

7.0 **WATER (HYDROLOGY AND HYDROGEOLOGY)**

7.1 **Introduction**

This chapter of the EIAR comprises of an assessment of the likely impact of the proposed development on the surrounding surface water and hydrogeological environments (including flood risk, surface water drainage, foul drainage and water supply) as well as identifying proposed mitigation measures to minimise any impacts.

A detailed description of the proposed development can be found in Chapter 3 of this EIAR.

The proposed development will also include the following associated engineering infrastructure:

- Provision of a site access point / formation of a new junction on Clonminch Road.
- Provision of improved facilities for cyclists between the proposed site access and Tullamore Town Centre.
- Delivery of a portion of the roads objective between the Clonminch Road and Chancery Lane (as shown in the Tullamore Town and Environs Development Plan) including high quality cycle infrastructure.
- Facilitation of potential future pedestrian links through adjacent lands.
- Provision of internal site road network including associated footpaths.
- Provision of surface water drainage, foul drainage and water supply infrastructure.
- Provision of a foul pumping station discharging to the existing public foul drain located on the Clonminch Road.

The proposed surface water drainage network accords with SUDS principles, divides the site into four drainage catchments and discharges to existing open drains located along the site's northern and western boundaries at a controlled greenfield runoff rate of 2.37 l/sec/ha.

The proposed foul discharge point is located along the western boundary and is somewhat elevated above the north-east of the site (refer to Irish Water's Network Plan as included in Appendix 7-A, therefore, a strategic pumping station and associated rising main will be required to service the development. The proposed foul drainage network within the development has been designed in compliance with Irish Water's Code of Practice for Wastewater Infrastructure and comprises of a series of 225mm diameter pipes, discharging to the strategic pumping station described above.

An existing 9" watermain is located to the west of the site along the Clonminch Road. It is proposed to connect to the existing 9" diameter watermain on the Clonminch Road to service the proposed development. The proposed water main layout has been designed in accordance with Irish Water's Water's Code of Practice for Water Supply. A 200mm diameter spine water main will be provided along the

development's arterial roads with a number of 150mm / 100mm diameter looped branch mains provided elsewhere.

7.2 **Study Methodology**

An assessment of the likely impact of the proposed development on the surrounding surface water and hydrogeological environments included the following activities:

- Site inspection / walkover
- Review of existing topographic survey information
- Review of Irish Water utility plans (foul drainage and water supply), refer to Appendix 7-A
- Ground investigations including trial pits and infiltration testing
- Review of information available on the Environmental Protection Agency (EPA) online mapping service
- Review of information available on the Geological Survey of Ireland (GSI) online mapping service
- Review of Office of Public Works (OPW) National Flood Hazard Mapping and CFRAM Studies (Catchment Flood Risk Assessment and Management Studies)
- Consultation with Offaly County Council's Water Services Section
- Consultation with Irish Water
- Submission of a Pre-Connection Enquiry Application to Irish Water
- Obtaining a Statement of Design Acceptance from Irish Water

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 Pre-Connection Enquiry Application (water demand and foul drainage discharge)

7.3 Receiving Environment/Baseline

7.3.1 Hydrology

The primary hydrological features in the vicinity of the site are the Tullamore River (approx. 1.5km to the north) and a local stream which is a tributary to the Tullamore River (1.0km to the east). Refer to Figure 7.1 for the location of the Tullamore River.

The site currently drains via a network of open drains which ultimately discharge to an open drain located adjacent to the northern portion of the site (along the Dublin to Galway railway line).

There are a number of culverts beneath the railway line which direct flow from network of open drains within the site to an existing open drain on the northern side of the railway. This open drain then directs flows towards an existing 375mm diameter surface water drain at Chancery Lane. Refer to Figure 7.2 for the location of the open drains noted above.

As the site generally falls from south-west to north-east, the drainage network described above will provide a suitable discharge point for attenuated surface water flows from the proposed development.

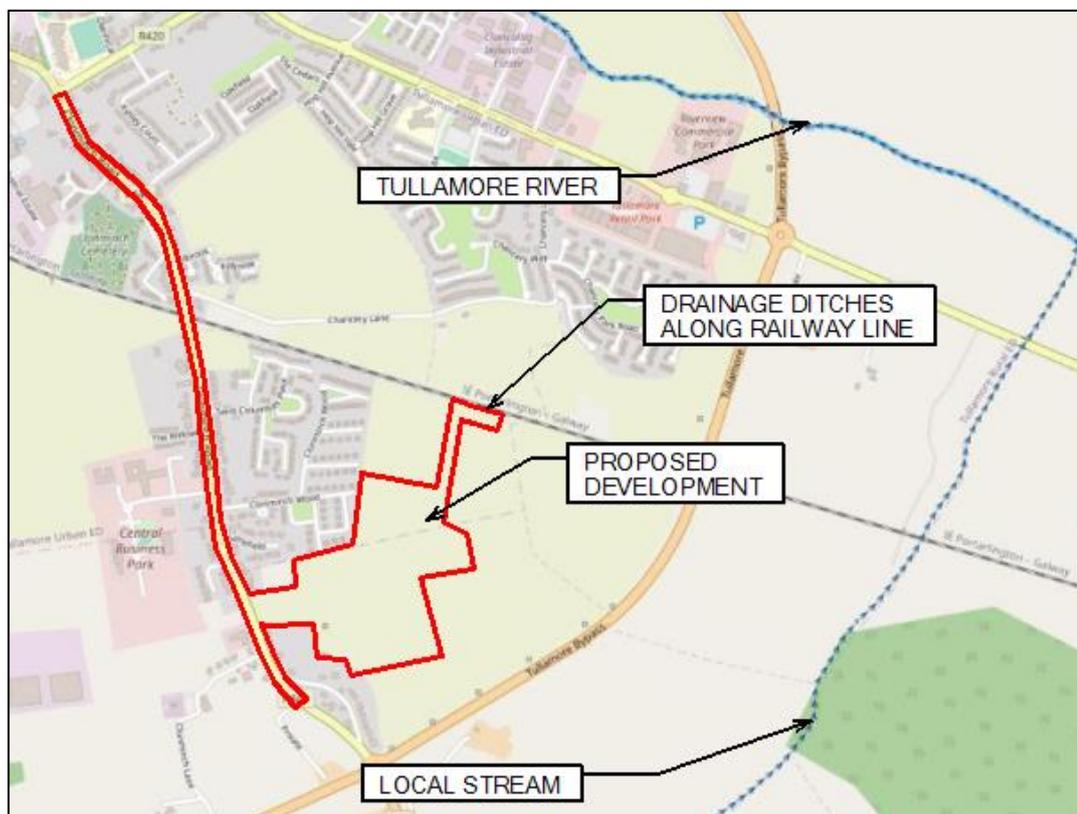


Figure 7.1: Extract from EPA Online Mapping Service (Site Boundary Indicative Only)

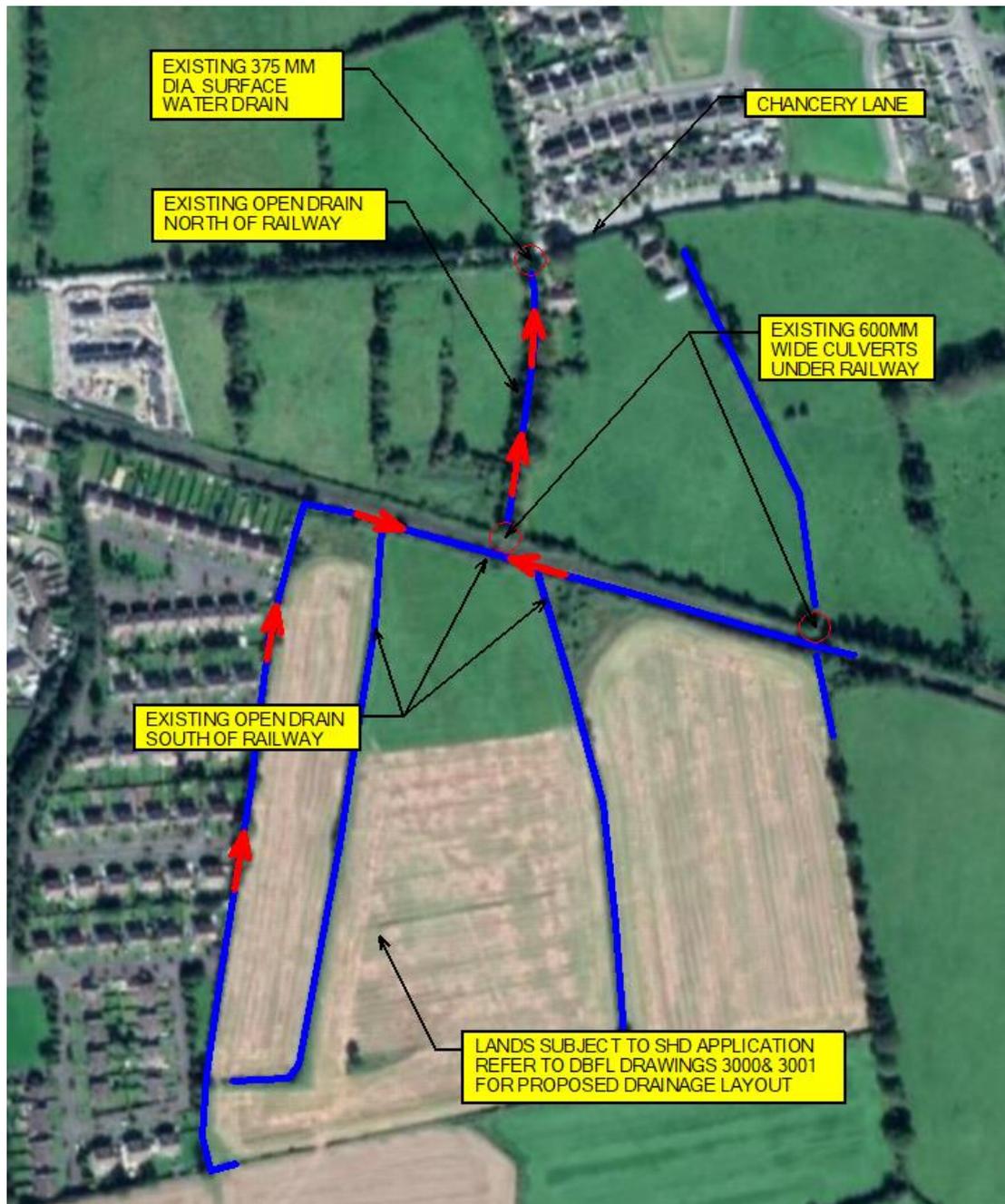


Figure 7.2: Existing Drainage Network at Northern End of the Site

7.3.2 Hydrogeology

GSI's Groundwater Data Viewer indicates that the site is located within the "Geashill" Groundwater Body. Geology in the vicinity of the site is generally described as "Dark limestone and shale".

The underlying bedrock aquifer is classified as "Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones". Refer to Figure 7.3 below.

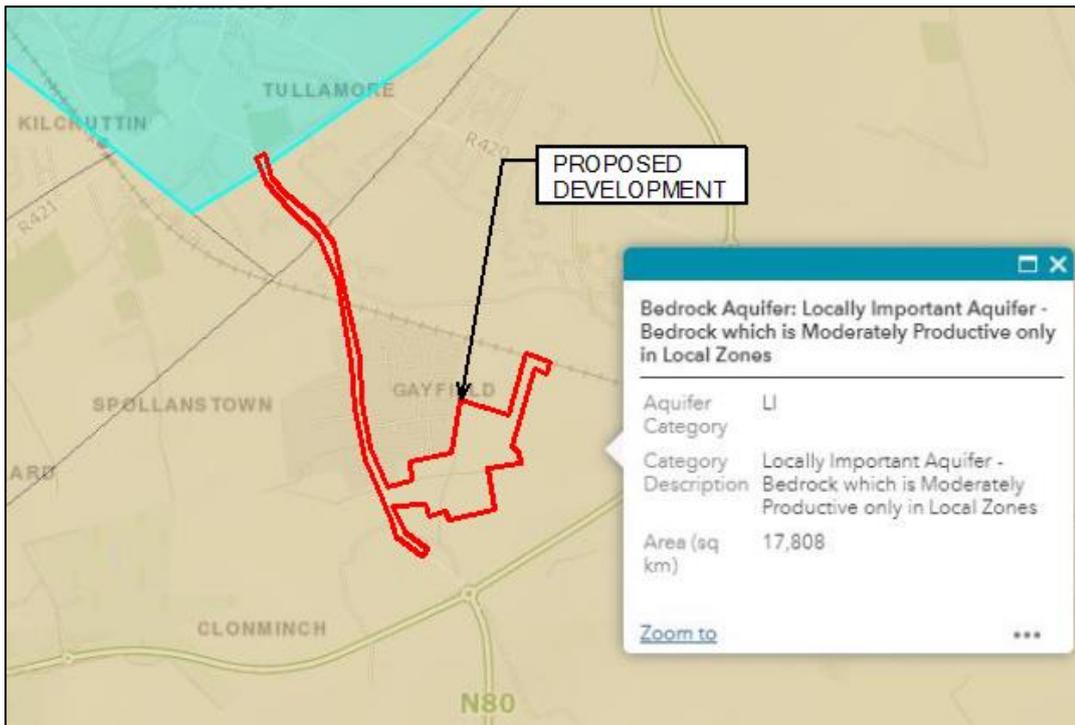


Figure 7.3: Extract from GSI Online Mapping Service – Groundwater Aquifers

Generally, GSI classify the site’s groundwater vulnerability as “Moderate” with a small portion in the south-west part of the site classified as “High”. Refer to Figure 7.3 below.

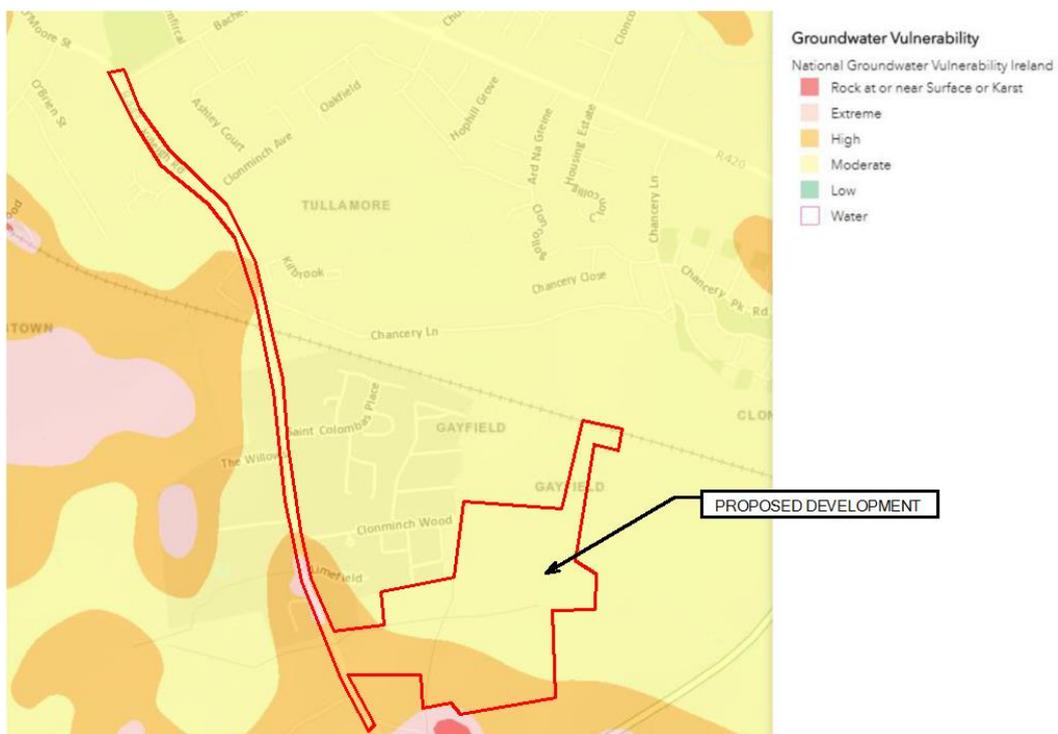


Figure 7.4: Extract from GSI Online Mapping Service – Groundwater Vulnerability

7.3.3 Flood Risk

A Site Specific Flood Risk Assessment has been undertaken for the proposed development and accompanies the planning application under separate cover and has been undertaken by reviewing information from the Office of Public Works (OPW) National Flood Hazard Mapping / Summary Local Area Report (www.floods.ie), the Tullamore CFRAM Study and Tullamore Town & Environs Development Plan. This assessment has been carried out in accordance with the procedures for a "Flood Risk Assessment" as outlined in the OPW's Guidelines for Planning Authorities – The Planning System and Flood Management (November 2009).

The above noted information can be found in Appendix 7-B (Flood Hazard Information).

7.3.3.1 **OPW Flood Hazard Mapping**

OPW's Summary Local Area Report is included Appendix 7-B (Flood Hazard Information).

This report is sourced from the OPW website (www.floodmaps.ie) and summarises all flood events within 2.5 km of the site. No flood events are noted in the immediate vicinity of the site.

7.3.3.2 **Eastern CFRAM Study**

OPW's Tullamore CFRAM study indicated the extent of fluvial flooding in the Tullamore area.

Extracts from the Tullamore CFRAMS Study showing Fluvial Flood Extent are included in Appendix 7-B (Flood Hazard Information). No fluvial flooding is indicated in the vicinity of the site.

7.3.3.3 **Tullamore Town & Environs Development Plan (Extended until 2020)**

The Office of Public Works in conjunction with Offaly County Council and Tullamore Town Council completed the Tullamore Flood Risk Assessment and Management Study (FRAM) in 2008. The study area for the Tullamore FRAM covered the areas of the town that are affected by flooding (refer to Appendix 7-B). No fluvial flooding indicated in the vicinity of the site.

7.3.4 Foul Drainage

An existing 225mm diameter public foul sewer is located west of the site along the Clonminch Road (see Figure 7.5) which discharges northwards towards Church Road Pump Station and onwards to Tullamore WWTP. Irish Water's Environmental Report (2018) for Tullamore WWTP states a capacity of 45,000 PE.

As the site generally falls from south-west to north-east, a foul pumping station will be required to service the development via the existing foul sewer noted above.

Pre-connection enquiry feedback has been received from Irish Water (included in Appendix 7-C).

Irish Water have advised as follows:

- “Based upon the details you have provided with your pre-connection enquiry and on the capacity currently available as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network can be facilitated”.
- “The proposed connection to the existing wastewater network for this development is feasible subject to upgrades. A survey and model build of the existing drainage network is currently ongoing and the results of which will determine the exact requirements of the upgrades. Further details of the required upgrades can be discussed at Connection Application stage”.

In advance of the tripartite meeting with ABP in January 2020, Irish Water confirmed their issue of a confirmation of feasibility letter (refer to Irish Water letter dated January 2020 in Appendix 7C) and with regard to foul drainage noted that:

- “Any upgrades will relate to the upsizing of existing sewers and/or watermains and will note require third party or statutory consents other than road opening licenses from the Local Authority”.



Figure 7.5: Extract from Irish Water Network Maps (Site Boundary Indicative)

7.3.5 Surface Water Drainage

The site currently drains via a network of open drains which ultimately discharge to an open drain located adjacent to the northern portion of the site (along the Dublin to Galway railway line).

There are a number of culverts beneath the railway line which direct flow from network of open drains within the site to an existing open drain on the northern side of the railway. This open drain then directs flows towards an existing 375mm diameter surface water drain at Chancery Lane.

Refer to Figure 7.2 for the location of the open drains noted above.

As the site generally falls from south-west to north-east, the drainage network described above will provide a suitable discharge point for attenuated surface water flows from the proposed development.

7.3.6 Water Supply

An existing 12" asbestos watermain, 9" asbestos watermain and 6" cast iron watermain are located to the west of the site along the Clonminch Road (see Figure 7.6).

Pre-Connection Feedback (Appendix 7-C) received from Irish Water confirms that following upgrade works at Clonsalee Water Treatment there will be available capacity to meet the water supply requirements of this development (via the existing 9" asbestos watermain). The feedback also notes that the existing 9" watermain should have sufficient capacity to supply the proposed development, however a full calibration and modelling exercise of the water network will be required to be completed during connection application stage.

In advance of the tripartite meeting with ABP in January 2020, Irish Water confirmed their issue of a confirmation of feasibility letter (refer to Irish Water letter dated January 2020 in Appendix 7C) and with regard to water supply and upgrade works at Clonsalee Water Treatment Plant noted that:

- "This project is on Irish Water's Capital Investment Plan and is scheduled to be complete by Q3 2020".

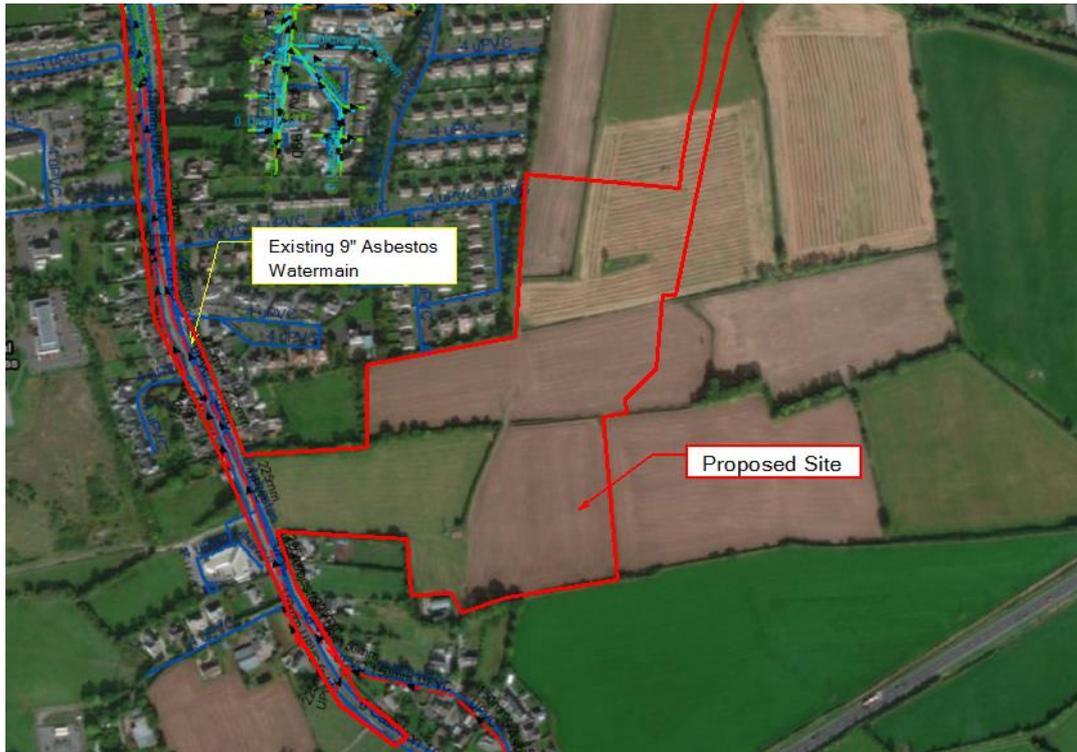


Figure 7.5: Extract from Irish Water Network Maps (Site Boundary Indicative)

7.4 **Characteristics of the Proposed Development**

7.4.1 Hydrology

The proposed development is located 1.5km from the Tullamore River and 1km from a local stream which is a tributary to the Tullamore River (refer to Figure 7.1).

No adverse effects on surrounding hydrology is anticipated as surface water flows are attenuated to greenfield runoff rates in conjunction with implementation of SUDS strategies such as permeable paving, green roofs and installation of a Class 1 full retention fuel / oil separator.

A Natura Impact Statement has been undertaken to assess the impact of the proposed development on ecologically designated sites in the area and is submitted under separate cover.

7.4.2 Hydrogeology

The designed finished floor levels and external pavement levels have been designed to follow the natural topography of the site, therefore minimising the need for excavation to enable development.

During construction, the deepest excavations are expected to be required for installation of attenuation tanks and a foul pump station in the northern portion of the site (up to approximately 3.0m deep).

At soakaway test and trial pits locations, excavations were carried out to depths ranging from 2.0m to 3.3m below existing ground level. Groundwater was observed in four of the twenty trial pits. These trial pits were located in the northern part of the site with ground water observed at depths of 1.7m to 3.0m below existing ground level. There may be a need to dewater excavations during construction in this part of the site.

It is not envisaged that the proposed development works will have any direct impact on the underlying hydrogeology.

7.4.3 Flood Risk

The Site-Specific Flood Risk Assessment for proposed development was undertaken in accordance with the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.

Following the Flood Risk Assessment, it was determined that the site is located in Flood Zone C as defined by the Guidelines. It concluded that the;

- Proposed residential development is appropriate for the site’s flood zone category.
- The sequential approach outlined in the Guidelines has been adhered to and that the ‘Avoid’ principal has been achieved.

The proposed development is considered to have the required level of flood protection up to and including the 1% AEP flood event. Overland flow paths have been identified for pluvial flooding exceeding the capacity of the surface water drainage network.

7.4.4 Foul Drainage

An existing 225mm diameter public foul sewer is located west of the site along the Clonminch Road (see Figure 7.5). As the site generally falls from south-west to north-east, a foul pumping station will be required to service the development via the existing foul sewer noted above.

- The proposed foul drainage network comprises of a series of 225mm diameter pipes, discharging to the strategic pumping station described above. Each residential unit is serviced by an individual 100mm diameter connection.
- The foul drainage network for the proposed development has been designed in accordance with the Irish Water Code of Practice for Wastewater Infrastructure, 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.
- A daily foul discharge volume of 160m³ has been calculated as outlined in Irish Water's Pre-Connection Enquiry Application Form.
- A BOD (Biochemical Oxygen Demand) loading of 64,440g has been calculated for the proposed development as outlined in the EPA Waste Water Treatment Manual.

As noted in Section 7.3.4, Irish Water have confirmed that provision of a foul drainage connection is feasible.

DBFL have been in discussions with Irish Water regarding the foul servicing of the subject lands since 2018. In tandem with development proposals coming forward, we understand that the Drainage Area Plan (DAP) being prepared by Irish Water will address all zoned lands within the various drainage catchments leading to the Tullamore WWTP (including the Clonminch Road catchment), that strategic network modelling has commenced and that Irish Water are now focusing on the solution for the Southern Catchment which consists of a new interceptor sewer south of the railway line from the Clonminch Road to Tullamore WWTP.

This proposal will reduce loadings on exiting problematic pump stations in the town centre. Irish Water have also noted that Tullamore is a priority area given existing overflow issues at pump stations and future development pressures.

Pending completion of the proposed Interceptor Sewer Project, Irish Water have agreed to consider temporary solutions to enable development to commence in the interim. The principal of storage at the subject lands strategic pump station during critical rainfall events was seen as a workable solution and would be developed further at connection application stage.

It is proposed to install telemetry at the developments foul pumping station linking to problematic pump stations in the town centre which will allow the developments foul storage tank to be activated and store flows generated by the development should the network in the town centre become inundated.

In summary the developments foul storage tank would be utilised to store development discharge during surcharge events in the town centre and therefore allow development to progress in advance of any network upgrades (subject to Connection Agreement with Irish Water).

Refer to DBFL's Infrastructure Design Report for further details of the temporary solution outlined above.

7.4.5 Surface Water Drainage

The existing drainage network described in Section 7.3.1 and 7.3.5 above will provide a suitable discharge point for attenuated surface water flows from the proposed development.

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GSDS), 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.

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). Underground attenuation tanks are sized to attenuate the 1 in 30 year storm event. The difference between the 1 in 100 year event and the 1 in 30 year event is being attenuated above ground in shallow basins. Surface water calculations are based on an allowable outflow / greenfield runoff rate of 2.37 l/sec/ha resulting in a total attenuation volume of 2,177.8m³.

Surface water discharge will also pass via a full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tank, flow control device and separator arrangement as noted above.

Surface water runoff from the site's road network will be directed to tree pits via conventional road gullies (with high level overflow to the piped surface water network). Surface water runoff from driveways will be captured by permeable paving.

Surface water runoff from house 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). Surface water runoff from apartment roofs will be captured by green roofs (sedum blanket) prior to being routed to the piped surface water drainage network.

7.4.6 Water Supply

It is proposed to link the existing 9" diameter watermain main from Clonminch road to service the proposed development. A 200mm diameter spine water main will be provided along the development's arterial roads with a number of 150/100mm diameter looped branch mains provided elsewhere.

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".

An average daily domestic demand of approx. 145m³ has been calculated as outlined in Irish Water's Pre-Connection Enquiry Application Form.

7.5 **Potential Impact of Proposed Development**

7.5.1 Construction Phase

Potential impacts that may arise during the construction phase are noted below:

- 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. (potential impact on existing hydrology e.g. infiltration to ground).
- Discharge of vehicle wheel wash water (potential impact on existing hydrology e.g. discharge to existing surface water drainage infrastructure).
- Improper discharge of foul drainage from contractor's compound (impact on existing hydrology e.g. cross-contamination of existing surface water drainage.).
- Cross contamination of potable water supply to construction compound.

7.5.2 Operational Phase

Potential operational phase impacts are noted below:

- 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).
- Increased discharge to foul drainage network (Daily Foul Discharge Volume = approx. 160 m³)
- Increased potable water consumption (Average Daily Domestic Demand = approx. 145m³)

7.5.3 Potential Cumulative Impacts

The proposed surface water drainage infrastructure has been designed in accordance with the relevant guidelines. Any other future development in the vicinity of the site would have to be similarly designed in relation to permitted surface water discharge, surface water attenuation and SuDS, therefore, no potential cumulative impacts are anticipated in relation to surface water drainage and flooding.

No potential cumulative impacts are anticipated in relation to foul drainage and water supply (Irish Water have advised that subject to a valid connection agreement being put in place, proposed connection to the Irish Water networks can be facilitated).

7.5.4 Interactions

11.5.4.1 Soils and Hydrology

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

11.5.4.2 Biodiversity

Contamination of water receptors has the potential to affect aquatic ecology. With the implementation of the mitigation measures outlined in Section 7.6, the likelihood of such events occurring would be local and not significant.

A Natura Impact Assessment has been prepared for the proposed development and accompanies this planning application under separate cover.

7.5.5 'Do Nothing' Scenario

There are no predicted impacts should the proposed development not proceed.

7.6 **Mitigation Measures**

7.6.1 Construction Phase

The following measures are proposed during the construction phase to mitigate against risks to the surrounding hydrological environment.

- A site-specific Construction and Environment Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environment Management Plan.
- 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.
- Weather conditions and typical seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations with an objective of minimizing soil erosion.
- 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 authorized 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.
- The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.
- The construction compound's potable water supply shall be protected from contamination by any construction activities or materials.

- Reinstatement – Oil, fuel etc. storage areas are to be decommissioned on completion of the construction phase. Any remaining liquids are to be removed from site and disposed of at an appropriate licenced facility. Offaly County Council’s Environmental Control Section is to be notified of the proposed destination for disposal of any liquid fuels.
- Reinstatement – All sediment control measures (e.g. sediment retention ponds) are to be decommissioned on completion of the construction phase. Such areas are to be reinstated in accordance with the landscape architects plan and engineer’s drawings.

7.6.2 Operational Phase

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.

Following the Site Specific Flood Risk Assessment, it has been determined that the entire site / zoned developable area is located in Flood Zone C as defined by the Guidelines (i.e. proposed development is considered to have the required level of flood protection up to and including the 1% AEP flood event.)

Surface water runoff from the site will be attenuated to the greenfield runoff rate as outlined in the Greater Dublin Strategic Drainage Study (GSDSDS). Surface water discharge rates will be controlled by a Hydrobrake type vortex control device in conjunction with below ground attenuation storage.

The following methodologies are being implemented as part of a SuDS surface water treatment train approach:

- Impermeable Roads / Footpaths Drained via Tree
- Permeable Paved Areas Draining via SUDS
- House Roofs Draining via SuDS (permeable paving)
- Apartments – Green Roof
- Attenuation of the 1 in 30 year storm event in underground attenuation chambers (stormtech or equivalent) with the difference between 1 in 100 year event and the 1 in 30 year event attenuated above ground in shallow basins.
- Installation of a vortex flow control device (Hydrobrake or equivalent), limiting surface water discharge from the site to 2.37 l/sec/ha
- Surface water discharge will also pass via a Class 1 full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

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.

No specific mitigation measures are proposed in relation to foul drainage however, all new foul drainage lines will be pressure tested and be subject to a CCTV survey in order to identify any possible defects prior to being made operational.

No specific mitigation measures are proposed in relation to water supply, however, water conservation measures such as dual flush water cisterns and low flow taps will be included in the design.

The potential impact of climate change has been allowed for as follows;

- Pluvial flood risk - attenuation storage design allows for a 20% increase in rainfall intensities.
- Pluvial flood risk - drainage system design allows for a 20% increase in flows, as recommended by the GSDS.
- Provision of min. freeboard (500mm) from 1% AEP as required by GSDS (mitigation against impact of climate change).

7.6.3 'Do Nothing' Scenario

No mitigation measures are proposed if the development does not proceed

7.7 Predicted Impact of the Proposed Development

This section describes the predicted impact of the proposed development following the implementation of the remedial and mitigation measures, as set out above.

7.7.1 Construction Phase

Implementation of the measures outlined in Section 7.6.1 will ensure that the potential impacts of the proposed development on water and the hydrogeological environment do not occur during the construction phase. The predicted impact, post mitigation measures, will be negligible.

7.7.2 Operational Phase

As surface water drainage design has been carried out in accordance with the GSDS and SuDS methodologies are being implemented as part of a treatment train approach, predicted impacts on the water and hydrogeological environment arising from the operational phase will be negligible.

7.7.3 'Worst Case' Scenario

Under a 'worst case' scenario the following incidents relating to hydrology could potentially give rise to a serious incident putting people at risk:

- Accidental spills and leaks may result in contamination of water
- Flooding due to extreme event or unsuitable drainage measures
- Cross contamination of potable water supply to construction compound

Worst case scenarios envisioned are extreme occurrences of the potential impacts identified above in conjunction with failure of mitigation measures. The majority of the mitigation measures outlined above are design solutions that will be managed through the design and construction process and enforced as part of the contract documentation and monitored as outlined below in Section 7.9 of this chapter.

7.7.4 'Do Nothing' Scenario

There are no predicted impacts should the proposed development not proceed.

7.8 Residual Impacts

Implementation of the mitigation measures outlined in Section 7.6.1 will ensure that the potential impacts of the proposed development on surrounding surface water and hydrogeological environments do not occur during the construction phase and that any residual impacts will be short term.

7.9 Monitoring

Proposed monitoring during the construction phase in relation to the water and hydrogeological environment are as follows:

- Adherence to Outline Construction Management Plan
- Inspection of fuel / oil storage areas.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.)
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content)

During the operational phase an inspection and maintenance contract is to be implemented in relation to the proposed Class 1 full retention fuel / oil separators.

7.10 Difficulties Encountered

No particular difficulties were encountered during preparation of this chapter. The analysis reported within this chapter is based upon consultations with Offaly County Council's Water Services Department and Irish Water as well as publicly available information from the Office of Public Works and Geological Survey of Ireland.

7.11 References

Greater Dublin Strategic Drainage Study (2005)

The Greater Dublin Region Code of Practice for Drainage Works (2012)

Tullamore Town & Environs Development Plan (Extended until 2020)

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

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

Ground Investigation Report (GII, Issued June 2020, Project No. 9551-03-20).

Environmental Protection Agency (EPA) Online Mapping Service

Geological Survey of Ireland (GSI) online mapping service

Office of Public Works (OPW) National Flood Hazard Maps

OPW's Tullamore Catchment Flood Risk Assessment and Management (CFRAM) Study

OPW (November 2009) Guidelines for Planning Authorities – The Planning System and Flood Risk Management.

Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements. Institute of Geologists of Ireland (2013)

Guidelines on the information to be contained in environmental impact assessment reports. Environmental Protection Agency (Draft 2017).

APPENDIX 7A

Irish Water Network Plans

APPENDIX 7B

Flood Hazard Information

APPENDIX 7C

Pre-Connection Correspondence with Irish Water