

7 LAND, SOIL & GEOLOGY

7.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) has been prepared by Waterman Moylan and provides a review of the impact that this proposed development will have on the land and soils in the area.

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Jana is a Civil Engineer with Waterman Moylan. She holds a first class honours degree in Civil Engineering and a Master Degree in Environmental Health and Safety from Dublin Institute of Technology now Technological University Dublin. She has over 7 years practical experience in the industry and has demonstrated a high level of competence on all of her projects at all stages from project feasibility studies, design, planning, control of construction, testing, inspecting and commissioning thereof.

Ian is an Associate Engineer with Waterman Moylan. Ian is a highly qualified Chartered Engineer with over 28 years practical experience in the industry, who has demonstrated a high level of competence on all of his projects at all stages from feasibility study, through preliminary design to construction stage.

In summary, the proposed Strategic Housing Development (SHD) broadly comprises: -

- 415no. residential units (254no. houses, 55no. duplex and 106no. apartments) in buildings ranging in height from 2 to 5-storeys.
- 1no. childcare facility (c. 409 sq. m gross floor area).
- Provision of access from Drumree Road (Character Area 6) and Dunshaughlin Link Road – R125 (Character Areas 3 & 4) and provision of internal road network including pedestrian and cycle links.
- Provision of public open space including facilitation of planned pedestrian and cyclist connection along River Skane Greenway toward Dunshaughlin Town Centre.
- Provision of wastewater infrastructure including connections to main sewers on Drumree Road and to foul networks in permitted Phase 1 development and provision of SuDS infrastructure.
- All associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works.

A full project description is provided in Chapter 3: Description of Proposed Development.

7.2 Assessment Methodology

A desktop study was undertaken to classify the geological features related to the site. Data was sourced from the following:

Geological Survey of Ireland (GSI) on-line mapping of geology, hydrogeological data, aquifers, groundwater vulnerability and groundwater protection areas.

A comprehensive site investigation was completed by Site Investigations Ltd in March 2020 to identify the ground conditions. The site investigation included the following: -

Fieldwork: -

- 9 No. Cable percussive boreholes.
- 7 No. Trial Pits.
- 4 No. Soakaway tests.
- 16 No. California Bearing Ratio tests.

Laboratory Testing: -

- 2 No. Moisture contents.
- 2 No. Atterberg limits.
- 2 No. Particle size gradings.
- 3 No. pH, sulphate and chloride content.
- 4 No. Suite I analysis to determine if the material is hazardous or non-hazardous.
- 3 No. loss on ignition tests.

The results of the site investigation are included in a geotechnical report prepared by Site Investigations Ltd presented in Appendix 7.1.

7.3 Receiving Environment

A detailed description of the site is provided in Chapter 3: Description of Proposed Development. This section provides information on the existing local and regional geological and hydrogeological environments, with details of available site investigation data including subsoil information and bedrock geology.

7.3.1 Proposed Development

The subject site is located in Dunshaughlin, County Meath. Drumree Road runs east-west past the site and the R125 runs north-south past the site. The site is split into two portions, one north of Drumree Road (North Site) and the other to the south of Phase 1, east of the R125 (South Site).

The overall site area is approximately 14.84 Ha, generally falling towards the River Skane located in the South Site. The site is currently a green field used for agricultural purposes.

Topography

North Site

The North Site area is approximately 4.32 Ha. The North Site generally falls at a grade of 1/67 from north to south towards Drumree Road. With a high point of 106.46m OD Malin and a low point of 102.61m OD Malin.

South Site

The South Site area is approximately 10.52Ha. The South Site generally falls towards the River Skane. A portion to the south of River Skane generally falls at a grade of 1/42 with a high point of 97.5m OD Malin located in the site south eastern corner. A portion to the north of River Skane generally falls at a grade of 1/81 with a high point of 96.5m OD Malin located in the site north eastern corner. The low point of 91.46m OD Malin is in the Skane riverbed in the vicinity of the R125 road culvert, which flows east to west.

Geotechnical Conditions

The geotechnical site investigation commissioned for the Phase 2 North and South Sites has confirmed the following site conditions: -

North Site

- Topsoil overlying conditions are brown slightly sandy slightly gravelly silty CLAY.

- Depth to weathered rock or boulder obstructions is between 1.00m and 2.50m.
- A rotary cored drilling test would need to be commissioned to determine whether the underlying material is weather rock or boulder obstructions. CBR values taken 500mm BGL varied from 4.1% to 7.3%.
- Soils tested have Low sulphate content and near neutral pH.
- Testing confirmed that the sub soils are inert.
- The sub soils have low permeability and are unsuitable for dispersion/soak away of surface or storm water.

South Site

- Topsoil overlying conditions are brown and grey brown slightly sandy slightly gravelly silty CLAY.
- Depth to weathered rock or boulder obstructions is between 1.00m and 2.50m.
- A rotary cored drilling test would need to be commissioned to determine whether the underlying material is weather rock or boulder obstructions.
- CBR values taken 500mm BGL varied from 4.1% to 7.3%.
- Soils tested have Low sulphate content and near neutral pH.
- Testing confirmed that the sub soils are inert.
- The sub soils have low permeability and are unsuitable for dispersion/soak away of surface or storm water.

Geology

The area is underlain by Visean limestone & Calcareous shale of Dinantian age. The limestone formation of the area is Loughshinny Formation which is well exposed in the area between Drumanagh Head and Copper Mine Bay in the Loughshinny area. According to GSI the Loughshinny Formation is described as dark micrite & calcarenite, shale with thickness from 100 to 150m.

An extract of the GSI Map, shown in Figure 7.1 below, indicates that there is one fault line in the vicinity of the lands. This fault line traverses the North Site of subject lands.

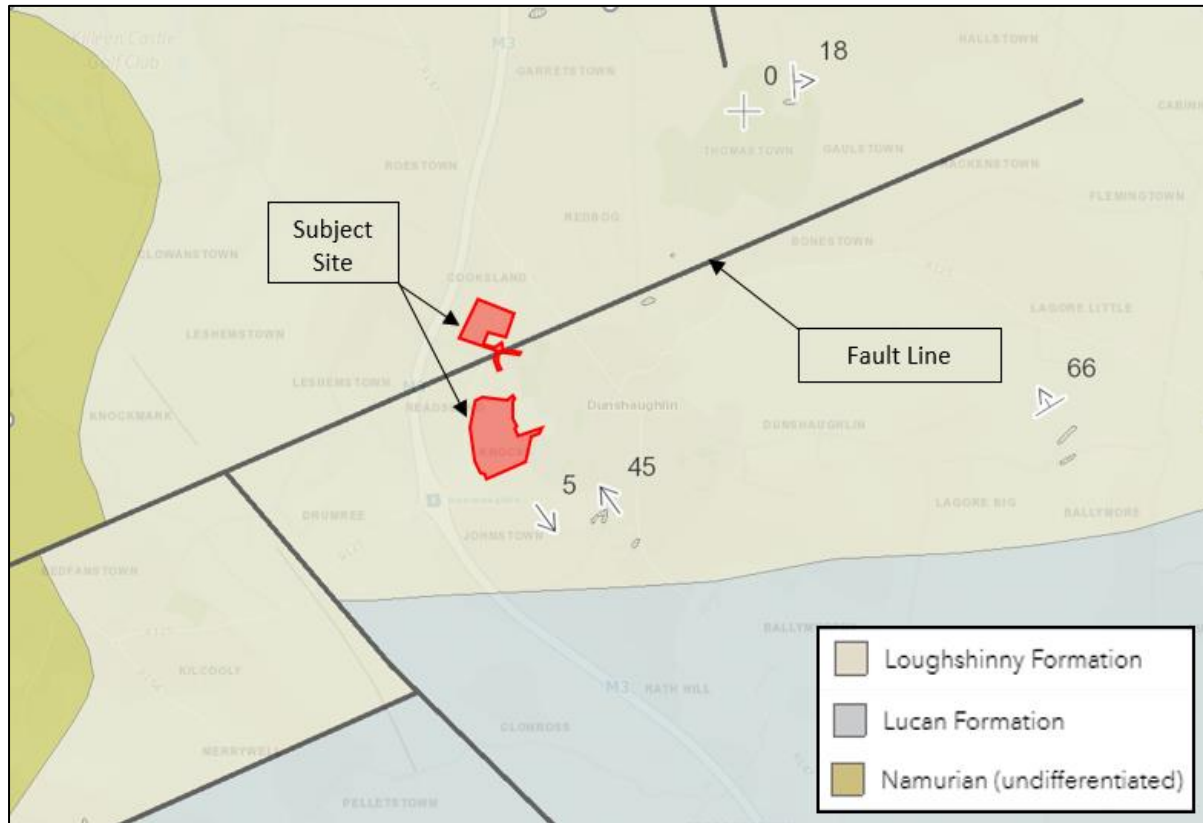


Figure 7.1: Bedrock Geology Map Extract from GSI.

Quaternary sediment mapping by GSI, seen in Figure 7.2 below, shows that the lands are underlined by glacial till derived from limestone with a small portion of the South Site underlined with lacustrine sediments.

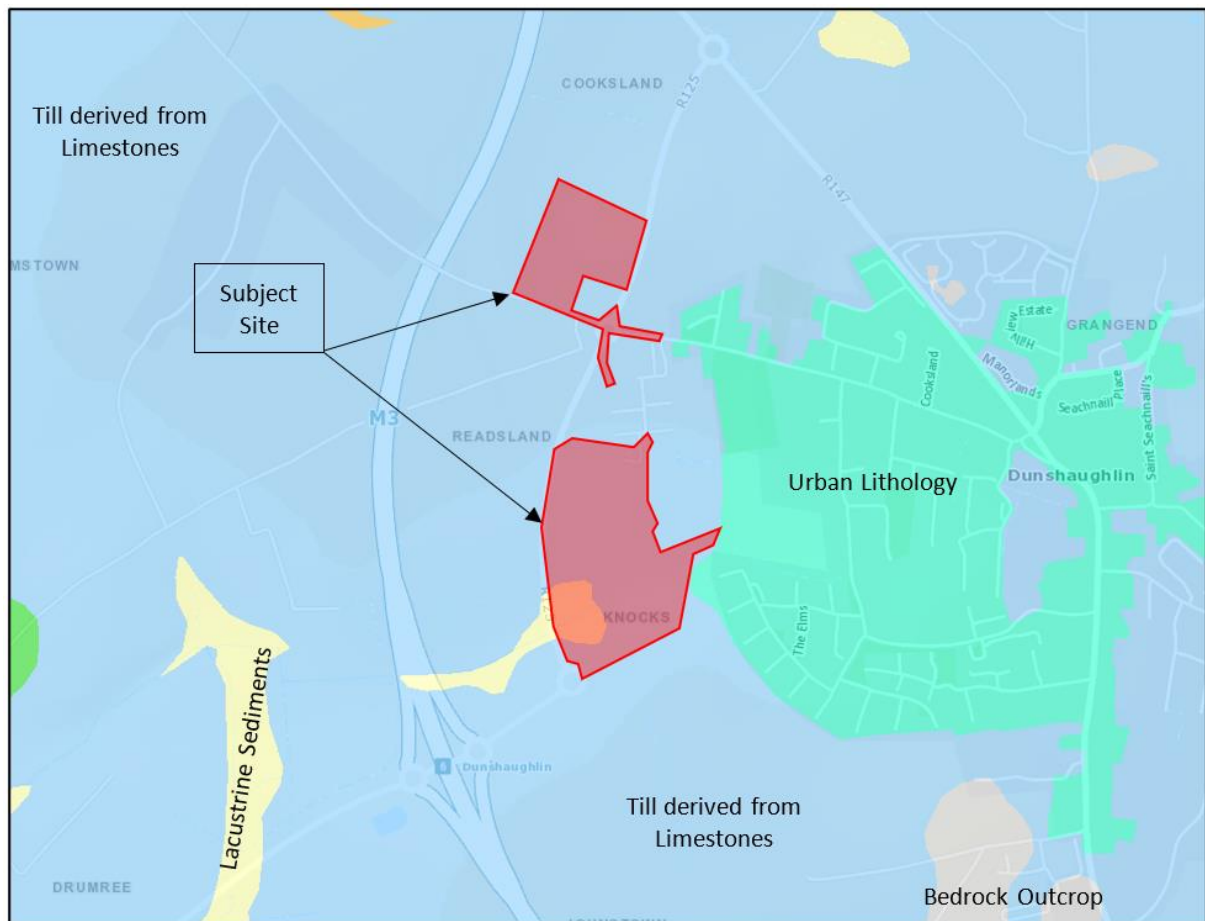


Figure 7.2: Quaternary Sediments Map Extract from GSI.

Hydrogeology

The National Aquifer Bedrock Map prepared by the Geological Survey of Ireland was consulted and it was established that the majority of the site is within the designation Lm which represents a Locally Important Aquifer - Bedrock which is Generally Moderately Productive with a vulnerability description of low.

Figure 7.3 below is an extract from the GSI web mapping of underlying aquifers in the region which shows the corresponding average recharge rates (mm/yr) of the subject site and surrounding areas.

Similarly, Figure 7.4 below shows that the subject site is in the area of Low aquifer vulnerability.

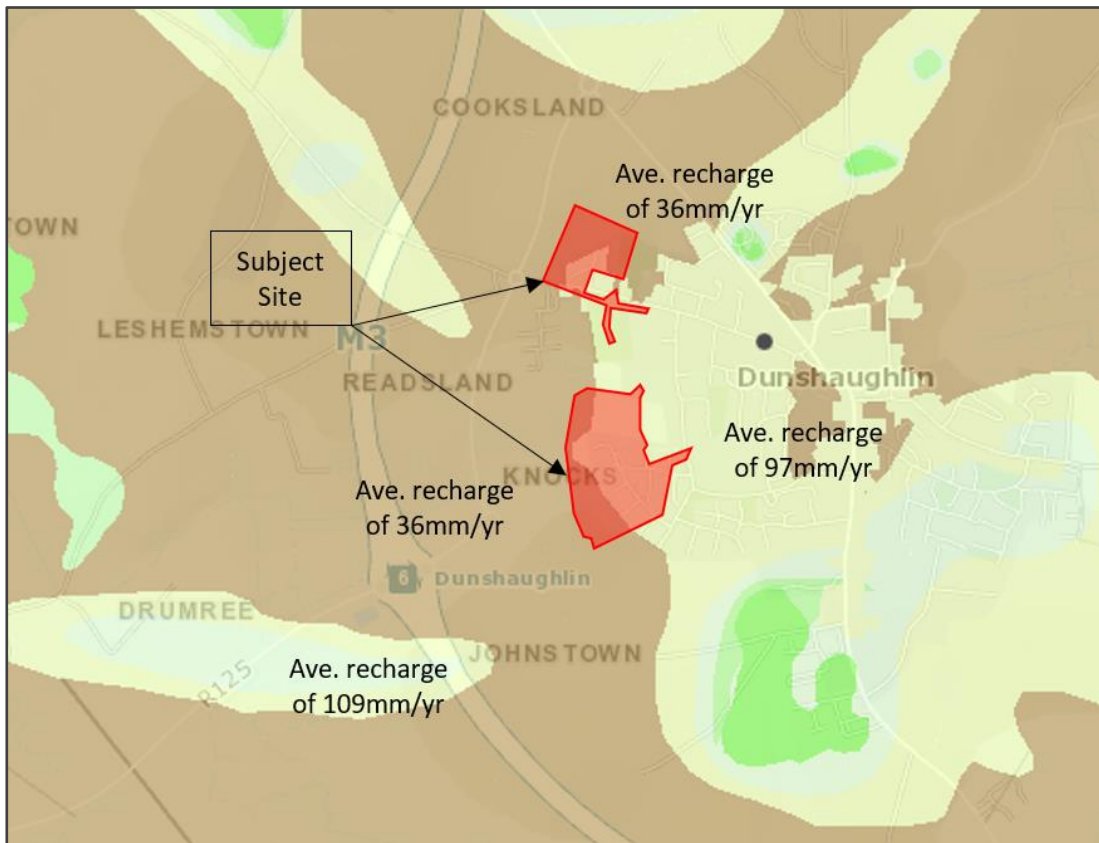


Figure 7.3: Groundwater Recharge Map Extract from GSI.

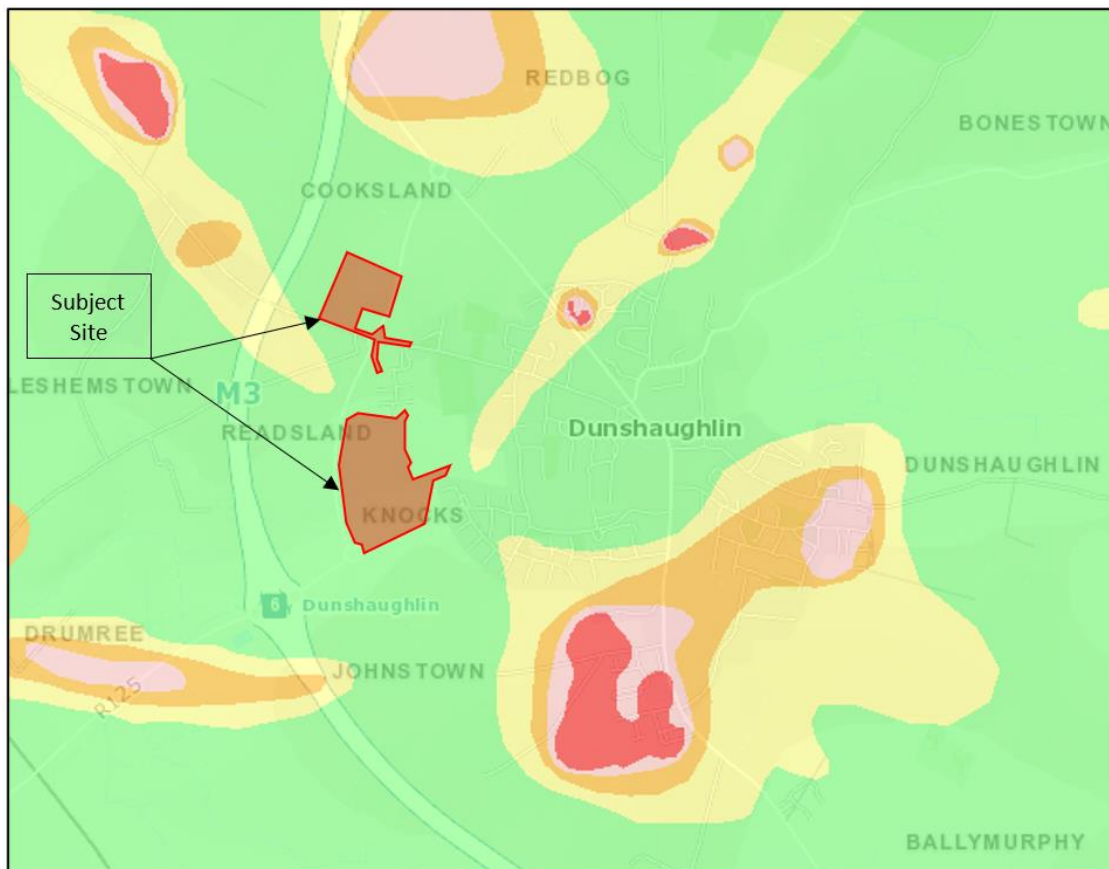


Figure 7.4: Aquifer Vulnerability Map Extract from GSI.

Groundwater Source Protection Zones

The source protection areas are designed to protect groundwater abstractions by employing varying levels of restrictions on human activities. Three zones are delineated for Dunshaughlin ground water source as follows: -

Inner Protection area (SI)

The Inner Protection Area is the area defined by a 100 day time of travel to the source and it is delineated to protect against the effects of potentially contaminating activities which may have an immediate influence on water quality at the source, in particular from microbial contamination.

Outer Protection area (SO)

The Outer Protection Area includes the remainder of the catchment area to the source, i.e. the zone of contribution (ZOC), and is defined as the area required to support an abstraction from long-term recharge.

Main public supply well for Dunshaughlin is PW1 and its surrounds is located 1 Km east of the subject South Site. According to the June 2004 MCC/GIS, Dunshaughlin Water Supply Groundwater Source Protection Zones report, the Production Well (PW1, drilled November 1993) is located within a housing estate, on a small green area and is completed below ground level (June 1996) inside a manhole 1.3 metres deep.

The subject South Site encroaches partly on the PW1 Outer Protection area (SO) with only a small portion reaching the PW1 Inner Protection area (SI). Due to low permeability of subsoil the vulnerability rating of both ground water protection zones within the South Site is low.

See Figures 7.5 and 7.6 below for details.

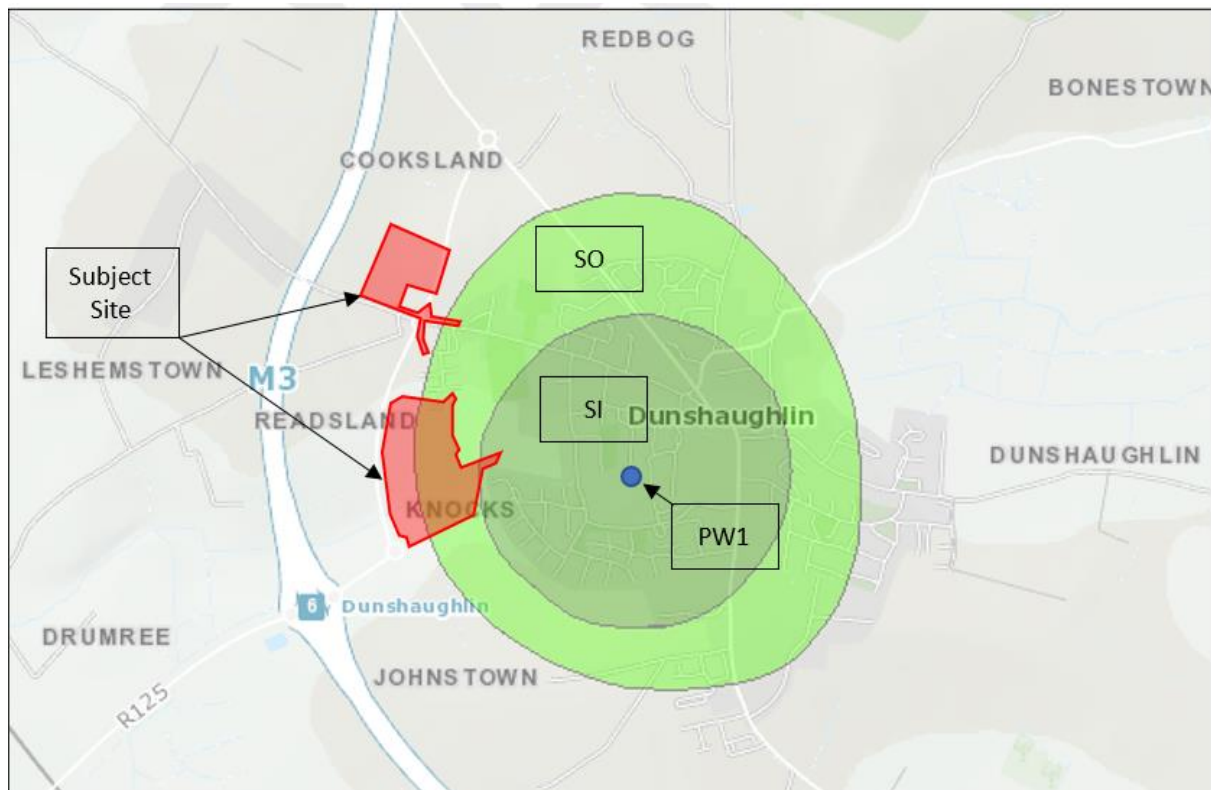


Figure 7.5: Aquifer Vulnerability Map Extract from GSI.

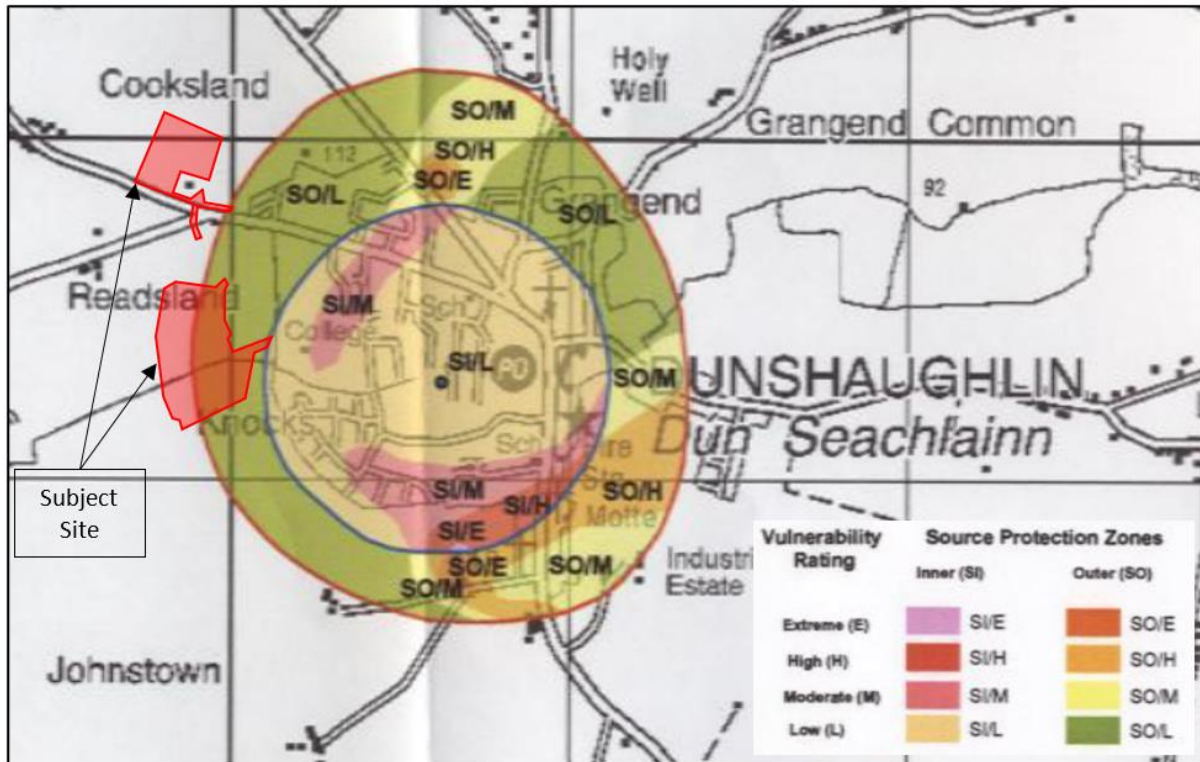


Figure 7.6: Aquifer Vulnerability Historic Map Extract from MCC/GIS June 2004 Report.

MCC/GIS June 2004 report identified the primary threat to the public supply at Dunshaughlin is the town itself, very close to the source, which may be affected in particular, by septic tanks and/or leaky sewers (if present) in the village. All potentially polluting activities within the zone of contribution should be conducted to very high standards

7.4 Characteristics of the Proposed Development

7.4.1 Proposed Development

7.4.1.1 Construction Stage

In terms of land, soils and geology, the development will involve an amount of earth movement during the re-levelling and landscaping of the lands.

Topsoil will be removed from areas of the site where construction works are to take place. This topsoil will be stored on site for reuse in public open spaces if suitable. (The portion of topsoil not required for reuse on the site will be either sold off as topsoil or disposed of to a licensed site.)

Rock and suitable subsoil material will be used as fill where possible and appropriate.

Suitable material will be brought to the site to fill areas of ground to raise surface levels where required and where suitable material is not available on the site.

All spoil and unsuitable material will be disposed of at an approved facility.

The proposed development, with respect to soils and geology, includes the following characteristics: -

- Stripping of topsoil.
- Excavation of foundations.
- Excavation of drainage sewers and utilities.
- Reinstatement of excavations and topsoil.
- Minor regrading and landscaping.
- Importation of suitable material.
- Disposal of any surplus excavated soils including any contaminated material.
- There is no basement structure included within the proposal.

Surface water runoff flows during the construction phase will be managed by sump pumping as required, additional proposals for the sites include: -

North Site

It is proposed that the development will discharge surface water runoff at a rate (equivalent of the existing agricultural runoff) into River Skane via the existing 450 dia. surface water sewer constructed in the Drumree Road and along the R125).

South Site

It is proposed that the development will discharge surface water runoff at a rate into the River Skane.

Generally, works have been proposed outside of the Riparian zone (20m) with the exception of services and roads linking the development either side the River Skane.

Proposed works in the vicinity of the River Skane Riparian Zone include the following: -

- Two-way cycle track and footpath greenway along the northern bank c. 5m of River Skane.
- Two Attenuation Tanks c.3m off River Skane southern bank.
- One spine road link bridge crossing with a foul water pipeline and a watermain pipeline.
- Two shared pedestrian and cycle links bridge crossings.

An alternative layout has been provided by the design team, which includes the omission of a vehicular link between Character Area 3 and Character Area 4. It is a minor and localised amendment to the proposed development which does not have a bearing on its land, soil & geology impact.

7.4.1.2 Operational Stage

Landscape features and planting associated with the proposed residential development will be regularly inspected and maintained by an appointed management company. (There is no parks department in Meath County Council.)

7.5 Potential Impact of the Proposed Development

7.5.1 Proposed Development

7.5.1.1 Construction Stage

The removal of topsoil during earthworks and the construction of the parking spaces, services, buildings and foundations, will expose subsoil to weathering and may result in the erosion of soils during adverse weather conditions.

Excavations for terracing, foundations and drainage will generally result in a surplus of subsoil and excavated rock.

In addition to the excavations referred to above, the effect of construction traffic movements involved in the construction of the proposed development will result in the compaction of the subsoil.

Excavation activities will by their nature generate mud during wet periods and dust during dry periods. It will increase the amount of mud and dust on the roads providing access to the site. This will be kept to a minimum with the use of road sweepers and wheel washing facilities.

Surface water runoff from the exposed excavated areas may result in silt discharges to the River Skane. Proposed riparian works in the vicinity of the River Skane include: -

- Shared surface / cycle path.
- Attenuation.
- Drainage works crossing over the River Skane.
- The road link and associated services that cross the River Skane to link the northern and southern development areas.
- Tie-ing into foul water manhole constructed under Phase 1 for the existing 525mm dia foul line which is located parallel to the River Skane, on the north side.
- Two additional pedestrian / cycle bridges.

Any hydro-geological impacts are temporary and associated with the construction of the proposed development.

7.5.1.2 Operational Stage

On completion of the construction phase, following replacement of topsoil and a planting program, no further impacts on soil are envisaged except for the possibility of contamination of soil from foul water effluent when connection are installed on live existing sewers.

7.5.1.3 Do Nothing Impact

In terms of the “do nothing” scenario the subject lands would be retained within the Dunshaughlin Lands as agricultural lands and there would be no impact in terms of soil or geology from the construction works.

7.5.2 Cumulative

7.5.2.1 Construction Stage

Excavation activities will by their nature generate mud during wet periods and dust during dry periods. If construction works associated with other development in the area were to occur during the same time as the construction of the proposed development, there may be an increase in the amount of mud and dust on the roads providing access to the site. However, such impacts will be kept to a minimum with the use of road sweepers and wheel washing facilities. No cumulative effects on land, soils and geology are predicted to occur if any other development occurs concurrent to the construction of the proposed development. There are therefore no significant cumulative effects of Land, Soils and Geology associated with the proposed development.

7.5.2.2 Operational Stage

No cumulative effects are anticipated at the operational phase of the proposed development.

7.6 Mitigation Measures (Ameliorative, Remedial or Reductive Measures)

7.6.1 Proposed Development

7.6.1.1 Construction Stage

The excavations for the drainage pipes, water supply, utilities and foundations are anticipated as being relatively shallow and will have minimal impact on the ground water in the site.

Following completion of any required initial dewatering, it is expected that flows of water into the excavation will be relatively small. These flows will be managed by sump pumping on an as-required basis.

The quantity of excavated materials to be removed from or imported into the site has been reduced by establishing levels of the proposed buildings which optimise the volume of cut and fill as best as possible.

Unsuitable sub-soils generated by excavations on site will be reviewed for reuse as landscaping or non-engineering fills on adjoining or other construction sites within the region.

In the case of topsoil, careful planning and on-site storage can ensure that this resource is reused on-site as much as possible. Any surplus topsoil not reused on site can be sold. However, topsoil is quite easily damaged and can be rendered useless if not stored and cared for properly.

It is important that topsoil is kept completely separate from all other construction waste as any cross-contamination of the topsoil can render it useless for reuse as topsoil.

It is important to ensure that topsoil is protected from all kinds of vehicle damage and kept away from site-track, delivery vehicle turning areas and site plant and vehicle storage areas.

If topsoil is stored in piles of greater than two metres in height the soil matrix (internal structure) can be damaged beyond repair. It should be sealed and be kept as dry as possible and used as soon as possible to reduce any deterioration through lengthy storage and excess moving around the site.

Records of topsoil storage, movements and transfer from site will be kept by the Construction and Demolition Waste Manager.

Silt traps, silt fences and tailing ponds will also need to be provided by the contractor where necessary to prevent silts and soils being washed away by heavy rains during the course of the construction phase.

Surplus subsoil will be stockpiled on site, in such a manner as to avoid contamination with builders' waste materials, etc., and to preserve the materials for future use as clean fill.

The provision of wheel wash areas at the exit to the development will be required to minimise the amount of soils deposited on the surrounding road network. The adjoining road network will be cleaned on a regular basis. All trucks on the public roads will carry up to a maximum of ten cubic metres with suitable covering of the material to prevent spillage and damage to the surrounding road network.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

Appropriate storage and bunding measures will be implemented throughout the construction stage to prevent contamination of the soil and groundwater from oil and petrol leakage from site plant. Refuelling will be restricted to allocated re-fuelling areas. This area is to be an impermeable bunded area designed to contain 110% of the volume of fuel stored.

Soil samples taken from the site during the site investigations in March 2020 showed no evidence of contamination. However, due to the random sampling process and the sample size taken, this does not mean that the site has no contamination. In the unlikely event that any contaminated soil is uncovered on site during excavations, this will be identified and disposed of to an appropriate waste disposal facility.

On foot of Waterman Moylan's accompanying Preliminary Construction Management Plan, a Construction Management Plan, Traffic Management Plan and Waste Management Plan will be implemented by the contractor during the construction phase to control the above remedial measures.

7.6.1.2 Operational Stage

On completion of the works, it is proposed to re-topsoil and replant open areas within the development. Following completion of these reinstatement works, no significant adverse impacts on the soils and geology are envisaged and therefore no mitigation measures will be required.

7.7 Residual Impact of the Proposed Development

7.7.1 Proposed Development

7.7.1.1 Construction Stage

If the recommended remedial or reductive measures are implemented, the proposed development will not give rise to any significant residual adverse impact. Negative impacts during the construction phase will be temporary only.

7.7.1.2 Operational Stage

It is predicted that there will be no residual impacts on land, soil or geology, resulting from the proposed development in the operational phase.

7.8 Monitoring

7.8.1 Proposed Development

7.8.1.1 Construction Stage

Monitoring during the construction phase is recommended, in particular in relation to the following: -

- Monitoring that topsoil is protected from vehicular damage and completely separate from all other construction materials.
- Monitoring of surface water discharged to existing watercourses.
- Monitoring cleanliness of the adjoining road network.

- Monitoring of oil & fuel storage banded areas.
- Dust control by dampening down measures close to the boundaries of the site when required by unusually dry weather conditions.
- The public roads which provide access to the site will be monitored and cleaned as necessary.
- During any discharge of surface water from the excavations, the quality of the water will be regularly monitored visually for hydrocarbon sheen and suspended solids. Periodic laboratory testing of discharge water samples will be carried out in accordance with the requirements of the discharge licence obtained from Meath County Council.

7.8.1.2 Operational Stage

Landscape features and planting associated with the proposed residential development should be regularly inspected and maintained by an appointed management company.

7.9 Reinstatement

7.9.1 Proposed Development

7.9.1.1 Construction Stage

Reinstatement measures in relation to soils consists primarily of the re-topsoiling of open areas and the replanting of these areas.

7.9.1.2 Operational Stage

No post development reinstatement works will be required.

7.10 Difficulties Encountered

There were no difficulties encountered.

