

## 7 LAND, SOIL AND GEOLOGY

### 7.1 Introduction

This chapter describes the type of land, soils and geology likely to be encountered beneath and in the general area of the proposed development. It also addresses the potential impact of the proposed development on land, soils and geology together with the mitigation measures that will be employed to eliminate or reduce any potential impacts.

The project involves the first phase of a new residential development comprising 685no. housing units, at Woodbrook, Shanganagh, Co. Dublin. The proposed development also includes for the relocation of a portion of Woodbrook Golf Course (to facilitate future phased residential development), and for the installation of a rising main will be constructed north of the main development lands. Further details of the proposed development are presented in Chapter 3: Description of Proposed Development.

### 7.2 Assessment Methodology

The following scope of works were undertaken or managed by Atkins to complete the land, soils and geology assessment presented in this chapter: -

- Ground Investigation.
- Desk-based study including review of available historical information.
- Site Walkover Survey by an experienced Geo-Environmental Engineer (27 September 2018).

The desk-based study involved reviewing information from the following sources: -

- GSI Datasets Public Viewer and Groundwater web-mapping (consulted 28 March 2019).
- Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 28 March 2019).
- EPA Environment and Wellbeing web-mapping (consulted 28 March 2019).
- Dún Laoghaire-Rathdown County Council, 2018. Planning Maps (Consulted 28 March 2019).

The ground investigation for the proposed development was carried out by Ground Investigations Ireland Ltd (GIIL) between 25 June to 29 June 2018 in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015. Areas investigated included both onsite locations and also lands immediately adjacent to the proposed development. 12no. trial pits (TP1 to TP12) were excavated using a JCB 3CX to depths of between 1.9 and 3.0metres below ground level (mbgl). Soakaway testing was also carried out at 6no. locations (TP1, TP2, TP6, TP8, TP9 and TP11) in accordance with BRE Digest 365. 3no. cable percussive boreholes (BH1 to BH3) were drilled using a using a Dando 2000 drilling rig to a maximum depth of 5mbgl. Full details of the ground investigation are presented in the Ground Investigation Report in Appendix 7.1.

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), *'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'* (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, *'Geology in Environmental Impact Statements, A Guide'* (IGI, 2002), which was revised to take account of legislative changes, and the operational experience developed by geoscientists in the production of relevant environmental assessments. This assessment has also been prepared with regard to the guidelines prepared by the Environmental Protection Agency (EPA) outlined in *'Revised Guidelines on the Information to be contained in Environmental Impact Statements'* published in 2015, *'Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)'* published in 2015, and also *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft'* published in August 2017.

### 7.3 Receiving Environment

This section provides a description of the land, soils and geology in the general region of the proposed development and takes account of the current and historic uses of the proposed development (hereafter referred to as the site).

#### 7.3.1 Site Development

A review of historic maps (including available 6-inch historic maps (1829 – 41), 25-inch historic maps (1897 – 1913) and aerial photographs from the Ordnance Survey of Ireland) (OSI 2019) confirms that land use at the site has remained primarily agricultural over time; however, the surrounding lands have developed considerably since the early nineteenth century. A detailed summary of land use both in relation to the site and surrounding lands is presented in Table 7.1.

Therefore, available current and historic data, as presented in Table 7.1, confirms that the site has not changed significantly in terms of land use over time.

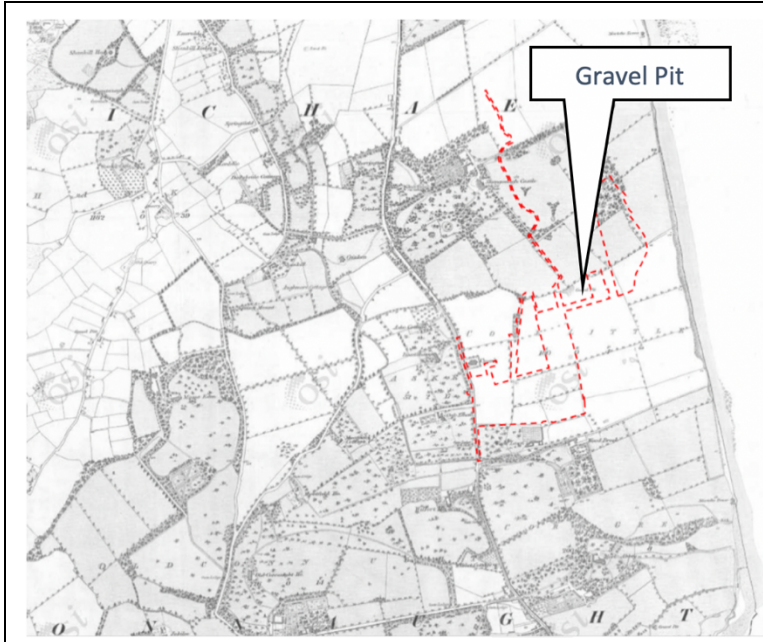
A site walkover was carried out on the 27 September 2018. Weather conditions were dry bright, blustery and cool. The walkover confirmed that the main development area of the site comprises agricultural land and appears to be used for arable crops. Ground conditions underfoot were quite firm. There are minor undulations across the site with localised higher areas and lower areas particularly to the centre of the site adjacent to the drainage ditch that runs north south to the centre of the site. An overgrown access track was noted running along the eastern southern portion of the site. An area to the centre of the site was overgrown with a small number of large cobbles at the surface towards the east of the site.

The area of the proposed relocated golf course is currently parkland. A railway runs along the western boundary of this portion of the site. One minor stockpile of what appeared to be clean fill material was noted in the north west corner and a stockpile of topsoil of unknown origin was noted in the south west corner of this portion of the site.

The site is bounded by the R119 Road and St. James Church to the west of the site. It is bounded by Shanganagh Cemetery and recreational land to the north. To the east the site is bounded by Woodbrook Golf Club. The land to the south is a mix of woodland and grassland.

The proposed relocated golf holes area is bounded to the west by the railway line, to the north by parkland and to the east and south by Woodbrook Golf Club.

The proposed rising main will run along the western boundary of Shanganagh Cemetery, around the western boundary of Shanganagh Public Park and through the housing estates of Castle Farm and St. Anne's Park.



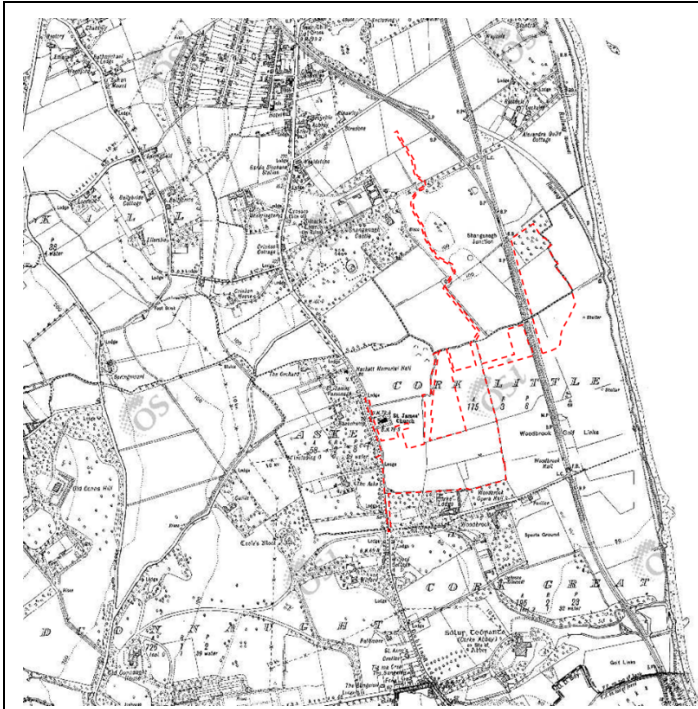
**1837-1842 6 Inch BW (OSI 2019)**

The location of the housing development is shown to be agricultural land. The location of the proposed relocated golf holes is generally agricultural with the northern section of the site under woodland. A road is indicated to the west of the housing development. Generally, the site is surrounded by agricultural land to the north and east with the road and woodland to the west and south. St James Church is shown to the north of the proposed housing development. Several farmsteads are dotted throughout the area. A quarry is noted to north and east of the housing development area.



**1888-1913 Historic Map 25 Inch (OSI 2019)**

There are no significant changes to the immediate area of the site. The map shows the construction of a railway line to the east of the site. Bray town is indicated to the south of the map. Shanganagh Castle is noted further north.



**6 Inch Cassini Maps 1830-1930 (OSI 2019)**

The location of the housing development is shown to be agricultural land. The location of the proposed relocated golf holes is generally agricultural with the northern section of the site under woodland. A road is indicated to the west of the housing development. Generally, the site is surrounded by agricultural land to the north. It is bounded to the east by Woodbrook golf course with the road and woodland to the west and south. Several lodges, halls in addition to a parsonage are located in the wooded areas. Further east of the site the railway line is noted with a golf course further east along the railway line. The original railway line to the north east is recorded as disused. St James Church is shown to the north. A number of farmsteads are dotted throughout the area. Shanganagh Castle is noted to the north.



**Aerial Map 1995 (OSI 2019)**

The 1995 aerial map shows that the majority of the site is still agricultural land. Woodbrook golf course has been constructed immediately beyond the eastern boundary of the site with a railway line further east. Agricultural land is noted to the south with the town of Bray further south. The R119 runs to the west. Further west a small cluster of houses have been constructed as Woodbrook Downs. The M11 motorway has been constructed approximately 500m west of the site. Shanganagh Cemetery appears to be under development to the north. Shanganagh Castle is visible further north. A housing estate has been constructed to the north of Shanganagh Castle. The site of the proposed relocated golf holes appears to be recreational ground, bounded to the east and south by Woodbrook golf course, the railway line to the west and recreational ground to the north.

	<p><b>Aerial Map 2000 (OSI 2019)</b></p> <p>The 2000 aerial map shows no changes to the development site. An additional section of Shanganagh Cemetery has been constructed to the north east of the main development area.</p>
	<p><b>Aerial Map 2005 (OSI 2019)</b></p> <p>No significant changes to the area are identified.</p>
	<p><b>Aerial Map 2012 (OSI 2019)</b></p> <p>No significant changes to the area are identified.</p>

**Table 7.1:** Land Use Summary.

### 7.3.2 Site Topography

The western half of the housing development site falls from the north west to the south east towards the drainage ditch which runs along the centre of the main site. There is a high point of 20 meters above ordnance datum (m AOD) to the north west and a low point of 15m AOD in the south.

The eastern section of the site falls to the south east towards the drainage ditch from a high point of 24m AOD in the north to a low point of 15m AOD in the south.

The location of the proposed relocated golf course is generally flat at approximately 20m AOD.

### 7.3.3 Soils

On a regional scale, the general vicinity of the site is underlain by shallow well drained mineral soil as presented in Figure 7.1, and Irish Sea Till derived from limestones, as presented in Figure 7.2 (GSI, 2019).

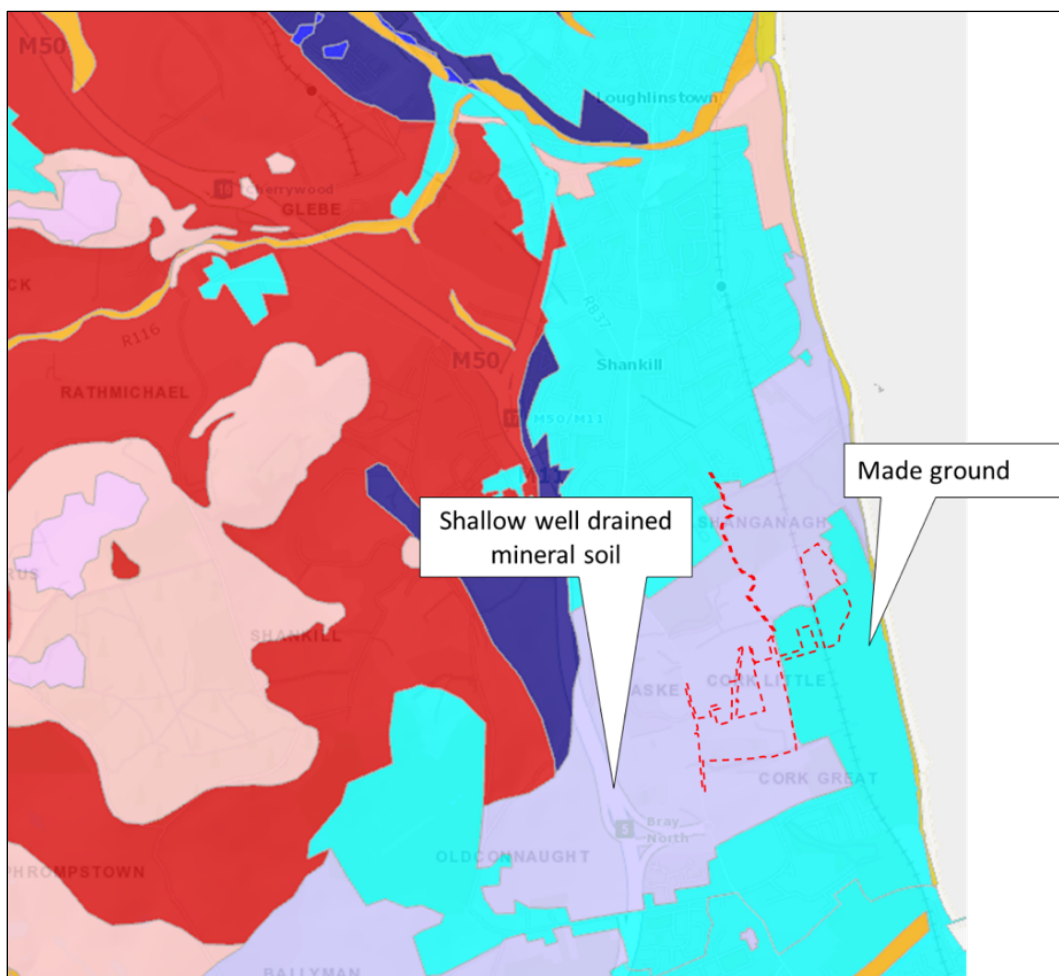
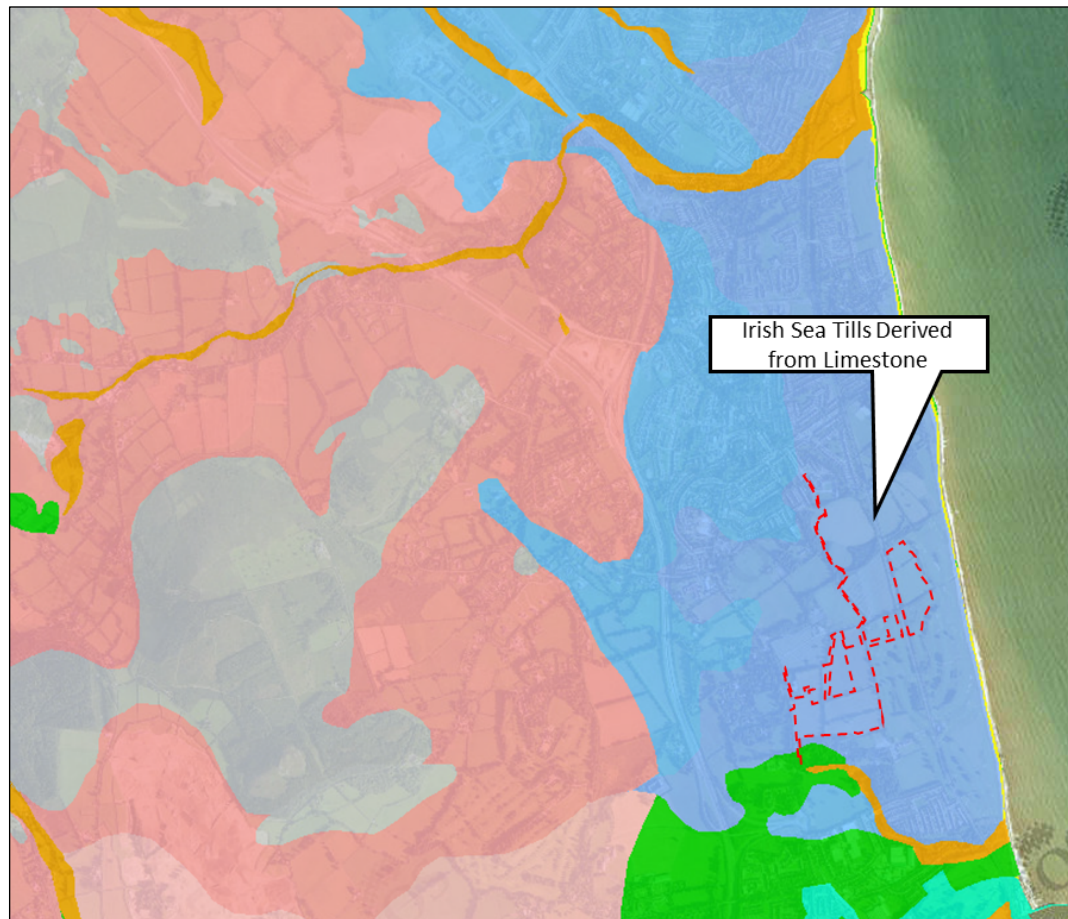


Figure 7.1: Teagasc Soil Map (GSI 2019).



**Figure 7.2:** Quaternary Sediments (GSI 2019).

Site-specific geological data has been obtained via the completion of ground investigation works across the site, and in lands immediately adjacent to the site, as detailed previously. Full details of the ground investigation are presented in the Ground Investigation Report in Appendix 7.1. The locations of all exploratory holes undertaken during the ground investigation are presented in Figure 7.3. Ground conditions, as observed during the 2018 ground investigation, are summarised as follows: -

- No significant visual or olfactory evidence of contamination was encountered.
- Topsoil was encountered at a depth of between 0.25 to 0.4mbgl.
- Till was generally encountered beneath the topsoil layer, to a maximum depth of 5mbgl. Till generally comprised soft to firm, brown occasionally silty, sandy gravelly clay with occasional cobbles.
- Gravel layers / lenses were encountered at depths ranging from 0.6mbgl to 4.0mbgl. More generally gravel was encountered between c. 1.6 to 2.3mbgl. The maximum thickness of gravel encountered was 1.25m. Gravel was generally described as slightly sandy, clayey fine to coarse brown gravel with occasional cobbles.
- Localised pockets of sand were also encountered, at depths of between 1.0m and 3.0mbgl. The maximum thickness of sand encountered was 1.0m. Sand was generally described as gravelly, clayey, brown, fine to coarse sand with occasional cobbles.

2no. cross sections presented in Figure 7.4 and Figure 7.5, provide a schematic representation of the strata encountered across the site during the ground investigation. These sections represent the Conceptual Site Model (CSM) for the receiving land and soils environment of the proposed development.

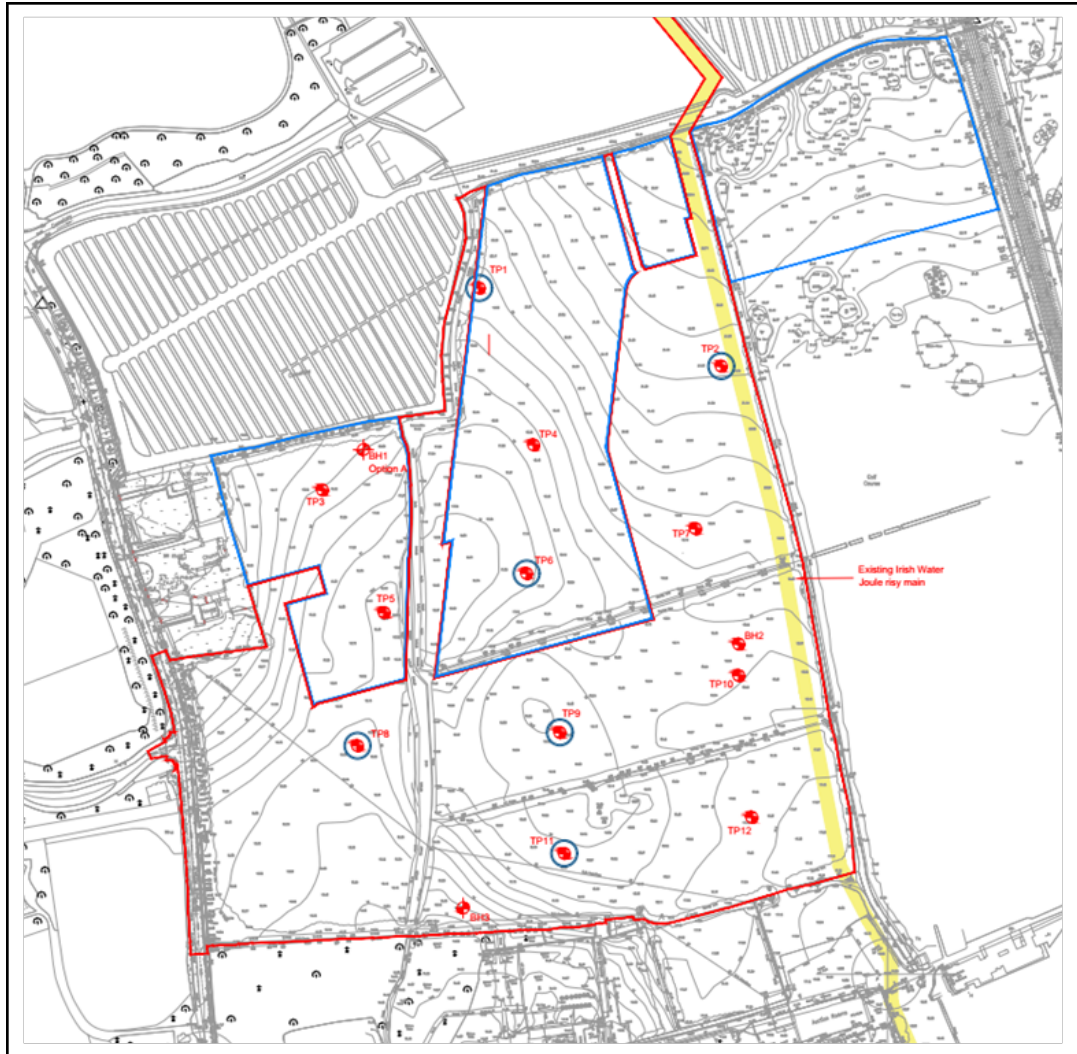


Figure 7.3: Ground Investigation Locations (Atkins 2018).



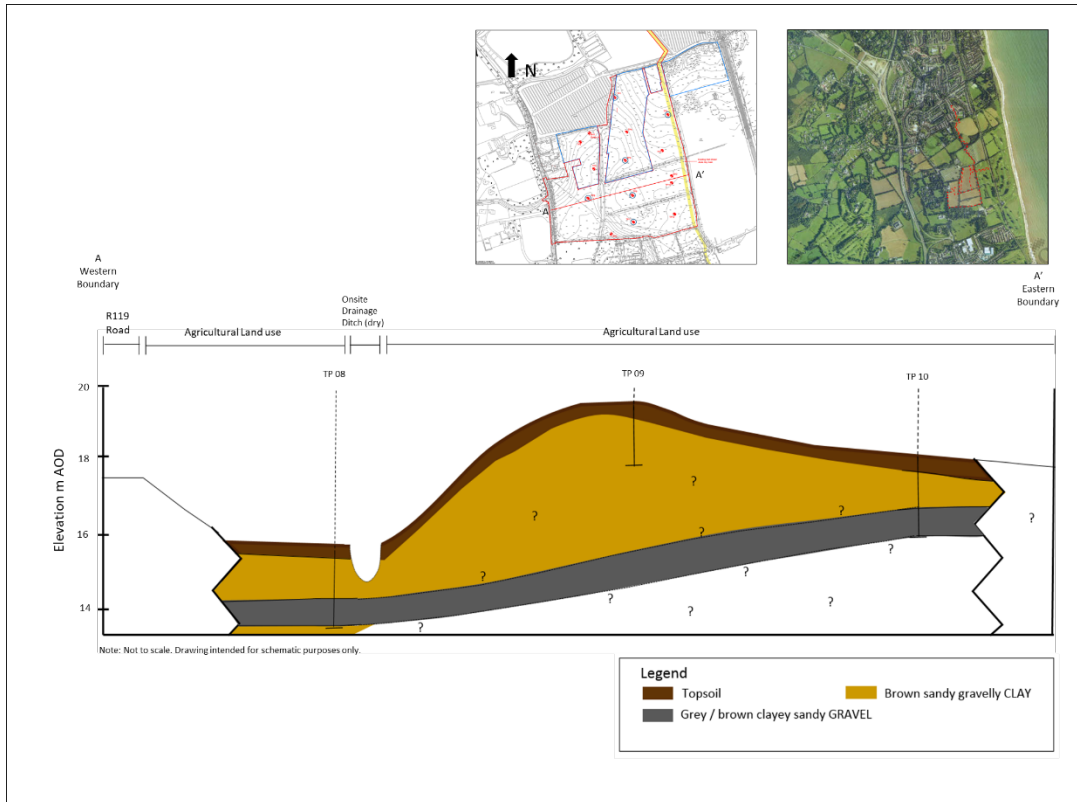


Figure 7.4: Cross Section 'A-A'.

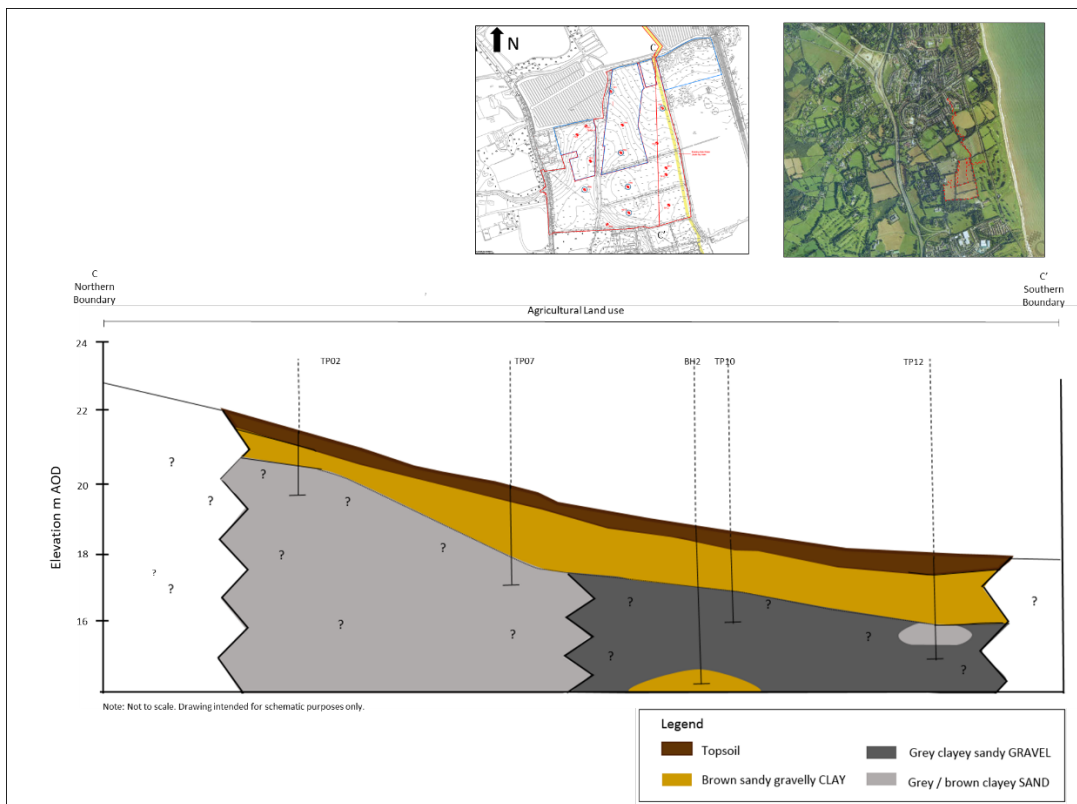


Figure 7.5: Cross Section 'C-C'.

### 7.3.4 Bedrock Geology

The underlying bedrock in the vicinity of the site comprises slate, phyllite and schist of the Maulin Formation as presented in Figure 7.6 (GSI 2019). This formation is described as blue grey slates and phyllites which are commonly striped with pale siltstone laminae. Depth to bedrock is currently unknown; however, bedrock was not encountered during the ground investigation which extended to a maximum depth of 5m. Based on the regional geology karst features would not be expected to be encountered beneath the site or surrounding lands. The closest reported karst feature is a cave at Deerpark located c. 9.5km south east of the site (GSI, 2019).

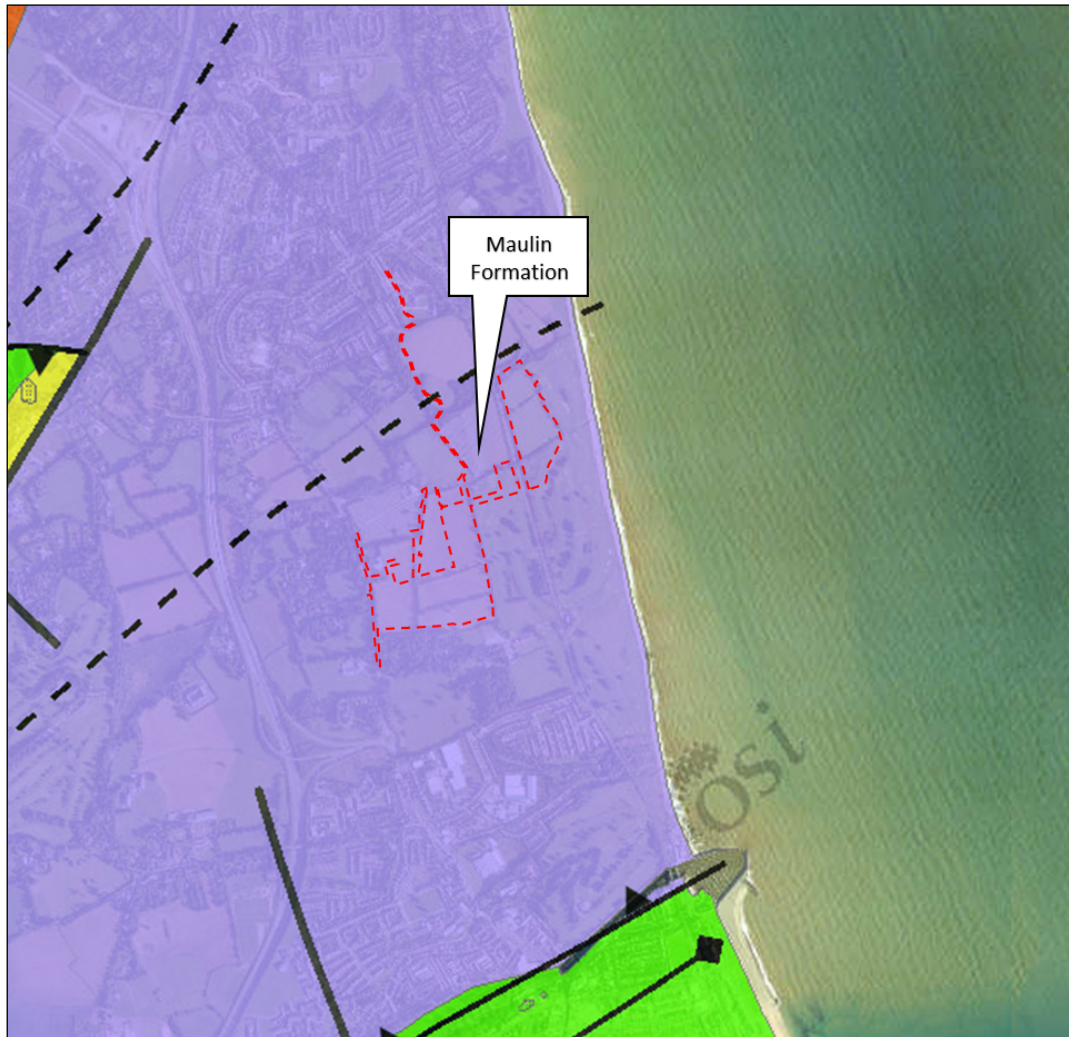


Figure 7.6: Bedrock Geology (GSI 2019)

### 7.3.5 Ground Contamination

There are no EPA Waste Licenced Facilities or IPPC / IED Licenced Facilities within 500m of the site. The closest IPPC licenced facility is located 0.8km to the south east while the closest waste licenced facility is located 2.5km to the south west as presented in Figure 7.7. Taking account of the current and historic land-use of the site and adjacent lands, the only potential source of contamination is the current adjacent graveyard, Shanganagh Cemetery, which is discussed in further detail in Chapter 8: Water. No evidence of any contamination was encountered during the ground investigation, and no evidence of surface contamination (e.g. grass / vegetation die-off) was observed during the site walkover survey.

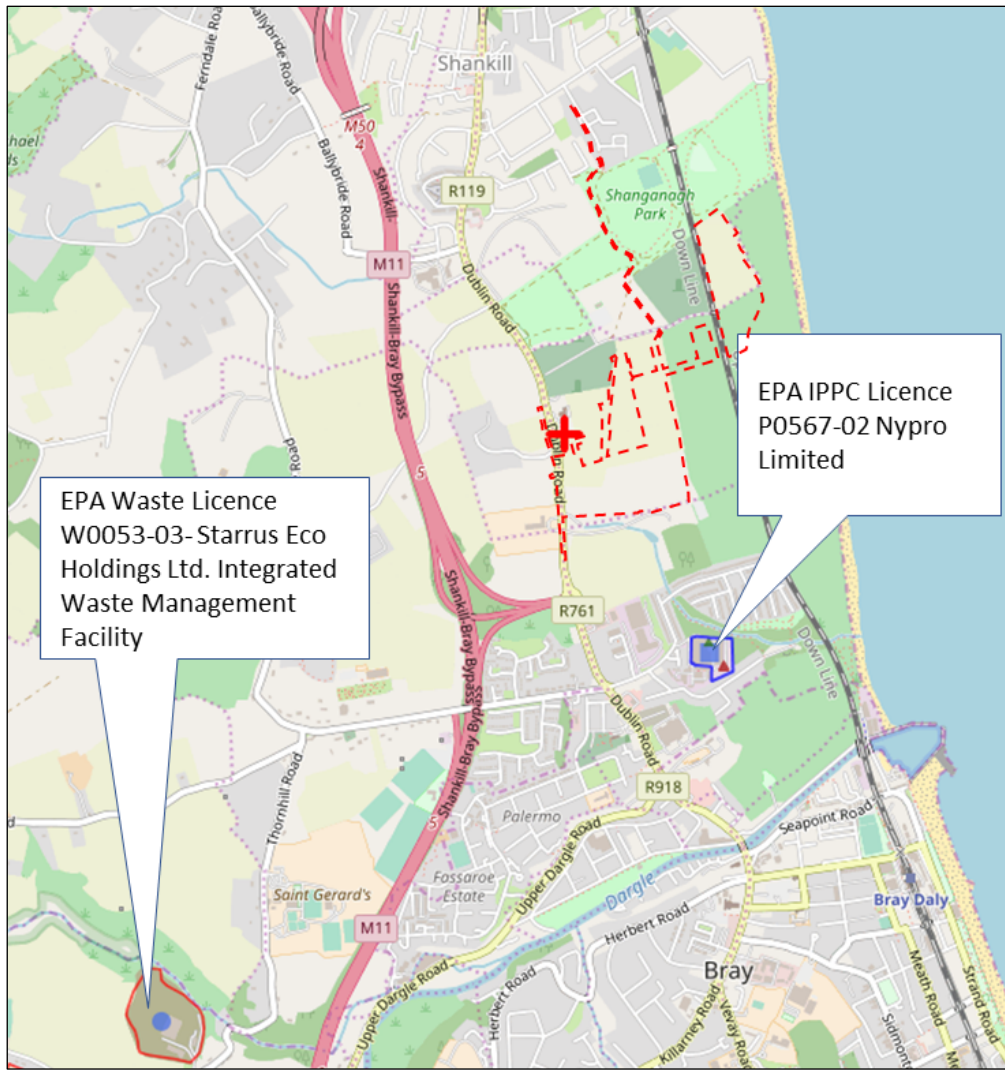


Figure 7.7: EPA Licenced Facilities and Local Authority Waste Permitted Facilities (EPA 2019)

**7.3.6 Geological Heritage Areas**

Killiney Bay geological heritage area is located c. 100m east of the area of the proposed relocated golf holes and c. 500m east of the proposed housing development site as shown in Figure 7.8 (GSI 2019). The geological heritage area is described as a 5km long coastal section which exposes a succession of several units of glacial till. It is considered a particularly impressive exposure into deep till with many sedimentological characteristics exposed (GSI, 2019).



**Figure 7.8:** Geological Heritage Areas (GSI 2019).

### 7.3.7 Geo-hazards

No landslide susceptibility issues are reported within 500m of the site (GSI, 2019). The closest reported landslide event is located c. 1.8 km southwest of the site at Hazelwood Crescent Landfill (refer to Figure 7.9).



**Figure 7.9:** Landslide Susceptibility (GSI 2019).

Available EPA radon maps shows that between five and ten per cent of the homes within the 10km grid square where the site is located, are estimated to be above the radon reference level as shown in Figure 7.10 (EPA 2019). The site is therefore not considered to be in a high radon area.

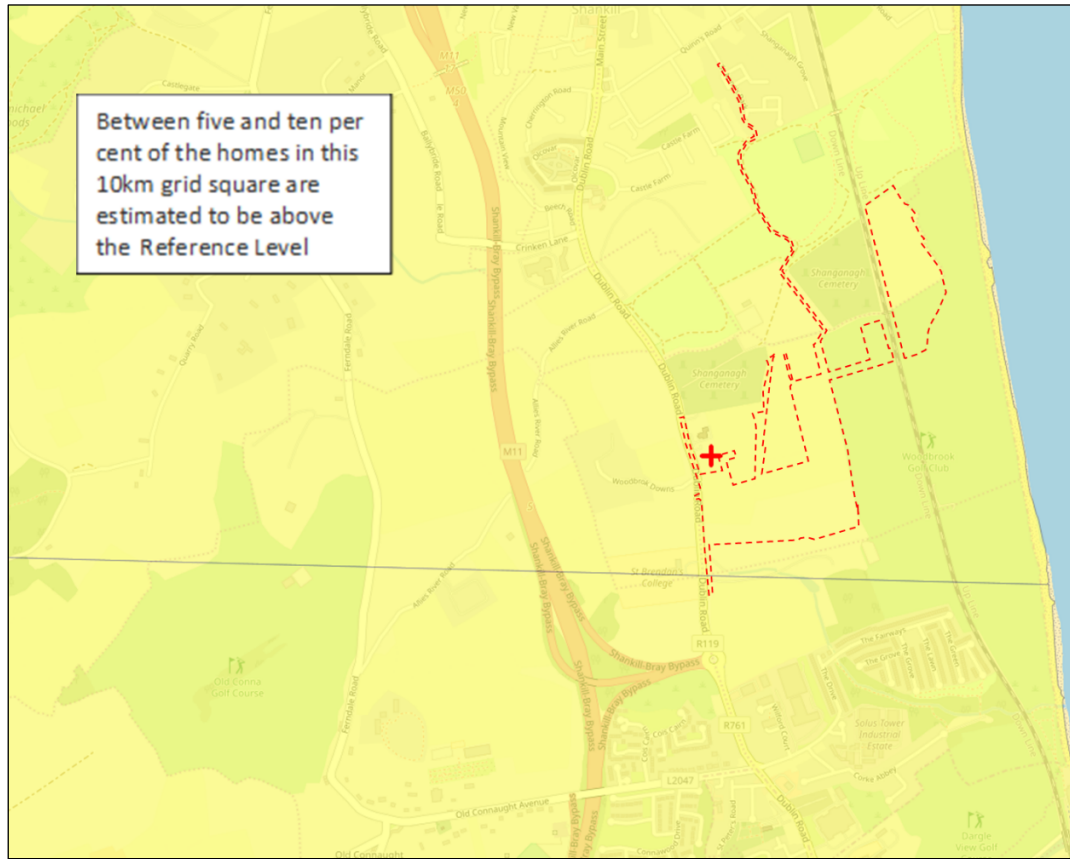


Figure 7.10: Regional Radon Levels (EPA 2019).

**7.3.8 Economic Geology**

There are no mines or mineral occurrences near the site. The closest mineral occurrence is located c. 2.5km to the south of the site as shown in Figure 7.11 (GSI 2019).

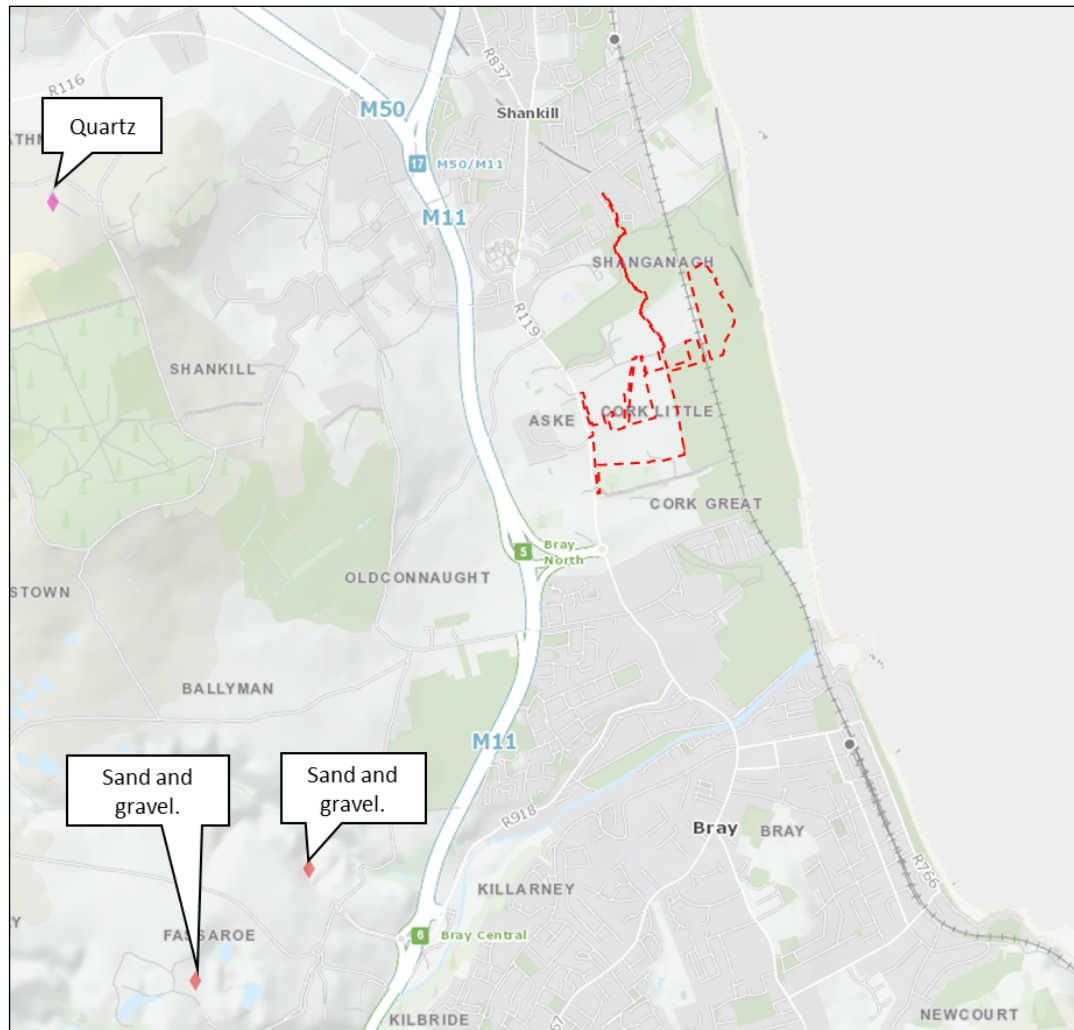


Figure 7.11: Mining Features (GSI 2019).

## 7.4 Characteristics and Potential Impacts of the Proposed Development

### 7.4.1 'Do Nothing Scenario'

The site is currently an agricultural field. The do-nothing scenario will have a neutral and imperceptible effect on the site as per Table 3.3 'Description of Effects' of the EPA guidance document 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.'

### 7.4.2 Cumulative Impacts

All relevant developments in the immediate environs of the proposed development, which have been approved but are not yet built or operational, have been reviewed as part of this assessment and key developments are summarised below;

- D14A/0872 – Church of St. James at Crinken. Planning permission granted on 08/06/2015 for a single storey extension to the ministry centre immediately to the east of the site; and,
- D17A/0065 - Woodbrook Campus Ltd. Planning permission granted on 19/12/2017 for a 56no. inpatient specialist hospital 20-30m south east of the site.

Based on the nature of the proposed developments identified above, no significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operation phases. The remainder of committed developments in the vicinity generally comprise the redevelopment or extension of existing properties.

#### 7.4.2.1 Construction Phase

##### **Characteristics of the Proposed Development on Land (including Land Take)**

Approximately 12.9Ha of good quality agricultural land will be taken out of agricultural production for the construction of housing. The area utilised for the rising main will 1.05Ha of land zoned for burial ground and for recreational use. 4.5Ha of recreational ground will be diverted from public open space and incorporated as part of Woodbrook golf course. The area of the housing development is zoned residential and is located between an area protected for Shanganagh Burial Ground to the north, and an area designated for the protection of open nature and land between urban areas to the east south and west. Housing developments are located further north with more commercial and residential areas associated with the town of Bray further south. Woodbrook golf course and the Dublin to Rosslare railway line are located to the east of the housing development site.

The area for the proposed relocated golf holes is located in an area zoned to protect and enhance the open nature of lands between urban areas.

##### **Characteristics of the Proposed Development on Soils and Geology**

Stripping of topsoil will be required across the site. It is expected that all stripped topsoil will be reused on site (incorporated into landscaping of back gardens and public open spaces).

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of surface water attenuation facilities. Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material beneath houses and roads); however, should some subsoils prove not suitable for engineering reuse onsite, such material may need to be removed and disposed offsite to a suitably licenced waste recovery / disposal facility.

Soils and potentially bedrock will be excavated during the construction of the foundations for the housing units and the drainage infrastructure. This is a direct, permanent effect on the soils and geology, however, it is not considered to be a significant adverse effect as the removal will have a negligible influence on the overall landform morphology.

Activities during construction will primarily comprise the excavation and pouring of foundations for the housing units, installation of the storm water and foul water drainage works, watermains and laying of cable ducts.

Tracked excavators and rock-breakers will likely be sufficient to excavate soils and potentially weathered/ fractured bedrock for subsequent relocation to facilitate construction works. The extent of the foundations for the housing units is likely to be less than 1m deep. The extent of excavation for service / utility trenches will vary; however, the general depth will be in the region of 1m. The maximum anticipated depth of excavation across the site is anticipated to be 2.8mbgl. All excavations are anticipated to encounter clay, sand and/or gravel.

The total volume of soil requiring excavation for the housing development and the relocated golf holes is expected to be approximately 69,434m<sup>3</sup>. It is anticipated that all the excavated material for the golf holes will be reused in the reprofiling of the golf holes. The preliminary landscape designs indicate that the majority of excess material for the proposed housing development will be re-used in the property garden areas, road side verges & road side landscaped areas and within the linear landscaped areas which contain numerous earth mounds. It is anticipated that there will be ca.38,000m<sup>3</sup> of subsoil excavated of which 29,300m<sup>3</sup> of material can be used in reprofiling landscaped areas with 8,700m<sup>3</sup> requiring offsite disposal.



The preliminary landscape design for the relocated golf holes indicates that excess material for the relocated golf holes area will be re-used for landscaping within the site.

## **7.5 Potential Impacts**

### **7.5.1 Land (Including Land Take)**

The impact on land take is likely to have a moderate negative impact on the environment of the area, in that it alters the character of the environment, albeit in a manner consistent with existing and emerging trends. The current zoning for the housing development area is A1, *'To provide for new residential communities in accordance with approved Local Area Plans'*. 1.05Ha of recreational ground and lands designated for burial ground will be required for the installation of the rising main.

### **7.5.2 Potential Soil / Bedrock impacts**

During the construction phase of the development, the following potential impacts on soils and bedrock could occur and have been assessed accordingly: -

- Stripping of topsoil may 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.
- Soils beneath the proposed development may become unnecessarily compacted by machinery during construction.
- Topsoil and subsoil may become rutted and deterioration of the topsoil layer and any exposed subsoil layers may result in erosion and generation of sediment laden runoff.
- Dust generation can also occur during extended dry weather periods as a result of construction traffic.
- Soils and bedrock may be at risk of becoming contaminated through site construction activity; in particular the risk of fuel spillages and leakage.

These are likely to result in a moderate negative impact on receiving soils and bedrock; however, any impacts are considered to be short-term and localised. Furthermore, mitigation measures will be implemented during the construction phase to avoid these potential impacts, and to address any potential waste management issues.

### **7.5.3 Ground Stability**

There is no evidence of significant historic landslides and there are no known karst features within the proposed development boundary. Industry standard health and safety practices will be implemented during the construction phase to address any potential ground stability issues associated with excavations and trenching works. Therefore, no significant negative impact, associated with ground stability, is likely.

#### **7.5.3.1 Operational Stage**

There will be a moderate negative impact on agricultural land and public open space from the operational phase. The development will have neutral permanent impact on soils and geology during the operational phase. The operational stage of the residential development consists of the typical activities in a residential area and will not involve further disturbance to the topsoil, subsoils and geology of the area. No significant cumulative impacts on soils and geology are envisaged during the operational stage.

## 7.6 Mitigation Measures

### 7.6.1 Construction Phase

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 will be located so as not to necessitate double handling.

The design of road levels and finished floor levels has been carried out in such a way as to minimise cut/fill type earthworks operations. The duration that subsoil layers are exposed to the effects of weather will be minimised. 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). 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.

The excavation of material will be minimised as much as possible to reduce the impact on soils and geology. Topsoil and any native soils that can be used for amenity purposes will be stockpiled on the proposed development area for use as required in the final landscaping of the development.

Any surplus material, or materials which are deemed not suitable for onsite reuse will be Classified as non-hazardous or hazardous in accordance with the EPA waste Classification Guidelines (2015). It will be managed, transported and disposed of in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

An Outline Construction and Demolition Waste Management Plan has been generated for the site (prepared by AWN Consulting Ltd.). A project specific Detailed Waste Management Plan will be fully implemented onsite for the duration of the project.

Mitigation measures for the prevention of soil / bedrock contamination during construction are proposed below. Mitigation measures outlined in Chapter 8: Water are also applicable to the protection of soils and geology during the construction phase: -

- Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site;
- Vehicle wheel wash facilities will be installed near any site entrances and road sweeping implemented as necessary 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;
- The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the proposed development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 8: Water. Specifically, regarding soils and geology, the following will be adhered to: -
  - Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice.
  - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the proposed development for disposal or re-cycling.
  - Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the proposed development and properly disposed of.

- All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area.
- All plant and machinery will be serviced before being mobilised to site.
- No plant maintenance will be completed on site, any broken-down plant will be removed from site to be fixed.
- Refuelling will be completed in a controlled manner using drip trays at all times.
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water.
- Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores.
- Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored.
- Ancillary equipment such as hoses and pipes will be contained within the bund.
- Taps, nozzles or valves will be fitted with a lock system.
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage.
- Drip-trays will be used for fixed or mobile plant such as pumps and generators to retain oil leaks and spills.
- Only designated trained operators will be authorised to refuel plant on site.
- Procedures and contingency plans will be set up to deal with emergency accidents or spills.
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment.
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the site. This will minimise the risk of soils and bedrock becoming contaminated through site activity.
- The highest standards of site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively.
- All excavated materials will be stored away from the excavations, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m.
- A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the site.

All of the above mitigation measures will form part of a site-specific Construction Environmental Management Plan (CEMP) which will be in operation during the construction phase.

## 7.6.2 Operational Phase

The area used for the rising mains will be reinstated. The land used for the rising mains can continue to be used for recreational purposes and incorporated into the pathways and landscaping areas associated with the burial grounds of Shanganagh Cemetery. 2.96 Ha of the main housing development area will be designated public open space. No mitigation measures will be required during the operational phase.

## **7.7 Residual Impacts**

### **7.7.1 Construction Phase**

The impact on land take is likely to have a moderate negative impact on the environment of the area, in that it alters the character of the environment, albeit in a manner consistent with existing and emerging trends.

Implementation of the measures outlined above 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 slight negative and short term in duration. The primary residual impact is the potential removal of material unsuitable for reuse as fill material; however, the residual impact is likely to be slight negative and permanent.

### **7.7.2 Operational Phase**

The impact on land take is likely to have a moderate negative permanent impact on the environment of the area (in that it alters the character of the environment); however, this change is consistent with existing and emerging trends. There are no predicted residual impacts, with respect to soils and geology, arising from the operational phase.

## **7.8 Reinstatement**

All temporary construction compounds and site entrances 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 appropriately licenced facility.