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APPENDICES

8 Land and Soils

8.1 Introduction

This chapter describes the scope of works and methods applied in the identification and assessment of the potential effects of the construction and operation of the Ballyhale Flood Relief Scheme with regard to Land and Soils.

The assessment techniques used are aimed at identifying the likely significant impacts, proposing suitable mitigation measures if required and identify the residual impacts.

The Land & Soils Assessment has been completed by John Carr, Chartered Civil Engineer [B.Eng MSc CEng], DBFL Consulting Engineers.

John is a Chartered Civil/Environmental Engineer with over 10 years' experience specialising in the detailed design and design co-ordination of Civil Works. He holds an Honours degree in Civil Engineering from University College Dublin and a Masters in Environmental Engineering from Queens University Belfast.

Key skills include the design of storm, foul & water systems, design of SuDS infrastructure, flood modelling, roadworks, earthworks and site development. John also holds substantial experience in environmental consultancy including the preparation of Flood Risk Assessments, Environmental Impact Assessment (EIA) & environmental monitoring.

8.1.1 Impact Assessment – Scope of Works

The report will identify and assesses the potential effects on the following:

- Existing bedrock geology
- Structural Geology;
- Superficial Geology;
- Extractive Industries;
- Geological Heritage Areas

To quantifiably assess the preceding, this chapter will:

- Outline relevant policy and legislation relating to the land and soils environment.
- Summarise consultation responses in relation to this assessment.
- Provide baseline information and identify sensitive receptors.
- Identify potential effects, including potential cumulative effects.
- Assess the significance of any adverse impacts and resulting effects based on the magnitude of the impact and the sensitivity of the receptors.

- Outline detailed mitigation measures where required.
- Provide a residual impact assessment.

8.1.2 European, National and Regional Policy

Key European and National legislative policy relevant to this assessment are contained within Table 8-1.

Table 8-1: Key Legislation

Policy	Legislation
EU	Water Framework Directive (2000/60/EC)
	Environmental Liability Directive (2004/35/EC)
National	Planning and Development Regulations 2001
	Planning and Development Act 2000
Local	Geological Survey of Ireland, Co. Kilkenny Groundwater Protection Scheme
	Kilkenny County Council – Kilkenny County Development Plan

Further to the above legislation, various bodies including; Transport Infrastructure Ireland (TII, formally National Roads Authority); the Institute of Geologist Ireland (IGI); and the Environmental Protection Agency (EPA) provide detailed guidance to the preparation and content required for an EIAR in relation to the geological environment. In addition, other regional and leading supplementary industry guidance referred to as part of this assessment are as follows:

Table 8-2: Key Supplementary Guidance

Body	Guidance
Transport Infrastructure Ireland (TII)	Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009)
	Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008)
	Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan
	The Management Of Waste From National Road Construction Projects
	Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066)
Environmental Protection Agency (EPA)	Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (May 2022)
	EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003
	Geo Portal (https://gis.epa.ie/EPAMaps/)
CIRIA	The SUDS Manual (CIRIA C753)
	Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532)
	Control of Water Pollution from Linear Construction Sites (CIRIA C648)
	Environmental Good Practice on Site (C692) (2010)
Institute of Geologists of Ireland (IGI)	Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013)
Dept of the Environment Heritage and Local Government	Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects
Department for Environment, Food and Rural Affairs (UK)	Construction Code of Practice for the Sustainable Use of Soils on Construction Sites

8.2 Assessment Methodology

This assessment has been undertaken using a qualitative assessment based on experienced professional judgement and assessment of compliance with statutory and industry guidance, including site visits.

8.2.1 Desktop Study

The desktop study involved collation and assessment of the relevant information from the following information sources.

- Consultation responses
- Vector mapping and aerial photography to assess land usage on the site and its environs.
- Site surveys including topographic, underground utilities, orthophotography and site geotechnical investigations.
- Utility & Local Authority infrastructure record drawings
- EPA Geo Portal (https://gis.epa.ie/EPAMaps/)
- Geological Survey Ireland Data Viewer (https://www.gsi.ie).

8.2.2 Site Walkover Assessment

Site walkover surveys were undertaken from June 2020 – October 2021 with the purpose of identifying / verifying land and soil characteristics.

The site walkover surveys encompassed the whole site area, with emphasis placed upon areas likely to be affected by proposed works in order to fully assess potential issues with regards to lands and soil.

8.2.3 Scoring Matrix for Impact Assessment

Impact assessment has been carried out with reference to the EPA's "Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (May 2022)" & the TII "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes".

The significance of the identified potential impacts is acknowledged by the combination of the sensitivity of the receptor and the magnitude of the potential impact.

Receptor Sensitivity

- The sensitivity of the receiving environment has been categorised on a scale from "high" to "negligible" as defined in Table 8-3

Sensitivity criteria has been based on:

- Vulnerability of a receptor to a particular pressure (degree of environmental response to any particular impact); and
- The 'value' of the receptor (e.g. an area of international importance should be considered more sensitive to the impact than an area of little or no conservation value.

Table 8-3: Receptor Sensitivity

Sensitivity of Environment	Criteria	Examples
High	Attribute has a high quality and rarity	Geological Feature rare on a regional of national scale (NHA) Large existing quarry / pit or landfill Active peat
Medium	Attribute has a medium quality and rarity	Geological Feature rare on a local scale (County Geological Site) Proven extractible resource rare on local level. Well drained and Highly Fertile Soils
Low	Attribute has a low quality and rarity	Moderately drained and moderately fertile soils Small existing commercial quarry/pit/landfill
Negligible	Attribute resilient to environmental change	Poorly Drained and/or low fertility soils Common soils and bedrock

Impact Magnitude

The Impact Magnitude has been categorised on a scale from “high” to “negligible” as defined in Table 8-4.

Table 8-4 Impact Magnitude Criteria

Magnitude of Impact	Criteria	Examples (non-exhaustive)
High	Results in permanent loss of attribute	An impact that obliterates sensitive characteristics of the soil/geological feature
Medium	Results in temporary or minor impact to attribute and/or quality and integrity of attribute.	Impact on regional geological / soil characteristics
Low	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	Local impacts to geological / soil characteristics not affecting overall integrity of receptor
Negligible	An Impact without measurable or noticeable consequences or	No measurable impacts on ground conditions

Factors which influence the Impact magnitude include the type of impact and duration. These aspects are considered in line with TII and EPA guidance below.

Table 8-5 Types of Impact

Potential Impact	Description
Direct Impact	The existing geological, hydrological or hydrogeological environment is altered in whole or in part as a consequence of scheme construction or operations
Indirect Impact	The existing geological, hydrological or hydrogeological environment beyond the proposed route corridors is altered by activities related to scheme construction and/or operation
No predicted impact	The proposed scheme has neither a negative nor a positive impact on the geological, hydrological or hydrogeological environment

Table 8-6 – Impact Duration (EPA 2022)

Duration	Description
Momentary	Lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting less than a year
Short-Term	Effects lasting one to seven years.
Medium Term	Lasting seven to fifteen years.
Long Term	Lasting fifteen to sixty years.
Permanent	Lasting over sixty years
Reversible	Impacts that can be undone, for example through remediation or restoration

Impact Significance

The significance of the identified potential impacts is acknowledged by the combination of the magnitude of the potential impact and sensitivity of the receptor.

The generalised significance terms used in this assessment is in line with the EPA guidance reproduced below.

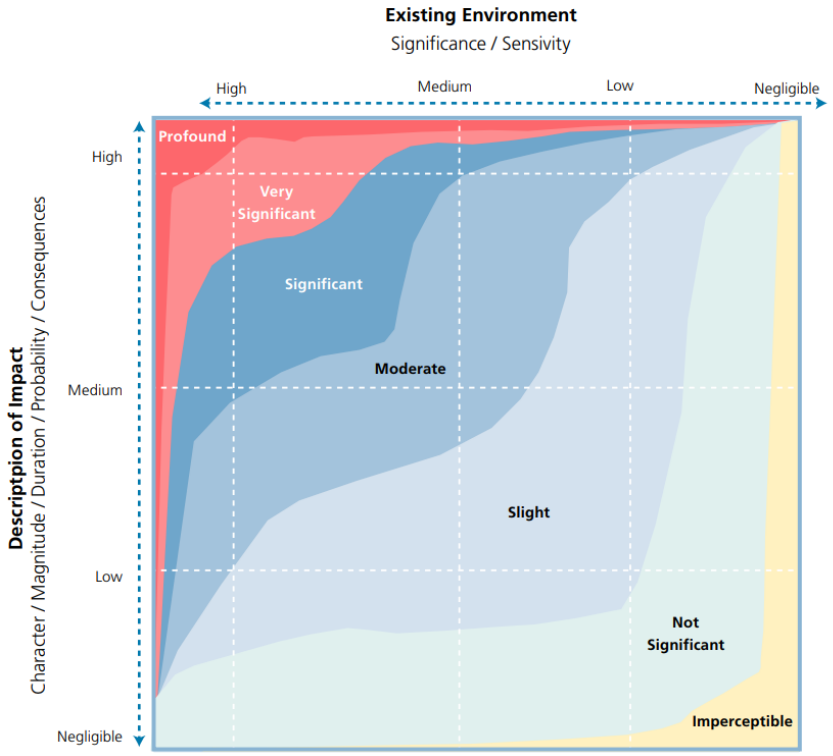

Figure 8-1: Significance Effect Matrix

In addition to significance, the effect on the receiving environment may be Positive, Neutral or Adverse.

8.3 Baseline Environment

8.3.1 Bedrock Geology

The 1:100,000 GSI bedrock Geology Map indicates that the Ballyhale Flood Relief Scheme is underlain in its majority by Kiltorcan Formation, which is underlain by Porters Gate Formation at the northern end of the scheme.

The Kiltorcan Formation generally consists of yellow and red sandstone and green mudstone. This formation is characterized by thick, non-red sandstones, often in channel forms, intraformational conglomerates and both red and non-red mudstones. Sandstones are yellow and coarse-grained as well as micaceous with white and red hues. The Porters Gate Formation is generally consisting of sandstone, shale and thick limestone. The formation is a gradational sequence consisting of grey flaser bedded sandstones and interbedded sand-lensed mudstone passing up to sandy bioclastic limestones and then to grey mudstones, thin sandstones and thin bioclast.

The County Kilkenny Groundwater Protection Scheme notes that the shales of the overlying Porter's Gate Formation are less permeable and can act as a confining layer and artesian flows have been obtained where wells have breached them to tap into the Kiltorcan sandstones below.

An extract from GSI mapping is presented below.

A number of bedrock outcrops in the vicinity of the site were noted on geological mapping and some bedrock was visible within stream channels during site walkovers.

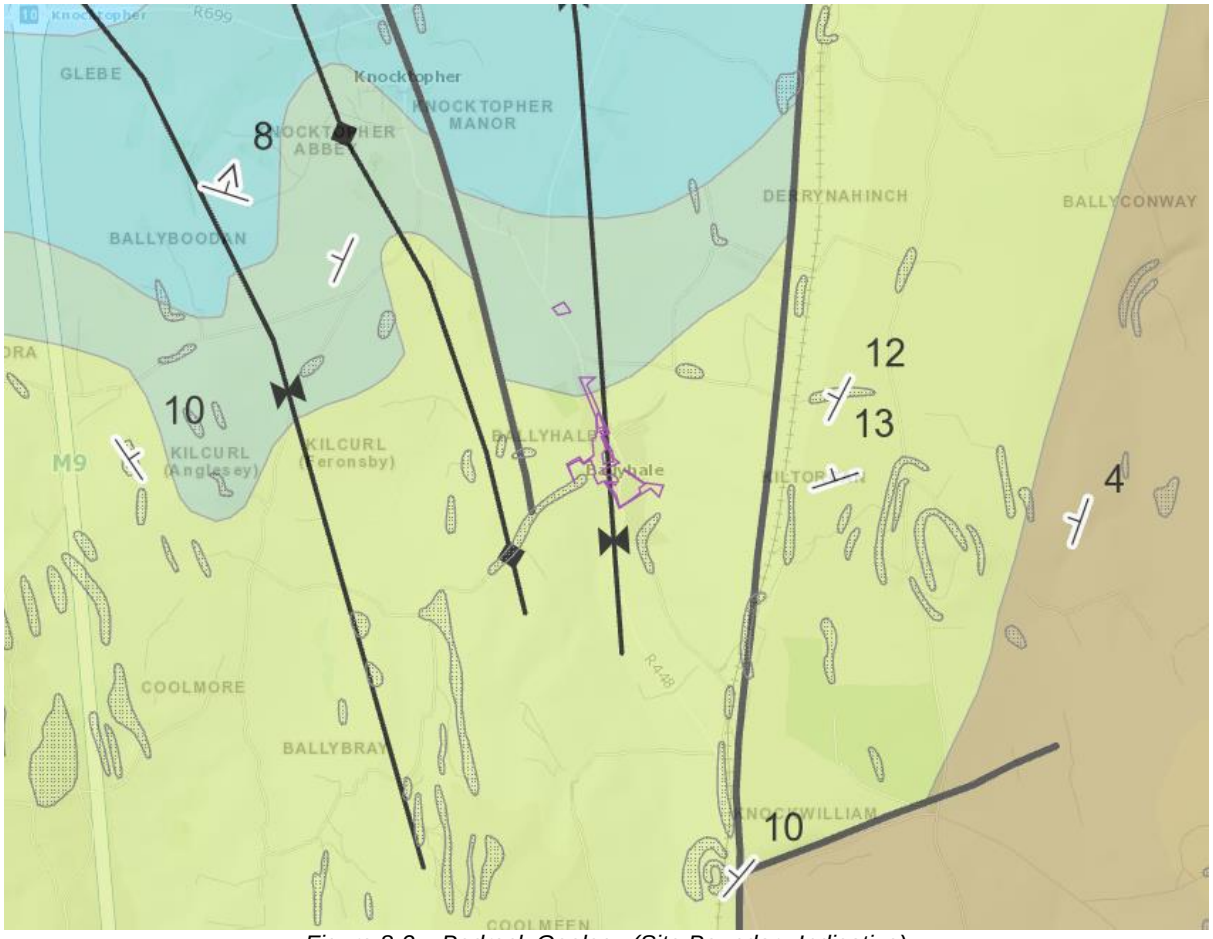

Figure 8-2 – Bedrock Geology (Site Boundary Indicative)

8.3.2 Superficial Geology (Soils)

The subsoils underlying Ballyhale are comprised of variable sediments and thickness of Quaternary aged sediments. GSI Quaternary sediment mapping indicates the majority of the scheme to be underlain by till derived from limestones. It notes bedrock outcrops in areas south of the village and alluvium along some stream channels. An extract from GSI mapping is presented below.

Areas within the developed portion of the village are anticipated to be made ground and Teagasc soil maps also indicates made ground here.

Site Investigation was generally in line with geological mapping. Typically soil strata's encountered were topsoil (0.10m – 0.25m) underlain by subsoils (0.80m – 2.80m). The majority of classifications were as a firm to stiff very gravelly clay. The site investigations were terminated at relatively shallow depths in the majority of locations.

Figure 8-3 – Quaternary Sediments (Site Boundary Indicative)

8.3.3 Contaminated Ground

No existing areas of contaminated ground have been identified within the scheme. Historical site uses do not appear to indicate heavy industrial use or contamination history. During site investigations environmental testing was carried out on samples from all trial pits. No asbestos was detected in any locations. Samples from all trial pits indicate that the soils would be classified as inert under the EPA Waste Acceptance Criteria.

8.3.4 Unstable Ground & Geohazards

The GSI holds a database of historical landslides in Ireland. No records in this database lie in the vicinity of the scheme.

GSI groundwater Karst Data do not have any records of Karst features in the area.

There is no evidence in mapping or site investigation of significant peat deposits in the area.

8.3.5 Waste Facilities

The EPA holds database of waste facilities. No waste facility is located to the vicinity of the site.

8.3.6 Quarries / Mines

There are no active Quarries or mines affected by the proposed scheme.

8.3.7 Geological Heritage Sites

The GSI hold a database of Geological Heritage Sites. No heritage sites are within the proposed scheme extents. The closest identified sites are Kiltorcan New Quarry located 1Km east, Kiltorcan Old Quarry located 1.5 Km east and the Hugginstown M9 Cutting located 2.5Km west from the scheme.

8.3.8 Site Investigations

Site investigations have been carried out at the proposed scheme in order to validate ground conditions at the site. The site investigation involved the excavation of 10 trial pits across the scheme extents by specialist ground investigation contractor IGSL.

Generally, site investigation findings showed good correlation with mapped GSI data outlined above. Site conditions were found to consist of shallow topsoil (0-0.25m) overlying firm to stiff very gravelly clay. Weathered bedrock (yellow and red sandstone) was encountered generally at depths of 1m-1.5m below ground.

Laboratory testing was carried out on geotechnical properties in order to establish the soil properties for detailed design purposes. Environmental testing was also carried out to establish the presence of contamination, all samples collected were classified as Inert in accordance with the Landfill Waste Acceptance Criteria (WAC). No traces of Asbestos were determined.

8.3.9 Designated Sites

Table 8-7 below details designated sites within 5km of the proposed scheme.

Table 8-7: Designated Sites

Station ID	Name	Designation	Distance	Commentary
002162	River Barrow and River Nore	Special Area of Conservation (SAC)	0.01 km	Freshwater stretches of the Barrow and Nore River catchments as far upstream as the Slieve Bloom Mountains and includes also the tidal elements and estuary as far downstream as Creadun Head in Waterford. Designation partially as a result of the presence of sensitive aquatic ecology such as the Freshwater Pearl Mussel and extremely rare Nore Freshwater Pearl Mussel. Site not considered sensitive to land and soil impacts at the site
000839	Kilkeasy Bog	Proposed Natural Heritage Area	4.5 km	Kilkeasy Bog is a large wetland area comprising. small lakes, fen, wet grassland, cutover bog and heathland Site is a considerable distance from proposed works so is not considered sensitive to land and soil impacts at the site
000404	Hugginstown Fen	SAC	4.5 km	Area of swamp and floating fen developed in a small valley in hilly country. It is underlain by limestone glacial till overlying and surrounded by acid Old Red Sandstone. Designated based in alkaline fens. Site is a considerable distance from proposed works so is not considered sensitive to land and soil impacts at the site.

Based on the above review no designated sites are considered to be sensitive to soils/geological impacts at the subject site.

8.3.10 Baseline Summary and Sensitivities

The baseline assessment indicates a number of land & soils receptors that have the potential to demonstrate sensitivity to the development proposed at the site. These are:

- Soils/Subsoils;
- Bedrock

Sensitivity of the receptors identified is determined in accordance with the rationale described in ‘Determination of Magnitude and Significance Criteria’.

Table 8-8 Baseline Summary

Type	Receptor	Sensitivity	Rationale
Geological	Bedrock	Negligible	Resilient to significant change without effect to the overall receptor value
Geological	Soils / Subsoils	Low	Moderate Fertility moderately drained soils. Common soil type across Ireland

8.4 Potential Impact of the Proposed Development

8.4.1 Construction Phase

The construction phase impacts are those associated with the significant excavations, soil movement, aggregate import and construction plant usage. Reference should be made to Chapter 5 “Description of the Proposed Scheme” where the construction activities have been outlined in detail. The lists below represent the likely potential impacts in the absence of mitigation. Mitigation measures to reduce the impact are discussed in Section 8.7. Construction activities can pose a significant risk to the watercourse receptors identified. The main impacts arising from construction activities are listed in Table 8-9:

It is noted that there is interaction and interrelationships with land and soils impacts discussed in other chapters of this assessment.

Table 8-9 – Predicted Impacts – Construction Phase

Impact	Source	Consequence
Chemical Pollution of geological receptors	- Temporary presence of chemicals, fuels, and other oils associated with construction activities on the site have potential to enter subsurface environment through accidental spillages, improper transport and refuelling, or inappropriate storage and disposal procedures, by gradual leakage or single failure of storage tanks or refuelling mechanism.	- Contamination of soils may result in the requirement for extensive remediation or offsite disposal of contaminated materials. - Contamination of soils may create pathways for contaminants to affect other environmental receptors.
Loss of soil value	- Temporary construction activities would require excavations, ground disturbance, stripping of soils, and temporary spoil deposition. Exposed soils have potential to be eroded by wind and water. - Soil may be compacted degraded by constructions works - Construction dewatering may affect slope stability	- Loss of soils value and potentially affecting air or water receptors. - Construction works may affect soils value and suitability for future use.

Material generation	- Excessive excavations or material import may occur. - Poor soil handing may result in mixing of higher value soils types such .as topsoil or gravels with lower value material.	- Poor soil handing may prevent reuse of materials within the scheme. - Excessive material import/export may affect complementary assessments such as traffic or waste receptors.

8.4.2 Unmitigated Significance – Construction Stage

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 8-13.

Table 8-10 – Unmitigated Significance – Construction Stage

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Duration of effect	Impact Significance
Soils /Subsoils	Low	Chemical Pollution of geological receptors as a result of accidents and spillages during construction	Low – Potential for local impacts to soil value and distribution.	Temporary	Slight
Bedrock	Negligible	Chemical Pollution of geological receptors as a result of accidents and spillages during construction.	Low – Potential for local impacts to rock value and distribution.	Temporary	Not Significant
Soils /Subsoils	Low	Loss of soil value as a result of accidents and spillages during construction.	Low – Potential for local impacts to soil value and distribution.	Short-Term	Slight
Soils /Subsoils	Low	Material Generation as a result of construction activities.	Low – Potential for local impacts to soil value and distribution.	Temporary	Slight
Bedrock	Negligible	Material Generation as a result of construction activities.	Low – Potential for local impacts to rock value and distribution. Extent of works	Temporary	Not Significant

			to extending to bedrock layers anticipated to be minor.		

8.4.3 Operational Phase

The operational impacts are those associated with the completed scheme including final surface treatments, conveyance of flows and all operation and maintenance activities. The main impacts arising from construction activities include:

Table 8-11 – Predicted Impact – Operational Phase

Impact	Source	Consequence
Loss of soil value	- Any exposed soils or those which remain unplanted and have potential to be eroded by wind and water - Potential of soil slippage or settlement on poorly constructed or damaged slopes/retaining walls	Any exposed soils or those which remain unplanted and have potential to be eroded by wind and water

8.4.4 Unmitigated Significance – Operation Phase

Magnitudes of identified impacts, and associated unmitigated significance of those impacts, are determined in accordance with the rationale previously described and are presented in the following table.

Mitigated significance is presented in Table 8-12.

Table 8-12 – Unmitigated Significance – Operational Phase

Receptor	Receptor Sensitivity	Potential Impact	Impact Magnitude	Impact Significance
Soils/Subsoils	Low	Loss of soil value	Low – Potential for local impacts to soil value and distribution	Slight

8.5 Mitigation Measures

8.5.1 Mitigation Measures – Preamble

From the assessment of potential impacts during construction & operation, the following key issues have demonstrated potential impact significance and so require particular attention for mitigation and management:

- Chemical Pollution of Geological Receptors
- Loss of Soil Value
- Material Generation

The greatest risk to the environment is during the construction period, coinciding with the greatest amount of activity on site. In addition, effects unmitigated during construction have the potential to extend into the operational phase.

8.5.2 Mitigation Through Design

The site layout has evolved in order that the design minimizes impact on the land and soil environment. Design evolution to minimise environmental impact has been prioritised throughout the various design stages. This is detailed in the Options Report which supported the Flood Defence Scheme's Option selection and has been continued throughout the planning stage design. Measures include designing to avoid deep excavations in bedrock and avoiding designs requiring excessive material generation / import.

8.5.3 Construction Phase Mitigation

A Construction & Environmental Management Plan (CEMP) has been produced and prior to any demolition, excavation or construction, the Contractor will take ownership of the CEMP. The Contractor will comply with the conditions of the EIAR and will produce a Construction Management Plan (CMP) to detail how the project is to be executed in accordance with all project statutory and environmental requirements. The final construction management plan would be submitted by the contractor to be agreed with the planning authority prior to commencement of development. The plan will incorporate any conditions and/or modifications imposed by the planning permission and the plan will be maintained by the contractor during the construction phase. The Plan includes a range of site-specific measures which will include the following mitigation measures in relation to geology, soils, and land:

- Stripping of topsoil will be carried out in a controlled and carefully managed way, coordinated with the proposed staging for the development and will be kept to a minimum.
- At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stripping will not take place during inclement weather.
- Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. The stockpiles will be covered with geotextile or seeded to prevent runoff and should

be place a minimum of 20m away from any watercourse or drain. Topsoil stockpiles will also be located so as not to necessitate double handling.

- The design of site levels have been carried out in such a way as to minimize the interaction with rock.
- The duration that rock layers are exposed to the effects of weather will be minimized by back filling excavations as soon as practicable after construction.
- Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. sediment retention ponds, surface water inlet protection and earth bunding adjacent to water bodies). The level of suspended solids in any discharge as a result of construction work shall not exceed 25mg/l, nor result in the deposition of silts on gravels or any element of the aquatic flora or fauna.
- Earthwork's plant and vehicles exporting soil and delivering construction materials to site will be confined to predetermined haul routes around the site following the R448.

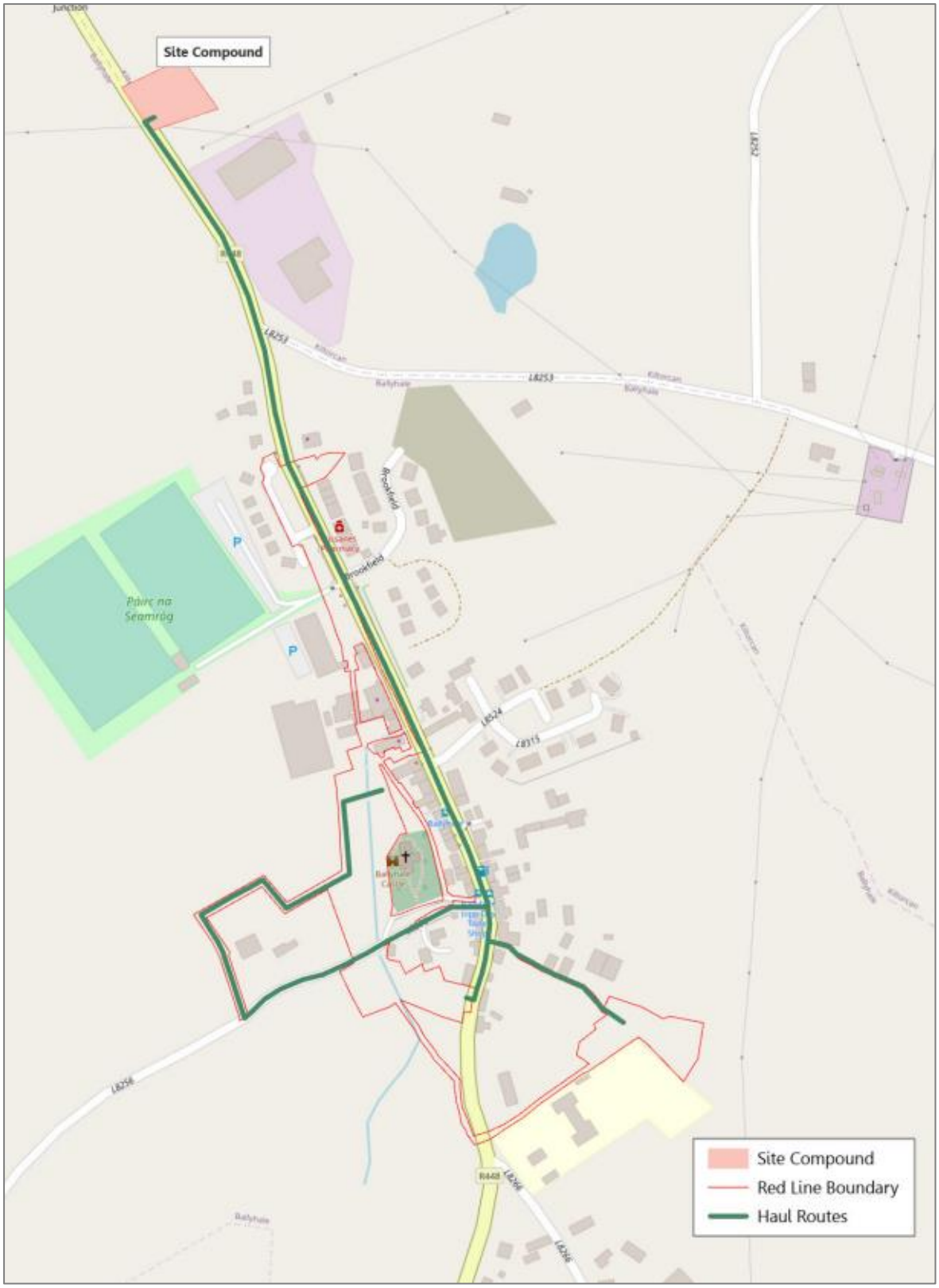

Figure 8-4 – Haul Routes

- Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.

- Dust suppression measures as noted in Chapter 12 will be implemented.
- In order to mitigate against spillages contaminating underlying soils and geology, all oils, fuels, paints and other chemicals will be stored in a secure bunded hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote (50m) from any surface water inlets (when not possible to carry out such activities off site).
- Pouring of concrete including wash down and washout of concrete from delivery vehicles will be controlled in a secure bunded hardstand area to prevent contamination.
- Regular samples will be taken from soils affected by earthworks which shall be analysed for contamination.
- All materials exported from site to be in accordance with the Waste Management Acts and all materials shall be disposed to an appropriately licensed landfill site. The closest appropriately licensed landfill is the CHI Environmental Limited Landfill located approximately 23km away in County Waterford.
- Imported materials to be suitably separated to avoid contamination or mixing.
- For imported materials, the use of local quarries or locally available material will be prioritised.
- Any potential for use of surplus material within local sites shall be pursued at construction and detailed design stage (subject to compliance with Waste Management Acts). If any material is to be reused on another site as a by-product (and not as waste), this will be done in accordance with Article 27 of the Waste Directive Regulations. Sources should be inspected prior to use for any invasive species or contaminated material.

8.5.4 Operational Phase

Once the development is completed, risks to the geology, soil and land will be from loss of soil value and pollution of soils/subsoils due to accidental spills. The following mitigation measures will be implemented:

- A detailed landscape plan has been prepared and will be constructed for the development to ensure all areas are planted and established.
- Earthworks will be designed and constructed in accordance with good practice and design standards to ensure slope stability.

8.6 Predicted Impact Following Mitigation (Residual Impact)

The impact on land, soil, geology, and hydrogeology from accidental spillages of fuel and lubricants used during the construction phase of the development is predicted to be minimal when stored and used in a responsible manner. After implementation of the mitigation measures recommended above for the construction phase, the proposed development will not give rise to any significant long term adverse impact.

Implementation of the measures outlined in Section 5.6 will ensure that the potential impacts of the development on soils and the geological environment are minimised during the construction phase and that any residual impacts will be short term, and imperceptible.

Residual Impacts from earthworks haulage and the risk of contamination of groundwater are deemed to be of minor risk. Implementation of the mitigation measures outlined above will ensure that potential significant effects of the proposed development on land, soils and geology do not occur during the construction phase and that any residual effects will be short term and not significant.

Table 8-13 – Significance – Construction Phase Post Mitigation

Receptor	Potential Effect	Quality of Effects	Magnitude of Effect	Significance of Effects (post mitigation)
Soils/Subsoils	Chemical Pollution of soils/subsoils	Negative	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates effect. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Limestone Bedrock	Chemical Pollution of bedrock	Negative	Low / Negligible: Implementation of best practice measures to control hazardous substances mitigates effect. Measures include controls on use and storage of hazardous materials, controls on construction works.	Not Significant
Soils/Subsoils	Loss of soil value	Negative	Low / Negligible: Implementation of best practice measures to protect soil value mitigates effect. Measures include best practice soil handling and construction practices and reinstatement of affected areas.	Not Significant

Receptor	Potential Effect	Quality of Effects	Magnitude of Effect	Significance of Effects (post mitigation)
Soils/Subsoils	Material Generation	Negative	Low / Negligible: Implementation of best practice measures for material generation mitigates effect. Measures include optimisation of site levels, reuse of materials and use of local quarries/waste receivers.	Not Significant
Limestone Bedrock	Material Generation	Negative	Low / Negligible: Implementation of best practice measures for material generation mitigates effect. Measures include optimisation of scheme levels, reuse of materials and use of local quarries/waste receivers.	Not Significant

Table 8-14 – Significance – Operational Phase Post Mitigation

Receptor	Receptor Sensitivity	Quality of Effects	Magnitude of Effect	Significance of Effects (post mitigation)
Soils/Subsoils	Low	Negative	Low / Negligible: Implementation of best practice measures to protect soil value mitigates effect. Measures include design and construction of detailed earthworks and landscaping proposals.	Not Significant
Soils/Subsoils	Pollution of soils/subsoils	Negative	Low / Negligible: Implementation of best practice measures to control chemical pollution mitigates effect. Measures include testing of drainage networks, oil interceptors and sustainable urban drainage systems.	Not Significant

8.7 Worst Case Scenario

8.7.1 Construction Phase

Under a ‘worst case’ scenario, the accidental release of fuel, oil, paints, or other hazardous material occurs on site during the construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground, then these materials could infiltrate through the soil contaminating the soil zone. If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors causing a significant contamination event.

If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and surface water receptors and the ground water could become poisonous, undrinkable, and unusable for general agricultural methods. The impacts from such an accident, would be negative and long-term. Given the likely small quantity in any spillage, the effects will be localised and imperceptible.

The contractor must adhere to the conditions of planning consent as well as the mitigation detailed in the EIAR as transposed into the CEMP.

8.7.2 Operational Phase

Under a 'worst case' scenario, soil slippage due to poorly constructed earthworks during the construction phase causes ground instability in the surrounding areas. If this were to occur the surrounding lands could become unstable, adversely affecting any potential future development in the area.

8.8 In-combination Effects

No cumulative impacts on the land and soil environment are envisaged during the construction, operational and decommissioning stage. Pre mitigation, there will be a slight risk of pollution from hydrocarbons or other leakage from machinery but with mitigation, this is not likely to add to a significant cumulative effect.

8.9 Cumulative Effects

In relation to the in-combination construction and/or operational impact of the proposed Ballyhale Flood Relief Scheme, with other proposed schemes planned in the area, the list of schemes noted from the planning chapter have been reviewed. None of these schemes will result in any significant additional construction and/or operational Land and Soils Impact within Ballyhale.

8.10 Conclusions

For the reasons outlined in this Chapter and with mitigation measures in place, the proposed Scheme will not lead to any deterioration in Soils quality status and will not impair objectives for any European site.

8.11 Difficulties Encountered in Assessment

No particular difficulties were encountered in completing this section.

8.12 References

- Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (NRA, 2009);
- Environmental Impact Assessment of National Road Schemes – A Practical Guide (NRA, 2008);
- Guidelines for the Creation, Implementation and Maintenance of an Environmental Operating Plan (TII);
- The Management Of Waste From National Road Construction Projects (TII);
- Design of Earthworks Drainage, Network Drainage, Attenuation & Pollution Control (DN-DNG-03066) (TII);
- Guidelines On The Information To Be Contained In Environmental Impact Assessment Reports (May 2022) (EPA);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) Sept. 2003;
- Geo Portal (https://gis.epa.ie/EPAMaps/)(EPA);
- The SUDS Manual (CIRIA C753) (CIRIA);
- Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors (CIRIA C532);
- Control of Water Pollution from Linear Construction Sites (CIRIA C648);
- Environmental Good Practice on Site (C692) (2010) (CIRIA);
- Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements. (2013) Institute of Geologists of Ireland (IGI);
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects, Dept of the Environment Heritage and Local Government;
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, Department for Environment, Food and Rural Affairs (UK); and
- Geological Survey Ireland Spatial Resources https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228

APPENDIX 8-1

Site Investigations