12. MATERIAL ASSETS – SITE SERVICES / UTILITIES

12.1 Introduction

This chapter of the EIAR comprises of an assessment of the likely impact of the proposed development on existing surface water, water supply, foul drainage and utility services in the vicinity of the site and assesses the impact of the proposed development on these aspects of the existing environment. Where necessary, proposed mitigation measures have been identified to minimise any impacts.

The author of this Chapter is Brendan Keogh (BA BAI PGradDip CEng MIEI) of DBFL Consulting Engineers- a Chartered Professional Engineer with over 15 years' experience in the design and construction of civil engineering projects. Projects have included works associated with the commercial, industrial, energy, residential and public infrastructure sectors.

The material assets considered in this chapter of the EIAR include Surface Water Drainage, Foul Drainage, Water Supply, Electricity, Gas and Telecommunications.

In summary, the project comprises the development of 372 no. residential units with ancillary public open space, ancillary residential parking spaces and a childcare facility with associated parking spaces.

The surface water drainage system accords with SUDs principles with the main body of the site divided into five drainage catchments. Attenuation will be provided in each catchment utilising Stormtech Underground Chamber systems or similar, with a controlled greenfield run-off rate of 2.00l/sec/ha. There is an existing 450mm diameter public surface water drain adjacent to the South-West corner of the site. It is expected to provide a suitable surface discharge point for the proposed development.

There is an existing public 225mm diameter foul sewer located along the site's western boundary which outfalls towards Celbridge Main Street. Ground levels at the discharge point are somewhat elevated above the eastern side of the site. It is therefore proposed to raise existing ground levels along the eastern side of the site in order to achieve a gravity drainage solution (avoiding the need for a pumped solution). In order to accommodate the proposed site layout, diversion of the existing foul sewer is required which traverses the western portion of the site. This is then expected to provide a suitable foul discharge point for the proposed development.

It is proposed to take a 160 mm diameter connection off the existing 12" diameter public water supply line (located along the R405). A 160 mm diameter looped water main will be provided (generally along the site's arterial roads) with a number of 160mm and 110mm diameters looped branch mains provided elsewhere (off the main 160mm diameter loop).

12.2 Assessment Methodology

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS)
- Method outlined in Irish Water's Code of Practice for Wastewater Infrastructure
- Method outlined in Irish Water's Code of Practice for Water Infrastructure

Assessment of the potential impacts of the proposed development on existing material assets in the vicinity of the site included:

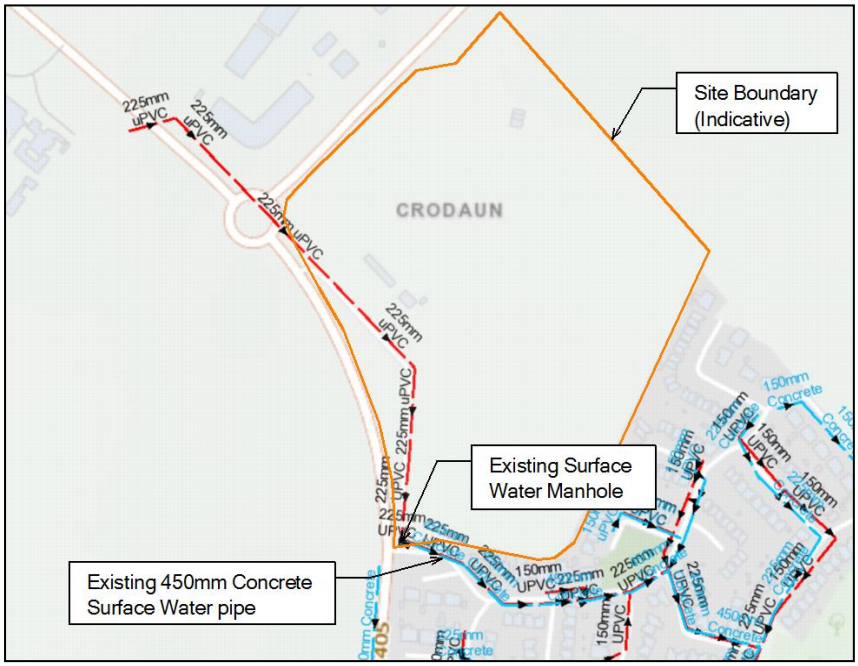
- Review of Irish Water utility plans (surface water drainage, foul drainage and water supply)
- Consultation with Irish Water and Kildare County Council
- Submission of a Pre-Connection Enquiry Application to Irish Water.
- Review of ESB Networks Utility Plans
- Review of Gas Networks Ireland Service Plans
- Review of Eir E-Maps
- Review of Virgin Media Maps

12.3 Receiving Environment

12.3.1 Surface Water Drainage

An existing 450mm diameter public surface water drain is located south west of the site at the entrance to Crodaun Forest Park (refer to Figure 12.1). This will provide a suitable surface water discharge point for the proposed development.

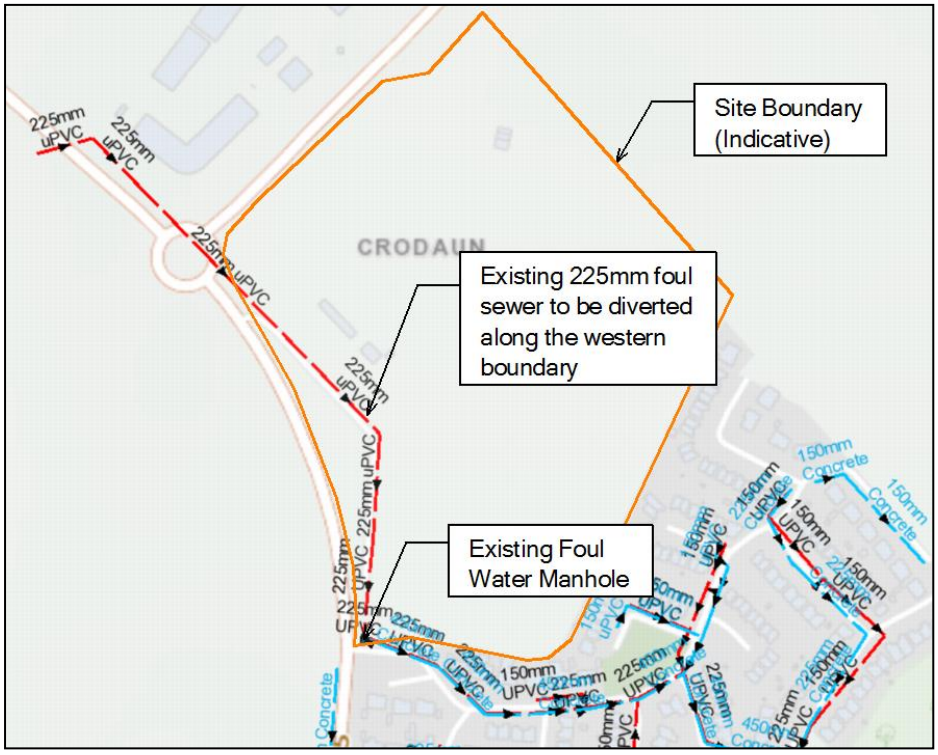
Figure 12.1 Extract from Irish Water Utility Plan



12.3.2 Foul Drainage

An existing 225mm diameter foul sewer is located along the site's western boundary (adjacent to the R405) which outfalls towards Celbridge Main Street. The location of this existing foul sewer is shown on the J&L Survey's Topographic Survey Plan (Appendix F) and Irish Water's Network Plans (Appendix D). In order to accommodate the proposed site layout, diversion of the existing foul sewer is required which traverses the western portion of the site. This is then expected to provide a suitable foul discharge point for the proposed development.

Figure 12.2 Extract from Irish Water Utility Plan



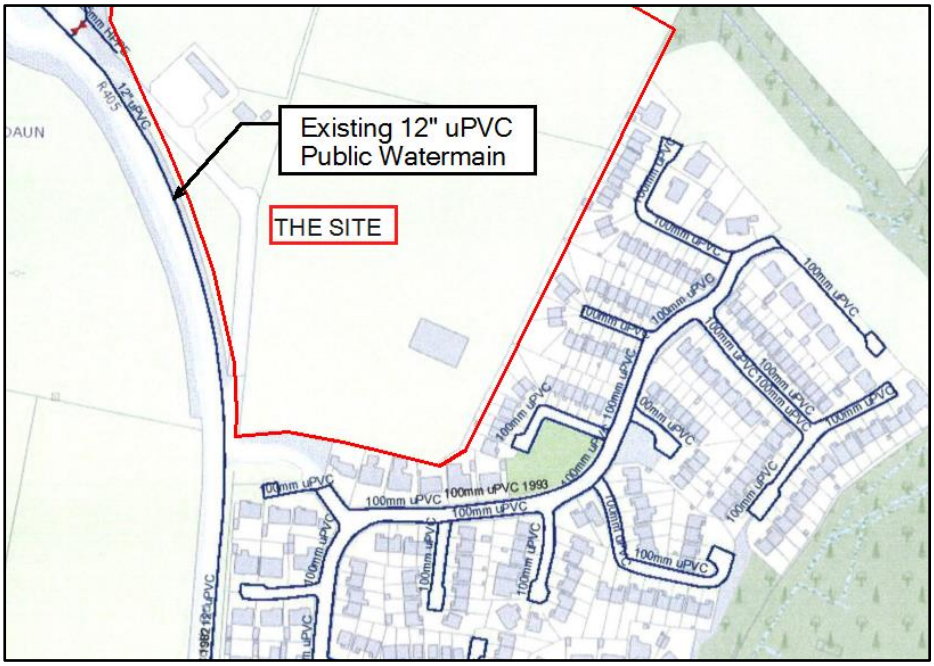
Pre-connection enquiry feedback has been received from Irish Water.

"Based upon the details you have provided with your pre-connection enquiry and on the capacity currently available in the networks(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place and the condition listed below, your proposed connection to the Irish Water network can be facilitated"

12.3.3 Water Supply

The locations of the existing public water mains are shown on Irish Water's Network Plans (refer to Appendix D). An existing 12" uPVC public watermains runs along the R405 (along the sites Western boundary).

Figure 12.3 Extract from Irish Water Utility Plan



Pre-connection enquiry feedback has been received from Irish Water (refer to Appendix G). No issues are noted in relation to the existing public water supply network.

12.3.4 Electricity

An ESB Networks plan is included in Appendix J showing the location of existing electrical services in the vicinity of the site.

An existing LV (400V/230V) overhead line enters a small section of the site at the west side of the site.

12.3.5 Gas

Gas Networks Ireland plans are included in Appendix K showing the location of gas distribution pipes in the vicinity of the site.

An existing medium pressure distribution pipeline is shown running along the road north of the site (125mm / 4bar) and along the road west of the site (250mm /4 bar).

An existing medium pressure distribution pipeline (90mm & 63mm/4 bar) is shown around the residential development south and east of the site.

12.3.6 Telecoms

Eir network plans are included in Appendix L showing the location of telecommunications infrastructure in the vicinity of the site.

Telecommunications infrastructure is located along the R405 road to the west of the site. Existing developments to the north, south and east of the site also contain existing telecommunications networks.

12.4 Characteristics of the Proposed Development

12.4.1 Surface Water Drainage

The existing 450mm diameter concrete surface water line will provide a suitable surface water discharge point for the proposed development.

Surface water discharge rates from the proposed surface water drainage network will be controlled by a vortex flow control device (Hydrobrake or equivalent) and associated underground attenuation tanks (Stormtech Chambers). Attenuation volumes have been calculated based on an allowable outflow / greenfield runoff rate of 2.00 l/sec/ha. Surface water discharge will also pass via a full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

Surface water runoff from the site's road network will be directed to a proposed pipe network via conventional road gullies while surface water from roofs will be routed to the proposed surface water pipe network via the porous aggregates beneath permeable paved driveways (providing an additional element of attenuation).

The site's surface water management infrastructure has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS).

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS), the Department of the Environment's Recommendations for Site Development Works for Housing Areas, the Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" and BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

12.4.2 Foul Drainage

The Topography of the site generally falls from the western boundary to the east at gradients ranging from 1/80 to 1/120.

The proposed foul drainage discharge point is located adjacent to the South-West corner of the site. Ground levels in this area are somewhat elevated above the eastern side of the site. It is therefore proposed to raise existing ground levels along the eastern side of the site in order to achieve a gravity drainage solution (avoiding the need for a pumped solution).

In order to accommodate the proposed site layout, diversion of the existing foul sewer is required which traverses the western portion of the site. This is then expected to provide a suitable foul discharge point for the proposed development. The proposed foul drainage network will comprise of a series of 225mm diameter pipes. Each residential unit is to be serviced by individual 100mm diameter connections.

The foul drainage network for the proposed development has been designed in accordance with the Department of the Environment's Recommendations for Site Development Works for Housing Areas, the Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal", BS EN 752: 2008 Drain and Sewer Systems Outside Buildings, IS EN 12056: Part 2 (2000) Gravity Drainage Systems Inside Buildings and BS 8301:1985 Building Drainage.

12.4.3 Water Supply

It is proposed to take a 200mm diameter connection off the existing 12" diameter public water supply line (located along the R405).

A 200mm diameter looped water main will be provided (generally along the site's arterial roads) with a number of 160mm and 110mm diameters looped branch mains provided elsewhere (off the main 200mm diameter loop).

Individual houses will have their own connections (25mm O.D. PE pipe) to distribution water mains via service connections and meter / boundary boxes.

All connections, valves, hydrants, meters etc. have been design and are to be installed in accordance with Irish Water's Code of Practice / Standard Details and the Department of the Environment's Building Regulations "Technical Guidance Document Part B Fire Safety".

12.4.4 Electricity

Electricity supply for the proposed development will be taken from the existing ESB Network.

Existing overhead electricity lines within the site (LV 400V/230V) will be relocated in advance of commencement of site works.

12.4.5 Gas

Gas supply for the proposed development (if required as part of the energy strategy) will be taken from the existing Gas Networks Ireland network located to the west of the site.

12.4.6 Telecoms

The existing Eir network located to the west of the site will be extended to service the proposed development.

12.5 Identification of Likely Significant Impacts

12.5.1 Surface Water

12.5.1.1 Construction

- Surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities.
- Discharge of rainwater pumped from excavations may also contain increased silt levels (potential impact on existing hydrology e.g. discharge to existing open drain).
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refuelling and maintenance.
- Concrete runoff, particularly discharge of wash water from concrete trucks

12.5.1.2 Operational

- Increased impermeable surface area will reduce local ground water recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate).
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).
- Risk of flooding if runoff of surface water from the development site is not attenuated and managed properly

12.5.1.3 Cumulative Impacts

- Should any other developments be under construction or planned in the vicinity of the site they are likely to have similar impacts during the construction phase in relation to Surface Water. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

12.5.2 Foul Sewerage

12.5.2.1 Construction

- Improper discharge of foul drainage from contractor's compound.
- Discharge from the excavated areas could potentially lead to siltation, surcharge and flooding within the sewerage system.
- Relocation or diversion of existing foul line may lead to interruption to foul supply

12.5.2.2 Operational

- Increased discharge to foul drainage network.
- Leaks in the network causing potential contamination of groundwater and surface water

12.5.2.3 Cumulative Impacts

- Should any other developments be under construction or planned in the vicinity of the site they are likely to have similar impacts during the construction phase in relation to foul. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.
- Additional flow to wastewater treatment plant

12.5.3 Water Supply

12.5.3.1 Construction

- Cross contamination of potable water supply to construction compound.
- The installation of water supply line will be conducted in parallel with other services using trench excavation.

12.5.3.2 Operational

- Increased potable water consumption

12.5.3.3 Cumulative Impacts

- Increased demand on the water supply infrastructure.

12.5.4 Electricity

12.5.4.1 Construction

- There is potential interruption to ESB Networks Infrastructure while carrying out works to provide service connections to the proposed development (e.g. damage to existing underground and over ground infrastructure).
- Relocation or diversions to existing overhead ESB lines may lead to loss of connectivity to and / or interruption of supply from the electrical grid.

12.5.4.2 Operational

- On completion of the construction phase, there will be no further impact on the electrical supplies.

12.5.4.3 Cumulative Impacts

- Other developments in the vicinity of the site are likely to have similar impacts during the construction phase in relation to Material Assets - Utilities. Should the construction phase of any other developments coincide with the development of site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

12.5.5 Gas

12.5.5.1 Construction

- There is potential interruption to Gas Networks Ireland's Infrastructure while carrying out road works along the Maynooth Road (formation of site access junction) and while carrying out works to provide service connections to the proposed development.

12.5.5.2 Operational

- On completion of the construction phase, there will be no further impact on the existing gas network.

12.5.5.3 Cumulative Impacts

- Other developments in the vicinity of the site are likely to have similar impacts during the construction phase in relation to Material Assets - Utilities. Should the construction phase of any other developments coincide with the development of site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

12.5.6 Telecommunications

12.5.6.1 Construction

- There is potential interruption to Eir's Infrastructure while carrying out road works along the Maynooth Road (formation of site access junction) and while carrying out works to provide service connections to the proposed development.

12.5.6.2 Operational

- On completion of the construction phase, there will be no further impact on the existing gas network.

12.5.6.3 Cumulative Impacts

- Other developments in the vicinity of the site are likely to have similar impacts during the construction phase in relation to Material Assets - Utilities. Should the construction phase of any other developments coincide with the development of site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

12.6 'Do Nothing' Scenario

If the proposed development were not undertaken, it is expected that there would be no change on the subject site and therefore no impact on surface water drainage, foul drainage, water supply and other utilities arising from the subject site.

12.7 Mitigation Measures

A detailed "Construction Management Plan" will be prepared by the Contractor and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan".

12.7.1 Surface Water

- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- In order to mitigate against spillages contaminating the surrounding surface water and hydrogeological environments, all oils, fuels, paints and other chemicals should be stored in a secure bunded hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any surface water inlets (where not possible to carry out such activities off site).
- Concrete batching will take place off site and wash down and wash out of concrete trucks will take place off site (at authorised concrete batching plant in full compliance with relevant planning and environmental consents).
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with the relevant standards, pressure tested, and CCTV surveyed to ascertain any possible defects.
- Regular maintenance of the drainage network including the petrol interceptor, flow control and surface water storage system would ensure that they are operating correctly.
- The design of proposed site levels (roads, FFL etc.) has been carried out to ensure the proposed development is elevated and set in such a way as to avoid concentrating additional surface water flow in a particular location.
- Surface water runoff from the site will be attenuated to the greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GDSDS).
- Surface water discharge rates will be controlled by a Hydrobrake type vortex control device.

- A contract will be entered into with a suitably qualified contractor from maintenance of the attenuation system, Hydrobrake and full retention fuel / oil separator noted above.

12.7.2 Foul Sewerage

- In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with the relevant standards, pressure tested, and CCTV surveyed to ascertain any possible defects.
- The construction compound will include adequate staff welfare facilities including foul drainage. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established.
- Diversion of the existing Foul Sewer traversing the site will be fully coordinated with Irish Water to ensure interruption to the existing foul network is minimised. Foul sewer along the proposed relocated route will be constructed and ready for rerouting in advance of decommissioning and removal of existing foul sewer.
- It is envisaged that the development would take place and be occupied over a reasonable time period, and therefore the downstream foul sewerage system (foul sewer network and wastewater treatment facility) would be gradually loaded.

12.7.3 Water Supply

- The watermains would be tested according to the requirements of Irish Water and Kildare County Council prior to commissioning.
- Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.

12.7.4 Electricity Supply

- Contractor to prepare Method Statement detailing proposals for works in the vicinity of existing utilities (method statement to be agreed with PSDP).
- Contractor to locate and record all services on site prior to commencement of excavations (including but not limited to a GPR utility survey along the Maynooth Road and slit trench investigation to confirm the location of electrical infrastructure).
- Connections to the existing electrical networks will be coordinated with the relevant utility provider and carried out by approved contractors.
- Contractor to comply with HSA Code of Practice for Avoiding Danger from Underground Services.
- Relocation of existing overhead ESB lines will be fully coordinated with ESB Networks to ensure interruption to the existing electricity network is minimised (e.g. agreeing electricity outage to facilitate relocation of cables).
- Ducting and / or poles along the proposed relocated route will be constructed and ready for rerouting of cables in advance of decommissioning of existing overhead electricity lines.

12.7.5 Gas Supply

- Contractor to prepare Method Statement detailing proposals for works in the vicinity of existing utilities (method statement to be agreed with PSDP).
- Contractor to locate and record all services on site prior to commencement of excavations (including but not limited to a GPR utility survey along the Maynooth Road and slit trench investigation to confirm the location of existing gas infrastructure).
- Connections to the existing gas networks will be coordinated with the relevant utility provider (e.g. agreeing outage to facilitate connection) and carried out by approved contractors.
- Contractor to comply with HSA Code of Practice for Avoiding Danger from Underground Services.

12.7.6 Telecommunication

- Contractor to prepare Method Statement detailing proposals for works in the vicinity of existing utilities (method statement to be agreed with PSDP).
- Contractor to locate and record all services on site prior to commencement of excavations (including but not limited to a GPR utility survey along the Maynooth Road and slit trench investigation to confirm the location of existing telecommunications infrastructure).
- Connections to the existing telecoms networks will be coordinated with the relevant utility provider (e.g. agreeing outage to facilitate connection) and carried out by approved contractors.
- Contractor to comply with HSA Code of Practice for Avoiding Danger from Underground Services.

12.8 Residual Impacts of Proposed Development

It is considered that once the mitigation measures, as proposed above have been implemented that the potential for residual impacts on site services arising from proposed development is negligible.

12.8.1 Construction Phase

Implementation of measures outlined in Section 12.7 will ensure that the potential impacts of the proposed development on site services do not occur during the construction phase and that any residual impacts will be short term / imperceptible**.**

12.8.2 Operational Phase

Where mitigation measures outlined in Sections 12.7 are implemented, the residual impact is considered to be imperceptible.

12.9 Monitoring

- All drainage works will be approved by Kildare County Council and will be carried out in accordance with the GDRCOP (Greater Dublin Regional Code of Practice for Drainage Works).
- All foul and surface water sewers will be CCTV surveyed prior to being 'taken in charge' by Kildare County Council.

- Watermains, foul sewers and surface water sewers will be pressure tested prior to connection to the public system.

No specific monitoring is proposed in relation to electrical, gas and telecommunications infrastructure

12.10 Human Health

During the construction phase, there is potential for adverse impact on human health arising from construction activities and construction personnel, interruption of utility services and the general public and pollution of ground and surface water and the general public.

Potential impacts to human health include:

- The potential for construction activities and operation of the proposed development to cause pollution and contamination
- Cross contamination of potable water supply to construction compound.
- Dust generation can also occur during extended dry weather periods as a result of construction traffic.
- Gas leaks or explosions. The installation of services is tightly monitored and controlled by Gas Networks Ireland to ensure the protection of human health. Therefore, the risk of effect on human health is not considered significant.
- Loss of supply. This is a managed process that is the responsibility of the individual utility supplier and emergency plans will be in place. The effect is therefore considered brief and not significant.

During the operational phase, there is potential for adverse impact on human health arising from maintenance activities and maintenance personnel, reduction in utility service and the general public and pollution of ground and surface water and the general public.

Risks to human health during the construction and operational phases have been managed in design by the application of the general principles of prevention hierarchy of risk elimination and reduction. In the construction phase, the works contractor will assess residual risks and implement appropriate construction methodologies. During the operational phase, inspection and maintenance of the material assets should be carried out by adequately equipped competent personnel.

With the implementation of the aforementioned mitigation measures, the impact of the proposed built services on human health is likely to be negligible.

12.11 Unplanned Events

The following accidents and disasters involving built services during construction could potentially give rise to a serious incident putting people at risk:

- Excavation works coming into contact with live electricity lines
- Excavation works causing damage and leaks to gas mains
- Collapse of trench during excavation works
- Accidental spills and leaks may result in contamination of water

- Flooding due to unsuitable drainage measures

With the implementation of the aforementioned mitigation measures, the likelihood of such events occurring would be local and not significant.

The following accidents & disasters involving built services during operation could potentially give rise to a serious incident putting end users at risk:

- Gas explosions. The installation of services is tightly monitored and controlled by Gas Networks Ireland. Therefore, the residual risk is not considered significant.

The proposed infrastructure is designed in accordance with the relevant regulations, codes of practice and guidelines to provide sufficient capacity for the expected loading. However, in the design of the proposed development, the potential impact of these planned loads being exceeded was assessed.

Where the designed capacity of piped drainage is exceeded, flow will travel over ground along roads; the road infrastructure has been designed to convey overland flow away from highly vulnerable receptors.

The proposed wastewater network has been sized in accordance with Irish Water's Code of Practice for Wastewater Infrastructure.

In the event of unplanned interruptions to water supply, water will be available to future occupants of the site from on-site domestic water storage tanks.

All proposed electricity, gas and telecommunications infrastructure will be provided below ground, where the risk of accidental damage is minimised.

12.12 Interactions

12.12.1 Soils and Geology

Trench excavations to facilitate site service installation will result in exposure of subsoils to potential erosion and subsequent sediment generation. Mitigation measures are outlined in Chapter 7 Land, Soils and Geology (i.e. service trenches to be backfilled as soon as practicable to minimise potential erosion of subsoils). This interaction is described as neutral.

12.12.2 Hydrology

Surface water runoff during the construction phase may lead to erosion and contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities. Runoff from exposed soils or contaminated leachate has the potential to affect water receptors

Increased impermeable surface area will reduce local ground water recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate).

During the construction phase this interaction will be negative and is quantified as slight. During the operational phase the interaction will be neutral.

12.12.3 Biodiversity

Contamination of water receptors has the potential to affect aquatic ecology.

With the implementation of the aforementioned mitigation measures, the likelihood of such events occurring would be local and not significant.

12.13 References

Greater Dublin Strategic Drainage Study (2005) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

The Greater Dublin Region Code of Practice for Drainage Works (2012) – Fingal County Council, Dublin City Council, Dún Laoghaire-Rathdown County Council, South Dublin County Council, Wicklow County Council, Kildare County Council, Meath County Council

Code of Practice for Water Infrastructure (2017) – Irish Water

Code of Practice for Wastewater Infrastructure (2017) – Irish Water

The Department of the Environment's Recommendations for Site Development Works for Housing Areas (1998)

The Department of the Environment's Building Regulations "Technical Guidance Document Part H Drainage and Waste Water Disposal" (2016)

BS EN 752: 2008 Drain and Sewer Systems Outside Buildings.

IS EN 12056: Part 2 (2000) Gravity Drainage Systems Inside Buildings