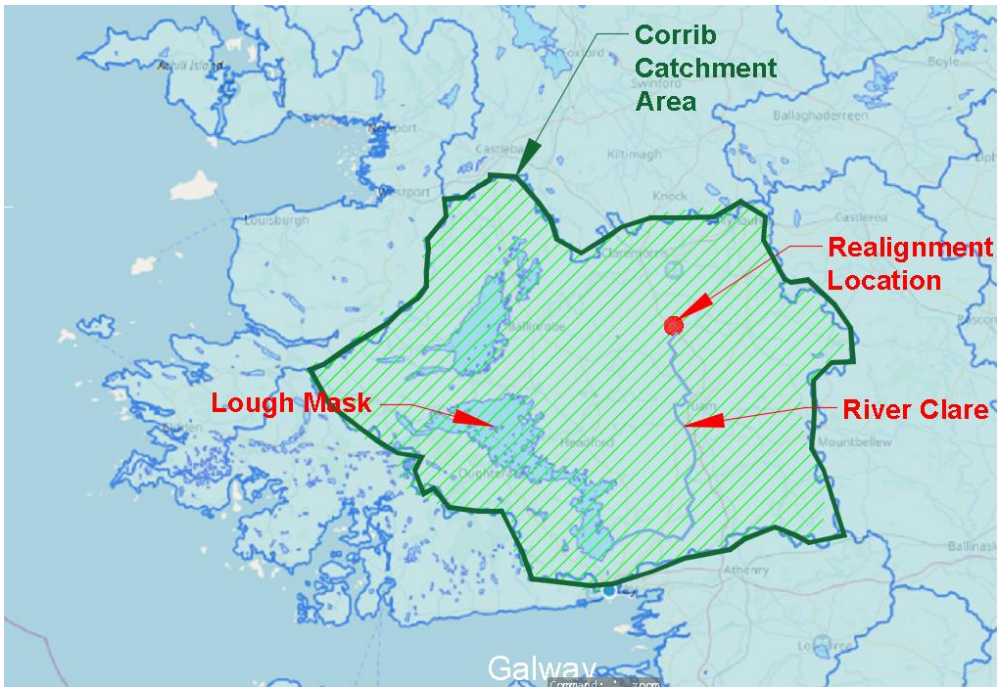


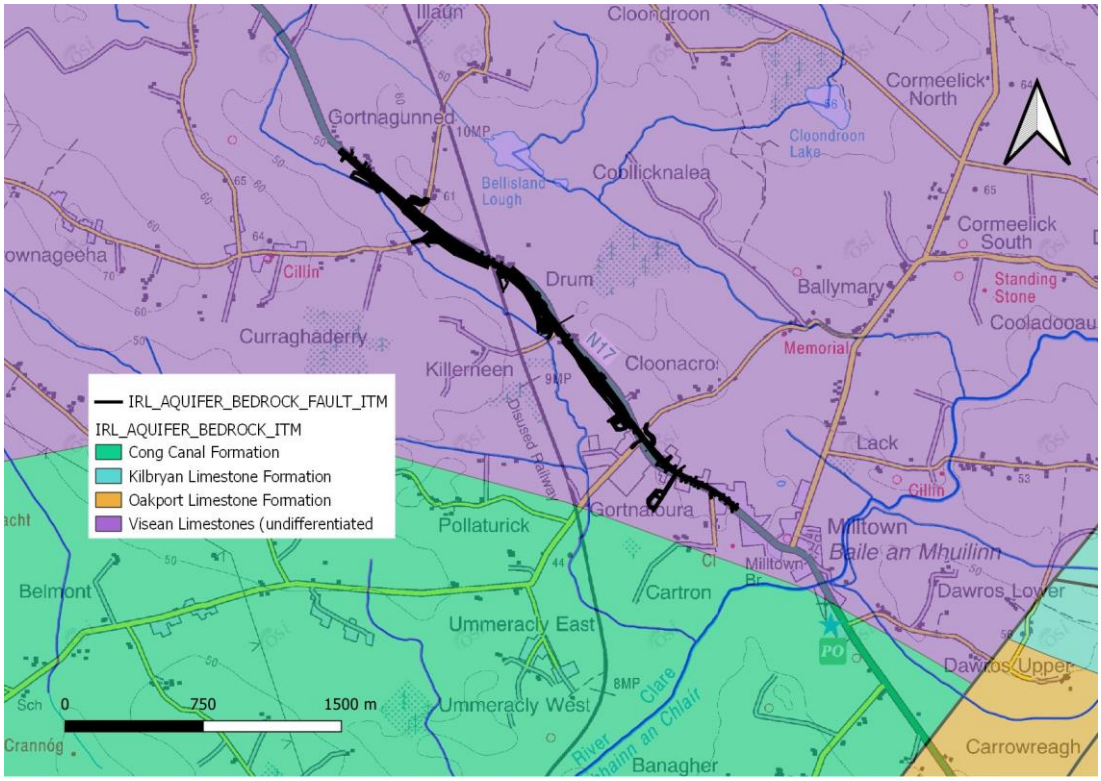
Figure 2.3: Route with Lakes/Rivers/Streams

2.6 Hydrogeological Features

2.6.1 Aquifers

The proposed road development and surrounding area is underlain by Visean undifferentiated limestones which are clean, pale grey, fossiliferous limestone which are subject to karstification. The aquifer classification associated with this limestone formation is a regionally Important karstic conduit flow aquifer, refer to **Figure 2.5**. To the southeast of Milltown Village SW-NE faulting occurs and the bedrock formation is the Oakport and Kilbryan limestone formation. These are muddier limestones and their lithology describes as dark nodular calcarenites and shales and is subject to less karstification. The aquifer type associated with this bedrock is classified as (LI) locally important aquifer, bedrock which is moderately productive only in local zones.

Figure 2.4: GSI Bedrock Formations



2.6.2 Karst Features

There are no mapped karst features in proximity to the proposed road development. This may be associated with the large depth of overburden in the Drum area which is generally of low permeability. There are no significant groundwater supplies within or proximate to the study area. The section of road that may have potential for karstification is in the shallow overburden area towards the southern tie-end of the scheme close to Milltown.

Figure 2.5: Bedrock Aquifer Classification

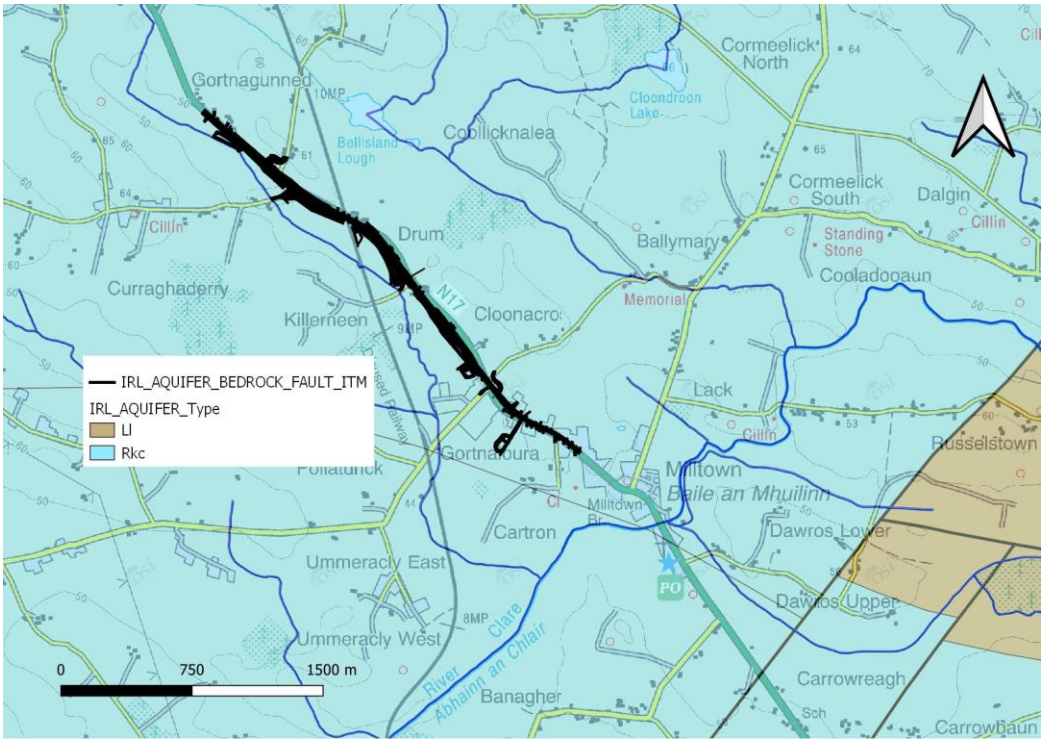
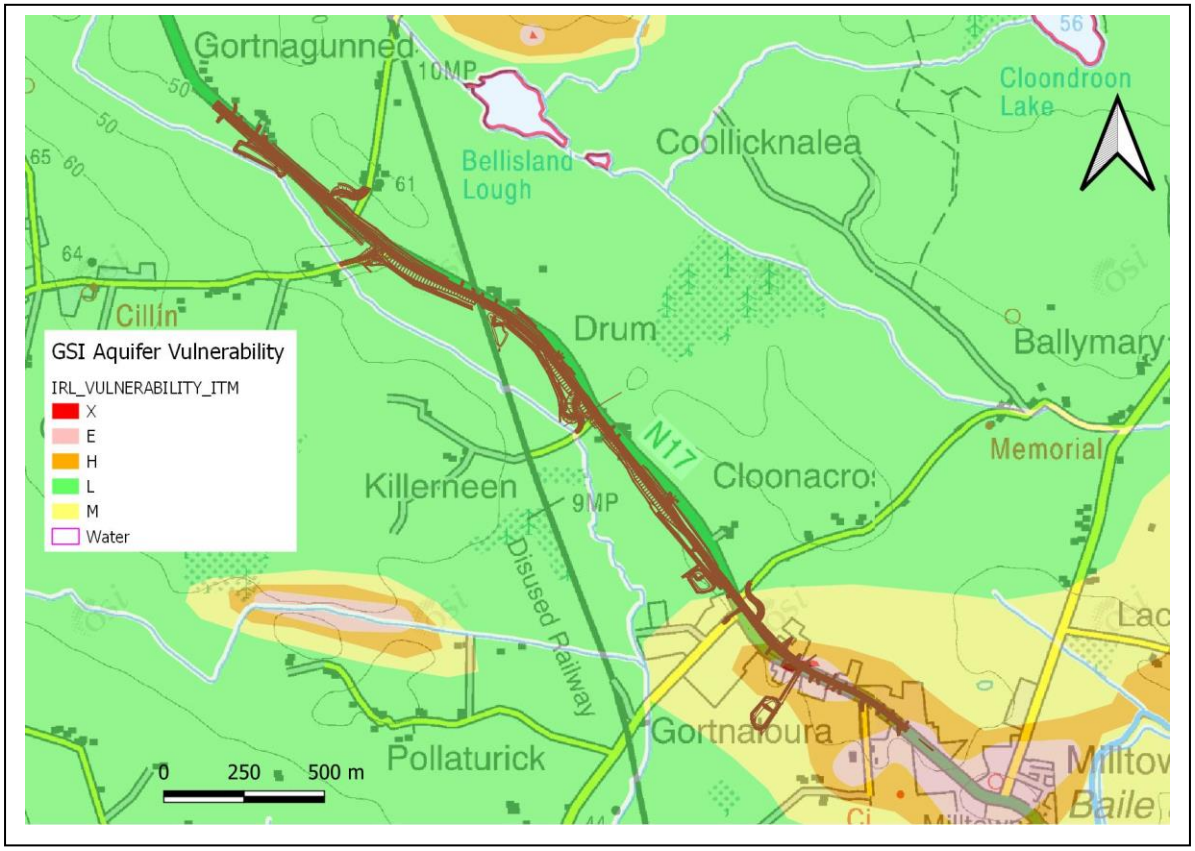


Table 2.3: Groundwater vulnerability rating versus road chainage

Road Chainage	Acquifer Type	Groundwater Vulnerability
0 - 2240	Rkc	Low
2240 - 2450	Rkc	Moderate
2450 - 2490	Rkc	High
2490 - 2730	Rkc	Extreme and Extreme with outcropping
2730 - 2910	Rkc	High
2910 - 2945	Rkc	Extreme

Given the aquifer classification the road drainage design will require a sealed drainage system such as gully and carrier pipe system for pavement runoff waters in the section of high to extreme groundwater vulnerability (i.e. Ch 2450 to 2945) to meet TII Road drainage guidelines. Surface road drains in the low and medium vulnerability section (chainage 0 to 2450) can be an unsealed, open drainage system given the depth of overburden.

Figure 2.6: Groundwater Vulnerability to Pollution – GSI Mapping



2.6.3 Water Resources and wells

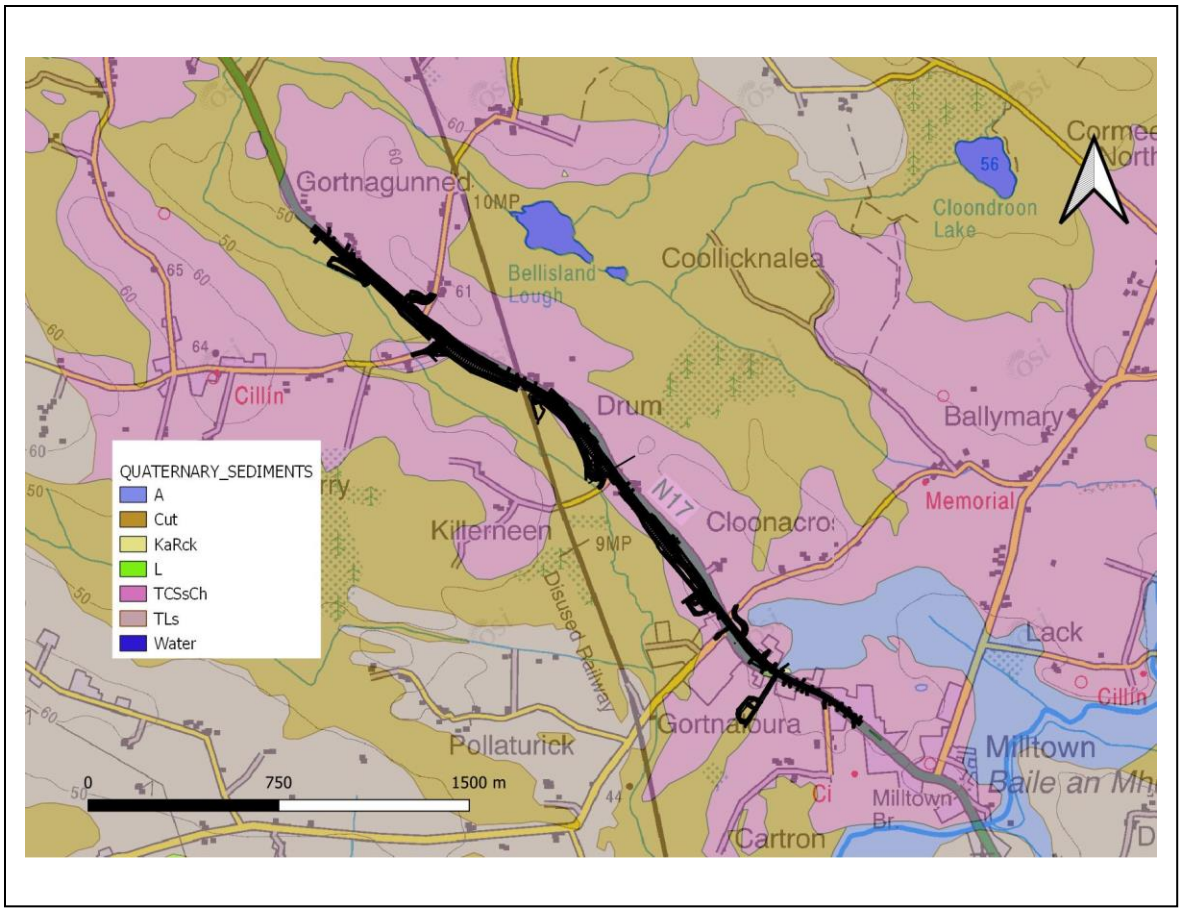
The area is serviced by Milltown group water scheme with the supply source, a treated surface water abstraction from the Clare River approximately 1.5km upstream of the Town. This abstraction is for a P.E. of 1400 households within the group scheme area. The proposed road development is downstream of the is abstraction and therefore will not have the potential to impact the supply source either via groundwater or surface water.

There are many historical wells shown on the historical OSI maps near the existing road which supplied individual dwellings along the N17. Historical wells are mapped but no springs in the proposed road development have been identified, historical or otherwise.

2.6.4 Quaternary

The sub-soils within the study area are presented in **Figure 2.7**, obtained from GSI mapping. The road alignment is primarily located on the glacial till defined as till derived from carboniferous sandstones and cherts. The alignment runs close to boundary between the till on the higher ground to the northeast and the cut-over raised peat to the southwest with the alignment partially cutting through sections of this peat. An Alluvium deposit is present to the north of chainage 2300 which is associated with lands draining eastward to the Clare river. The soil along the route within the carboniferous tills is described as surface gleys, a mineral soil poorly drained.

Figure 2.7: Quaternary Sediment classifications within the Study Area



2.6.5 Ground Water Levels

Within deep quaternary deposits from Ch. 0 to 2300 described as poorly drained mineral soils overlaying Carboniferous till the soil and subsoil permeability is very low and the depth to the water table is likely to be perched and strongly influenced by the surface drainage levels. In the shallower tills towards the end of the scheme the groundwater table is likely to be within the upper weathered section of the bedrock. The topography and permeability limits any significant groundwater flows that would generally be in southerly direction. Within the cutover peat located on the lower lying lands to the south and southwest of the proposed road the water table is likely to be close to the surface with potential for winter ponding of rainwater.

2.7 Biodiversity

A search of the National Biodiversity Data Centre (NBDC) website was conducted with a focus on records of protected fauna recorded. The results of the database search are provided below in **Table 2.4**. In **Table 2.5** which includes records of high impact non-native invasive species listed under the Third Schedule of the European Communities Regulations 2011 (S.I. 477 of 2011).

Table 2.4: NBDC records for protected species for hectad M36

Species	Conservation status
Common Frog (Rana temporaria)	HD, WA
Freshwater White-clawed Crayfish (Austropotamobius)	HD, WA
Marsh Fritillary (Euphydryas aurinia)	HD
Large White-moss (Leucobryum glaucum)	HD, WA
European Otter (Lutra lutra)	HD, WA
Pine Marten (Martes martes)	HD, WA
Lesser Horseshoe Bat (Rhinolophus hipposideros)	HD, WA
Lesser Noctule (Nyctalus leisleri)	HD, WA
Pipistrelle (Pipistrellus pipistrellus sensu lato)	HD, WA
Soprano Pipistrelle (Pipistrellus pygmaeus)	HD, WA
Eurasian Badger (Meles meles)	WA
West European Hedgehog (Erinaceus europaeus)	WA

HD = EU Habitats Directive; WA = Wildlife Acts (Ireland)

Table 2.5: NBDC invasive species records

Common Name	Latin Name
Canadian Waterweed	Elodea canadensis
Japanese Knotweed	Fallopia japonica
Rhododendron	Rhododendron ponticum
American Mink	Mustela vison
Brown Rat	Rattus norvegicus

2.8 Designated Site Lough Corrib SAC & SPA

This European Site is adjacent to the boundary of the proposed works area. There is no potential for direct impact as the proposed development is outside of the site boundary. A network of drainage ditches, that have surface water connectivity with Lough Corrib SAC. The proposed works have the potential to cause deterioration in surface water quality during construction and operation, due to the release of pollutants including suspended solids and hydrocarbons, potentially affecting the following downstream surface water.

3 Source – Pathway – Receptor

3.1 General

To establish the main effects which runoff from the Construction Stage of the project will have on the receiving environment, it is important to establish the:

(i) Source of such pollution
(ii) Potential pathway for this pollution to migrate; and
(iii) Key receptors which this pollution could cause effects to

Where there is a link between these three criteria it is important that appropriate mitigation, in the form of erosion and sediment control is provided.

3.2 Potential Sources of Pollution

Pollution can damage the water environment in many various ways as indicated in **Table 3.1**

Table 3.1: Common water pollutants and their effects on the aquatic environment.

Common Causes of Pollution	Adverse effect on the aquatic environment
Silt	Reduces water quality, clogs fish gills, covers aquatic plants
Bentonite (very fine silt)	Reduces water quality, clogs fish gills, covers aquatic plants
Cement or concrete wash water (highly alkaline)	Changes the chemical balance, is toxic to fish and other wildlife.
Hydrocarbons	Suffocates aquatic life, damaging other wildlife (e.g. Birds), and to water supplies including industrial abstractions.

The following paragraph's outlines which are considered the main sources of pollution arising from the Construction Stage of the Road Project.

3.3 Earthworks

The most significant area of concern regarding erosion and sediment control on any road construction project is those soil, subsoil and peat surfaces which are exposed during the earthworks operations.

Typically, these surfaces are exposed during:

(i) The initial site clearance works;
(ii) Excavation of cut slopes;
(iii) Construction of fill slopes with actable glacial till material;
(iv) Construction of haul roads for earthwork operations;
(v) Stockpiling of acceptable material and unacceptable material for reuse or removal offsite.

3.4 Structures and Concrete

Concrete, grout and other cement-based products which would typically be used in the construction of structures are highly alkaline and corrosive and can have a devastating effect upon water quality.

Cement-based products generate very fine, highly alkaline silt (11.5 pH) that can physically damage fish by burning their skin and blocking their gills. This alkaline silt can also smother vegetation and the bed of watercourses and can mobilise pollutants such as heavy metals by changing the water's pH scale. Concrete and grout pollution is often highly visible.

Risks are posed to water quality when construction is taking place over or near surface waters (e.g. headwalls). It is proposed to use precast units during construction of culverts to reduce any potential pollution entering the watercourse.

3.5 Watercourse Crossings

Watercourse crossed by the project are shown in **Figure 3.1**. The main watercourse in term of sensitivity is the Clare River. There are numerous minor watercourse crossings and streams which are tributary of the Clare River and associated with this proposed road development. Diversion or maintenance of these channels has the potential to generate sediment through disturbance.

All new culverts to be designed for a flood return period of 1 in 100 years with a minimum of 300mm freeboard between the design water levels and the soffit level of the culvert in accordance with OPW requirements.

A minimum culvert diameter of 900mm will be adopted on all new culverts conveying watercourses to ensure accessibility for future maintenance and reduce the likelihood of blockages in accordance with OPW requirements. The minimum culvert diameter for ditches and earthwork drainage cross drains will be 450mm as smaller sizes are prone to blockages in accordance with TII publications.

The design of all culverts conveying watercourses provide a minimum embedment depth of 150mm on circular culverts or 300mm on rectangular box culverts below stream bed or to the minimum level as requested by Inland Fisheries Ireland. This is to encourage the re-establishment of stream bed ecology. The bed of the channel both upstream and downstream of the culvert should be reinstated with material similar, to that removed during construction. This is similar, to a natural bed contiguous with the existing stream bed, upstream and downstream of the proposed culvert. Proposed culverts encroaching on fish habitats shall be designed to ensure that the velocity of flow will be less than the swimming speed to allow passage of migrating fish. Culverts will be designed such that the velocity in the barrel will not be significantly increased from the velocity of the existing watercourse.

Gradients of proposed culverts will aim to recreate the gradient of the existing watercourse where possible. Where relevant, the culvert design shall accommodate invert baffles to facilitate fish passage upstream and downstream. Suitable measures are to be employed to ensure that livestock are prevented from entering the culverts.

Figure 3.1: Route selection with Streams and Rivers

3.6 Construction Compound & Machinery Re-fuelling/lubrication

Subject to controls prescribed in section 5.3.5.3 of this Plan, the proposed location of the construction compounds has been identified as per section 5.3.5.2 & shown in **Figure 5.6**. Confirmation of the site compound location will be determined by the contractor during Phase 5 of the TII PMG. Considerations in relation to the location of such facilities and their generation of pollution during the construction stage include:

(i) Sanitary Wastewater treatment;
(ii) Hard-standing runoff;
(iii) Potential for hydrocarbon pollution to groundwater and surface water;

3.7 Potential Pathways

The potential pathway link is the flow path from an area of exposed ground to an adjacent watercourse or sensitive habitat. This might include for example sheet flow over the edge of an exposed embankment which subsequently has a route via the ground topography to enter adjacent land drains discharging to watercourses. In general, potential pathways have been examined based on:

(i) An examination of watercourses mapped on the EPA Envision website;
(ii) Reference to watercourses mapped on the OSI mapping;
(iii) An examination of the topography information of the area;
(iv) An examination of karst features in the area based on GSI mapping;

4 Investigation and Survey Information

4.1 Ground Investigation

A ground investigation for fieldwork and laboratory testing contract was awarded to Priority Geotechnical in July 2018 and October 2020. The preliminary ground investigation works were carried out to determine the ground conditions along the proposed offline route. The field works for the contract consist of cable percussion boreholes, Trial pit excavations with data recorded. Laboratory testing was carried out of the samples obtained onsite. In-situ testing CBR plate loading tests were undertaken. Also, Standard Penetration Testing (SPT) was undertaken with disturbed and undisturbed samples taken from each of the boreholes.

4.2 Geology

The site is in a rural area with much of the area being greenfield/ agricultural land. The new proposed route passes through Limestone till deposits derived from the Limestone bedrock as outlined by the Geological Survey of Ireland maps. Subsoils present in the study area include Glaciofluvial sands and gravels and Limestone till.

The bedrock has been classified by GSI mapping as Ballymore Limestone formation but no specific areas of Limestone have been found in the location area. National groundwater vulnerability mapping has classed majority of the area as an area of low vulnerability with a section closer to Milltown as moderate which could indicate that the bedrock is deeper than 10m.

Topsoil was encountered at various depths from 100mm to 400mm thick. The Topsoil was underlain by mixed glacial deposits; soft to firm, grey/ brown, slightly sandy slightly gravelly clay/ silt, clayey/ silty sandy gravel and silty sandy gravelly cobbles to depths 1.2m below ground level (bgl) to 2.3m below ground level (bgl). Cobble and Boulder content was noted within the deposits matrix. Peat deposits were encountered during the investigation. Groundwater was encountered 1.8m bgl to 1.9m bgl. Groundwater and karst were identified as geotechnical hazards.

4.3 Laboratory Testing

Laboratory determined CBR values ranged between CBR 0.1% to CBR 1.6% at natural moisture content levels. In-situ CBR as measured by plate load tests yielded values of CBR 0.3% to CBR 1.2% in the upper 1.0m bgl.

Capping of 600mm thick and a sub-base thickness of 150mm is recommended for hard standing and pavement construction in accordance with TII DMRB Vol 7 Pt 2A, TD25-26/1-Fig 4.1 for a proposed design CBR 1%. Lime improvement may be considered.

4.4 Re-use of materials

Optimum moisture content for the mixed glacial deposits was between 10.5% and 15.7% (Clay 10.5% - 15.7%; GRAVEL 12.5%). The gravel requires some drying to reach the range of optimum moisture content; up to 10%. The clay with variable moisture content is expected to require some drying; up to -13% moisture.

Moisture condition values of MCV0.0 to MCV8.3 were measured for the silt/ clay deposits at the range of natural moisture content, *w* 30% to 87%. Drying of -8% is required to achieve MCV8 – MCV12 for re-use as general earthworks fill.

At natural moisture content, some drying is required of the deposits to allow them to be re-used as general cohesive fill with CBR5% or greater.

4.5 Ground Water

Groundwater ingress was encountered 1.8m below ground level (bgl) to 1.9m below ground level (bgl). Static groundwater levels have not been determined. Noting the proposed road alignment has areas of cut slopes along the alignment to achieve formation level, this shall be reviewed closely in relation to groundwater and drainage requirements.

4.6 Chemicals

Based on the Laboratory results from samples taken, the pH readings (8.1 – 8.6) and sulphate (<0.010g/l – 0.019g/l; <0.010% - 0.12%) data indicate design sulphate class DS-1 in accordance with BRE Digest for concrete in aggressive ground for static groundwater conditions. There are no special requirements with concrete mix design.

5 Erosion and Sediment Controls

5.1 General

The principal objectives in relation to erosion and sediment control during the earthworks operation will be:

(i) To keep the exposed surface area to an absolute minimum;

(ii) To minimise the amount of runoff from the site;

(iii) To organise the work so that it progresses from the low point towards the high point within each outfall catchment;

(iv) To have an efficient earthworks operation to ensure that fill is placed as material is removed; and

(v) To ensure that the unacceptable material is removed and placed in controlled material deposition areas in an effective manner.

5.2 Principal Avoidance Measures

The protection of watercourses from pollution by construction works is achieved through avoidance in the first instance. In this regard, the following measures will be implemented during the construction phase:

(i) Site Clearance involving topsoil stripping will progress along with the earthworks and will not be carried out over large areas in advance of the earthworks;

(ii) It is estimated that a maximum of 83,000m3 of soft subsoil, organic clays and peat material, likely to be excavated during the construction operations of the proposed road development. It is intended that much of the soft subsoil excavated can be utilised for:

- (a) Embankment Construction following processing;
- (b) Landscaping measures;

(iii) The material deposition areas have been specifically designed to avoid sediment entering adjacent watercourses and minimise water quality impacts on waterbodies;

(iv) Watercourse crossing construction will involve precast box culverts installed as part of the drainage system for the scheme, to avoid significant and lengthy works adjacent to watercourses.

(v) Haul Roads will be limited to the confines of the Land Made Available (LMA). Haul roads outside the limits of the site or permanent earthworks are not anticipated;

5.3 Principle Control Measures

5.3.1 General

The protection of watercourses from pollution is achieved by avoidance. In this regard, the following measures will be implemented during the construction phase to protect all the catchments, watercourses and ecologically designated areas:

(i) Before works commence on site, the contractor will be required to prepare an Environmental Operating Plan (EOP) in accordance with the NRA guidance document for EOP's. The contractor will be required to incorporate a fully developed construction stage Erosion and Sediment Plan for the proposed works based on this Outline Plan. The contractor will be required to incorporate mitigation measures outlined in this Plan in the Construction Stage Plan. In addition, the Contractor shall consult with the NPWS and IFI in relation to the final detail of the Plan and shall include their requirements in this regard;

(ii) To prevent the potential for disturbance of ground outside the construction footprint, the site will be fenced off, prior to works commencing;

(iii) Before earthworks commence on site and before they are needed - drainage, erosion control and sediment control measures must be in place and functioning;

(iv) Silt Fences will be erected in accordance with the manufacturer's recommendations and in compliance with the Design Criteria outlined in CIRIA C648 Control of Water Pollution from Linear Construction Projects;

a. At all sections of road construction where the works are at or above existing ground level
b. Along any other identified surface pathways for sediment laden runoff;

(v) Where land drains intersect the site boundary or where the adjacent land falls towards the construction site – temporary cut-off drains will be provided to intercept this clean runoff water and divert to the nearest watercourse. Small check dams will be constructed in these cut-off drains to trap any sediment and prevent erosion. Silt fences will be provided immediately before the outfall to existing watercourses as a precaution and to allow a response time in the event of an emergency;

(vi) All watercourses will be will be fenced off with double silt fences located at least 10m back from the watercourse bank until the road crossing is constructed.

(vii) All silt fences at watercourse crossings will be inspected daily and repairs or replacements carried out as required. A record of such inspections/ repairs/ replacements will be maintained as part of the Environmental Operating Plan.

(viii) Dewatering and surface water runoff discharges from the construction site, including any advance works, during and for the duration of the construction works will be controlled, collected and routed via appropriate treatment measures. These measures will be in accordance with the CIRIA publication's Control of Water from Linear Construction Projects and Environmental Good practice on site guide (fourth

edition). As a minimum, the measures will include appropriately sized settlement ponds. Each pond will be provided with a double silt curtain at the outfall from the pond and a further double silt fence located before the discharge point. These facilities will be inspected/ maintained at least daily and the maintenance record will be available for inspection by the Client and other statutory organisations as part of the EOP;

(ix) Haul roads shall be constructed so that the natural contour is followed as clearly as possible and so that runoff is diverted to a treatment area;

(x) Check dams and sediment traps shall be placed along constructed drains to reduce the velocity of concentrated runoff. Trapped sediment will be removed regularly from behind the check dams, deposited > 25m from any watercourse and reseeded with grass seed or alternatively removed to licenced waste facility;

(xi) Direct connections between the settlement pond outfalls and the watercourse will not be allowed. Instead, the outfall will be allowed to disperse across at least 3m of undisturbed vegetated ground, covered with a coir mesh or similar matting prior to reaching the watercourse;

(xii) Where these ponds cannot be constructed in the dry, then they shall be formed by constructing bunds and placing an appropriate geotextile liner on top. Alternative methods of ensuring that the temporary settlement ponds are constructed in a manner that prevents sediment reaching the water environment may be included in the Construction Erosion and Sediment Control Plan providing this can be demonstrated to achieve the same or better level of treatment. Any/ all materials arising from the construction of the temporary settlement ponds shall be removed offsite to a licensed facility, or used elsewhere in the works if deemed appropriate;

(xiii) Landscaping of the constructed road will be carried out in stages as the works progress and will commence as soon as is practicable in each of the outfall catchment areas;

(xiv) The requirement for reseeding will be determined by the final land use (i.e. agriculture, amenity etc.). If seeding of cut/fill slopes is not practical, the use of roughened slope surfaces shall be considered by the contractor which will encourage water infiltration, and decrease runoff velocity;

(xv) Silt fencing shall remain in place until ground vegetation has recovered. Any accumulated silt will then be removed and disposed of to a licensed facility;

(xvi) Ensure that control measures are correctly installed and adequately sized prior to commencing site clearance and earthworks;

(xvii) Develop a maintenance checklist for control measures and inspect controls measures regularly throughout the project, particularly after heavy rainfall;

(xviii) Maintain controls through project such as removing sediment in silt traps once half full.

5.3.2 Earthworks

5.3.2.1 Cut and Embankment Excavation

The following principal controls will be put in place:

(i) The area of the earthworks operation will be kept to an absolute minimum at any one time. Earthworks operations will be as self-contained as is practicable having regard to environmental constraints. The importation and placement of road foundation fill will be carried out in an integrated operation such that fill will be placed as soon as practicable after excavation;

(ii) The excavation of peat and other soft materials (if required) will be carried out in a manner that minimises the amount of water entering the face of the works. This will be achieved by placing fill in the excavated area as soon as is practicable (generally the same day);

(iii) Where pumping out of the excavation is necessary, this will be carried out using appropriately sized pumps. A clean stone filled perforated pipe (or similar) will be used as a sump for the pump intake. The pumped-out water will be directed to the earthworks drainage system and to the settlement pond (or other) treatment system. The outlet from the pump shall be designed so as not to mobilise additional sediment.

Figure 5.1: Typical Silt Fence

Figure 5.2: Typical Temporary Settlement Pond

5.3.2.2 Subsoil Stabilisation

Subsoil Stabilisation is an activity which involves spreading powdered lime evenly over the surface of thin loose lifts (150-350 mm) of the Class U1 material, mixing it with the clay by rotavating, and then allowing the mix to dry or cure over a short period of time prior to compaction. Should this activity be proposed to be used by the contractor, the following controls will be applied:

(i) The activity shall only be carried out under calm dry metrological conditions. Lime application shall not be exposed to wind and where any risk occurs will be misted/sprayed down immediately;

(ii) The activity will not take place within 100m of any watercourse;

(iii) Following mixing (which should take place generally within 15 minutes of spreading the lime on the surface) the material shall be compacted within 1 hour and appropriately sealed. In no case will this material be allowed to be left unsealed overnight;

It is not envisaged that subsoil stabilisation will be used on this project.

5.3.2.3 Transportation

The transportation of materials, will be carried out, in an efficient manner, so as, to minimise the number of trips, minimise the length of individual trips, and minimise the escape of material from the trucks. The following principal controls will be put in place:

(i) The construction operation will be managed to minimise journey lengths;

(ii) Where any excavated material is "sloppy" and presents a risk of splashing over the top of the trucks the capacity of the trucks will be limited to 75% of the height of the lowest side of the truck;

(iii) Trucks leaving and entering the site will do so via a defined/controlled construction entrance;

(iv) Road cleaning will be carried out at least daily to ensure that there is no build-up of sediment on the public road;

(v) In the event of a substantial quantity of spoil material being required to be exported offsite then a proprietary mobile truck wheel wash system shall be installed at the relevant locations;

All trucks leaving site will be required to pass through this facility. The water from the sediment tanks shall be discharged via the site runoff treatment system (i.e. settlement ponds, etc.) and the sediment portion shall be removed offsite to a licenced facility.

5.3.2.4 Stockpiles

It is envisaged that topsoil will be the main material which will require to be stockpiled during the project. The following controls shall apply.

(i) Topsoil stripping over large areas in advance of main excavation works will not be permitted. It will be restricted to the minimum required for efficient earthworks operations and in any case, will only be carried out in construction area units where earthworks are on-going;

(ii) Each construction area unit will be top soiled as the works proceeds thus limiting both the amount and the length of time for which materials must be stockpiled;

(iii) Stockpiles will not be located within 25m of a watercourse and shall be surrounded with a continuous silt fence;

(iv) Runoff from a stockpile will be collected via a shallow toe drain, located outside the silt fence, which will have check dams at regular intervals and will be designed to have a retention time of at least 5 hours. Prior to outfall straw wrapped in geotextile bags and inset into the base of the drain by at least 100mm shall be provided followed by a silt fence upstream of the outlet;

(v) Stockpiles of non-granular materials shall be limited in height to not more than 2.5m;

(vi) Where stockpiling of peat or organic clays is required they shall be limited in height to 1m (with 1V:5H side slopes) or fully contained within an appropriately designed bund.

Figure 5.3: Typical Silt Fence

Figure 5.4: Location of Proposed Waste Spoil Area

5.3.3 Waterbodies and Sensitive Habitats

5.3.3.1 Introduction

The following outlines the control measures that will be put in place to protect waterbodies and sensitive habitats from sediment ingress during the construction stage – these are in parallel to the measures outlined above and elsewhere in this document.

(i) All works in proximity to watercourses shall follow the best practice guidance outlined in the following documents:
   a. TII/NRA 'Guidelines for the crossing of Watercourses During Construction of National Road Schemes (2008);
   b. Inland Fisheries Ireland, Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters, 2016;

(ii) Preserve natural vegetation near watercourses and along the perimeter of the site as much as practically possible;

(iii) Leave a 5m grassed strip next to river banks when stripping topsoil or place grassed soil bunds along river banks to prevent site runoff directly entering watercourses;

(iv) Place straw bales or sand bags along the sides of temporary or existing bridges to prevent runoff entering the watercourse.

5.3.3.2 General Watercourses (Constituting land drains and small streams)

(i) These watercourse crossings will be replaced by piped (or box) crossings of at least 900mm diameter;

(ii) The works will be programmed so that where watercourses are dry for a portion of the year then the crossing will be constructed "in the dry" during that period;

(iii) Crossings in wet watercourses will be provided with a silt trap and a sedimat immediately downstream of the crossing point;

(iv) The silt trap shall be left in place for at least 6 weeks following completion of the work and shall be inspected and maintained at least 3 times per week;

(v) The area of disturbance of the watercourse bed and bank shall be the absolute minimum required for the installation of the crossing;

(vi) Only precast Concrete pipes/ units will be used in the installation of these crossings;

(vii) Where some of these minor watercourses require diversion, cut-off drains will be constructed to divert water away from the construction site. Small check dams will

be constructed in these cut-off drains to trap any sediment and silt fences will be provided immediately before the outfall to existing watercourses.

5.3.3.3 Sensitive Watercourses

There is one crossing (Contributory Stream to Clare River), which is deemed to be a sensitive watercourse.

The principal avoidance and control measures to be adopted at this crossing include:

(i) In accordance with IFI recommendations, in-stream works shall be carried out in the period July to September (unless expressly agreed with the IFI in advance);

(ii) All works will be carried out under the supervision of the Clients Representative;

(iii) In-stream working will be kept to an absolute minimum, will be carried out in the close season only, NPWS and IFI will be informed at least 2 weeks prior to commencement, in-stream works will be allowed on a Permit-to-Work basis that must be signed by the Clients Representative at the commencement of the works and on a weekly basis thereafter;

(iv) Where in-stream or bank side works is for constructing a structural element that requires the placing of concrete then a cofferdam shall be constructed and made as water tight as possible. Pumping out from the cofferdam shall be to a settlement tank of sufficient capacity to allow solids to settle prior to discharge;

(v) Sand bags shall be double bagged and use washed sand only. Each bag shall be marked with a reference number and a record of placing and removal shall be maintained in the EOP;

(vi) There will be no machinery working in-stream. Where excavation, breaking, etc. is required at the bank, it will be carried out with machinery operating from the bank;

(vii) Machinery operating from the bank will work on “bog mats” to minimise damage to the vegetated banks;

(viii) A silt trap and a double sedimat shall be placed immediately downstream of the works. The sedimats shall be replaced as per the manufacturer’s recommendations with that mat closest to the works being removed first;

(ix) Precast structural elements shall be used for all structures thus minimising the use of fresh concrete to the placement of foundations, and such works.

5.3.3.4 Sensitive Habitats

A Habitat survey was carried out and recorded within the proposed development site, the habitat results are provided in **Table 5.1** below.

Table 5.1: Habitat within the development site

Habitat	Habitat
Agricultural grassland	Scrub
Buildings & artificial surfaces	Depositing/lowland river
Amenity grasslands	Drainage ditches
Dry meadow & grassy verges	Hedgerows
Wet grassland	Treelines
Scattered trees & parklands	

The following are the principal control measures:

(i) A double silt fence on the side of the road realignment, which is closest to the habitat for the duration of the works in this area. These will be inspected daily and maintained as required;
(ii) Preserve natural vegetation near the watercourse and along the perimeter of the site as much as practically possible.

5.3.4 Concrete Works

5.3.4.1 Introduction

The use and management of concrete in or close to watercourses must be carefully controlled to avoid spillage which has a deleterious effect on water chemistry and aquatic habitats and species. Where the use of concrete near and in watercourses cannot be avoided the following control, measures will be employed:

(i) Hydrophilic grout and quick-setting mixes or rapid hardener additives shall be used to promote the early set of concrete surfaces exposed to water;

(ii) 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 shutter oils shall be used;

(iii) Any plant operating close to the water will require special consideration on the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;

(iv) Placing of concrete near watercourses will be carried out only under the supervision of the Clients Representative;

(v) There will be no hosing into surface water drains of spills of concrete, cement, grout or similar materials. Such spills shall be contained immediately and runoff prevented from entering the watercourse;

(vi) Washout from concrete lorries shall not be permitted to enter any surface water or groundwater bodies. The preferred option is to wash out the container and chute back at the batching plant, or, alternatively in a designated onsite concrete wash down area, which is set back at least 100m from any watercourse and is of an impermeable nature. Concrete waste shall be disposed of in accordance with the site-specific Construction & Demolition Waste Management Plan;

a. will be contained and managed on site to prevent pollution of all surface watercourses;

b. On- site concrete batching and mixing activities shall only be permitted following a considered site selection process which shall consider the contents of this plan. Site Selection shall require the approval of the Clients Representative, the NPWS and the IFI;

c. Washout from concrete lorries, except for the chute, will not be permitted on site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer);

(vii) Chute washout will be carried out at designated locations only. These locations will be signposted. The concrete plant and all delivery drivers will be informed of their location with the order information and on arrival on site;

(viii) Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks. The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction stage settlement facilities) or alternatively disposed of as waste in accordance with the contractor's Waste Management Plan included in the EOP.

Figure 5.5: Typical Washout Facility

5.3.5 Construction Compounds

5.3.5.1 Introduction

A Construction Compound will be required for the duration of the works. While the exact location of this will be determined by the contractor, same will be subject to the controls outlined below.

Construction compounds may include stores, offices, materials storage areas, materials processing areas, plant storage, parking of site and staff vehicles, and other ancillary facilities and activities.

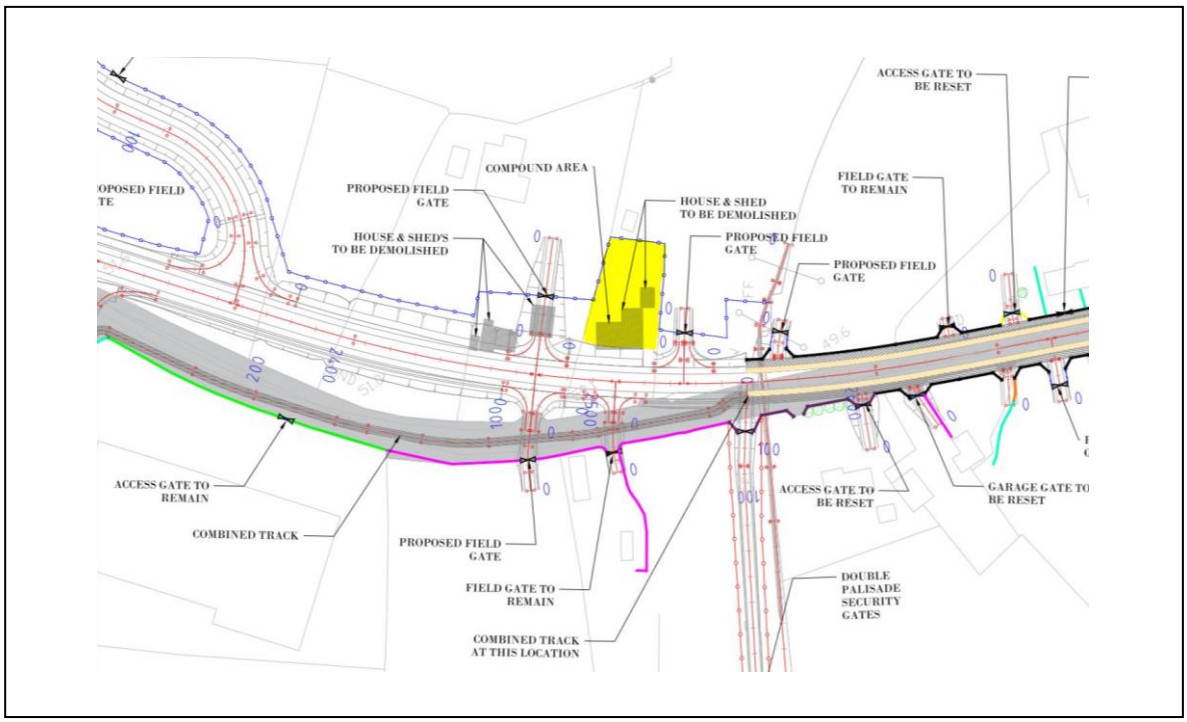
5.3.5.2 Location

Construction compounds shall be located on dry land and set back a minimum of 25m from lakes, river and stream channels, ecological sensitive areas (internationally and nationally important habitats, wet areas such as wetland habitats, marshes and fens, etc.) and away from potential floodplain areas. It is proposed to locate the construction compound at chainage 2510m left hand side as per **Figure 5.6** below.

Construction compounds shall not be in European Sites or within 50m of the boundary of same. Construction compounds shall not be located within other designated environmental sites or other ecologically sensitive sites. The storage of fuels, other hydrocarbons, and other chemicals within the construction compounds will not be permitted within 30m of any sensitive watercourse. Compounds shall not be located within 75m of an inhabited dwelling house.

Additionally, from a landscape and visual perspective, any site compound will not be permitted to be located, within proximity to visually vulnerable areas namely areas, were potential detriment effect on views from Scenic Routes would occur, and such areas will be fully re-instated prior to or at the end of the construction contract.

Figure 5.6: Location of Proposed Compound in Yellow



5.3.5.3 Other Controls

All compounds will have appropriate levels of security to deter vandalism, theft and unauthorised access. All site compounds will be fenced off and a silt fence erected and maintained on the site boundary.

Surface runoff from compounds will be minimised by ensuring that the paved/ impervious area is minimised. All surface water runoff will be intercepted and directed to appropriate treatment systems for the removal of pollutants prior to discharge.

Wastewater drainage from all site offices and construction facilities will be contained and disposed of in an appropriate manner to prevent water pollution and in accordance with the relevant statutory requirements.

The storage of fuels, other hydrocarbons and other chemicals within the construction compounds shall be in accordance with relevant legislation and with best practice

(i) All fuel/ Hydrocarbon/ Chemical (fluid) storage areas shall be bunded to 110% of storage capacity;

(ii) Storage of these materials within a compound shall be organised to be as far away from all water bodies as is practicable;

(iii) The Emergency Response Plan shall include arrangements for dealing with accidental spillage and relevant staff shall be trained in these procedures.

5.3.6 Runoff Estimation

To appropriately size sediment control facilities for runoff, the following approach will be adopted. Runoff from the exposed surfaces is calculated using the Modified Rational (MR) Method and applying extreme rainfall information obtained from Met Éirean and specific to the area.

MR Formula: $Q = C * i * A$

Where Q = the peak discharge (m^3/hour)

C = Coefficient of permeability taken conservatively at 0.6

i = rainfall intensity (m/hour)

A = the contributing area (10,000m^2)

Resulting in: $Q = 0.6*0.037$ (m/hour) * 10,000m^2

$Q = 222m^3$ /hour for a 1 Ha site

Q = 3,700 litres/minute

5.3.7 Land Availability

Areas required for sediment control treatment, will be included in the Compulsory Purchase Order of the Project.

6 Monitoring and Audit

6.1 Introduction

This Outline Erosion and Sediment Control Plan will be developed by the contractor into the Construction Erosion and Sediment Control Plan (CESCP) and will form part of the Environmental Operating Plan (EOP). While the final details of the CESCP will require agreement with the NPWS and IFI, the minimum requirements of same shall include all the controls, measures, mitigations and monitoring described in this document. The monitoring of all aspects of the EOP, including the CESCP, will be carried out by the contractor as the responsible party. The responsibilities of the Employer will be discharged by the Employer's Site Representative staff. The contractor will be required to undertake continuous monitoring of the works to ensure compliance with the EOP, including the CESCP. In addition, the Employers Site Representative Staff will oversee the works to ensure that the contractor is complying with their responsibilities.

6.2 Monitoring and Audit

6.2.1 General

The avoidance, control and mitigation measures outlined in this document will ensure that erosion and sedimentation arising from the works is controlled. They have been developed in accordance with best practice, in consultation with environmental organisations including NPWS and IFI, and have been shown to work on other projects. As with all systems, there is a requirement to have monitoring, audit and feedback loops to demonstrate the operation of the system. The following describes the framework of the pre-construction monitoring and construction monitoring regime;

6.2.2 Pre-Construction

Pre-construction water quality monitoring for Turbidity will commence 6 months in advance of construction and will continue through to construction completion at identified locations along the Clare River. A minimum of six monthly samples being taken to establish baseline conditions. This testing shall include (but will not be limited to): Suspended Solids (SS), Turbidity, Dissolved Oxygen (DO), Nitrate, Nitrite, Total Nitrogen, Phosphate, Total Phosphorus, Temperature, Ammonia, Biological Oxygen Demand (BOD) and Total Hydrocarbons.

6.2.3 Construction Stage

Similarly, monthly surface water quality sampling shall be undertaken at the identified locations and for the sample quality parameters throughout the construction phase. In addition, the suspended solids concentration in the watercourses will be measured at each location on a weekly basis.

This monitoring will be reviewed on an ongoing basis during construction. Where the surface water regulations are exceeded in these watercourses, an investigation shall be undertaken to identify the source of non-compliance and corrective action

implemented where the non-compliance is deemed to be associated with the proposed road development. To support the reactive element of this monitoring all watercourses to which there is a discharge from the works shall be monitored on a daily basis for turbidity. Readings will be taken from the watercourses immediately upstream and downstream of the works and where the difference between these readings exceed 30ntu, this will trigger investigatory procedures.

The investigation will establish whether the elevated turbidity readings are as a result of the construction works. Where this is the case, immediate corrective actions which may include stopping of these sediments generating works, it will be enforced until such time that such polluting activities can be controlled.

6.2.4 Contractor

The procedures and monitoring and audit regime outlined in this section shall be used by the contractor to ensure and demonstrate the effective operation of the avoidance, control and mitigation measures for Erosion and Sediment control. It will facilitate use as a feedback loop to target any issues that may arise.

The following are the main procedures that will be followed:

(i) The contractor shall appoint an Environmental Officer, whom shall be responsible for implementing/overseeing all aspects of this plan;

(ii) The contractor will be obliged to hold a full day training course for all site staff immediately before works commence on site on the EOP and in the CESCP. The subject of this course shall be the measures that have been put in place to protect the environment and the procedures and monitoring and recording that is to be undertaken in accordance with the EOP.

(iii) Environmental checklists shall be prepared for each operation. Responsibility for completion of these checklists will be assigned to individual members of the contractor's staff. The following operations will also require a permit-to-work before operations can commence, each of which must be counter signed by the Employers Representative:

a. Any in-stream works;
b. Placing of concrete in, or within 50m of watercourse;
c. Completion of sediment removal facilities prior to initial discharge to watercourse;
d. Restart of works following any pollution incident.

(iv) All environmental monitoring and checklists shall be recorded and added to the EOP daily;

(v) The EOP shall assign responsibility and monitoring duties to named staff and the Site Agent/ Manager shall ensure that this is implemented in full. Training for each

member of staff on their specific area of responsibility shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the EOP and a further copy issued to the Employers Representative;

(vi) Monitoring for Turbidity shall be undertaken as described at section 8.2.5. The results shall be relayed to the Employers Representative and to the Local Authority's website;

(vii) All other watercourses near the works shall be monitored daily and turbidity readings taken. The results shall be issued to the Employers Representative daily;

(viii) All mitigation/control measures shall be inspected daily by designated contractor staff and maintenance and repairs carried out immediately;

(ix) Any direct release of sediment to a watercourse causing plumes or exceedances of the turbidity investigatory level shall trigger an investigation commencing with notification to the Employers Representative who shall determine the appropriate course of action which may involve the cessation of works, the initiation of emergency procedures and the notification to the NPWS and the IFI. In such a case of cessation, works shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the Employers Representative following consultation with the NPWS and IFI

6.2.5 Site Environmental Manager

In order, to ensure the successful development, implementation and maintenance of the EOP, the Client will be required to appoint an independent Site Environmental Manager (SEM) to provide independently verifiable audit reports.

The Site Environmental Manager must possess sufficient training, experience and knowledge appropriate to the nature of the task to be undertaken, a Level Eight qualification recognised by the Higher Education and Training Awards Council (HETAC), or a University equivalent, or other qualification acceptable to the Employer, in Environmental Science or Environmental Management, Environmental Hydrology, Engineering or other relevant qualification acceptable to the Employer.

Separate from the on-going and detailed monitoring carried out by the contractor as part of the EOP; the SEM shall carry out the inspection/ monitoring regime described below on behalf of the employer. The results will be stored in the SEM's Monitoring file and will be available for inspection/ audit by the Client, NPWS or IFI staff. All inspections/ monitoring/ results will be recorded on standard forms.

Inspection / Monitoring Regime:

(i) Inspect the Principal Control Measures outlined in this plan on a weekly basis. Report findings to the Contractor;

(ii) Inspect surface water treatment measures daily (ponds, tanks, mini-dams, sandbags, etc.) and obtain turbidity readings;

(iii) Inspect all outfalls to watercourses daily and obtain turbidity readings. Where excavations, deposition, pumping out or concreting works are on-going in the vicinity obtain turbidity readings three times per day;

(iv) Daily visual inspection of watercourses to which there is a discharge from the construction works;

(v) Wheel wash facilities shall be inspected on a weekly basis;

(vi) Borrow Pits shall be inspected daily while in operation and on a weekly basis thereafter;

(vii) Material Deposition Areas shall be inspected daily while in operation and weekly basis thereafter;

(viii) Stockpiles shall be monitored daily while being filled or emptied and otherwise on a weekly basis;

(ix) Control measures for works at or near water bodies shall be inspected daily;

(x) Concrete operations at or near watercourses shall be supervised and designated chute washing out facilities shall be inspected daily;

(xi) Site Compounds shall be inspected on a weekly basis;

(xii) The Contractor's EOP monitoring results shall be audited by the SEM on a frequent basis (6 times per quarter at a minimum)

(xiii) All or any exceedance of the investigatory level for turbidity shall be reported to the Employer and shall be investigated thoroughly by the SEM and the Contractor. Where the works are identified as the source causing the exceedance, the procedure outlined in Item "(xiv) (a) – (d)" below shall be followed;

(xiv) Any direct release of sediment to a watercourse causing plumes or exceedance of the turbidity investigatory levels shall result in:

a. the Employer shall be notified immediately;
b. the contractor will be required to take immediate action and to implement measures to ensure that such discharge do not re-occur;

c. Works if stopped, shall not recommence until appropriate corrective measures to avoid any repetition are put in place. Such measures shall be agreed with the SEM following consultation with the Employer;
d. Works and/ or discharges from the works shall not recommence until written consent is received from the SEM.

(xv) Where the SEM considers that the risk of a sediment release is high, he/she shall inform the Contractor and request protective action to be taken. The SEM shall report all such notifications and requests to the Contract Manager and the Client.

7 Conclusion

7.1 Introduction

Prior to commencing works, the Contractor shall prepare an Emergency Response Plan based on a thorough risk assessment. The plan shall detail the procedures to be undertaken in the event of the release of any sediment into a watercourse, serious spillage of chemical, fuel or other hazardous wastes (e.g. concrete), non-compliance incident with any permit or license, or other such risks that could lead to a pollution incident, including flood risks.

7.2 Resources

Relevant staff, including cover staff, shall be trained in the implementation of the Emergency Response Plan and the use of any spill kit/ control equipment as necessary. The contractor shall provide a list of all such staff to the Employer's Site Representative detailing the name, contact number, and training received, and the date of that training.
The Contractor shall provide a full list, including the exact locations, of all pollution control plant and equipment to the Employer's Site Representative. All such plant and equipment shall be maintained in place and in working order for the duration of the works.

7.3 Spill Response

The Emergency Response Plan shall include a simplified Spill Response with the following as a minimum: -

(i) Instruction to stop work;

(ii) Instruction to contain the spill;

(iii) Details of spill clean-up material location;

(iv) Name and contact details of responsible staff;

(v) Measures particular to the location and the activity;

(vi) Instruction to contact the SEM (including Name and Contact Details).

This Spill Response shall be displayed at several locations throughout the site and at all sensitive locations.

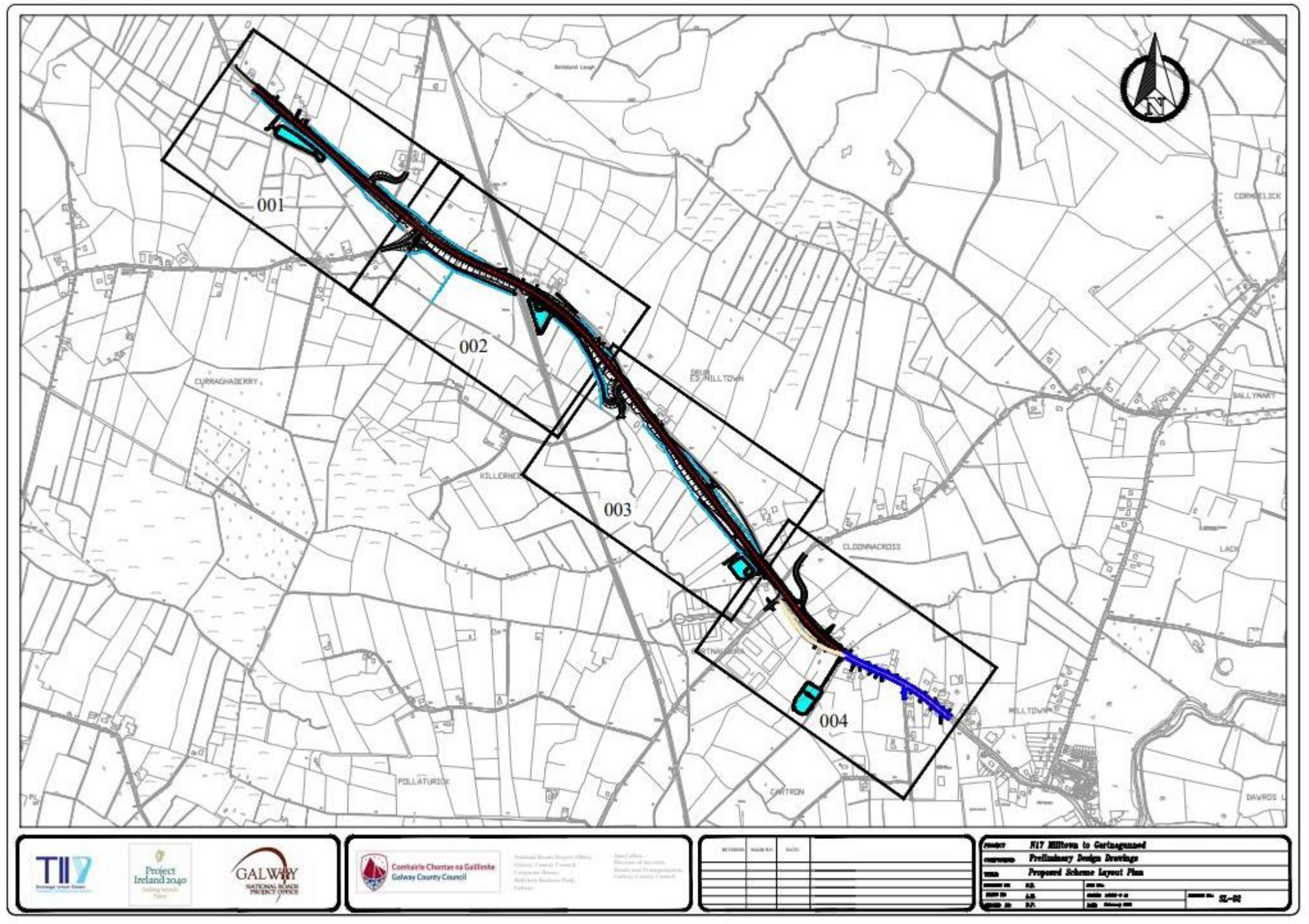
The Employers Representative shall be responsible for notifying the IFI/NPWS and shall also determine when works may proceed once corrective actions have been completed.

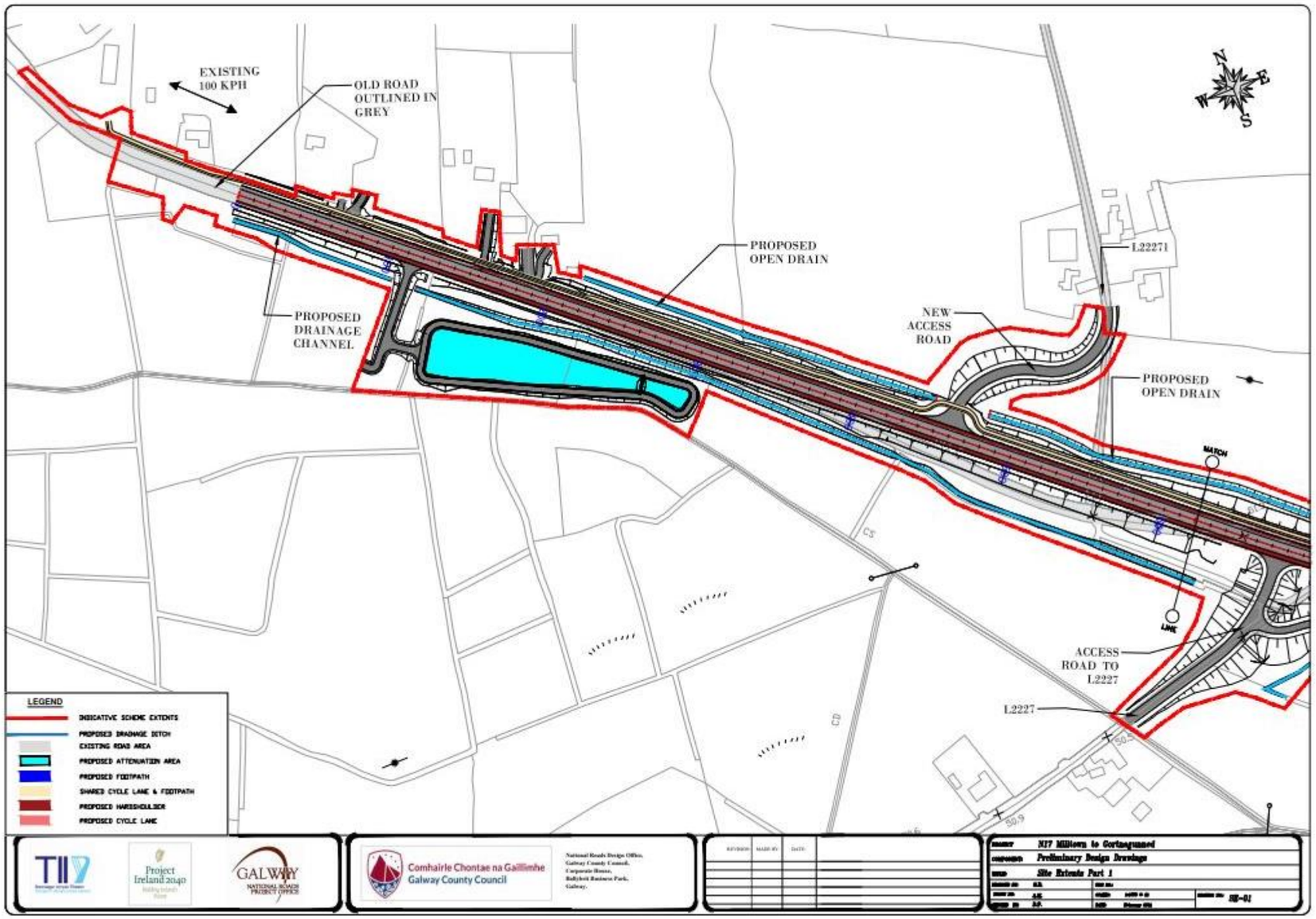
8 Appendices

Appendix A - Scheme Drawings

Appendix A - Scheme Drawings

Preferred Option 2

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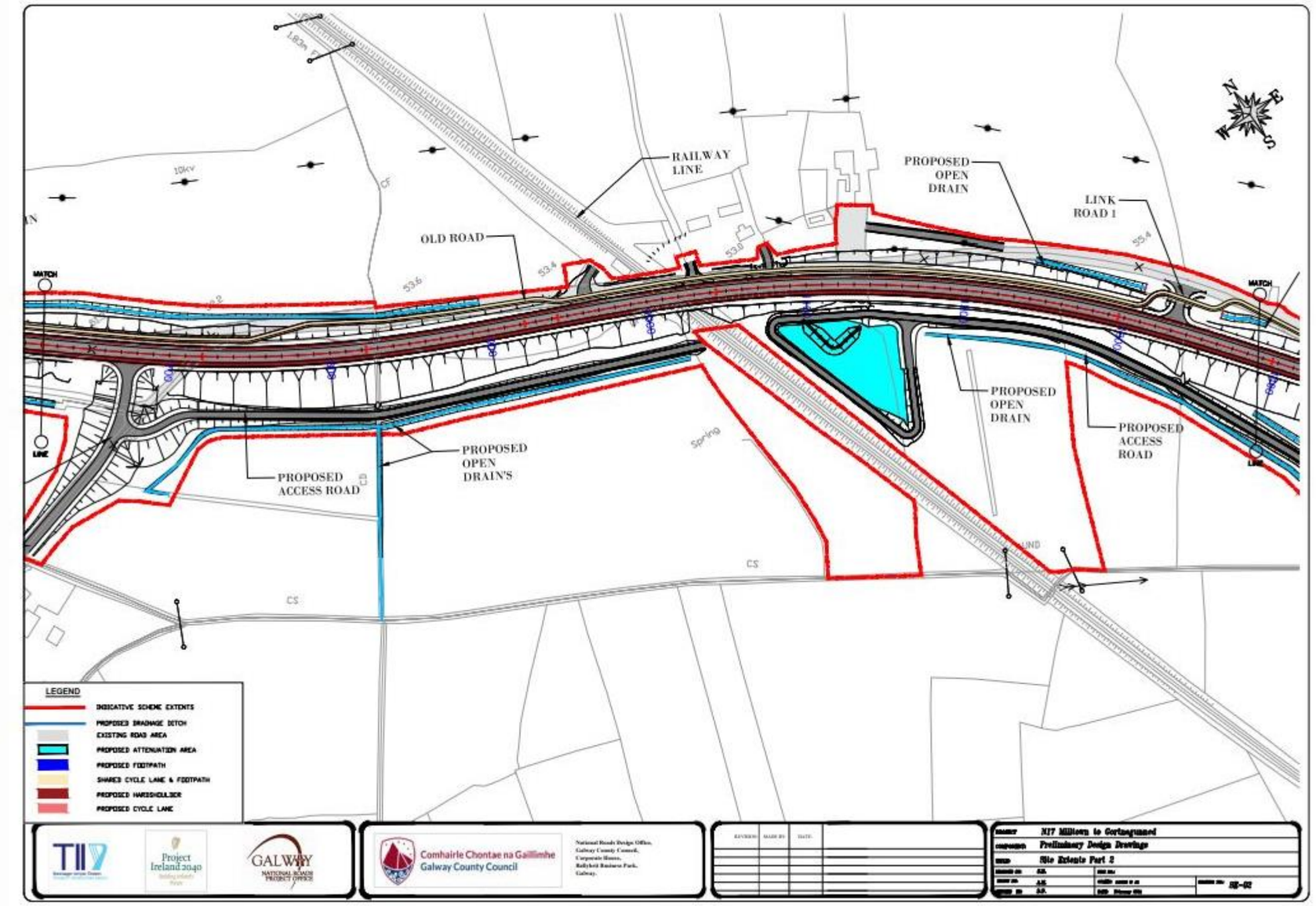
EXISTING ROAD AREA
PROPOSED ATTENUATION AREA
PROPOSED FOOTPATH
SHARED CYCLE LANE & FOOTPATH
PROPOSED HARDSHOULDER
PROPOSED CYCLE LANE
Comhairle Chontae na Gaillimhe
Galway County Council
N17 Milltown to Gortnagunned
Preliminary Design Drawings
Site Extents Part 1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PROPOSED OPEN DRAIN
LINK ROAD 1
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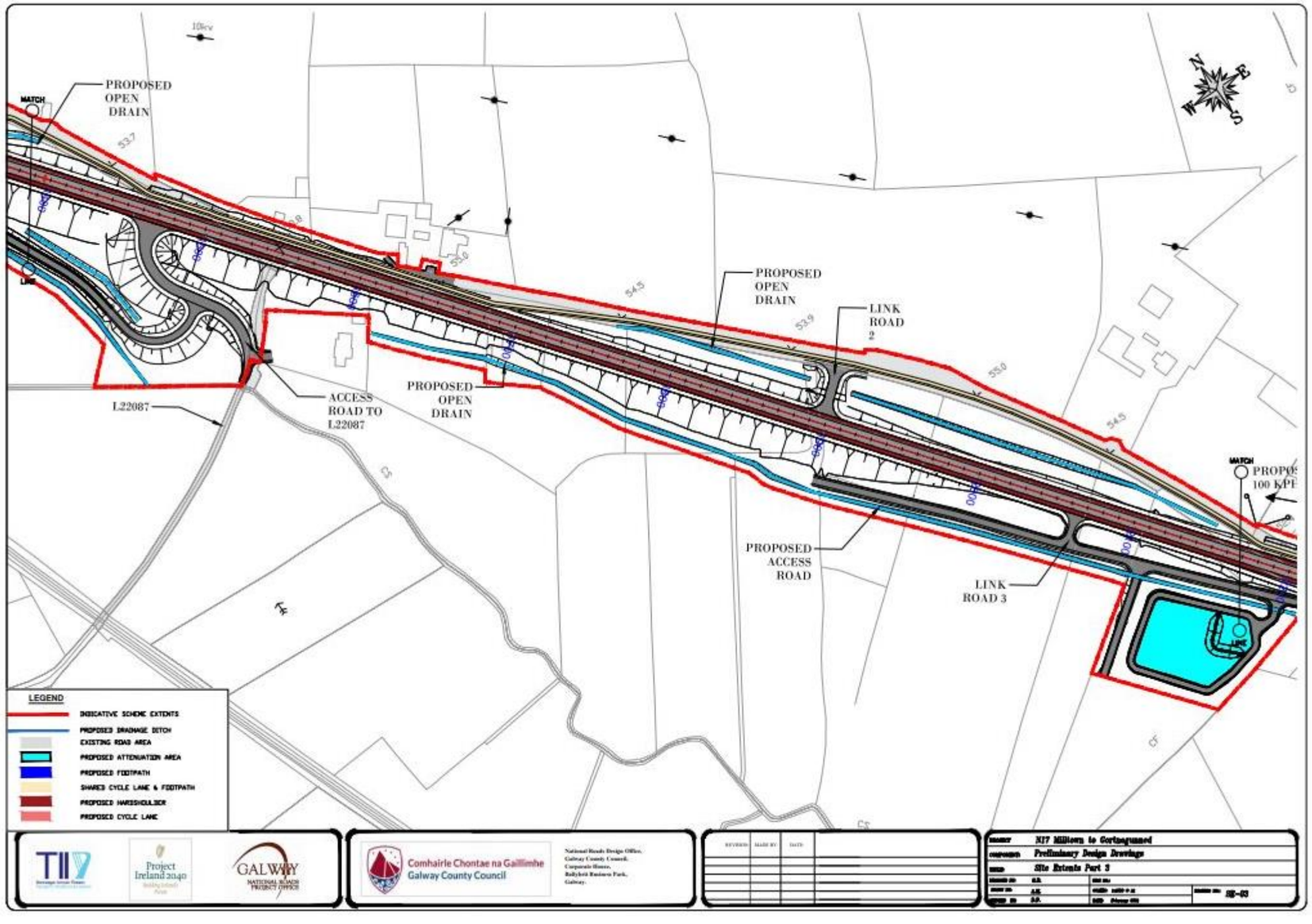
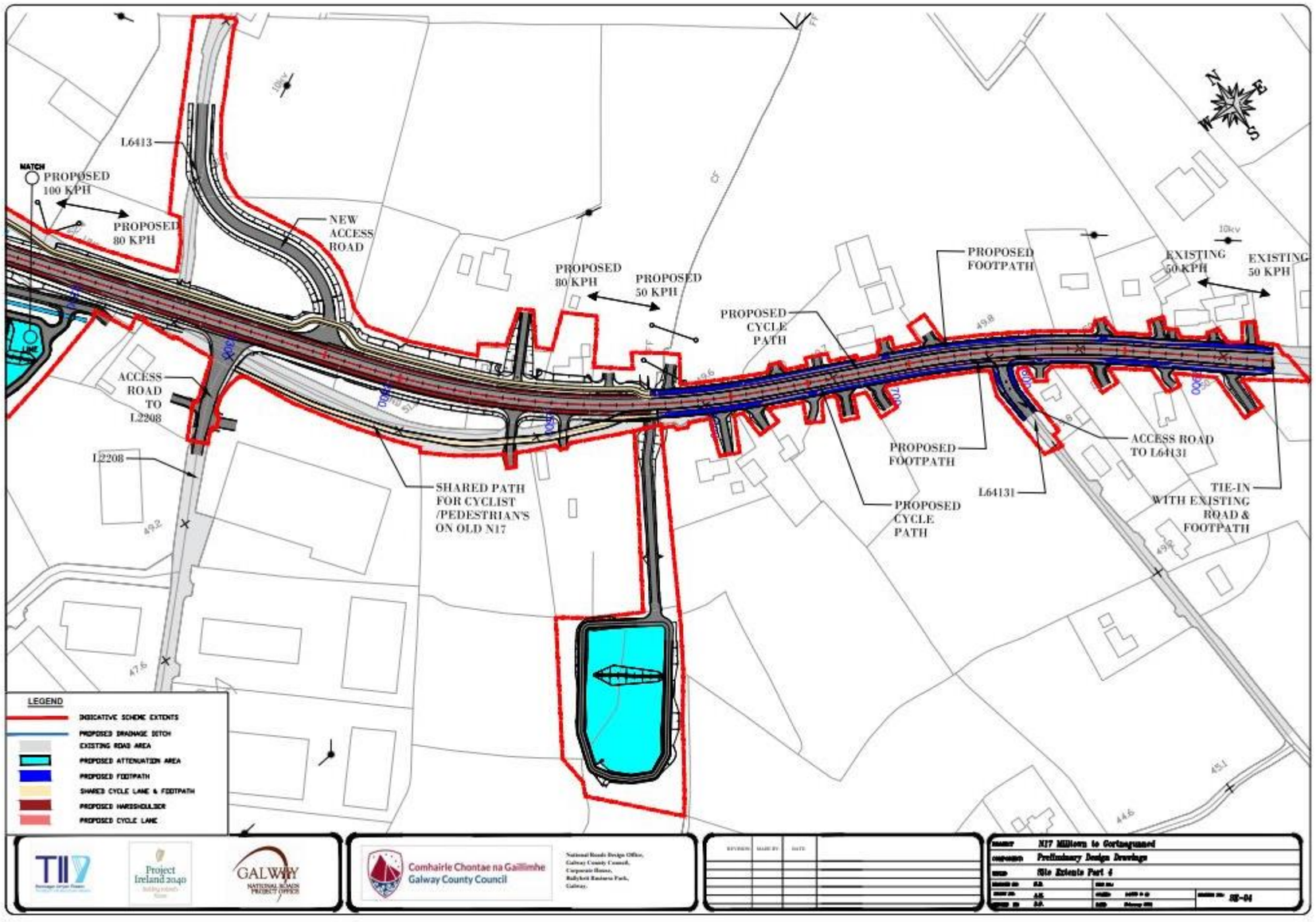
MATCH
LINE
CS
LEGEND
INDICATIVE SCHEME EXTENTS
PROPOSED DRAINAGE DITCH
EXISTING ROAD AREA
PROPOSED ATTENUATION AREA
PROPOSED FOOTPATH
SHARED CYCLE LANE & FOOTPATH
PROPOSED HARDSHOULDER
PROPOSED CYCLE LANE
Comhairle Chontae na Gaillimhe
Galway County Council
N17 Milltown to Gortnagunned
Preliminary Design Drawings
Site Extents Part 2


PROPOSED OPEN DRAIN
MATCH
LINE
L22087
ACCESS ROAD TO L22087
PROPOSED OPEN DRAIN
PROPOSED OPEN DRAIN
LINK ROAD 2
PROPOSED ACCESS ROAD
LINK ROAD 3
MATCH
LEGEND
INDICATIVE SCHEME EXTENTS
PROPOSED DRAINAGE DITCH
EXISTING ROAD AREA
PROPOSED ATTENUATION AREA
PROPOSED FOOTPATH
SHARED CYCLE LANE & FOOTPATH
PROPOSED HARDSHOULDER
PROPOSED CYCLE LANE
Project Ireland 2040
GALWAY
Comhairle Chontae na Gaillimhe
Galway County Council
N17 Milltown to Gortnagunned
Preliminary Design Drawings
Site Extents Part 3


L6413
MATCH
PROPOSED 100 KPH
PROPOSED 80 KPH
NEW ACCESS ROAD
PROPOSED 80 KPH
PROPOSED 50 KPH
PROPOSED CYCLE PATH
PROPOSED FOOTPATH
EXISTING 50 KPH
EXISTING 50 KPH
ACCESS ROAD TO L2208
L2208
SHARED PATH FOR CYCLIST /PEDESTRIAN'S ON OLD N17
PROPOSED FOOTPATH
PROPOSED CYCLE PATH
L64131
ACCESS ROAD TO L64131
TIE-IN WITH EXISTING ROAD & FOOTPATH
LEGEND
INDICATIVE SCHEME EXTENTS
PROPOSED DRAINAGE DITCH
EXISTING ROAD AREA
PROPOSED ATTENUATION AREA
PROPOSED FOOTPATH
SHARED CYCLE LANE & FOOTPATH
PROPOSED HARDSHOULDER
PROPOSED CYCLE LANE
Comhairle Chontae na Gaillimhe
Galway County Council
N17 Milltown to Gortnagunned
Preliminary Design Drawings
Site Extents Part 4