Chapter 9
Land and Soils

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9. LAND AND SOILS

9.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) presents the land and soils assessment for the proposed West Clare Railway Greenway Section 1 Kilrush to Kilkee (the 'proposed development' hereafter). 'Land and Soils' in the context of this chapter refers to the existing soil and geological characteristics of the receiving environment.

This chapter sets out the methodology used to undertake the assessment (Section 9.3), describes the existing environment (Section 9.4), examines the predicted impacts of the proposed development (Section 9.5), proposes mitigation and monitoring measures (Section 9.6 and Section 9.7 respectively), and identifies residual impacts (Section 9.8). This chapter should be read in conjunction with the other relevant Chapters of this EIAR.

9.2 Legislation, Policy and Guidance

9.2.1 Legislation

The West Clare Railway Greenway EIAR complies with Irish and EU legislation governing environmental impact assessments (EIAs). As outlined in Chapter 2: Policy Context and Need for the Proposed Development in Volume 2 of this EIAR, the EIA Directive (2011/92/EU as amended by Directive 2014/52/EU) requires the assessment of environmental effects, including impacts on the Land and Soils, at the European Level. The project also aligns with the Strategic Environmental Assessment (SEA) Directive (2001/42/EC), which applies to national and regional strategies like the National Planning Framework (NPF). Nationally, the Planning and Development Act 2000 (as amended) and the European Union (EIA) Regulations 2018 (SI No. 296/2018) provide the legal framework for EIAs, while the Climate Action and Low Carbon Development (Amendment) Act 2021 supports the project's focus on reducing emissions through active travel.

9.2.2 Policy

Relevant policy documents that have informed the report:

- Clare County Development Plan 2023 – 2029.
- Clare Local Economic Development Plan 2024 – 2030.
- Clare Climate Action Plan 2024 – 2029.

9.2.3 Guidance

This chapter has been prepared following the guidance documents below:

- Transport Infrastructure Ireland (TII) (November 2024), *Environmental Impact Assessment of Rural Cycleways (Offline & Greenway) – A Practical Guide PE-ENV-01109*;
- TII (2023), *Environmental Planning of National Road and Greenway Projects RE-ENV-07008*;
- Environmental Protection Agency (EPA) (2022), *Guidelines on the Information to be contained in Environmental Impact Assessment Reports;*
- (EPA (2015), *Advice Notes for Preparing Environmental Impact Statements;*
- Institute of Geologists of Ireland (IGI) (2013), *Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*;

- TII (2008), *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes PE-ENV-01116*.

9.3 Methodology

9.3.1 Study Area

The proposed development is approximately 15.2km long and generally follows the route of the abandoned West Clare Railway between Kilrush and Kilkee in County Clare, connecting towns and villages along the route.

The railway was constructed in the late 19th century and the surviving railway infrastructure includes bridges, culverts and earthworks (embankments and cuttings). Additional elements are proposed at some key locations along the proposed Greenway alignment such as trailheads, access points, new junction layouts and structures (e.g., new river bridges, over bridges, pipe and box culverts). The route diverges from the existing railway line in certain sections and crosses agricultural lands and local roads, field drains and watercourses, and areas associated with or in close distance to the Poulnasherry Bay proposed Natural Heritage Area (pNHA), Lower River Shannon Special Area of Conservation (SAC), and River Shannon and River Fergus Estuaries Special Protection Area (SPA).

9.3.2 Desktop Study

A detailed desktop study involving a review and collection of publicly available geological information has been undertaken. Sources of historical information, geological maps and/or features were established during the geotechnical desktop study. The sources of information review include:

- Geological mapping from the Geological Survey of Ireland (GSI), including GeoIndex, Historic Borehole Logs, Geotechnical, GeoUrban, Aquifer Viewers and GOLDMINE digital report depository.
- Environmental Protection Agency (EPA).
- Historical ordnance survey mapping information from OSI website, including historical maps available, OSI Historic 6" black & white and colour, OSI 6" Cassini and OSI Historic 25".
- Other available mapping and imagery (e.g., Google Earth, Bing Maps and OSI) for aerial imagery and large-scale identification of surficial ground features and general topographical characteristics as well as features of the built environment or to assist in general geohazard identification and characterisations.

9.3.3 Ground Investigation

A preliminary ground investigation was completed in March 2026 as part of Phase 3 – Design and Environmental Evaluation (refer to Appendix 9.1 in Volume 4 of this EIAR). The proposed ground investigation results have been reviewed to inform the ground conditions and groundwater regime around the proposed structures via trial pitting and cable percussive boreholes, and were also used to verify utilities and minor geoenvironmental testing at junction locations and trail heads via slit trenching and trial pitting. There was no rotary coring carried out to verify rock depths or quality as part of the preliminary ground investigations, these may be carried out if required for the purpose of detailed design.

9.3.4 Assessment Methodology

The potential impact of the proposed development on the soils and land environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of impact on these attributes. The rating criteria for assessing the importance of

geological features within the study area (red boundary line) are detailed in Table 9-1 whilst the rating criteria for quantifying the magnitude of impacts are detailed in Table 9-2.

The rating of potential environmental effects on the soils and lands environment are based on the assessment criteria presented in Table 9-3 which take account of both the importance of an attribute and magnitude of the potential environmental impacts of the proposed development on it. This assessment methodology is consistent with impact assessment criteria outlined in the EPA, Guidelines on the Information to be contained in Environmental Impact Assessment Reports (May 2022).

The impact assessment methodology is in accordance with the guidance outlined in Section 5.4 of the TII's Guidelines on Procedures for Assessment & Treatment of Geology, Hydrology & Hydrogeology for National Roads (TII, 2008). Impact categories, duration and the type/nature of impacts have been taken into account in this assessment in accordance with those guidelines.

Table 9-1 Criteria for rating importance

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a national or regional scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale*	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource. Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale*	Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale*	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale*	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.
**Relative to the total volume of inert soil disposed of and/or recovered*		

Table 9-2 Criteria for rating the impact magnitude at EIAR Stage – Estimation of magnitude of impact on soil/geology attribute

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute.	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature. Requirement to excavate / remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute.	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature. Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate / remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute.	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate / remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes.
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature.
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature.
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature.

Table 9-3 Significance of Effects

Significance	Description
Imperceptible	An effect capable of measurement but without significant consequences
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities

Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing or emerging baseline trends
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
Profound Effect	An effect which obliterates sensitive characteristics

9.3.5 Consultation

Relevant feedback received from statutory, non-statutory groups, the public, community groups, and private individuals on the proposed development has helped inform this assessment. The key consultation phases include:

- Public Consultation 1 (September 2021).
- Public Consultation 2 (September 2022).
- Public Consultation 3 (March 2024).
- Non-statutory EIA Scoping Report.

The feedback received during consultations is summarised in Section 1.5 of Chapter 1 Introduction of this EIAR which has informed this chapter.

9.3.6 Difficulties Encountered

No difficulties were encountered during this assessment.

9.4 Receiving Environment

9.4.1 General Description

The proposed development spans from Kilrush to Kilkee towns via Moyasta village. The study area comprises mainly the abandoned railway corridor, farming land and peat lands along the edge of Poulnasherry Bay, and will tie-in at the three urban environs (Kilrush, Kilkee and Moyasta).

9.4.2 Topography

The topography in the study area is relatively flat, with ground levels varying between approximately a minimum of +0.5mOD to a maximum +5.0mOD and average ground level ca. +3.0mOD, from Kilrush to Moyasta. The ground is slightly higher from Moyasta to Kilkee, varying from a minimum of +3.0mOD to +15.0mOD and an average of ca. +7.0mOD.

The quaternary geomorphology shows presence of drumlins, streamed bedrock and crag-and-tail glacial formations. Refer to Figure 9.1 in Volume 3 of this EIAR.

9.4.3 Bedrock Geology

The existing bedrock geology of the study area has been identified from the Geological Survey of Ireland's (GSI's) geological online mapping, refer to Figure 9.2 in Volume 3 of the EIAR. The study area is underlain by the Gull Island Formation from Kilrush west towards Moyasta and Poulnasherry Bay, and Central Clare Group in the northwest of the study area in the area of Kilkee. The Gull Island Formation is described as grey siltstone with up to 20% sandstones at the base of the succession. The Central Clare Group comprises sandstones, siltstone and mudstone. The geology of the study area is predominantly fluvio-deltaic and turbiditic and comprises shale, sandstone and coal of the late Palaeozoic era.

9.4.4 Quaternary Sediments

The study area is predominantly underlain by till derived from Namurian sandstones and shales and is interspersed by blanket and cut over raised peat, particularly around Kilkee and Moyasta. The volume of peat and/or soft organic soil underlying route is moderate on a local scale; relative to the total volume of inert soil disposed of and/or recovered. Areas of bedrock outcrop or sub crops are scattered within the study area, predominantly near Kilrush, Poulnasherry Bay and west of Moyasta. Estuarine silts and clays are present in Moyasta and around Poulnasherry Bay, and windblown sands west of Kilrush close to the Poulnasherry Bay. A small area of Alluvium is located west of Kilrush town. Within the area of Kilkee and Kilrush, the soils and subsoils are urban and can be classified as 'made ground'. Figure 9.3 in Volume 3 of this EIAR shows the quaternary sediments over the proposed study area.

9.4.5 Existing Geological Heritage

There are no records of geological heritage areas within the study area. The closest geological heritage area is located at Foohagh Point, 1km from the study area on the coast, west of Kilkee.

9.4.6 Mineral Observations

Mineral observations reported in GSI mapping relate to local observations of metallic or non-metallic constituents indicating materials of potential suitability or desirable characteristics in the soils or rocks. There are no mineral observations / localities or active quarries in the vicinity of the proposed development. The nearest locations are approximately 3.5 - 4.0km north-east of Kilkee, near Knocknagore, noted as historical coal mine.

9.4.7 Karstification and Weathering of Bedrock

No karst features have been identified within the proposed development, nor in a 25km radius of it. As described in Section 8.4.3, none of the bedrock comprises limestone, so are not naturally prone to dissolution. As a result, karst is not anticipated to be encountered in the study area.

9.4.8 Contaminated Soils

9.4.8.1 Site History

The study area incorporates three urban areas (Kilrush, Kilkee and Moyasta). The nature of the urban / made ground deposits suggest the presence of contaminants is likely to be encountered. The proposed development is running along a historical railway line, as a result contaminated soils are likely to be encountered. Additionally, there are likely to be hotspot areas of contamination at decommissioned maintenance, depot, stations, etc. along the old railway route. The available mapping does not indicate the presence of current or historical waste facilities, landfills or dumps. There is anecdotal evidence of historical landfill activities at Kilrush trailhead, however this is not supported by desktop research or the results of ground investigations to date as discussed below.

9.4.8.2 Discussion on potential contaminants

Prior to receipt of geoenvironmental test results, a qualitative assessment of potential contaminants was carried out as summarised below based on the desk-based study and the site history.

- Hydrocarbons: diesel and lubricating oils associated with the abandoned railway operations and from runoff from the adjacent local roads.
- Coal Tar and Polycyclic Aromatic Hydrocarbons (PAHs): residues from the abandoned railway corridor.
- Heavy Metals: residues from the abandoned railway corridor.

- Asbestos: potential presence of asbestos exists in debris within made ground, both at urban developments and the historical railway line.

9.4.8.3 Preliminary Ground Investigations

Preliminary ground investigations were completed in March 2026 (refer to Appendix 9.1 in Volume 4 of this EIAR). The made ground at the proposed Kilrush trailhead was investigated at locations BH-KTH01 (K-TH01), TP-KTH-01 and ST-14985 which show the soils to comprise very sandy, very silty GRAVEL with low to high cobble content and occasional inclusions indicative of construction debris such as glass and plastic. The ground at Moyasta is similar, but with particles of concrete blocks present.

Further investigations will be prescribed, as required to inform the detailed design and check for pockets of material, particularly anywhere that will require excavation as part of the trailhead construction.

9.4.8.4 Environmental Testing and Sampling

As discussed in section 9.3.3, the ground investigation aims to clarify the geoenvironmental properties of the ground at urban locations and trailheads. Suites C, D, E, H and I have been completed as detailed in "*Specification and Related Documents for Ground Investigation in Ireland 2nd Edition 2016*" by Engineers Ireland. Waste Acceptance Criteria (WAC) has also been assessed along with the specified Suites H and I. Geo-environmental sampling and testing progressed as part of the preliminary ground investigations indicates that the material observed to date is inert in both locations.

9.4.8.5 Implications on Waste Management

The potential presence of contaminated soils will be managed through the implementation of the project's waste management strategy as outlined in Resource and Waste Management Plan (RWMP). Until validated by related laboratory testing, soils excavated from areas of potential contamination discussed in the previous subsections should be treated as potentially contaminated. The Construction Environmental Management Plan (CEMP) and associated RWMP will set out a procedure for the management of the contaminated soils. The materials will be classified in accordance with waste regulations and confirmed contaminated materials would require disposal at a licenced facility.

9.4.9 Waste Management / Landfill Sites

The Lisdeen Recycling Centre & Transfer Station is the closest licensed waste disposal site to the proposed development as identified by EPA mapping. Further details of waste management are included in the CEMP and RWMP contained in the appendices in Volume 4 of this EIAR.

9.5 Description of Potential Impacts

9.5.1 Do Nothing Scenario

The 'do nothing' approach would continue the use existing roads to provide pedestrian and cyclist connectivity between Kilrush, Kilkee and Moyasta.

With no development and associated disturbance of land, there would be no impact on land and soils in the Do-Nothing scenario.

9.5.2 Potential Construction Impacts

Details on the construction of the proposed development is presented in Chapter 4: Description of the Proposed Development in Volume 2 of this EIAR. In this regard, the construction of the following aspects of the proposed development were identified as having

the potential to cause effects on to Land and Soils during the construction of the proposed development:

- Greenway pavement.
- Drainage features.
- New structures.
- Reworks/repairs to existing structures.
- Temporary construction compounds and access points.
- Fencing and road crossings.
- Trailheads and ancillary facilities, including car parks.
- Earthworks and material balance, including disposal when required.

9.5.2.1 Greenway Pavement

The proposed pavement will consist of the following:

- Surface course, 20mm bituminous macadam;
- 150mm sub-base (–crushed stone);
- 300mm capping (larger crushed stone) (where necessary on soft ground);
- Geotextile layer (where necessary on soft ground).

The construction of the greenway pavement has the potential to impact Land and Soils in several ways. Earthworks for the greenway pavement mainly involve the construction of surface, sub-base course and capping as described above. It will also involve both cut and fill operations to achieve desired vertical and horizontal alignment of the greenway route. Cut operations will primarily consist of topsoil, subsoil including soft ground/peat, glacial till, minor areas of rock, alluvium, made ground and estuarine deposits being excavated to achieve the desired alignment. The excavated material will mainly be used for fill operations along with landscaping and verge construction within the footprint of the proposed development, where possible.

Some of the fill requirements along the proposed development will be sourced from the cut operations, with any shortfall being supplemented by imported fill material. The majority of the proposed cut estimates are expected to be used as fill required within the proposed development boundary; however, some quantity of cut may be inappropriate for reuse depending on further ground investigations as part of the detailed design. It is anticipated therefore that approx. 23,000m^3 of fill material will be required for the proposed development, which will be sourced from local quarries. The closest quarries are located approximately 7.5km north-east of Kilrush at Tullagower (Kilrush Quarry), 20km north-east of Kilrush at Glenmore (Gleenmore Quarry) and 30km north-east of Kilrush at Derragh (Darragh Quarry).

Blanket and cut over raised peat deposits are present in certain sections of the proposed development, particularly in greenfield areas where the route crosses in-situ peat. Peat depths and stability conditions will be investigated by a qualified Geotechnical Engineer prior to construction and as part of the detailed design ground investigation. The topography of the area is relatively flat; therefore, stability issues are not expected when carrying out construction works on peat deposits. The magnitude of impact on slope stability is therefore expected to be *Small Adverse,* and the significance of effect being *not-significant to slight, permanent Effect*.

In addition, peat disturbance poses additional risks, including potential carbon release and subsidence, particularly in low-lying or waterlogged sections of the proposed development. Based on the quaternary sediments noted along the corridor, the proposed greenway may

interface with peat sediments in 3 particular locations along the greenway. These have been identified at approximate chainage 0000m to 1500m, at approximate chainage 7600m to 7800m and at approximate chainage 8550m to 9100m. However, the greenway will predominantly be located along the original railway corridor in these sections, diverting away for approximately 115m into potentially peat sediment soils. Geotextiles will be used to minimise excavation of peat through these sections.

The use of plant and machinery during construction will require the storage and use of fuels and oils on site. Spills or leaks from plant and machinery have the potential to contaminate soils, resulting in a short-term *Small Adverse* magnitude of impact, and *Slight to Moderate, Permanent Effect* on soil quality. Refer to Chapter 10 Hydrology and Chapter 11 Hydrogeology of this EIAR for further discussion of the potential impact of spills and/or leaks on hydrology and hydrogeology.

Topsoil encountered during construction, particularly in greenfield sections, will be stripped and stored in temporary stockpiles along the route for reuse where possible. The majority of the topsoil is planned to be reused on site with minimal off-site export.

The significance of the potential effects associated with the construction of the Greenway pavement is considered to range between *Not Significant to Moderate, Permanent Effect* as described above, in the absence of mitigation measures.

9.5.2.2 Drainage Features

The proposed greenway configuration has been developed to avoid the use of pipework where feasible. The construction of pipes, culverts, headwalls, field drains and other proposed drainage features will have a *Small Adverse, Slight, Temporary Effect* to soils. Additionally, the import of fill material will also have a *Small Adverse, Slight, Temporary Effect* to the quarries.

9.5.2.3 New Structures

Several new structures including bridges, overpasses, underpass, retaining walls, and culverts will be constructed as part of the proposed development. The construction of new structures will require excavation of the in-situ ground to construct bridge foundations, as well as retaining structures and approach ramps with associated works. These structures are listed below:

- Greenway bridge at Lisdeen (Ch 2100), landowner farm access bridge at Lisdeen (Ch 2100), greenway bridge at Lisdeen, (Ch 2265), landowner farm access bridge at Lisdeen, (Ch 2265): single span precast concrete beams bridge over watercourses, varying from 10m span to 16m span. Structures are anticipated to be piled. Minor headwalls and approach embankments are anticipated.
- Landowner footbridge at Moyasta (Ch 7390), Turf Canal Bridge at Carrowncalla North (Ch 9175), box culvert underpass at Carrowncalla South Ferry Road (Ch 11575), agricultural overpass at Carrowncalla South (Ch 12400): precast concrete beams and structures with spans varying from approximately 8 to 17m. Structures are anticipated to be piled. Retaining walls and head walls with approach embankments are anticipated.
- Piped culverts: several piped or box culverts are proposed throughout the length of the scheme. These are proposed where the greenway crosses existing open field drains and shall be designed to mitigate impact on flooding locally. Minor excavations and ground improvements are anticipated at these locations.
- Retaining walls at Garraun (Ch 3850 to Ch 4100), Moyasta (Ch 7300 to Ch 7400) and Kilrush (Ch 14950 to Ch 15125) are proposed lengths of retaining walls to support the earthworks for the proposed greenway.

In general, the above structures will likely have a *Small Adverse magnitude of impact, and Slight, Temporary Effect* in relation to material excavation requirements to achieve the required foundations. These shall have a secondary or indirect *Small Adverse magnitude of impact, and slight, permanent Effect* to provide the required imported fill materials from suitably licensed quarries or other on-site sources, where acceptable fill materials are present.

The structures requiring approach embankments shall each require a volume of acceptable general fill materials either from elsewhere throughout the proposed development where suitable material is excavated during construction, or where sufficient material is not available or suitable for reuse, additional suitable fill may need to be imported to site or brought from other approved sources where suitable transport routes are present for haulage. Although the volumes required for the proposed development are considered modest, the impact of moving volumes of material over long distances can be more significant if suitable sources of materials cannot be identified from either within or in close proximity to the area. The closest quarries are located approximately 7.5km north-east of Kilrush at Tullagower (Kilrush Quarry), 20km north-east of Kilrush at Glenmore (Gleenmore Quarry) and 30km north-east of Kilrush at Derragh (Darragh Quarry).

Vibration from piling or drilling operations can also temporarily affect adjacent soils. However, this is expected to be limited to the immediate vicinity and is likely to result in a locally *Negligible magnitude of impact*, and *an Imperceptible, Temporary Effect* on soils.

9.5.2.4 Reworks / Repairs to Existing Structures

The proposed development includes repairs and modifications to existing structures along the route. These structures are listed below:

- Existing bridge structures:
  - Moyasta rail bridge.
  - L6090 Carrowncalla river bridge.
- Several culvert structures throughout the alignment.

These structures will require varying levels of intervention, ranging from masonry repointing and vegetation clearance to structural element replacement and / or upgrade. The works will be undertaken to restore structural integrity while maintaining the heritage character of the original railway infrastructure.

The use of plant and machinery for structural repairs will necessitate the storage and handling of fuels, oils, and construction materials within temporary work areas. Uncontrolled spills or leaks will lead to localised soil contamination, representing a *Small Adverse magnitude of impact,* and *Slight to Moderate, Permanent Effect* on soil quality.

Vibration from piling or drilling operations can also temporarily affect adjacent soils. However, this is expected to be limited to the immediate workspace and is likely to result in a locally *Negligible,* magnitude of impact and an *Imperceptible, Temporary Effect* on soils.

9.5.2.5 Temporary Construction Compounds and Access Points

Both the Kilrush and Moyasta Trailheads are proposed to be used as site compounds. The greenway construction areas will be accessed at approved locations via existing local roads. Access points will be outlined in the Construction Traffic Management Plan to be developed for the project (refer to Appendix 4.1 CEMP).
Construction of the temporary compounds will involve vegetation clearance and creation of hardstanding areas, which can lead to localised soil compaction from construction traffic. Unmitigated, this would represent a short-term, *Slight to Moderate Effect* on soil structure. The works will also expose soils to erosion during rainfall events, with potential for silt runoff

into sensitive watercourses feeding into the Poulnasherry Bay pNHA, Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA. Without mitigation, such erosion is likely to result in a short-term *Small Adverse, Slight to Moderate, Permanent Effect* on soil quality.

The operation of plant and machinery within the compounds will necessitate storage and use of fuels and oils, presenting a potential contamination risk to soils. Their storage, use and activities such as refuelling has the potential to cause spills and leaks. Unmitigated, this would be a short-term *Small Adverse magnitude of impact,* and a *Slight to Moderate Effect* on soil quality.

Similar to the greenway pavement construction, the importation of fill material and/or other construction related products for the construction of the compounds will have a permanent *Small Adverse, Slight to Moderate, Permanent Effect* on the source quarries.

As outlined in Chapter 4: Description of the Proposed Development of this EIAR, construction compounds and access points will be cleared upon completion of construction works. Temporary buildings, containers, parking areas and unused construction materials will be removed as appropriate.

9.5.2.6 Fencing and Road Crossings

The proposed development includes the installation of boundary fencing along sections of the Greenway where it traverses private lands or areas requiring user safety measures. Existing hedgerows and vegetation belts will be retained where possible, with new fencing and vegetation also proposed along the proposed development for livestock control, safety purposes and screening. In addition, temporary and permanent fencing and gate systems will also be deployed for the corresponding access points. The fencing will be constructed using either concrete foundations or driven posts for sections where ground conditions allow.

Construction of fencing and crossings can temporarily disturb soils within the working corridor, potentially leading to localised erosion or compaction. The installation of fence posts will require limited excavation depths for the case of concrete foundations where required. Given the limited extent of the ground disturbance, the effect on soils is expected to be of *Negligible magnitude, and an Imperceptible, Temporary Effect.*

Road crossings have been designed to maintain connectivity while also providing safety measures for the Greenway users. This includes traffic signages, road markings etc. Similar to fencing, construction of crossings will disturb the soils which is likely to result in a *Negligible, Imperceptible, Permanent Effect* on soils locally.

9.5.2.7 Trailheads and Ancillary Facilities

The construction of two trailheads at Moyasta and Kilrush, including ancillary facilities such as car parking, toilets, waste bins and picnic areas, will lead to several temporary and permanent impacts on land and soils.

The overall area affected by the trailheads is 0.5ha at Moyasta and 3.65ha at Kilrush. The installation of local instances of impermeable surfaces within the trailheads will lead to reduced soil permeability and increased surface runoff, potentially causing localised erosion and sedimentation in adjacent areas, particularly where slopes are present. Permeable paving is proposed for the parking bays along with suitably located bioretention areas to minimise the effect of runoffs. This is likely to result in a temporary increase in runoff and erosion, particularly under heavy rainfall events, resulting in a short-term *Small Adverse, Slight to Moderate, Permanent Effect* if unmitigated.

The proposed trailheads are planned to be constructed in urban environs, therefore the presence of made ground and contaminated is possible. Based on the results of preliminary ground investigations to date, the material at these locations has been assessed as being inert. This will be confirmed through further testing as part of the detailed design and construction phase. Additionally, the concentration of construction activity and material storage at trailhead locations, if unmitigated is likely to result in temporary soil contamination from spills or waste, particularly hydrocarbons from machinery and construction materials. This will lead to a short-term *Small Adverse magnitude of impact, Slight to Moderate Effect, Permanent Effect* on soil quality.

9.5.2.8 Earthworks and Material Balance

The proposed horizontal and vertical alignments are proposed so as to reduce the amount of earthworks required in so far as is possible, minimising the amount of excavation and disposal of material along with the import and placement of fill. In some locations, areas of cut are required to reconcile vertical gradients

The project requires excavation of approximately 9,500m³ of material (cut) and placement of 27,500m³ of fill material, thereby resulting in a deficit of approximately 18,000m³ of suitable material. Some cut material will not be re-usable as fill material, particularly due to the presence of peat and potentially contaminated deposits in the footprint of the proposed scheme. It is anticipated the quantity of material to be imported will be approximately 23,000m³. The imported fill will need to be sourced and brought to site from suitably licenced locations. Noting the fairly small overall quantities of fill material required, the fill import represents a *Small Adverse magnitude of impact,* and will result in *Slight to Moderate, Permanent Eff*ect on source quarries.

9.5.3 Potential Operational Impacts

During the operational phase of the proposed development, the primary users of the greenway will be cyclists and pedestrians. There will also be the sporadic need for maintenance vans to carry out maintenance along the route, which will have the potential to result in minor fuel or oil leaks. Furthermore, the use of herbicides will be required to control invasive species along the Greenway route. All of these operational impacts can be considered as *Imperceptible Permanent Effects (from a land and soils perspective.* Refer also to Chapter 8 Biodiversity of this EIAR.

9.6 Mitigation Measures

9.6.1 Construction Phase

The following sections outline appropriate mitigation measures during the construction phase to avoid or reduce the potential impact of the proposed development.

9.6.1.1 Earthworks and Material Handling

During construction, excavation of topsoil will be undertaken carefully. Reuse of excavated topsoil will be implemented wherever possible. Surplus topsoil will be stored temporarily at a construction compound before being transported to an authorised waste facility.

Imported fill material will be sourced from the nearest possible and most economic locations by the Contractor. A number of suitable active quarries with the necessary permits meeting the required specifications are present in the region. The detailed design and construction methodology will aim to maximise the potential to reuse acceptable materials arising on-site. The excavated soil arising on-site will be screened for contaminants and re-used during construction where possible. The reusability of soils will depend upon both their physical or engineering behaviour as well as the chemical constituents and classifications harm. In

accordance with the requirements specified by the design, soils can be classified as environmentally acceptable where the criteria for individual Generic Assessment Criteria or Suitable for Use Levels (S4ULs) are not exceeded.

Where the soil exceeds the threshold imposed, it will have to be disposed as non-hazardous or hazardous waste. It will not be possible to improve it by treatment for re-assessment of suitability for re-use.

Whenever the excavated / potentially treated soils do not meet the requirements, they will have to be disposed of by the Contractor who will ensure that all subsurface materials excavated during the construction phase of the proposed development are managed in accordance with the relevant waste management legislation, including the Waste Management Act 1996 (as amended). The Contractor will have to ensure that all unsuitable materials are removed from the site and sent to authorised waste management facilities (e.g., those which hold all relevant, valid permits / licences) which accept the corresponding types of waste. Further detail on waste management is included in the CEMP and associated RWMP contained in the Appendices in Volume 4 of this EIAR.

9.6.1.2 Soil Disturbance, Erosion and Seepage

As outlined in Chapter 4: Description of the Proposed Development in Volume 2 of this EIAR, temporary works areas will be established within the boundaries of the proposed development.

Efforts will be made to minimise environmental disruption, where possible, within the footprint of the development: fences, hedgerows, and existing field boundaries will remain intact where possible. Temporary and permanent stock-proof fencing will be installed to define the site boundaries, and machinery will stay within this working area to protect surrounding soil and peat.

To prevent soil erosion, excavations will be completed and promptly backfilled. Work will not continue during heavy rainfall to avoid soil erosion risks.

Earthworks for the proposed development necessitates erosion and sediment control measures. A CEMP will be implemented prior to any ground disturbance. This plan will incorporate protective measures including the installation of sediment traps, swales and ditches before any significant site earthworks take place. Vegetation clearance operations will be phased with respect to seasonality.

9.6.1.3 Peatland Protection and Management

The proposed development contains deposits of peat and organic soils that require specialised protection measures. As part of the detailed design prior to construction, detailed peat surveys shall be carried out to map the extent and depths of peat deposits. In these areas, a floating construction technique will be implemented as much as possible leaving the peat in place. This system consists of geotextile and geogrid layers across the peat surface along with a 300mm thick 6F2 capping layer. All plant movement in these areas will be restricted to designated routes protected by temporary timber matting, with bog master plant machinery having lower ground pressure. This construction methodology is standard for access routes to wind turbines and the like and will be more than adequate to cater for the anticipated loading along the greenway.
Where peat excavation is unavoidable, the material will be reused on-site for habitat restoration where possible, with any surplus being transported to licensed disposal facilities in accordance with EPA guidelines. Off-site exportation of peat to be used in peat restoration is subject to investigation and design of suitable options.

9.6.1.4 Soil Contamination

The successful contractor will produce a RWMP detailing how construction and demolition waste will be prevented, minimised, reused, recycled, transported and disposed of in compliance with Waste Management Act 1996–2023, Resource and Waste Management Plan requirements under the National Waste Management Plan for a Circular Economy (2023–2029), EPA Best Practice Guidelines for C&D Waste Management and EU Waste Framework Directive (2008/98/EC). An outline RWMP is included in the appendices in Volume 4 of this EIAR.

Construction activities in areas of made ground (urban deposits), particularly along the abandoned railway corridor, are likely to encounter contaminated materials including rails, concrete / timber sleepers, concrete, bricks and occasional plastic pipes which are possibly originated from old / demolished buildings. A soil testing program shall be implemented prior to excavation in areas of known or suspected contamination, particularly along the abandoned railway corridor or where former buildings were previously located. Any excavated contaminated materials will be segregated and disposed of at licensed facilities.

All construction compounds will be equipped with spill containment kits and designated refuelling areas located far enough from watercourses to prevent hydrocarbon contamination.

To prevent soil contamination, excavations will be completed and promptly backfilled and work will not continue during heavy rainfall. Refuelling of machinery will be restricted to designated areas with spill containment measures.

9.6.2 Operation Phase

Pesticide application for managing invasive species will adhere to the guidance of the Department of Agriculture, Food and the Marine, with herbicides used exclusively by trained personnel, under appropriate weather conditions, and at the lowest effective dosage. When possible, non-chemical control techniques like manual removal will be given priority. Collectively, these actions will diminish the likelihood of soil, surface water, and groundwater contamination throughout the project's operational period. Further details on the management of invasive species are available in Chapter 8 (Biodiversity) of this EIAR and in the Invasive Species Management Plan developed as part of the CEMP (refer to EIAR Volume 4).

9.7 Monitoring

Once the mitigation measures detailed above are implemented, there is no further requirement for monitoring in relation to lands and soils. As a result, no requirement for collecting additional data or carrying out inspections during the operational phase of the proposed development.

9.8 Residual Effects

The project area along the greenway corridor shall experience changes due to compaction of soils and losses in topsoil cover as a residual effect after the proposed development.

Once the mitigation measures are put in place, any remaining effect on the receiving environment is expected to be *Imperceptible* during both the construction and operation phases.

9.9 References

This document has been prepared with reference to following key documents, guidelines and data sources given below.

- Legislation and Policy Documents:
  - Clare County Development Plan 2023–2029.
  - Clare Local Economic Development Plan 2024-2030.
  - Clare Climate Action Plan 2024-2029.
  - European Commission (2017). Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report.
  - European Union Directive (EIA Directive) (2011/92/EU, as amended by Directive 2014/52/EU). European Union (2011). Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU of the European Parliament and of the Council. Official Journal of the European Union, L236, 1–23.
  - Government of Ireland (2018). European Union (Environmental Impact Assessment) Regulations 2018 (Statutory Instrument No. 296/2018).
  - Oireachtas (2000). Planning and Development Act 2000.
  - Oireachtas (2021). Climate Action and Low Carbon Development (Amendment) Act 2021.
  - Strategic Environmental Assessment (SEA) Directive (2001/42/EC). European Union (2001). Council Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment. Official Journal of the European Union, L189, 43–50.
- Technical Guidance:
  - Environmental Protection Agency (2015). Advice notes for preparing environmental impact statements.
  - Environmental Protection Agency (2022). Guidelines on the information to be contained in environmental impact assessment reports.
  - Institute of Geologists of Ireland (2013). Guidelines for the preparation of soils, geology and hydrogeology chapters of environmental impact statements.
  - Transport Infrastructure Ireland (2008). Guidelines on procedures for assessment and treatment of geology, hydrology and hydrogeology for national road schemes.
  - Transport Infrastructure Ireland (2023). Environmental planning of national road and greenway projects.
  - Transport Infrastructure Ireland (2024). Environmental impact assessment of rural cycleways (offline & greenway): A practical guide.
  - Transport Infrastructure Ireland (2024). Managing Geotechnical Risk, DN-ERW-03083.
  - Transport Infrastructure Ireland (2025). Rural cycleway design (offline and greenways).
- Scientific and Site-Specific Sources:
  - Geological Survey Ireland (GSI) (2024). Quaternary Sediments 50k, Quaternary Geomorphology 50k, Bedrock Geology 1 Million, Bedrock Geology 500k, Bedrock Geology 100k; Geological Heritage Audited and Unaudited Sites; Groundwater Karst and Surface Water Features; Landslides Landslide Events Databases.
  - Ordnance Survey Ireland (OSI) (2024). Historical Mapping Archives (map.geohive.ie).