

6.0 **LAND AND SOILS**

6.1 **Introduction**

This Chapter of the EiAR comprised of an assessment of the likely impact of the proposed development on the soils and the geological environment as well as identifying proposed mitigation measures to minimise any impacts.

A detailed description of the proposed development can be found in Chapter 3 of this EiAR.

The site is currently greenfield and in agricultural use.

The proposed development will also include the following associated engineering infrastructure:

- Provision of a site access point / formation of a new junction on Clonminch Road.
- Provision of improved facilities for cyclists between the proposed site access and Tullamore Town Centre.
- Delivery of a portion of the roads objective between the Clonminch Road and Chancery Lane (as shown in the Tullamore Town and Environs Development Plan) including high quality cycle infrastructure.
- Facilitation of potential future pedestrian links through adjacent lands.
- Provision of internal site road network including associated footpaths.
- Provision of surface water drainage, foul drainage and water supply infrastructure.
- Provision of a foul pumping station discharging to the existing public foul drain located on the Clonminch Road.

6.2 **Study Methodology**

An assessment of the likely impact of the proposed development on soils and the geological environment included the following activities:

- Preliminary Ground Investigation Study;
- Review of information available on the Geological Survey of Ireland (IGSL) online mapping service.

Preliminary Ground Investigations for the proposed development were carried out by Ground Investigations Ireland (GII) in May 2020 and included the following scope of work:

- 20 No. Trial Pits
- 20 No. Plate Bearing Tests
- 20 No. Dynamic Probes
- 12 No. Infiltration Tests

Refer to Appendix 6-A Ground Investigation Reports (GII, Project No. 9551-03-20, Issue Date July 2020).

6.3 Receiving Environment/Baseline

6.3.1. Soils

Review of information available on the GSI's online mapping service ("Quaternary Sediments") indicate that the site is underlain by a sediment type described as "TLs – Till derived from limestones". Refer to Figure 6.1 below.

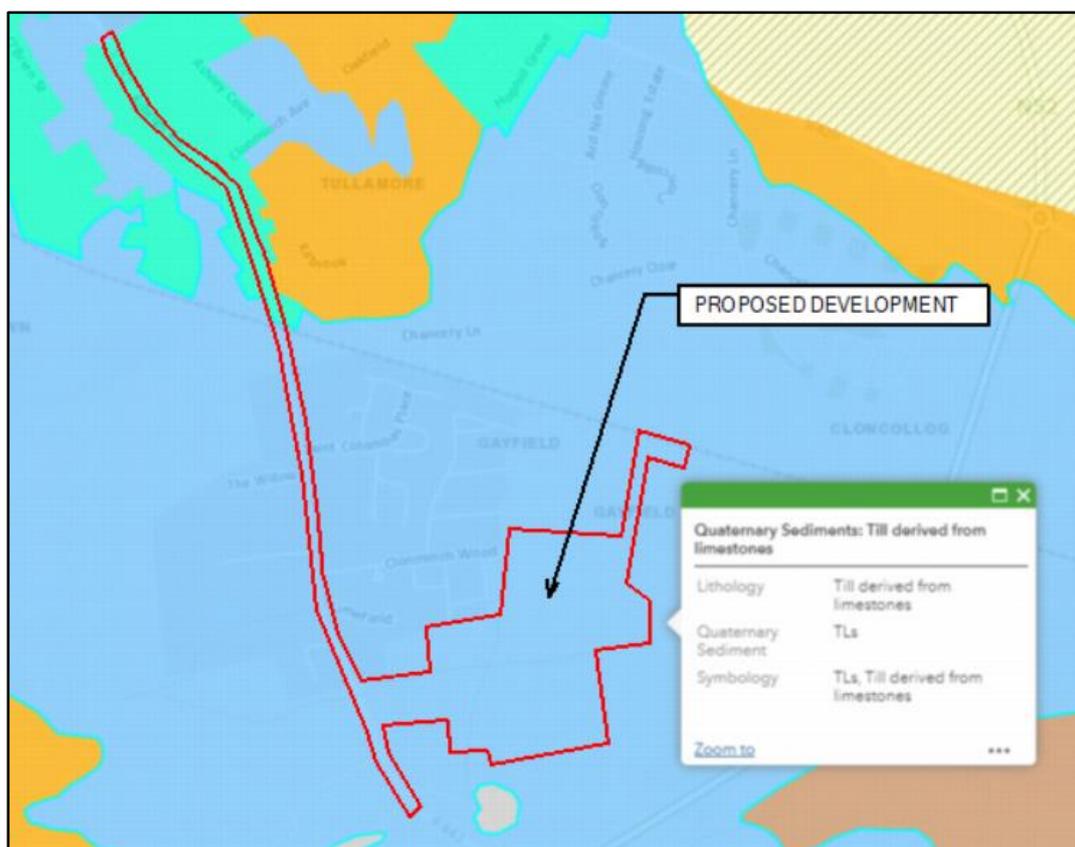


Figure 6.1 Extract from Quaternary Sediments Map (site boundary indicative)

Ground conditions at the site, as observed during ground investigations, are summarised as follows:

- 0.2m to 0.25m thick topsoil layer overlying;
- Cohesive deposits encountered beneath topsoil layer
 - Soft to firm, sandy clayey SILT or silty CLAY with occasional cobbles and boulders.
 - The strength of cohesive deposits increases with depth (firm to stiff or stiff below 1.5m BGL).
- Granular deposits were encountered within the cohesive deposits noted above
 - Clayey gravelly fine to coarse SAND with occasional cobbles and rare boulders.

Ground water was observed in four of the twenty trial pits. These trial pits were located in the northern part of the site with ground water observed at depths of 1.7m to 3.0m below existing ground level.

Infiltration tests were carried out at twelve locations. Infiltration rates (f), where observed at 4 No. test locations, ranged from 6.192×10^{-6} m/min to 1.262×10^{-5} m/min. Infiltration was not recorded at the remaining test locations as the water level dropped too slowly to obtain a result. These results reflect very low permeability soils.

6.3.2. Geology

Review of GSI's online mapping service ("Bedrock Geology") describes geology in the vicinity of the site as "Dark limestone and shale (Calp)".

GSI have classified the site's groundwater vulnerability as "moderate" with a small section south west of the site classified as "high" (refer to Figure 6.2 below).

GSI have classified the underlying aquifer as a "Locally Important" Bedrock Aquifer which is "moderately productive only in local zones".

Refer to Chapter 7 (Hydrology) of this EIAR for further comment regarding Hydrogeology.

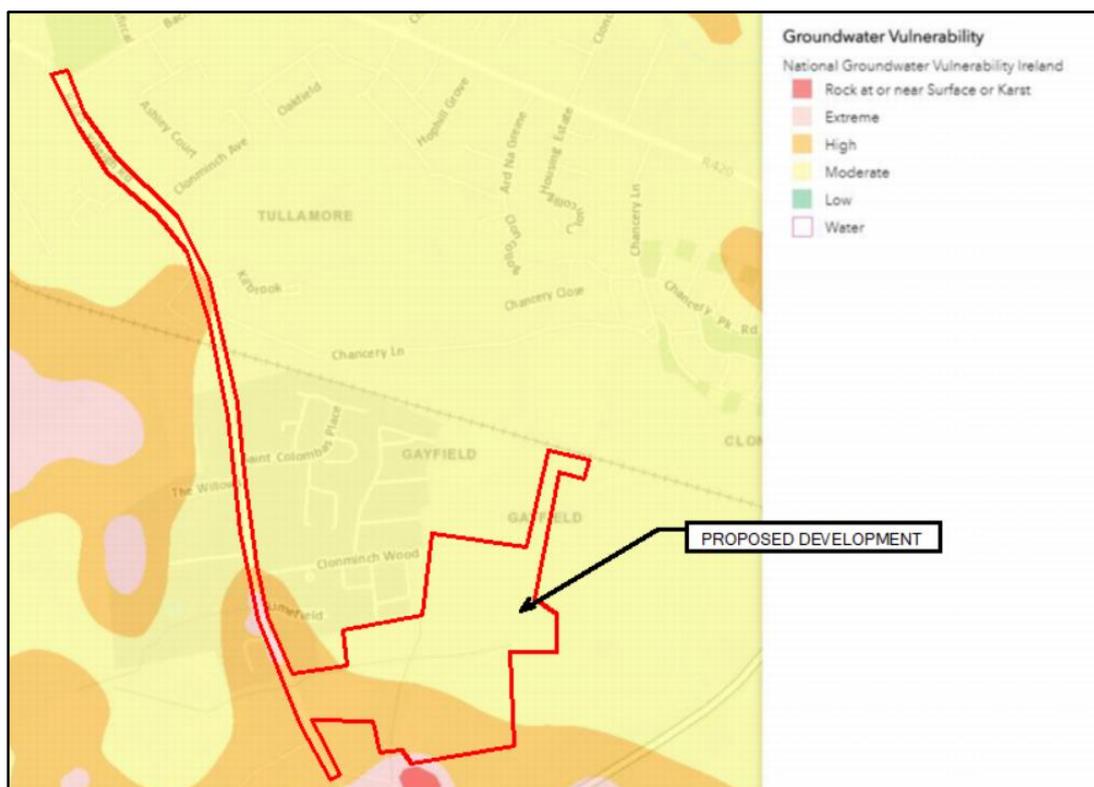


Figure 6.2 Extract from Groundwater Vulnerability Map (Site Boundary Indicative)

6.4 Characteristics of the Proposed Development

Site development works will include stripping of the 200mm to 250mm thick topsoil layer. It is expected that all stripped topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces). Also refer to Section 6.5.1.1 below.

Excavation of subsoil layers will be required in order to allow road construction, foundation excavation, basement excavation, drainage and utility installation and provision of underground attenuation of surface water. In general, underlying subsoil layers (sandy clayey silt or silty clay with occasional cobbles and boulders) are expected to be suitable for reuse as non-structural fill (e.g. build-up of back gardens areas or build-up of open spaces). Also refer to refer to Section 6.5.1.2 below.

Importation of fill will be required beneath houses, driveways and to roadways (structural fill). This material will be sourced from quarries that have all required licenses, planning permissions etc. Also refer to Section 6.5.1.3 below.

In general, the designed road levels and finished floor levels follow the natural topography of the site, therefore, minimising the need for cut / fill operations to enable development.

6.5 Potential Impacts of the Proposed Development

6.5.1 Construction Phase

6.5.1.1. Stripping of Topsoil

Removal of the existing topsoil layer will be required. As noted previously, it is expected that all topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces). Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff.

	Volume (m ³)
Topsoil strip (200mm to 250mm thick layer)	30,000
Topsoil reuse (landscape of gardens, open space etc.)	30,000

Table 6.1 Preliminary Estimated topsoil volumes (+/- 10%)

6.5.1.2. Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, basement excavation, drainage and utility installation and attenuation storage areas.

Underlying subsoil layers generally comprise of sandy gravelly silt or silty clay with occasional cobbles and boulders. In general, this material is expected to be suitable for reuse as non-structural fill (e.g. build-up of back gardens areas or build-up of open spaces).

	<i>Volume (m³)</i>
Cut (excavation of subsoil layers as described in 6.5.1.2)	42,000
Reuse of Excavated Material as Non Structural Fill	42,000

Table 6.2 Excavation of Subsoil / Reuse of Excavated Material (+/- 10%)

6.5.1.3. Imported Fill

Importation of fill will be required beneath road pavement, under floor slabs and for drainage and utility bedding and surrounds. This material will be sourced from quarries that have all required licenses, planning permissions etc.

Materials will be brought to site and placed in their final position in the shortest possible time. Any imported material will be kept separate from the indigenous arisings from the site. All excavation to accommodate imported material will be precisely co-ordinated to ensure no surplus material is brought to site beyond the engineering requirement.

	<i>Volume (m³)</i>
Fill (Total)	97,000
Reuse of Excavated Material as Non Structural Fill (ref. Table 9.2)	42,000
Imported Fill (granular material beneath road pavement, under floor slabs and for drainage and utility bedding and surrounds)	55,000

Table 6.3 Imported Fill (+/-) 10%

6.5.1.4. **Construction Traffic**

Earthworks plant (e.g. dump trucks) and vehicles delivering construction materials to site (e.g. road aggregates, concrete deliveries etc.) have potential to cause rutting and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff.

This issue can be particularly noticeable at site access points (resulting in deposition of mud and soil on the surrounding road network). Dust generation can also occur during extended dry weather periods as a result of construction traffic.

6.5.1.5. **Accidental Spills and Leaks**

During the construction phase there is a risk of accidental pollution from the sources noted below.

Accidental spills and leaks may result in contamination of the soils underlying the site.

- Storage of oils and fuels on site
- Oils and fuels leaking from construction machinery
- Spillage during refuelling and maintenance of construction machinery
- Use of cement and concrete during construction works

6.5.1.6. **Geological Environment**

Any excavations associated with development of the site are expected to be relatively shallow (maximum 3.0m deep) and are not expected to impact on the underlying geology.

6.5.2 Operational Phase

On completion of the construction phase, there will be no further impact on soils and the geological environment.

6.5.3 Potential Cumulative Impacts

Should the construction phase of any developments coincide with development of the site, potential cumulative impacts are not anticipated once similar ameliorative, remedial and reductive measures are implemented.

6.5.4 Interactions

6.5.4.1 **Traffic and Transport**

Delivery of materials to site (e.g. aggregates for road construction, concrete for foundations, delivery of construction plant to site) will lead to potential impact on the surrounding road network.

6.5.4.2 **Water and Hydrology**

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result subsoil erosion and generation of sediment laden surface water runoff.

6.5.4.3 **Waste Management**

Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility.

6.5.4.4 **Noise and Vibration**

Development of the site will result in a level of construction related noise and vibration.

6.5.4.5 **Air Quality**

Dust generation can also occur during extended dry weather periods as a result of construction traffic.

6.5.4.6 **Flora and Fauna**

Removal of the existing topsoil layer will be required across the site as well as removal of some trees, vegetation etc.

6.5.5 “Do Nothing Scenario

There will be no impact on soils and the geological environment if the development does not proceed.

6.6 **Mitigation Measures**

6.6.1 **Construction Phase**

6.6.1.1 **Stripping of Topsoil**

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development. 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 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.
- Topsoil stockpiles will also be located so as not to necessitate double handling.
- Surface water runoff from areas stripped of topsoil will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- On-site settlement ponds are to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion.

6.6.1.2 **Excavation of Subsoil Layers**

- The designed road levels and floor levels for the site have been designed to minimise excavation of existing subsoil layers.
- Disturbed subsoil layers will be stabilised as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). The duration that subsoil layers are exposed is to be minimised in order to mitigate against weather effects.
- Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles.
- 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 open drainage ditches).

6.6.1.3 **Imported Fill**

- No large or long-term stockpiles of fill material will be held on the site. At any time, the extent of fill material held on site will be limited to that needed in the immediate vicinity of the active work area.
- Smaller stockpiles of fill, where required, will be suitably protected to ensure no sediment laden runoff enters existing surface water drains. Such stockpiles are to be located in order to avoid double handling.

6.6.1.4 Construction Traffic

- Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site.
- Vehicles using unsurfaced site roads will have their speed restricted to 20km/hour.
- 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 (e.g. dampening down) will be implemented as necessary during dry periods.

6.6.1.5 Accidental Spills and Leaks

- In order to mitigate against spillages contaminating underlying soils, 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 from any surface water inlets (when not possible to carry out off site).

6.6.1.6 Geological Environment

- No mitigation measures are proposed in relation to the geological environment.

6.6.1.7 Reinstatement

- All temporary construction compounds are to be removed upon completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.
- All construction waste and / or scrapped building materials are to be removed from site on completion of the construction phase.
- Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility.
- All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer's drawings.

6.6.2 Operational Phase

On completion of the construction phase no further mitigation measures are proposed as there will be no further impact on soils and the geological environment.

6.6.3 'Do Nothing' Scenario

No mitigation measures are proposed in relation to soils and the geological environment if the development does not proceed.

6.7 **Predicted Impact of the Proposed Development**

6.7.1 **Construction Phase**

Implementation of the measures outlined in Section 6.6.1 will ensure that the potential impacts of the proposed development on soils and the geological environment do not occur during the construction phase and that any residual impacts will be short term.

6.7.2 **Operational Phase**

There are no predicted impacts arising from the operational phase.

6.7.3 **'Worst Case' Scenario**

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. If this were to occur over open ground / areas subsoils are exposed, 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.

Worst case scenarios envisioned are extreme occurrences of the potential impacts identified above in conjunction with failure of mitigation measures. The majority of the mitigation measures outlined above are design solutions that will be managed through the design and construction process and enforced as part of the contract documentation and monitored as outlined below in Section 6.9 of this chapter.

A Natura Impact Statement (NIS) has been prepared to assess the impact of the proposed development on ecologically designated sites in the surrounding area. This has been submitted as part of the planning application, please consult the NIS for further details.

6.7.4 **'Do Nothing' Scenario**

There are no predicted impacts should the proposed development not proceed.

6.8 **Residual Impacts**

Implementation of the mitigation measures outlined in Section 6.6.1 will ensure that the potential impacts of the proposed development on soils and the geological environment do not occur during the construction phase and that any residual impacts will be short term.

6.9 **Monitoring**

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to Preliminary Construction Management Plan (and any Construction Management Plan subsequently prepared by the contractor).
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.).

No ongoing monitoring is proposed on completion of the construction phase.

6.10 **Difficulties Encountered**

No particular difficulties were encountered during preparation of this chapter. The analysis reported within this chapter is based upon site specific ground investigation reporting as well as publicly available information from Geological Survey of Ireland.

6.11 **References**

GII Ground Investigation Report (Issued July 2020, Project No. 9551-03-20).

Environmental Protection Agency (EPA) Online Mapping Service

Geological Survey of Ireland (GSI) online mapping service

Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland (2013)

Guidelines on the information to be contained in environmental impact assessment reports.

Environmental Protection Agency (Draft 2017).

APPENDIX 6A

Ground Investigation Report (July 2020)