7. LAND, SOILS AND GEOLOGY

7.1 Introduction

7.1.1 Background and Objectives

This section of the Environmental Impact Assessment Report (EIAR) provides a description and assessment of the residual direct and indirect potential effects of the Proposed Development on Land, Soils and Geology The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

As outlined in Chapter 1: Introduction, this EIAR assess the impact of all six planning applications under the one 'Proposed Development' due to the proximity, timeline and links between the applications. Three planning applications will be submitted to Meath County Council (Site A, Site B and MOOR). One planning application will be submitted to An Bord Pleanála (Site C: SHD) as the competent authority, while two planning applications will be submitted to Kildare Council for infrastructure works required to connect the Proposed Development to services and utility infrastructure within Co. Kildare.

This chapter provides a baseline assessment of the environmental setting of the Proposed Development in terms of land, soils, and geology, and discusses the potential impacts that the construction and operation of the Proposed Development will have. Where required, appropriate mitigation measures to limit any identified potentially significant impacts to soils and geology are recommended and an assessment of residual impacts and significance of effects provided.

7.1.2 Statement of Authority

This section of the EIAR has been prepared by Michael Watson, David Naughton and Daire O'Shaughnessy, of MKO. Michael Watson is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork based environmental & hydrogeological consultancy firm. David is an Environmental Scientist with over five years of consultancy experience with MKO and has been involved in a number of EIAR applications. David has worked as project manager for a number of EIAR applications, providing a pivotal link liaising between the applicant and the EIAR project team to ensure all work is carried out to a high standard. David and Daire hold a BSc (Hons) in Environmental Science.

7.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 – 2018;
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I. No. 93 of 1999; S.I. No. 450 of 2000; S.I No. 538 of 2001); S.I. No. 30 of 2000 the

Planning and Development Act, 2000; and S.I 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Planning and Development Act, 2000, as amended;
- S.I. No 296 of 2018: S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law; and,
- The Heritage Act 1995, as amended.

7.1.4 Relevant Guidance

The land, soils and geology chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- European Commission (2017) Guidance on the preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements; and,
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

7.2 Assessment Methodology

7.2.1 Desk Study

A desk study of the site and the surrounding study area was largely completed in advance of undertaking a site walkover survey. The desk study involved collecting all the relevant geological data for the Proposed Development site and study area. This included consultation with the following:

- Environmental Protection Agency (EPA) database (www.epa.ie);
- Geological Survey of Ireland (GSI) - National Draft Bedrock Aquifer map;
- GSI - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 16 (Geology of Kildare-Wicklow). (GSI, 1994);
- GSI – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie).

7.2.2 Site Investigation

Site Investigations were carried out by Site Investigations Ltd. (SIL) between June and July 2021. The scope of works included cable percussive boreholes, rotary coreholes, trial pits, dynamic probes and laboratory testing of field samples. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design. A summary of site investigation works are presented below;

- 18 no. cable percussive boreholes,
- 16 no. rotary coreholes,
- 21 no. trial pits with soakaway tests,
- 84 no. dynamic probes.

Subsoil at **Site A** was broadly encountered to a depth of 0.1 – 3.2m maximum depth. Subsoil beneath the Topsoil is described as slightly sandy, slightly gravelly silty CLAY, which is generally firm to stiff.

Trial pit depths at **Site B** was broadly encountered to a depth of 0.1 – 2.6m maximum depth. Subsoil described as silty sandy, with gravelly clay occasionally observed at further depths, which is generally firm to stiff.

Subsoils at **Site C** was broadly encountered to a depth of 0.1 – 2.5m maximum depth. Made Ground was encountered to depths of 1.6m, 2.9m and 0.6m in TP 23, TP25 and TP26. The subsoil beneath the Topsoil/Made ground is described as silty sandy, with gravelly clay occasionally observed at further depths, which is generally firm to stiff.

Subsoils at the **MOOR** was broadly encountered to a depth of 0.1 – 2.5m maximum depth. Subsoil is described as silty sandy, with gravelly clay occasionally observed at further depths, which is generally firm to stiff.

Groundwater was encountered in five boreholes and ten trial pits at depths ranging from 1.50mbgl to 3.60mbgl within the Proposed Development area.

Groundwater ingresses were recorded in two boreholes within the Proposed Development, both of which were located within Site B, at depths of 3.20mbgl at BH14 and 3.60mbgl at BH17. All ingresses were sealed off by the casing as the drilling advanced and therefore indicates perched water lenses. There were water ingresses into 3 No. trial pits within the Proposed Development site, one of which was located within Site A, while the remaining two were located within Site B. A water ingress was recorded at trial pit no. TP11, located within Site A at a depth of 1.80mbgl, with the ingress rate logged as a seepage. Water ingresses were recorded at trial pits no. TP13 and TP21, within Site B at a depth of 1.80mbgl and 2.90mbgl respectively, with the ingress rate logged as a seepage at TP13 and at a medium rate at TP21.

Detailed reports on the Site Investigation works carried out at the Proposed Development site can be found in Volume 3c(i) - Appendix 4-9 – Appendix E of this EIAR.

7.2.3 Additional Site Investigation

Additional Site Investigations were carried out by Site Investigations Ltd. (SIL) and can be found in Volume 3c(i) - Appendix 4-9 – Appendix E of this EIAR. The additional works examine an area to the west of the Blackhall Little Stream (Site C). Site Investigations were carried out between June and July 2021. The scope of works comprises of 9 no. trial pits. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design.

Topsoil along the additional works area was broadly encountered to a depth of 0.1 – 3.1m maximum depth. Made Ground was encountered in TP23 to a depth of 1.6m, TP25 to a depth of 2.9m and TP26 to a depth of 0.6m. Subsoil beneath the Topsoil/Made Ground is described as silty gravelly fine to coarse sand, with gravelly clay occasionally observed at further depths, which is generally firm to stiff.

7.2.4 Walkover Survey

A visual inspection of the Proposed Development site was undertaken by MKO on the 5th of August 2021 and 19th August 2022. The purpose of the site inspection was to investigate the site for any surface indications of impacts to land, soils and geology resulting from current land use and confirm the baseline conditions. Particular attention was paid to identifying any potential areas of soil erosion that may have arisen from the operation of agricultural machinery on the site. No evidence of any residual impacts to land, soils and geology was observed.

7.2.5 Impact Assessment Methodology

Using information from the desk study, visual inspection and site investigation, an estimation of the importance of the soil and geological environment within the study area is assessed using the criteria set out in Table 7-1 (NRA, 2008).

Table 7-1 Estimation of Importance of Soil and Geology Criteria (NRA, 2008).

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

Importance	Criteria	Typical Example
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying site is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

The statutory criteria (EPA 2017) for the assessment of impacts require that likely impacts are described with respect to their extent, magnitude, type (*i.e.* negative, positive, or neutral) probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment are those set out in EPA (2017) Glossary of Impacts as outlined in Chapter 1 of this EIAR. In addition, the two impact characteristics, proximity and probability, are described for each impact and these are defined in Table 7-2.

In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of impacts are related to examples of potential impacts on the geology and morphology of the existing environment, as listed in Table 7-3.

Table 7-2 Additional Impact Characteristics.

Impact Characteristic	Degree/ Nature	Description
Proximity	Direct	An impact which occurs within the area of the proposed project, as a direct result of the proposed project.
	Indirect	An impact which is caused by the interaction of effects, or by off-site developments.
Probability	Low	A low likelihood of occurrence of the impact.
	Medium	A medium likelihood of occurrence of the impact.
	High	A high likelihood of occurrence of the impact.

Table 7-3 Impact descriptors related to the receiving environment.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	Significance	
Negative only	Profound	Widespread permanent impact on: • The extent or morphology of a designated site • Regionally important aquifers. • Extents of floodplains. • Loss of a geologically sensitive site.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	Significance	
		Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Very Significant/ Significant	Local or widespread time dependent impacts on: • The extent or morphology of a cSAC / ecologically important area. • A regionally important geological feature (or widespread effects to minor geological features). • Extent of floodplains. Widespread permanent impacts on the extent or morphology of an NHA/ecologically important area, Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time dependent impacts on: • The extent or morphology of a cSAC / NHA / ecologically important area. • A minor geological feature. • Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive, Negative or Neutral	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Positive, Negative or Neutral	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

7.3 Existing Environment

7.3.1 Site Description and Land-Use

Each of Site A, Site B, Site C (SHD) and the MOOR of the Proposed Development are located in County Meath on the northern environs of Maynooth town, Co. Kildare. The Kildare Bridge works and Moyglare Bridge works are located within County Kildare.

The proposed healthcare facilities are located approximately 500m north of Maynooth town at its closest point, while the proposed strategic employment zone is located approximately 1km north of Maynooth at its closest point. The proposed strategic housing development is located approximately 1.1km from Maynooth at its closest point. The Maynooth outer orbital road is located approximately 1km from Maynooth. The Kildare Bridge application is located within Maynooth. The Moyglare Bridge application is located 100m from Maynooth.

Please refer to Figure 1-1 of Chapter: Introduction, for the site location. Both the healthcare site (Site B) and the strategic employment zone (Site A) within the Proposed Development are accessed by the existing R157 Regional Road. The strategic housing development (Site C) within the proposed development is accessed from the L6219 & L22143 Locals Roads.

Site A: Strategic Employment Zone Application

The site boundary for the proposed Site A is approximately 6.8 hectares (ha). The site is bounded by the R157 Regional Road to the east, the L22143 Local Road to the west, and farmland to the north, south and west. Site A is currently a green-field site which supports small-scale agriculture. The site is relatively flat with a topography ranging from approximately 56m OD (Ordnance Datum) in the south of the site to 60m OD in the centre and north of the site. There is an existing drainage ditch around the perimeter of the agricultural field in which the site is located. The drainage ditch was observed to be dry during site visits due to good draining soils (moderate permeability) and flat topography of the site. The Blackhall Little Stream is located to the northwest of the site, more than 250m northwest of the proposed office buildings and associated infrastructure. The proposed 360m section of the Maynooth Outer Orbital Road (MOOR) will run in a northwest direction from the office/business park towards the Blackhall Little Stream. The MOOR will run right up to the southern boundary of the stream which will be traversed by a new bridge structure that will form part of a separate planning application for the MOOR.

Due to the nature of Site A, there will be a substantial water requirement once operational, primarily for washing and plumbing facilities. The existing Irish Water Mains within the Study Area are reported as having their source as the Dunboyne Water Supply Zone (WSZ). Site A is located entirely within the Liffey and Dublin Bay (09) Water Framework Directive (WFD) Catchment.

Site B: Healthcare Application

The site boundary for the proposed Site B is approximately 6.6 hectares (ha). The site is bounded by the Rye Water River to the south and the R157 regional road to the east. The site is currently a green-field site which supports small-scale agricultural practices. The areas to the north and west of the site are also used for small scale agriculture. The site is relatively flat where infrastructure is proposed although the topography slopes gradually down towards the Rye Water River to the south. The topography ranges from approximately 56m OD (Ordnance Datum) in the north of the site to 46m OD at the southern boundary of the site at the Rye Water River. There is an existing drainage ditch around the western and northern perimeter of the agricultural field in which the site is located. The drainage ditch was observed to be dry during site visits due to good draining soils and relatively flat topography of the site. The Rye Water River is located to the south of the site, more than 45m south of the closest proposed infrastructure.

Due to the nature of Site B, there will be a substantial water requirement once operational, primarily for washing and plumbing facilities. The existing Irish Water Mains within the Study Area are reported as having their source as the Dunboyne Water Supply Zone (WSZ). Site B is located entirely within the Liffey and Dublin Bay (09) Water Framework Directive (WFD) Catchment.

Site C: Strategic Housing Development (SHD)

The site boundary for the proposed Site C (SHD) is approximately 19.5 hectares (ha). The site is located approximately 250m west of the R157 Regional Road and is bounded by the L22143 Local Road which runs along the north of the site from east to west with farmland to the north, south and west. Site C is currently a green-field site which supports small-scale agriculture.

The site is relatively flat with a topography ranging from approximately 58m OD (Ordnance Datum) in the west of the site to 47m OD in the south and east of the site. There is an existing drainage ditch around the perimeter of the agricultural field in which the site is located. The drainage ditch was observed to be dry during site visits due to good draining soils (moderate permeability). The Blackhall Little Stream runs from north to south through the centre of the site, approximately 55m east of the proposed housing development. The proposed section of the Maynooth Outer Orbital Road (MOOR) will run in a northeast direction from the proposed Moyglare Bridge northeast towards the Blackhall Little Stream. The MOOR will run across the western boundary of the Rye Water River which will include a new watercourse crossing. The upgrade works on an existing crossing, to provide for a new pedestrian and cycle bridge will take place to the northeast of the site and these works form part of the SHD application.

Due to the nature of Site C, there will be a substantial water requirement once operational, primarily for washing and plumbing facilities. The existing Irish Water Mains within the Study Area are reported as having their source as the Dunboyne Water Supply Zone (WSZ). Site C is located entirely within the Liffey and Dublin Bay (09) Water Framework Directive (WFD) Catchment.

MOOR: Maynooth Outer Orbital Road

The site boundary for the proposed Maynooth Outer Orbital Road (MOOR) is approximately 6.6 hectares (ha). The site is bounded by the R157 Regional Road to the east, the site is bounded by the Moyglare Hall road to the southwest, the L22143 Local Road to the west, the L2214 Local Road to the north and the R157 Regional Road to the east and southeast. The MOOR once constructed will provide connectivity from the R157 to the southeast of the site to the L2214 to the north and finally to the Moyglare hall road to the west. The site is relatively flat with a topography ranging from approximately 48m OD (Ordnance Datum) in the south of the site to 62m OD to the north of the site. There are existing drainage ditches adjacent to the existing roads in which upgrade works will be carried out as part of the MOOR. The drainage ditches were observed to be dry during site visits due to good draining soils (moderate permeability) and flat topography of the site. The Rye Water River travels through the south of the MOOR at two points, one located to the west and one located to the east. Watercourse crossings will be constructed at Moyglare, to the west in the form of a single span bridge and a new pedestrian and cycle bridge will be constructed adjacent to the Kildare bridge in the east. The Blackhall Little Stream is located to the north and east of the site and travels through the MOOR at two points, one located to the northeast and one located within the centre. A new watercourse crossing will be constructed as part of the MOOR over the Blackhall Little Stream and upgrade works on an existing crossing will occur in the centre of the site.

Kildare Bridge Application

The site boundary for the proposed Kildare Bridge application is approximately 1.2 hectares (ha). The site includes upgrade works to the R157 Regional Road to the north of the site along with a standalone pedestrian and cycle bridge across the Rye Water River adjacent to the existing Kildare Bridge. The site boundary is bounded by the L1013 Local Road to the south of the site. The wastewater pumping station (WWPS) which is part of the Proposed Development and the associated rising main will cross the Rye Water River along the public road and footpath to the Maynooth Municipal WWTP. The Kildare Bridge application is located entirely within the Liffey and Dublin Bay (09) Water Framework Directive (WFD) Catchment.

Moyglare Bridge Application

The site boundary for the proposed Moyglare Bridge application is approximately 0.5 hectares (ha). The site includes a single span bridge over the Rye Water River as well as services and utilities connection from the proposed onsite pumping station at Site C (SHD) to). There are no existing buildings or structures within the site boundary. The site is relatively flat ranging from 48m OD at the north of the site to 55m OD to the west. The Moyglare Bridge application is located entirely within the Liffey and Dublin Bay (09) Water Framework Directive (WFD) Catchment.

The location of the Proposed Development and associated Topography is shown in Figure 7-1 below.

7.3.1.2 Soils and Subsoils

According to GSI mapping (www.gsi.ie), the Proposed Development is predominantly underlain by soils which are largely derived from basic parent materials (surface water gleys/ basic poorly drained mineral [BminPD] soils). There is a small section of the Proposed Development site which is underlain by mineral alluvial (AlluvMin) soils along the banks of the Rye Water River.

There is no proposed infrastructure in this area with the exception of drainage infrastructure and road widening and upgrade works along the existing R157 Regional Road.

GSI mapping for the site also indicates that the entirety of the site is underlain by dark limestone and shale which form the Lucan formation (CDLUCAN).

The Teagasc soils map (www.gis.teagasc.ie/soils/map) identifies the soil association within the wider region of the site as fine loamy drift with limestones. These soils are generally well drained and well suited to pastoral agricultural systems. Site Investigations at the site reported average soil depths of approximately 2.6m across the Proposed Development site. The local subsoils map is shown as Figure-7-2.

It was noted that during the site walkover that most of the site is under agricultural use for pasture and grazing. The site is used for grazing of livestock such as sheep and cattle with relatively low stocking densities. Low levels of soil erosion are likely due to intermittent farm machinery use.

The extensive Site Investigation results confirm that the subsoils are predominantly brown/black slightly sandy gravelly silty CLAY with cobbles and boulders. They are relatively homogenous across the entire site and are typical of the natural subsoils in the area and across North Leinster which are derived from limestone parent materials.

7.3.1.3 Bedrock Geology

Based on the GSI bedrock map of the region, the site of both Proposed Developments is underlain by the Lucan Formation (Dark Limestone and Shale) formation (LU) which consists of dark grey to black, fine-grained, occasionally cherty limestones that weather paler, usually to pale grey. There are also rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. This formation spreads both east and west, encompassing large areas of counties Meath, Dublin, Kildare Westmeath and Offaly.

The Lucan Formation is classified by the GSI as a Locally Important Aquifer – Bedrock which is Generally Moderately Productive only in Local Zones (LI).

A bedrock geology map of the area is included as Figure 7-3. The bedrock and aquifer receptors at and adjacent to the Proposed Development are considered to be of Moderate value.

Bedrock (Limestone interbedded with moderately strong grey calcareous MUDSTONE with pyrite crystals) was encountered in the Site Investigation at depths ranging from 2.8m, below ground level to 7.8m below ground level and was in excess of 8m below ground level in the east of the site.

7.3.1.4 Geological Heritage and Designated Sites

There are no Geological Heritage sites within or close to the Proposed Development. The closest Geological Heritage Site to the Proposed Development is located in the environs of Leixlip town, approximately 5km east of the Proposed Development at its closest point. This Geological Heritage site is Louisa Bridge Cold Spring (KE016), which is a cold spring which was formerly a warm spring used as a spa.

The site lies immediately adjacent to the west of the Rye Water Valley/ Carton Special Area of Conservation (SAC). This SAC is nationally important as it possesses petrifying springs with tufa formation and possesses habitat supporting the Narrow-mouthed Whorl Snail and the Desmoulin's Whorl Snail. The nearest Special Protection Area (SPA) is the River Boyne and River Blackwater SPA, located approximately 20km northwest of the Proposed Development site at its closest point. Further assessment of potential impacts to designated sites are included in Chapter 6: Biodiversity of this EIAR.

7.3.1.5 Soil Contamination

According to the EPA online mapping (https://gis.epa.ie/EPAMaps), there are no licenced waste facilities on or within the immediate environs of the Proposed Development.

There are no historic mines at or in the immediate vicinity of the site that could potentially have contaminated tailings.

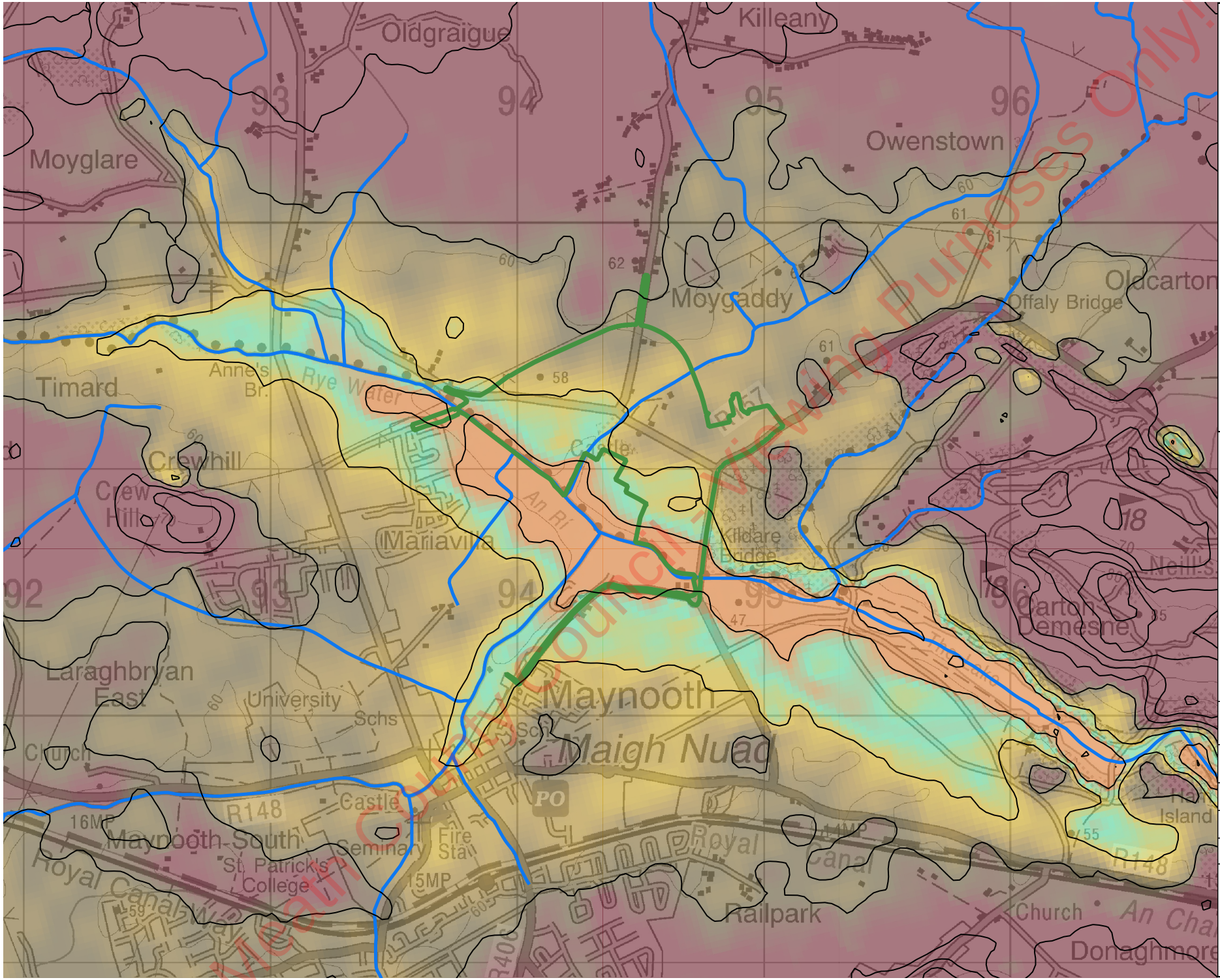
The site walkover did not identify any evidence of potential soil contamination at or adjacent to the Proposed Development, and there are no records from the current landowners of any environmental incidents with the potential to cause significant soil contamination.

The additional Site Investigation works were completed to determine the location and nature of some Made Ground identified in the first round of SI works. The additional work included for 9 No Trail Pits in one field. 6 No of the Trial Pits confirmed natural ground conditions. Small volumes of Made Ground including traces of plastic bags, tarmacadum, tree branch's and wire were observed in small volumes within the natural clays in 3 No Trial Pits located in close proximity to each other. The Site Investigation report and the photographic evidence indicates that the Made Ground is likely inert. No water ingress was noted in the Trial Pit logs. The environmental risk associated with the Made Ground is considered Low on the basis of the nature of the material and scale of the area. There is no evidence of significant ground contamination or unauthorised waste disposal activities.

7.3.1.6 Economic Geology

The GSI Online Minerals Database accessed via the Public Data Viewer shows no commercial pits or quarries within the vicinity of the Proposed Development.

The GSI online Aggregate Potential Mapping Database shows that the Proposed Development is not located within an area mapped as being of 'Very High' or 'High' granular aggregate potential (i.e., potential for gravel reserves considered Low).



Map Legend

- EIAR Site Boundary
- Elevation (m)
  - 50
  - 52.5
  - 55
  - 57.5
  - 60
  - 62.5
- Watercourses
- 5m Contours

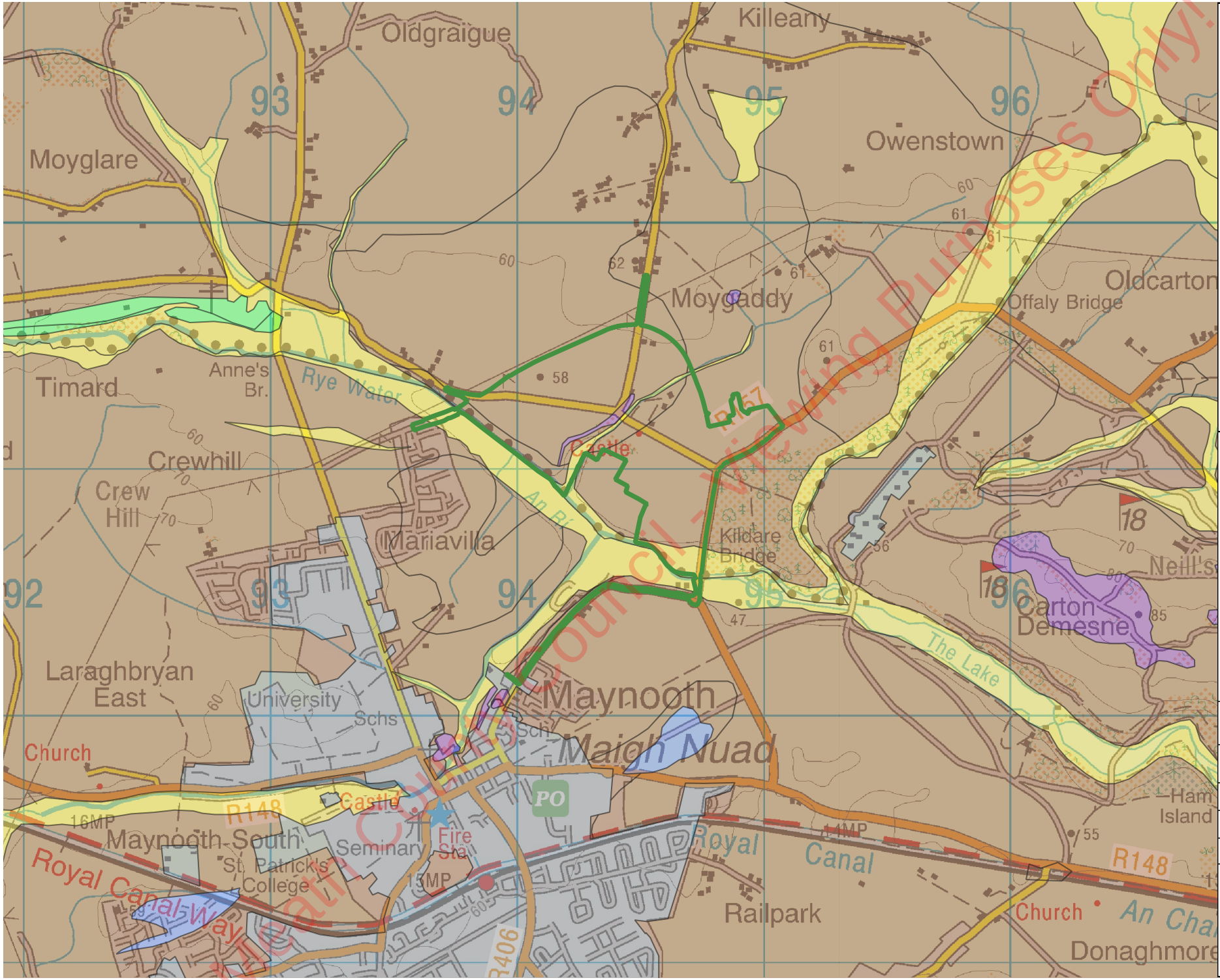
N

Drawing Title: Site Topography

Project Title: Moygaddy Mixed-Use Development

Drawn By	Checked By
TM	MW
Project No.	Drawing No.
210414	Figure 7-1
Scale	Date
1:20,000	30.08.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie



Map Legend

- EIAR Site Boundary

Local Subsoils

- Alluvium
- Sand and Gravels
- Lacustrine Sediments
- Made Ground
- Rock
- Limestone Tills

N

Drawing Title: Local Subsoils

Project Title: Moygaddy Mixed-Use Development

Drawn By	Checked By
TM	MW
Project No.	Drawing No.
210414	Figure 7-2
Scale	Date
1:20,000	30.08.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

Map Legend

- EIAR Site Boundary

Bedrock Geology

- Visean basinal limestone "Calp"
- Waulsortian mudbank

N

Drawing Title: Bedrock Geology

Project Title: Moygaddy Mixed-Use Development

Drawn By	Checked By
TM	MW
Project No.	Drawing No.
210414	Figure 7-3
Scale	Date
1:20,000	23.08.2022

MKO
Planning and Environmental Consultants
Tuam Road, Galway
Ireland, H91 VW84
+353 (0) 91 735611
email:info@mkoireland.ie
Website: ww.mkoireland.ie

7.4 Characteristics of the Development

The Proposed Development is described in full in Chapter 4 and will generally comprise the following:

- A Strategic Employment Zone (**Site A**) which consists of three office buildings, public road widening, and rod realignment works along the existing R157 Regional Road, the delivery new public access road under the Maynooth Outer Orbital Road (MOOR) scheme, internal access road and associated car parking;
- Healthcare Facilities (**Site B**) which includes a nursing home and primary care centre as well public road widening and rod realignment works along the existing R157 Regional Road, internal access road and associated car parking, and all associated infrastructure;
- The Strategic Housing Development (**Site C**) will consist of 360 no. residential homes, a creche facility, internal access roads, approximately 500m of distributor road, pedestrian and cycle improvements, a cycle bridge, shared communal and private open space and all associated site development works.
- The Maynooth Outer Orbital Road (**MOOR**) which consists of approximately 1.7km of distributor road, a single span bridge, pedestrian and cycle improvement measures, a cycle bridge, upgrade works to an existing road and all associated utilities,
- The **Kildare Bridge** planning application includes road upgrade works to the existing R157 Regional Road, a proposed pedestrian / cycle bridge adjacent to the existing Kildare Bridge, as well as a proposed wastewater connection to the Maynooth Municipal Wastewater Pumping Station to the southeast of the Proposed Development in County Kildare.
- The **Moyglare Bridge** planning application includes for the provision of an integral single span bridge over the Rye Water River with associated flood plain works and embankments, as well as services and utilities connections from the proposed onsite pumping station at SHD site.

The Proposed Development will require minor alteration of ground levels to ensure it is at an adequate level for the proposed surface water drainage and foul water drainage due to the relatively flat topography as described in Section 7.3.1 above. Excavation of soil and subsoil will be required for the Proposed Development in preparation for the construction of building foundations, suitable sub-formation for road construction, trenching for foul and drainage water infrastructure and other services.

The estimated amounts of excavations and earthworks required for the various components of the Proposed Development are described in the relevant Construction & Environmental Management Plans appended to this EIAR.

Surface Water Drainage

Surface water management proposals are described in detail in Volumes 3a, 3b & 3c(i) Appendix 4-9 Engineering Services Report and Volume 3d Appendix 4-6 MOOR Preliminary Design Report and are summarised below.

Surface water management for the Proposed Development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of Meath County Council. The surface water design includes for a climate change factor of 20%

It is proposed that surface water within Site A (from roads, roofs and hardstanding areas) will drain via gravity, and via hydrocarbon interceptors, and infiltration area/attenuation storage areas, to an existing ditch along the southern boundary, which is to be replaced by a new filter trench as part of the upgraded and re-aligned R157. This drain conveys surface water runoff in a southerly direction, ultimately towards the Rye Water River at the proposed outfall location described below. The main Site A attenuation systems will comprise underground poly-tunnel systems, to be located within the Proposed Development's green spaces, with adequate drainage to maintain functionality.

It is proposed that surface water within Site B (from roads, roofs and hardstanding areas) will drain via gravity, and via hydrocarbon interceptors, and infiltration area/attenuation storage (located in the shared carpark at Site B), to a high-level outfall at the Rye Water River, just west of the Kildare Bridge.

It is proposed that surface water within Site C (from roads, roofs and hardstanding areas) will drain via gravity, and via hydrocarbon interceptors, and infiltration areas/attenuation storage The main Site C attenuation systems will comprise underground poly-tunnel systems, to be located within the Proposed Development's green spaces, with adequate drainage to maintain functionality.

It is proposed that surface water run off on the MOOR is to be captured by adequately spaced trapped road gullies, which connect to a main carrier drain under the road. Surface water attenuation will be used to control runoff from all hard surfaces in accordance with the GDSDS.

The discharge rates for Site A, Site B**,** Site C and the MOOR are to be restricted to a flow rate less than the current greenfield equivalent runoff rate, to ensure that there is no increase in flow rates and volumes to be discharged from the Proposed Development to the receiving infrastructure and waterbodies. Therefore, there will be no adverse impact on downstream properties.

Water Supply

Water Supply proposals are described in detail in Volumes 3a, 3b & 3c(i) in Appendix 4-9 Engineering Services Report and are summarised below.

It is proposed for Site A to provide an extension from the existing 200mm watermain located at Kildare Bridge, to be provided along the MOOR road to the connection point at the site boundary. It is anticipated that a metered 150mm high density polyethylene connection will be required to serve the proposed office units.

It is proposed for Site B to provide an extension from the existing 200mm watermain located at Kildare Bridge, to be provided along the MOOR road to the connection point at the site boundary. It is anticipated that a metered 150mm high density polyethylene connection will be required to serve the proposed healthcare units.

It is proposed for Site C to provide an extension to the extension to the existing 200m ductile iron watermain at Moyglare Close, with a metered 200mm high density polyethylene connection serving the site. Internal distribution networks will serve the proposed residential units. An extension from the site's watermain will be provided to serve the proposed crèche facility and scouts den.

The Proposed Development will be subject to a New Connection Agreement with Irish Water, with all details in accordance with their requirements. There is no proposed extraction of groundwater at the site for drinking water purposes.

Wastewater Infrastructure

Wastewater management proposals are described in detail in Volumes 3a, 3b & 3c(i) in Appendix 4-9 Engineering Services Report and are summarised below.

It is proposed to provide a Pumping Station constructed to IW standards and specifications to the west of the proposed nursing home building at Site B within the Proposed Development. Site A to the northeast, Site B to the east and Site C to the west of the proposed pumping station will drain by gravity to the Pumping Station where it will then be pumped to the existing Irish Water network along the L1013 Local Road in County Kildare, approximately 1km south of the proposed pumping station.

Individual buildings will connect to the 225mm diameter foul drains via individual 100mm diameter connections, as per Irish Water Code of Practice for Wastewater Infrastructure.

The foul sewers are sealed and there will be no discharge of wastewater to ground within the Proposed Development. Wastewater will be pumped from the Proposed Development to the Maynooth pumping station, and onwards from Maynooth pumping station to the Leixlip Wastewater Treatment Plant.

7.5 Potential Impacts and Mitigation Measures Implemented

7.5.1 Do-Nothing Scenario

The 'Do-Nothing' scenario considers the evolution of the site, from an environmental perspective, if the Proposed Development were not to be carried out. In this scenario, the site would remain as a green-field site for grazing by livestock and the land use would remain as small-scale pastural agriculture. The impact to the topsoil from compaction and poaching of soft ground from the presence of livestock would continue as a result of the Do-Nothing Scenario. The potential effects associated with continuing the Do-Nothing scenario are considered to be likely long term and imperceptible in the context of impacts on soils and geology.

The lands are zoned for development and so continuing the existing land uses would be contrary to local policy and, would have a slight negative effect in the context of losing the benefits associated with the proposed land uses.

7.5.2 Construction Phase Impacts

7.5.2.1 Site A - Strategic Employment Zone

The likely impacts of Site A and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.1.1 *Effects on Land and Land-Use*

The construction of the Site A footprint (6.8 ha) will result in the loss of the majority of this land as agricultural land. There will be no effects on the lands adjoining Site A.

Pathway: Excavation/ foundation construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be loss of agricultural land within the site, and therefore the effects of actual agricultural land-use in the area must be considered. As per the Meath County Development Plan 2021-2027 and the Maynooth Environs Local Area Plan 2013-2019, Site A is zoned for Strategic Employment. Site A use is in keeping with the current land zoning; therefore, the Proposed Development will have a slight, positive impact on land use.

Residual Impact

Agriculture is the dominant land use in the area of Site A. As Site A is in keeping with the current land zoning, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.1.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil and bedrock will be required for site levelling, for the installation of foundations for the access roads, carpark and buildings, and service trenching. This will result in a permanent loss of subsoil and bedrock at excavation locations. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape. Due to the nature of the proposed works, which do not require deep excavations combined with the topography and nature of the underlying subsoils and bedrock, significant volumes of excavated materials are not anticipated. It is estimated that c13,843m^3 of soil, subsoil and bedrock will be excavated that that the majority of this will be required for reuse onsite. Approximately 12,400m^3 of additional fill material will be required to achieve formation levels which will be sourced from offsite authorised quarries or from excavation works from nearby construction projects, including other components of the Proposed Development, in accordance with relevant waste legislation.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden and/or bedrock material will be reused on site, where possible;
- Excavated materials will be used at adjacent sites subject to Article 17 authorisations or other regulatory consents in order to minimise environmental effects.
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a by-product or waste.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.1.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.1.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout Site A. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the constriction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects. Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.1.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.2.2 Site B – Healthcare Application

The likely impacts of Site B and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.2.1 *Effects on Land and Land-Use*

The construction of the Site B footprint (6.6 ha) will result in the loss of the majority of this land as agricultural land. There will be no effects on the lands adjoining Site B.

Pathway: Excavation/ foundation construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be loss of agricultural land within the site, and therefore the effects of actual agricultural land-use in the area must be considered. As per the Meath County Development Plan 2021-2027 and the Maynooth Environs Local Area Plan 2013-2019, Site B is zoned for Community Infrastructure. Site B use is in keeping with the current land zoning; therefore, Site B will have a slight positive impact on land use.

Residual Impact

Agriculture is the dominant land use in the area of Site B. As Site B is in keeping with the current land zoning, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.2.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil and bedrock will be required for site levelling, for the installation of foundations for the access roads, carpark and buildings, and service trenching. This will result in a permanent loss of subsoil and bedrock at excavation locations. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape. Due to the nature of the proposed works, which do not require deep excavations combined with the topography and nature of the underlying subsoils and bedrock, significant volumes of excavated materials are not anticipated. It is estimated that c11,000m^3 of soil, subsoil and bedrock will be excavated that that the majority of this will be required for reuse onsite (approximately 6,500m^3). Approximately 4,500m^3 of additional cut material will be required to be moved from the site to achieve formation levels. This may be available to either supply other parts of the Proposed Development site, supply other adjacent projects or will be managed in accordance with either by-product or waste legislation obligations.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a waste.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.2.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.2.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout Site B. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the construction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects. Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.2.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.2.3 Site C – Strategic Housing Development

The likely impacts of Site C and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.3.1 *Effects on Land and Land-Use*

The construction of the Site C footprint (19.5 ha) will result in the loss of the majority of this land as agricultural land. There will be no effects on the lands adjoining Site C.

Pathway: Excavation/ foundation construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be loss of agricultural land within the site, and therefore the effects of actual agricultural land-use in the area must be considered. As per the Meath County Development Plan 2021-2027 and the Maynooth Environs Local Area Plan 2013-2019, Site C is zoned for Housing. Site C use is in keeping with the current land zoning; therefore, Site C will have a slight positive impact on land use.

Residual Impact

Agriculture is the dominant land use in the area of Site C. As Site C is in keeping with the current land zoning, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.3.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil and bedrock will be required for site levelling, for the installation of foundations for the access roads, carpark and buildings, and service trenching. This will result in a permanent loss of subsoil and bedrock at excavation locations. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape. Due to the nature of the proposed works, which do not require deep excavations combined with the topography and nature of the underlying subsoils and bedrock, significant volumes of excavated materials are not anticipated. It is estimated that c22,450m^3 of soil, subsoil and bedrock will be excavated and that the majority of this will be required for reuse onsite. Approximately 26,560m^3 of additional fill material will be required to achieve formation levels which will be sourced from offsite authorised quarries or from excavation works from nearby construction projects, including other component of the Proposed Development, in accordance with relevant waste legislation.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a by-product or a waste.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.3.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.3.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout Site C. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the construction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects

Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.3.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.2.4 MOOR – Maynooth Outer Orbital Road

The likely impacts of the MOOR and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.4.1 *Effects on Land and Land-Use*

The construction of the MOOR footprint (6.6ha) will result in the loss of land as agricultural land. There will be no effects on the lands adjoining the MOOR.

Pathway: Excavation/ foundation construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be loss of agricultural land within the site, and therefore the effects of actual agricultural land-use in the area must be considered. As per the Meath County Development Plan 2021-2027 and the Maynooth Environs Local Area Plan 2013-2019, the MOOR is zoned for transport as an indicative road route. The MOOR use is in keeping with the current land zoning; therefore, the MOOR will have a slight positive impact on land use.

Residual Impact

Agriculture is the dominant land use in the area of the MOOR. As the MOOR is in keeping with the current land zoning, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.4.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil and bedrock will be required for site levelling, for the installation of foundations and service trenching. This will result in a permanent loss of subsoil and bedrock at excavation locations. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape. Due to the nature of the proposed works, which do not require deep excavations combined with the topography and nature of the underlying subsoils and bedrock, significant volumes of excavated materials are not anticipated. It is estimated that c34,750m^3 of soil, subsoil and bedrock will be excavated and that the majority of this will be required for reuse onsite. Approximately 17,500m^3 of additional cut material will be required to be moved from the site to achieve formation levels. This may be available to either supply other parts of the Proposed Development site, supply other adjacent projects or will be managed in accordance with either by-product or waste legislation obligations.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a by-product or waste.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.4.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution

prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.4.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout the construction of the MOOR. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the construction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects

Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.4.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.2.5 Kildare Bridge Application

As the Kildare Bridge application currently exists as existing road, there will be no considerable works associated with its construction. The likely impacts of the Kildare Bridge application and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.5.1 *Effects on Land and Land-Use*

The construction of the Kildare Bridge works application footprint (1.2ha) will result in the upgrade of existing road. A loss of a small portion of agricultural land will be associated with this component of the Proposed Development along each side of the proposed pedestrian/cycle bridge

Approximately 115m of existing road will also be upgraded. There will be no effects on the lands adjoining the Kildare Bridge application.

Pathway: Excavation/ Bridge Construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be minimal loss of agricultural land within the site, however the effects of actual agricultural land-use in the area must be considered. As per the Greater Dublin Area Cycle Network Plan a number of cycle routes have been proposed in the surrounding area. The proposed Kildare Bridge works will provide pedestrian and cycle infrastructure to the local area providing a positive impact on land use.

Residual Impact

Road network is the dominant land use in the area of the Kildare Bridge application. As the Kildare Bridge works are in keeping with the current existing infrastructure, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.5.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil will be required for the installation of piled foundations and reinforced earth abutments. The excavation of

The excavation of existing road materials will also occur in the installation of the wastewater infrastructure which will travel along the existing public road.

This will result in a permanent loss of subsoil excavation locations. The soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique nor abundant in the wider landscape.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil, existing road network.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and a excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a waste or a by-product.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.5.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.5.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout the construction of the Kildare Bridge works. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the construction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects

Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.5.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.2.6 Moyglare Bridge Application

The likely impacts of the Moyglare Bridge application and mitigation measures that will be put in place to eliminate or reduce them are outlined below.

7.5.2.6.1 *Effects on Land and Land-Use*

The construction of the Moyglare Bridge application footprint (0.5ha) will result in the loss of the majority of this land as agricultural land. There will be no effects on the lands adjoining the Moyglare Bridge.

Pathway: Excavation/ Bridge construction.

Receptor: Land or Land-Use

Potential Pre-mitigation Impact: Negative, slight, direct, likely, permanent impact on land and land-use.

Impact Assessment/ Mitigation Measures

There will be loss of agricultural land within the site, and therefore the effects of actual agricultural land-use in the area must be considered. As per the Meath County Development Plan 2021-2027 and the

Maynooth Environs Local Area Plan 2013-2019, The Moyglare Bridge is zoned for transport as an indicative road route linking the Moyglare Hall housing estate to the proposed MOOR. The Moyglare Bridge use is in keeping with current land zoning; therefore, the Moyglare Bridge will have a slight positive impact on land use.

Residual Impact

Agriculture is the dominant land use in the area of the Moyglare Hall application. As it is in keeping with the current land zoning, the residual effect is considered to be positive, direct, slight, likely, permanent impact on land and land-use.

Significance of Effects

For the reasons outlined above, no significant effects on land or land-use will occur.

7.5.2.6.2 *Subsoil Excavation and Bedrock Excavation*

Excavation of subsoil and bedrock will be required for site levelling, for the installation of foundations for the proposed road and bridge. This will result in a permanent loss of subsoil and bedrock at excavation locations. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape.

Pathway: Extraction/ excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Pre-mitigation Impact: Negative, slight/moderate, direct, likely, permanent impact on subsoil and bedrock.

Mitigation Measures

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design; and,
- Construction of service trenching, and surface water attenuation features will generate excess material, and excess material will be used locally within the site for achieving building formation levels and landscaping.
- Any spoil generated which will be removed offsite will be done so in accordance with the relevant regulations and best practice including waste management legislation if the material is considered a waste or a by-product.

Residual Impact

Due to the shallow nature of the excavations, the design and mitigation measures to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoils or bedrock will occur.

7.5.2.6.3 *Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry*

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Pre-Mitigation Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures

- 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 in order 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; and,
- 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.

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 suitably qualified individual will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Impacts

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. Proven and effective measures to mitigate the risk of spills and leaks have been proposed above and will break the pathway between the potential source and the receptor. The residual effect is considered to be - Negative, imperceptible, direct, short-term, unlikely effect on topsoil, subsoils and bedrock.

Significance of Effects

For the reasons outlined above, no significant effects on land, topsoil, subsoil or bedrock will occur.

7.5.2.6.4 *Soil and Subsoil Compaction*

Unintended soil and subsoil compaction may occur due to inadvertent construction traffic throughout the Moyglare Bridge application. Soil compaction leads to bulk density of the soil increasing and the total porosity decreasing which can pose a risk to site drainage due to the lower level of ground permeability on the site.

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Pre-Mitigation Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining drainage properties. This will be relevant within the proposed landscaped and green areas of the site.

Residual Impacts

The potential effects are limited to the period of the construction phase when soils are exposed. The entire site will be subject to ground level finishes which will eliminate the potential for any significant residual effects

Negative, slight, direct, likely impact on topsoil and subsoils.

Significance of Effects

For the reasons outlined above, no significant effects on topsoil or subsoil will occur.

7.5.2.6.5 *Geological impact on Local Designated Sites*

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect or indirect impacts on land, topsoil, subsoil or bedrock underlying Designated Sites are anticipated.

Residual Impact: None.

7.5.3 Operational Phase Impacts

7.5.3.1 Site A – Strategic Employment Zone

Due to the nature of Site A, no impacts on soils and geology are anticipated during the operational phase. The operational stage of the Proposed Development consists of the typical activities in a commercial area and will not involve further disturbance to the topsoil, subsoils and geology of the area.

No cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.2 Site B – Healthcare Application

Due to the nature of Site B, no impacts on soils and geology are anticipated during the operational phase. The operational stage of Site B consists of the typical activities in a commercial area and will not involve further disturbance to the topsoil, subsoils and geology of the area.

No cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.3 Site C – Strategic Housing Development

Due to the nature of Site C, no impacts on soils and geology are anticipated during the operational phase. The operational stage of Site C 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 cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.4 MOOR – Maynooth Outer Orbital Road

Due to the nature of the MOOR, potential impacts during the operational phase include the accidental spillage of petroleum hydrocarbons as a result of operational use of the road. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Pre-Mitigation Potential Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

Proposed Mitigation Measures:

Drainage design measures are set out in Volume 3d Appendix 4-6 MOOR Preliminary Design Report. Adequately spaced trapped road gullies, which connect to a carrier drain is proposed for the MOOR. Surface water attenuation systems included in the design will comprise of large enclosed vegetated ponds, and shall be preceded by a Class 1 bypass fuel separator.

No cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.5 Kildare Bridge Application

Due to the nature of the Kildare Bridge application, no impacts on soils and geology are anticipated during the operational phase. The operational stage of Kildare Bridge application consists of the typical activities involved with public amenity and will not involve further disturbance to the topsoil, subsoils and geology of the area.

No cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.6 Moyglare Bridge Application

Due to the nature of the Moyglare Bridge application, no impacts on soils and geology are anticipated during the operational phase. The operational stage of Moyglare Bridge application consists of the typical activities involved with transport infrastructure and will not involve further disturbance to the topsoil, subsoils and geology of the area.

No cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.4 Cumulative effects resulting from Interactions between various elements of the proposed development

The interaction of the various elements of the Proposed Development was considered and assessed in this EIAR with regards land, soils and geology. The potential for each individual element of the Proposed Development on its own to result in significant effects on land, soils and geology was considered throughout this impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on geological receptors in the impact assessment presented. The complex interactions between the requirement for site grading and the requirement to protect the Rye Water River and Blackhall Little Stream, human health, and other receptors were taken into account for the entire project and any impacts avoided through a series of mitigation measures that were fully described. The management and handling of potentially harmful materials across the entire project was assessed with mitigation proposed and described fully.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

7.5.5 Cumulative In-combination Effects

The potential cumulative effects of the Proposed Development in combination with the other projects described in Chapter 2 of this report have been considered in terms of impacts of impacts on land, soils and geology.

There are no active quarries, major earthworks, or other associated activities which could impact upon the soils and geological environment adjacent the proposed development site.

There are a number of proposed or permitted housing developments within the vicinity of the Proposed Development. A description of the developments is provided in Chapter 2, and where appropriate the application documentation, EIAR and NIS for each development have been reviewed

Further information on the above is provided in Table 2-8 of Chapter 2.

The proposed and permitted developments listed above will require minimal earthworks due to size, scale and nature of the developments. Furthermore, the scale of the proposed earthworks at the Proposed Development site is negligible in the context of the land, soil and geology type, which is common in the area, and so the potential cumulative effects are considered imperceptible.

With the implementation of mitigation measures for the Proposed Development as outlined above, no significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operation phases of the Proposed Development in combination with other developments. The other developments listed above will also include appropriate mitigation measures to reduce impacts to local land, soil and geology. Potential cumulative impact will be permanent, imperceptible, and neutral.

7.5.6 Human Health Effects

In the context of land soils and geology, human health effects may arise on sites where there are known and unknown risks associated with soil and ground contamination. The walkovers and extensive site investigations show that the site is a greenfield rather than brownfield site. Detailed Human Health risk assessments are required for brownfield sites with the potential for exposures to gases or chemicals which does not arise for the Proposed Development site. The operation of residential and commercial developments including the MOOR in accordance with established Health & Safety legislation and best practice ensures that there will be no significant negative effects associated with its operation on human health. Conclusion

Excavation of topsoil, subsoil and bedrock will be required for site levelling, building foundations, road construction and for the installation of drainage and services (wastewater, water supply, electricity, etc.). This will result in a permanent relocation and removal of subsoil and bedrock at most excavation locations. Due to the nature of the site topography and geology it will be possible to reuse cut material as fill which minimises the need to remove all excavated materials. Excess material will be used for reinstatement and landscaping works around the site at the end of the construction phase where possible. Any material moved offsite will be manage in accordance with relevant waste legislation should it be considered either a by-product or a waste. The bedrock at the site can be classified as of “Low” importance, and the soil and subsoil deposits at the site could be classified as of “Low” importance as neither are unique and are abundant in the wider landscape.

Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent subsoil compaction during excavation and reinstatement will be undertaken to prevent impacts on soil and subsoils with potential also minimising potential indirect effects on water quality.

No significant impacts on land, soil and geology will occur.

No significant cumulative impacts on land, soil and geology will occur due to the Proposed Development