CHAPTER 7

Land & Soils

7.0 LAND AND SOILS

7.1 INTRODUCTION

This chapter was prepared by DBFL Consulting Engineers and assesses and evaluates the impact of the proposed development on the Site's soils and lands during the demolition, construction and operational phases of the proposed development including cut and fill works. It also identifies the characteristics, predicted potential impacts, mitigation measures and residual impacts arising from the proposed development.

This chapter was prepared by Niall O' Hare BEng (Hons) MSc CEng MICE, MIEI and Kevin Sturgeon BEng (Hons) MSc CEng MIEI of DBFL Consulting Engineers.

Niall is an Associate and Chartered Engineer with 9 years experience post graduate and post 4 years in the design and planning of civil engineering deliverables of residential infrasturture projects including, design drawings, specifications, design reports, Preliminary Construction and Environmental Management Plans, Site Specific Flood Risk Assessments and compiling Land and Soils Chapters for Environmental Impact Assessment Reports.

Kevin is a Director and Chartered Engineer with over 22 years' experience in Consulting Civil engineering design for both public and private sector projects. His expertise includes civil infrastructure design, planning and procurement for roads, drainage, site development, water main distribution & supply and flood analysis projects from feasibility stage through option appraisal, planning, detailed design, tender & procurement to final construction. Kevin has been with DBFL for over 15 years and during this time has played a key role in infrastructure design for a range of projects including road schemes, drainage upgrades, wigsl#ater-main improvement schemes, site development and flood analysis for a range of projects.

7.2 METHODOLOGY

7.2.1 Guidelines

The assessment of the potential impact of the proposed development on land and soils was undertaken with reference to the methodology and specific criteria set out in the following documents:

- EPA Guidelines on Information to be Contained in an Environmental Impact Statement (2022),
- EIA Directive 2014/EU/52,
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003),
- EPA Draft EIAR Guidelines 2017,
- Environmental Impact Assessment (EIA),
- Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003),
- Development Management Guidelines (DoEHLG, 2007) and Guidelines for Planning Authorities and
- An Bord Pleanála on Carrying out Environmental Impact Assessments (DoECLG, March 2013).

Impacts are characterised using Table 3.3 of the EPA Guidelines on Information to be contained in an Environmental Impact Assessment (May 2022).

7.2.2 Consultation

The following statutory body information sources were consulted:

- Geological Survey of Ireland (GSI) interactive mapping.
- Environmental Protection Agency (EPA) interactive mapping.
- Teagasc soil and sub-soil data interactive mapping.
- Ordnance Survey Ireland (OSI) mapping.

The following investigative surveys / reports were consulted:

- Site Investigations undertaken by IGSL Ltd and completed January comprising, 24nr Dynamic probing techniques, 25nr trial pits, 5nr rotary drilled cores, 15 infiltriation tests, and groundwater monitoring located within 8nr standpipes. Refer to Ground Investigation Report by Ground Investigations Ireland Ltd included with application; (Included as Appendix B of the Infrastructure Design Report prepared by DBFL).
- Environmental Site Assessment & Waste Classification, Ballyoulster, Co. Kildare, January 2022, undertaken by O'Callaghan Moran and discussed in the Ground Investigation Report; (Included as Appendix A of the Infrastructure Design Report prepared by DBFL).
- Topographical survey (see existing survey plans included in OMP drawing pack).
- Site inspection / walkover survey.

7.2.3 Desktop Study

A desktop study for the site was completed and the relevant bodies and information sources referenced above used as information sources.

7.2.4 Application of Methodology / Study Methodology

The methodology was applied as per the guidelines referenced above.

7.2.5 Study Area

The proposed development ("the site") is located at Dublin Road and Shinkeen Road, Ballyoulster and Donaghcumper, Celbridge, Co. Kildare. The site is currently greenfield and located to the east of Celbridge town along R403 Dublin Road and the Shinkeen Road leading onto the Hazelhatch Road. Existing residential development is located to the south, west, and north-east of the development. R403 Dublin Road is located along the site's northern boundary with the Shinkeen Road located along the western boundary. The site measures approximately 13.4 ha in extent. It is a greenfield site which is divided into three number sub-site areas referred to as; Site A, Site B and Site C. The Shinkeen Stream spans the south-eastern boundary of site's A and B respectively and the Hazelhatch Stream is located on the western boundary.

7.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

Details of the existing land / soils receiving environment / baseline scenario are detailed in the following sections which were compiled based on the information sources and consultations above.

7.3.1 Topography and Land Use

The subject lands are predominately flat in character with a gentle slope from the central spine of the site to the watercourses on the eastern and western sides. The site is bisected by the Shinkeen Stream to the east of the development and there is a further stream known as the Hazelhatch watercourse to the west. The character of the Shinkeen watercourse is a very deep watercourse of circa 3-4m deep banks. The depth of this stream is a fundamental aspect to the flood zoning in this area and thus these levels will not be adjusted as part of the new development.

From the central spines of each sub-site the lands falls from towards its West and Eastern boundary edges at gradients ranging from 1/200 to 1/350, and the site falls from the Southern boundary to the Northern boundary at gradients ranging from 1/150 to 1/240 within sub-site B.

Within BH04 Made Ground was found four meters below ground level under the subsoil layer. The made ground was found to be consisting of gravelly cobbles with concrete. These made ground is located within the flood plain within Site A and therefore will not be disturbed during construction. Further investigations will be undertaken at construction stage to determine the extent of the made ground, however, it is not intended to massively impact on the proposed development.

7.3.2 Topsoil & Soil

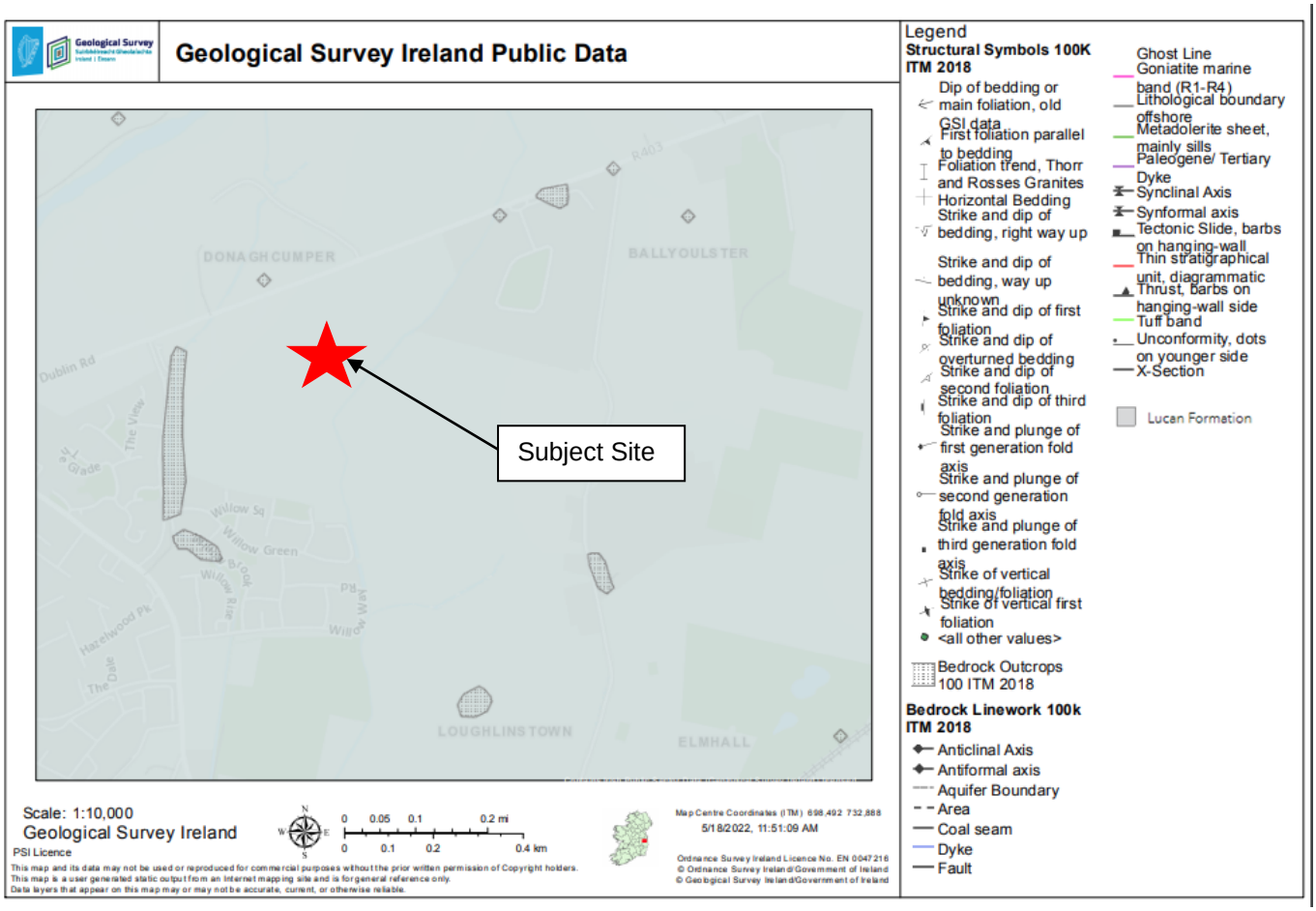
The results of site investigation works for the site indicate existing soil conditions as generally comprising a 0.3m thick topsoil layer overlying firm brown, black and grey sandy gravelly CLAY over firm to stiff brown slightly sandy

gravelly CLAY with occasional cobbles and boulders over grey sandy clayey silty angular subrounded fine to course gravel.

7.3.3 Bedrock Geology

Rock was encountered in all boreholes with the exception of RC04 and RC07 and was described as “weathered rockhead consisting of grey-black, strong, becoming locally weak, medium to thinly bedded, fine grained limestone with subordinate shaley mudstone”. The site investigations results are consistent with GSI bedrock mapping for the area which identifies the bedrock geology underlying the site and immediate vicinity as the Lucan Formation and described as “Dark limestone & shale”, refer to figure 5.1.

Figure 7.1 – Bedrock Unit (Courtesy of GSI)

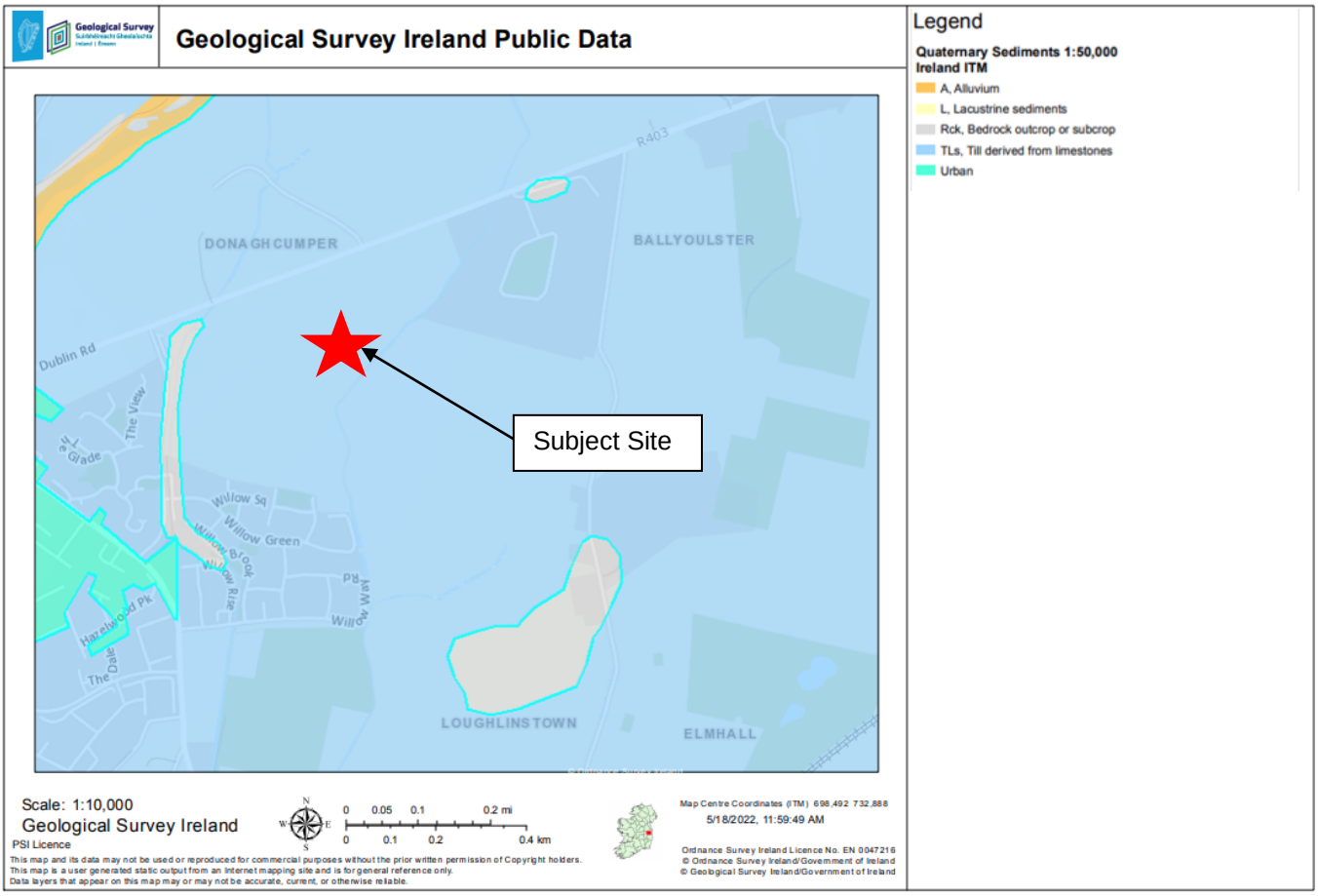


In general the depth to bedrock varies from 1.3m in Borehole 01 to 4m below ground level in borehole 08. Please refer to GSI located within Appendix B – Ground Investigations Report of the Infrastructure Design Report. Site Investigations also indicated in one number location (RC04) Made ground found 4m below ground level up to depths of 8m. There is no proposed works located within this area.

Quaternary & Soil

From a review of the GSI interactive mapping (Soils and Subsoils Map), the site’s subsoil is described as “till” derived chiefly from limestone. This correlates with the site investigation results which indicate the existing ground conditions as generally comprising a 0.3m thick topsoil layer overlying brown, black and grey sandy gravelly CLAY with cobbles and boulders over brown slightly sandy gravelly clay with occasional cobbles and boulders. The limestone rock has been noted at 1.3m below the ground in places.

Figure 7.2 – Quaternary Sediments (Courtesy of GSI)

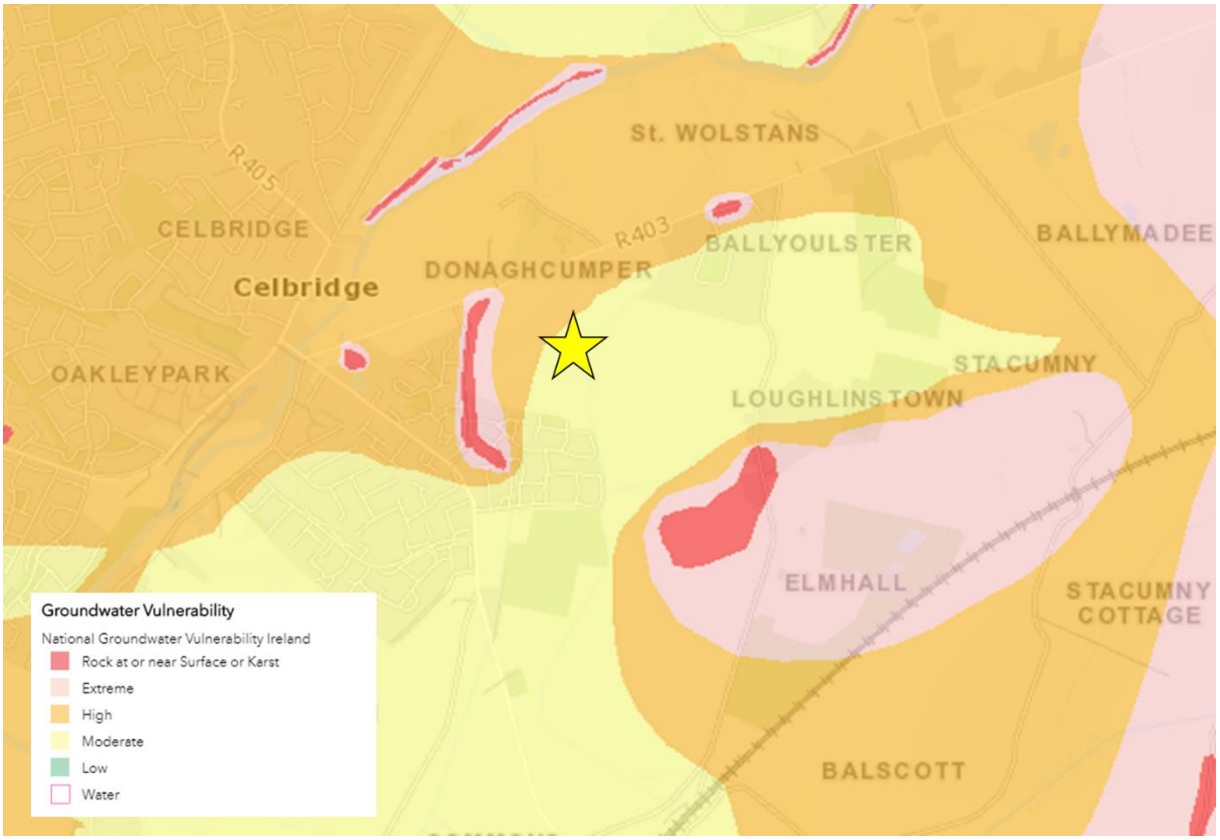


7.3.4 Hydrogeological aspects

A desktop study did not identify any formal designated protection or conservation areas, karst features, geological heritage areas, geo-hazards, or mines / mineral extract in the immediate area of the site.

GSI interactive mapping classifies the site's groundwater vulnerability as "*moderate*" for the majority of the site with western and Northern boundaries deemed "*high*" and along the Hazelhatch stream as "*extreme*". The underlying aquifers are classified as "*Locally important aquifer – Bedrock which is moderately productive only in local zones*", refer also to EIAR Chapter 8.0 Water, Hydrogeology & Hydrology for further information regarding Hydrogeology. Site investigations indicate that the vulnerability classification of the aquifer will be lowerwhere substantial overburden is present and provides protection to the bedrock.

Figure 7.1 – Groundwater Vulnerability (Courtesy of GSI)



Results of surface water soakaway tests undertaken on the site indicate that the permeability of the ground is very low with little infiltration occurring over the site. As such the groundwater vulnerability may be less vulnerable due to the substantial depths of low permeability made ground overburden on the site than indicated on the GSI interactive mapping.

7.3.5 Contaminated Land

A total of 19 soil samples were tested in accordance with the RILTA Suite, which is used to determine the suitability of soils for disposal to a landfill. The RILTA suite includes Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), TPH-CWG, BTEX, PCB and Total Organic Carbon (TOC) carried out on dry soil samples. Also included are leachate analyses, whereby leachate is generated in accordance with CEN 10:1 specification and this is tested for the presence of recognised contaminants including Heavy Metals, Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). An Asbestos Screen is also included in the RILTA Suite

As part of the IGSL Ltd remit, O'Callaghan Moran & Associates (OCM) were instructed to undertake a Waste Characterisation Asssement of the sampes from 19 Nr trial pits, installed as a site near Ballyoulster, Celbridge Co.Kildare. All samples are classified as non-hazourdous. Asbestos was not detected in any of the samples. Within the report is provides recommendations for the the disposal / handling of waste material. It concluded that out of the 19 samples:

- 10 samples meet the Soil recovery criterial 17 05 04 Category A
- 3 samples meet the inert waste limits (Category B1) and are suitable for recovery / disposal at an inert landfill.
- 6 Samples meet the Non Hazourdous Category C wastes suitable for disposal to non-hazourdous landfill.

Site investigations indicated within 1nr rotary core (RC04) of Made ground commencing 4m below ground level and consisting of gravelly cobbles with concrete. It is not proposed to disturb this made ground during the construction phase as no works are proposed in this vicinity. With regards to the foundations of the proposed bridge structure

careful consideration will be taken to determine the full extent and appropriate foundations to be placed, if made ground is found within the vicinity of the bridge structure, this material will be removed and backfilled appropriately.

7.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The Ballyoulster SHD Phase 1 development comprises the construction of 344 units totaling 54 no. 1 beds, 30 no. 2 beds, 210 no. 3 beds and 50 no. 4 beds), a childcare facility with a GFA of c. 369 sq.m, public and communal open space, landscaping, car and cycle parking spaces, provision of an access road from Dublin Road and Shinkeen Road, associated vehicular accesses, internal roads, pedestrian and cycle paths, bin storage, pumping station and all associated site and infrastructural worksblocks as well as associated road infrastructure and open space, refer to Chapter 3.0 (Description of Development and Alternatives) for a detailed site and development description.

It is anticipated that the main development characteristics impacting soils and geology comprise the following:

- General construction activities across most of the site.
- Excavations to facilitate construction of foundations, road construction, landscaping features and installation of services including drainage, utilities stormwater storage and SUDS features.
- Changes to ground levels across the site to facilitate final development levels.
- Disposal of substantial quantities of excavated soil off-site to facilitate the infrastructure
- Importation of construction materials to the site including incorporating same below the ground.

7.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

7.5.1 Construction Phase

This section identifies potential and significant impacts to the soil and geology of the subject site caused by the construction of the proposed development.

7.5.1.1 Stripping of Topsoil

Removal of the existing topsoil layer will be required across most of the site to facilitate the construction activities and development areas with the excetion of three areas. It is not proposed to strip topsoil from the floodplain open space area adjacent to the Shinkeen watercourse within Site A or to remove the topsoil within the archaelogical interest area located within site B apart from what is required as part of the Archelogical field works to be undertaken and as detailed within Chapter 4. It is also not proposed to disturned the solis along the riparian strips of either Hazelhatch or Shinkeen Streams apart from that required to build the brige crossings. Refer to chapter 5 of this EIAR and the Site Specific Flood Risk Assessment Report that as been completed as part of this application.

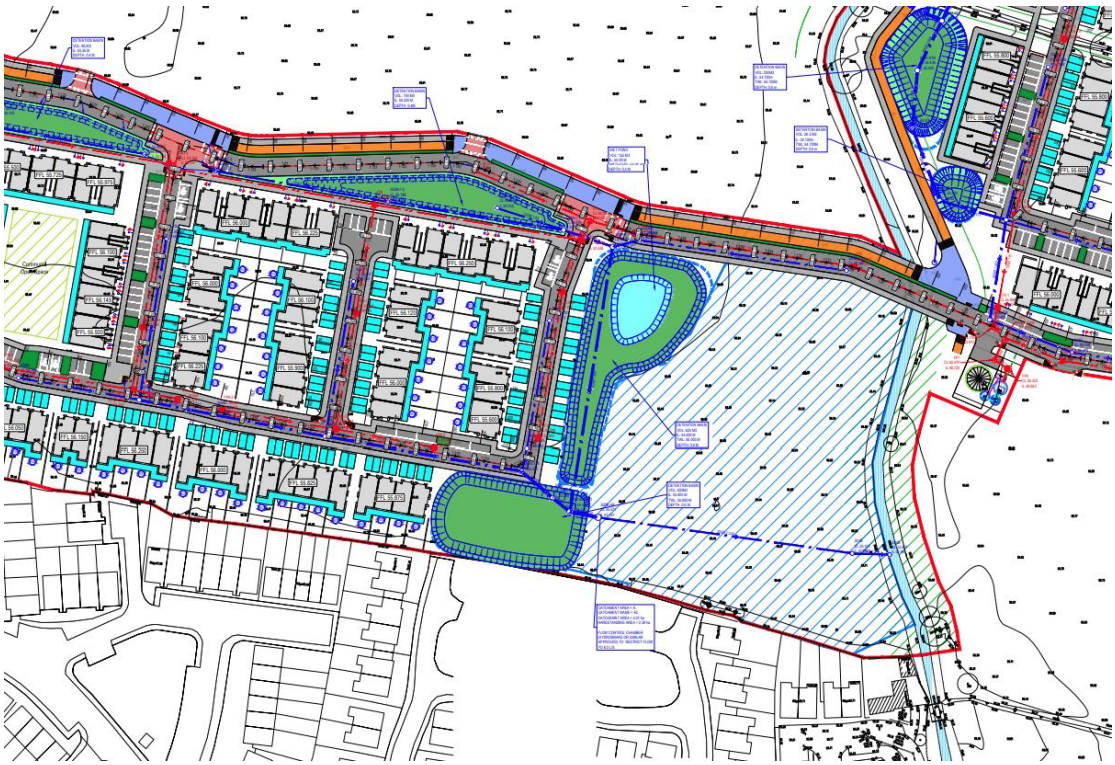


Figure 7.4 – Flood Plain within Site A – (Blue Hatching) Topsoil not proposed to be stripped only locally landscaped

Figure 7.5 – Archeological preservation ares (Purple Hatching) – Topsoil not proposed to be stripped apart from that required as part of the Archeological field works.

In these areas, topsoil will only be locally disturbed to facilitate local landscaping and field works which will then be reinstated. Stripped topsoil required to form open space attenuations features shall be removed stored and relaid in line with the architect recommendations. All other soft landscaping to the remainder of the development areas will be

undertaken using stored topsoil coming from the stripped foundations and placed at the later stages of the construction phase.

Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weathering and construction traffic. This in turn could result in potential subsoil erosion, deterioration and/or generation of sediment laden runoff.

The works proposals include for re-use of stripped topsoil in all open space areas. There will be no change to the soils or soil levels within the floodplain area and area of archeological interest. The Phasing of the construction works will dictate the extent of soil required to be removed at each stage however thre will be specific storage areas provided for the reuse of the soil to prevent the imported topsoil being brought into the site. It is not proposed to import any topsoil for the construction works. Table 4.1 below provides extimates of the soil required to be disturbed, reused and removed from site based on the ground site investigation.

Table 7.1 – Estimated Excavated Topsoil Volumes

	Volume (m^3)
Total Topsoil within site (0.2 - 0.3m thick layer)	33,400
Topsoil Strip (0.2 to 0.3m thick layer)	27,600
Topsoil undisturbed (floodplain, archeolgical, riparian strip)	5,800
Topsil Reuse	9,000
Cumulative total topsoil remain on site	14,800
Cumulative total Topsoil disposed	18,600

7.5.1.2 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required to facilitate construction of foundations for the housing and apartments, road construction, landscaping features and installation of services such as drainage, utilities, attenution ponds, strategic pumping station and SUDS features. Further excavations will be required for changing / modifying existing ground levels to meet final finish ground levels. Road levels and Finnished Floor Levels have been designed to limit the waste removed from site.

Most of the sub-soil excavations will be related to forming foundations for the housing units and the and the open attenuation features.

This will generate in the region of 8,850m3 of which 80% of the material will be existing Clay. The levels of the roads and housing units have been made to reduce the removal of sub-soil from the site.

The remaining volumes of excavated material will require to be disposed off-site since they cannot be incorporated into the works. Approximate quantities of cut and fill and excess soil volumes are detailed in Table 7.2. It is proposed that approximately 4,800m3 of excavated material will be reused as backfill to trenches, backfill to stormwater storage and placement in landscaping areas. All material to be disposed off-site will be subject to EPA licensing. The total disposed off site is estimated to be 8,100m3.

Table 7.2 – Estimated Cut/Fill Volumes (Approximate)

Excavations in Sub-Soil	**Volume (m^3)**
Foundations Cut	4,500
Road Construction Cut	250
Services Installation Cut	3800
Stormwater Storage Cut	4350
Total Cut	**12900**
Fill to Foundations	2,200

Fill to Trenches	2400
Fill to SW Storage Areas	200
Total Fill (re-use on site)	4,800
Net Disposal of Excess Excavated Material	**8,100**

7.5.1.3 Excavation of Bedrock

It is envisaged that the development proposals will require excavations at bedrock level for the installation of the infrastructure and for the pumping station. This amount of excavated material is expected to be re-used on site as general backfill material and capping material subject to appropriate testing.

Excavations in Rock	**Volume (m^3)**
Trench's	1700
Pumping Station	500
Total Cut	**2200**
Total rock to be reused for capping (crushed and subject to testing)	2,200
Net Disposal of Rock	**0**

7.5.1.4 Construction Traffic

Approximately 27,600m^3 (approximately 0.25m depth of topsoil across the site) of topsoil will be excavated from the existing ground levels to form building platforms and roads for the development. This will result in exposure of the subsoil to various elements including weather and construction traffic. Topsoil for re-use will be stored in stockpiles for its protection and retained for future use in landscaping works. Excess topsoil at the start of construction activities will be removed off-site by lorries under licence. New topsoil will be imported to the site at the end of the construction phase by lorries. These activities will generate associated construction traffic on the road network.

Following topsoil stripping there is a risk of rutting and deterioration of the exposed subsoil layers by earthworks plant and construction traffic during the construction period. This may cause erosion, generation of sediment laden run-off and mud being deposited on adjacent roads from construction vehicles. It is proposed to provide a sacrificial stone layer on all haulage roads however it is not envisaged that there would be any adverse impact on the existing natural strength or quality of the remaining subsoil on completion. As such the potential impact is likely to be short term, moderate impact on subsoil surfaces.

Excavation of subsoil layers is required to facilitate other site development works, in particular the construction of foundations, foul and surface water sewers and open surface water storage basins and ponds (attenuation).

It will be necessary to import materials to site, in particular large volumes of imported stone for construction of the roads, foundations and services, large quantities of concrete, bricks, steel, tar, windows, fittings, pipes, materials etc. will all be mainly delivered to site by lorry. These activities will generate a large amount of construction vehicle trips (mostly lorries) on the road network and local area during the construction phase of the works.

The construction of the development will require large numbers of construction workers to travel to and from the site daily which will generate additional traffic on the existing local road network for the construction phase of the project. Refer to Chapter 12 Traffic & Transport for further details and information on the traffic impacts.

The potential impact of construction traffic will be a not significant negative impact over the duration of the construction programme.

7.5.1.5 Accidental Spills and Leaks

During the construction phase there is a risk of accidental pollution related to the following construction activities;

- 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.

Potential accidental spills and leaks could cause contamination of the existing topsoil, subsoils or bedrock or groundwater underlying the site.

There is a potential risk of localised contamination of the groundwater due to construction activities i.e. from accidental spillages, leaks etc. resulting in a potential Permanent Negative impact on the groundwater (in the absence of mitigation). The gravelly clay on the subject site will limit the potential for contamination to infiltrate into the underlying groundwater.

7.5.2 Geological Environment

It is not envisaged that the proposed development will have any discernible impact on the geological environment. Excavations associated with development of the site have been designed as shallow as possible and are located mainly above bedrock level. Bedrock is only expected to be encountered at for the installation of the foul sewer (main spine trunk) and the WwPS.

7.5.3 Human Health

A potential risk to human health due to the development could be the short term construction activities which may result in direct contact, ingestion or inhalation by construction workers/personell on site with the soils (e.g. construction workers exposed to dust generated by the construction activities within the site which may expose soils in dry weather to wind). Further risks to human health include accidental spills / leaks of hydrocarbons / oils relating to construction activities. See section 7.5.1.5 above for more details.

7.5.4 Operational Phase

On completion of the construction phase, it is not envisaged that there would be further direct impact on the existing soils or geology on the site. Soft landscaping, planting, road surface and hard landscaping areas within the development will protect the soils from exposure and erosion. Properly designed and constructed hard landscaping, site services and stormwater collection will prevent concentrated run-off from eroding existing soils or banks or causing contamination.

The development when constructed will create additional impermeable surface areas. The type of development (residential) and the proposed layout comprising few roads or parking areas at ground level, has a low risk of impacting run-off water quality. Run-off from the development's impermeable areas is designed to be collected via a new stormwater network which incorporates on-line attenuation storage systems and SuDS features such as filter drains, bio-retention areas and tree pits, swales, to improve water quality. Site investigation results indicate that the existing subsoil has low permeability and as such only a small quantity of the run-off collected from impermeable areas during the operational phase will be dissipated via local infiltration into the soils. This is in accordance with the principles of SuDS design. The day-to-day operational activities of the completed development are therefore unlikely to have any direct impact on the groundwater environment or water quality.

Since operational run-off is collected into concentrated locations an associated minor impact will be reduction of the stormwater infiltration across the full site area i.e. the "greenfield" infiltration potential will be reduced.

Also the risk of accidental spills or leaks of fuels and oils from vehicles on the site may be collected via run-off and directed into the stormwater network / SUDS features which could lead to risk of impacting existing soils where infiltration is facilitated.

(EIAR Chapter 8 provides further details regarding the strategy in relation to the development's stormwater management for the subject site.)

7.5.5 "Do-Nothing" Scenario

If the proposed development did not proceed there would be no impact on the existing land, soils or geology of the site. It is envisaged that the land use would remain unchanged, and the large volumes of excess material would not be transferred to other locations for disposal.

7.6 MITIGATION MEASURES

7.6.1 Incorporated Design Mitigation

Mitigations incorporated into the design of the proposed development include:

- Proposed development levels are designed to minimise cut/fill type earthworks and volume of material to be disposed off-site where possible.
- Design of site services / drainage works are in accordance with the relevant design guidance.
- Excavated material to be removed off-site to be undertaken to the relevant EPA licensing requirements.
- Landscaping works for the development when incorporated into the scheme are designed to protect the soils from weathering and erosion.
- Appropriately designed site services / drainage / sewers will protect the soils and geology from risk of contamination arising from the development such as light liquids separator or SuDS treatment train.
- Soil sampling and analysis has already been undertaken. If during the construction phase should any excavated material differ significantly in nature from the classifications and assessment made then separate stockpiling and analysis of that material will be undertaken.

7.6.2 Construction Phase Mitigation

A Preliminary Construction Environmental Management Plan (PCEMP) is included with the planning application. This plan will be developed further by the contractor into a Construction and Environment Management Plan for the construction phase. The PCEMP includes a range of site specific measures including the following mitigation measures in relation to soils, and these should be reflected in the CEMP at construction stage:

L&S CONST 1: Construction Environmental Management Plan (CEMP)
A Construction Environmental Management Plan (CEMP) shall be prepared and agreed with the Planning Authority prior to commencement of development, and include the following mitigation measures:

- Stripping of topsoil to be carried out in a controlled and carefully managed way and coordinated with the proposed staging for the development.
- Topsoil stockpiles to be protected for the duration of the works and not located in areas where sediment laden runoff may enter watercourses.
- Topsoil stockpiles to be located on site so as not to necessitate double handling.
- Topsoil to be re-used throughout the development in landscaping and public open spaces / linear park.
- Disturbed subsoil layers to be stabilised as soon as practicable - backfilling of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping, to be carried out promptly to minimise the duration that subsoil layers are exposed to the effects of weather and construction vehicles.
- Stockpiles of excavated subsoil material to be protected for the duration of the works and located separate to the topsoil stockpiles.
- Construction site mitigation such as wheel wash and dust suppression measures to be implemented as recommended the PCEMP.
- Measures to be implemented to capture and treat sediment laden surface water runoff especially from basement excavations and stripped land (e.g. sediment tanks, surface water inlet protection and earth bunding adjacent to open drainage ditches).
- Where feasible, excavated subsoil material to be reused as part of the site development works (e.g. for landscaping works and for backfill to basements and trenches under non-trafficked areas).

- Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes on the site and entering the site.
- All oils, fuels, paints and other chemicals to be stored in a secure bunded hardstanding area.
- Refuelling and servicing of construction machinery to take place in a designated hardstanding area, remote from surface water inlets (when it is not possible to carry out such activities off-site).
- Good housekeeping (site clean-ups, use of disposal bins, etc.) on the site project.
- Any hazardous materials to be stored within secondary containment designed to retain at least 110% of the storage contents - to prevent the accidental release (fuels, paints, cleaning agents, etc.) with bunds for oil/diesel storage tanks.
- Any material removed from site shall be classified before removal to ensure it is disposed of to an appropriately licensed landfill or recovery facility in accordance with The Waste Management (Hazardous Waste) Regulations 1998. Unsuitable material that cannot be reused on site to be disposed off-site under license.
- Where bedrock / boulders are encountered in excavations, option to crush and reuse to be considered depending on quantity of material excavated. Screened material may be reused as a fill material e.g. in road construction and backfill to service trenches.
- Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material beneath roads) however, unsuitable excavated subsoil is expected and will have to be removed to an approved landfill.
- The Environmental Site Assessment & Waste Classification report O'Callaghan Moran & Associates (OCM) (included in Appendix B of the Infrastructure Design Report) recommend that a copy of the report be provided in full to the relevant waste management facilities to which the made ground and subsoils will be consigned to confirm their suitability of acceptance.

7.6.3 Operational Phase

Mitigation measures envisaged during the operational phase include:

L&S OPERA 1: Sustainable Urban Drainage

- Ensuring regular maintenance of site services, SuDS features and attenuation systems such that they operate as designed.
- Emptying oil separators as per manufacturer's operation and maintenance recommendations to mitigate against risk of spillage / leaks into the soils.

7.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

The predicted residual impact of the construction and operation activities following implementation of the mitigation measures included in design and construction in Section 5.6 above and the PCEMP is summarised below.

Topsoil
Quantity of topsoil material removed off-site to facilitate the development is unchanged from the current scenario. Impact will be permanent and slight.
Following implementation of mitigation measures included in section 7.6 and the PCEMP the risk of deterioration or erosion during construction will be temporary and slight.
Land use change from an agricultural / scrub area to a residential development during operational phase with associated public open space and landscaped areas will be permanent change to the existing top soil condition. Impact will be permanent and negligible.
Land use change from agricultural to landscaped open space within the floodplain during operational phase will be a permanent change. Impact is negligible to the top soil condition.

Sub-soil
The impact on land, soil, geology and hydrogeology from accidental spillages of fuel and lubricants used during the construction phase of the development is predicted to be minimal when stored and used in a responsible manner.

After implementation of the mitigation measures recommended in Section 7.6 and the PCEMP for the construction phase, the proposed development will not give rise to any significant long-term adverse impact. Slight negative impacts during the construction phase will be short term only in duration.

Implementation of the measures outlined in Section 7.6 and the PCEMP will ensure that the potential impacts of the development on soils and the geological environment are minimised during the construction phase and that any residual impacts will be short term and imperceptible.

Residual impacts from earthworks haulage and the risk of contamination of groundwater are deemed to be of minor risk. The residual impacts for a residential development, and open space are deemed to be imperceptible post construction (during the operational phase).

Landscaping for the developments will reduce the initial impact from the construction phase and will protect the soils again from weathering and erosion. The impacts on the underlying bedrock geology arising from the construction phase will be imperceptible. The greatest impact will be to the soils from the construction activity as soil levels will be greatly altered throughout. However final landscaping should reduce and address these impacts. It is anticipated that the impact on soils arising from the construction phase will be short term and moderate.

It is not envisaged that the development proposals will require excavations at bedrock level with the exception of the proposed wastewater pumping station and it is not proposed to use piles for any of the foundations. For these reasons, the potential impact is negligible on the groundwater contained within the bedrock aquifer. As a result, its significance is imperceptible

The impacts on the underlying bedrock geology arising from the construction phase will be imperceptible. The greatest impact will be to the soils from the construction activity as soil levels will be altered throughout. However final landscaping should reduce and address these impacts.

Impact on the soil resulting from the proposed operational phase of the development is anticipated to be imperceptile. Once the development is completed, risks to the land and soils will be from pollutants deriving from the use of the apartments and/or from contaminated surface water run-off.

Refer to Chapter 8 Water further information and details relating to water, hydrogeology and hydrology.

7.8 "WORST-CASE" SCENARIO

7.8.1 Construction Phase

Under a 'worst case' scenario none of the mitigation measures are implemented. This could result in the accidental release of fuel, oil, paints or other hazardous material could occur on site during the construction phase, through the failure of secondary containment or a materials handling accident on the site. If this were to occur over open ground, then these materials could infiltrate through the soil contaminating the soil zone. If the materials were not recovered promptly, then the contaminants may contaminate the down gradient groundwater and the floodplane where overburden is more shallow above bedrock. Refer to Chapter 8 Water further information and details relating to water, hydrogeology and hydrology.

7.8.2 Operational Phase

Should any other developments arise in the vicinity of the proposed development, significant impacts are not anticipated as long as appropriate mitigation measures are implemented.

7.9 MONITORING

Construction phase monitoring relates to the good maintenance of mitigation measures outlined above in section 7.6 including the project specific Construction Management Plan (PCEMP). Soil removed during the construction phase is to be monitored to maximise potential for re-use on site. Monitoring of any hazardous material stored on-site will

form part of the proposed Resource (Construction) Waste Management Plan. A dust management/monitoring programme should be implemented in accordance with the mitigation measures in section 7.6 and the PCEMP.

7.9.1 Monitoring measures – construction

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

- Contractors will be recommended to adhere to the CEMP.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-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 of vehicle wheel wash facilities.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site)
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site. Any contaminated soil encountered and not identified on site investigations will be analysed and disposed off at a suitable licensed facility.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

7.9.2 Monitoring measures – operational phase

No ongoing monitoring will be required during the operational phase.

7.10 REINSTATEMENT

There is no requirement to assess if these lands can be fully reinstated to green field in the future scenario.

7.11 DIFFICULTIES ENCOUNTERED

No particular difficulties were encountered in completing this section. It is noted that all volumes calculated are estimated volumes based on similar schemes and review of proposals. Actual volumes / amounts may change slightly based on final detailed design and condition of soils when exposed / excavated.

7.12 CUMULATIVE IMPACTS

The primary potential cumulative impact considered is local increase in hard standing and subsequent decrease in local groundwater recharge.

As part of the proposed developments features such as open bottom attenuation, swales/bio-retention areas, filter strips, tree pits, green roofs and surface water runoff from roofs will be routed to Suds features as part of the design which all promote groundwater recharge. Given these features and the geological and hydrogeological environments of the proposed development, i.e. the "local important" bedrock aquifer, the potential cumulative impact to the land, soils, geology and hydrogeology of the local and surrounding areas is deemed to be insignificant.

Each project currently permitted or under construction is subject to EIA and/or planning conditions which include appropriate mitigation measures to minimise impacts on the land, geological and hydrogeological environment. Cumulative impacts, if any, will be limited to the construction stage and will, therefore, be temporary to short-term in duration. As long as mitigation measures for the developments are carried out as permitted, there will be no cumulative impacts on the land, geological and hydrogeological environment.

Overall, the cumulative impact of the construction of the proposed development with are predicted to be neutral in terms of quality and of an imperceptible significance (temporary in duration).

Should any future developments be under construction or planned in the vicinity of the site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

There are no predicted cumulative impacts arising from the construction or operational phase.

7.13 INTERACTIONS

The most significant interactions with land, soils and geology are with water, hydrogeology and hydrology. Due to the inter-relationship between groundwater and surface water the discussed impacts are considered applicable to Chapter 8. The mitigation measures that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all surface and groundwater legislative limits and therefore the predicted impact is short-term, negative and imperceptible with respect to the construction phase and long-term, neutral and imperceptible with respect to the operational phase.

7.14 REFERENCES

- Ground Investigation Report by IGSL
- GSI online Mapping
- EPA. (2021). EPA Maps, Accessed on 23rd August 2021. http://gis.teagasc.ie/soils/map.php,
- Department of Communications, Climate Action and Environment, Geological Survey Ireland, Accessed on 23rd August 2021 Geological Survey Ireland Spatial Resources (arcgis.com)
- Infrastructure Design Report by DBFL
- Flood Risk Assessment by McCloy Consulting