

Chapter 8:

Water

## 8.0 WATER

### 8.1 INTRODUCTION

This chapter of the EIAR assesses and evaluates the likely impact of the proposed development on the surrounding surface water and hydrogeological environments, as well as identifying proposed mitigation measures to minimise any impacts.

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### 8.2 STUDY METHODOLOGY

The methodology followed for this section is in accordance with the EPA *Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) 2017*, *Advice Notes for Preparing Environmental Impact Statements (Draft) 2015* and 2018 DHPLG *Guidelines on Environmental Impact Assessment for Planning Authorities and An Bord Pleanála*. Information on the surrounding surface water and hydrogeological environments was assembled from the following sources:

- Environmental Protection Agency (EPA) interactive mapping and water quality data;
- Ordnance survey Ireland (OSI) mapping;
- Geological Survey of Ireland (GSI) online mapping service;
- Topographical survey;
- Site inspection / walkover;
- Office of Public Works (OPW) National Flood Hazard Mapping & CFRAM Studies (Catchment Flood Risk and Management Studies);
- Office of Public Works (OPW) ICPSS Phase III (Irish Coastal Protection Strategy Study) Flood Extent Maps;
- Meath County Council record drawings;
- Mill Road, Ground Investigation Report, Sept 2019;
- Mill Marsh Road, Co Meath, Ground Investigation Report, January 2018;
- Mill Road / Marsh Road Urban Design Framework Plan 2017;
- Local Area Plan for the Southern Environs of Drogheda 2009-2015;

### 8.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SITUATION)

#### 8.3.1 Hydrology

The main surface water bodies in the vicinity of the proposed development lands comprise the followings:

- The Stameen River lies circa 350m north of the site (Refer to Figure 8.1);
- The Boyne River and Estuary lies circa 1km north of the site (Refer to Figure 8.1);
- Irish Sea coast is approximately 4km to the east;
- The Nanny River lies circa 5km south of the site;
- There is an existing ditch along the northern boundary of the site which runs in an easterly direction and forms the northern boundary of *Gaelscoil An Bhradáin Feasa*, before crossing Mill Road and continuing north and east towards the Stameen River.
- There an existing ditch along the south-eastern boundary of the commercial development approved under *LB180620* and adjacent to Colpe Road. The ditch crosses Mill Road in a culvert and continues in an easterly direction before outfalling to the Stameen River to the north east. This ditch originally drained lands to the

south west of the railway line, however following development of these lands the catchment area reduced significantly and runoff to this ditch also reduced, with runoff from the section of Colpe Road between the bridge and Mill Road now being the primary source of runoff.

- Surface water sewers in the surrounding areas including the 1050mm diameter surface water sewer adjacent to the north west corner of the site and the railway line.

The site is in the Boyne Hydrometric area, in the Boyne Water Framework Directive catchment. The WFD sub catchment is identified as the Boyne SC 130 and the river sub basin is identified as Stagrennan 010.

### 8.3.2 Hydrogeology

The GSI (Geological Survey of Ireland) have classified the groundwater vulnerability in the area of the site as low, as indicated in Figure 8.2.

The GSI have classified underlying aquifers in the area of the subject site as “locally important”, as indicated in Figure 8.3. Locally important aquifers are defined as bedrock which is generally moderately productive.

Groundwater monitoring was undertaken at the RC05 by the installation of a standpipe. The standpipe was installed on the 6th June 2019 with the results included in Table 8.1 below.

Date	Ground Level (mAOD)	Depth to Ground Water (mBGL)	Groundwater Level (mAOD)
16.07.2019	29.5	3.57	25.93
02.08.2019	29.5	3.75	25.75

Groundwater flow was not measured but it is expected to follow the topography of the site.

Refer to “Mill Road Ground Investigation Report” by Ground Investigations Ireland.

### 8.3.3 Flood Risk

In accordance with the ‘The Planning System and Flood Risk Management – Guidelines for Planning Authorities’ (2009), a “Site Specific Flood Risk Assessment (SSFRA)”, has been carried out by DBFL Consulting Engineers for the subject site and is included as a standalone report. This report confirms that in accordance with the “Guidelines”, the subject site is located within Flood Zone ‘C’. Flood Zone C lands are suitable for all types of land use, including residential developments which are classified as “highly vulnerable” in the “Guidelines”. Therefore, the development meets the requirements of The FRA Guidelines, the proposed development is suitable for this type of flood zoning and the Planning Guidelines Sequential Approach is passed and a justification test is not required.

Final Eastern CFRAM Study, Drogheda Fluvial Flood Extent maps indicate that the site is in Flood Zone ‘C’.

Similarly, the ICPSS (Irish Coastal Protection Strategy Study) Phase III, North East Coast Flood Extent Maps do not indicate any flood risk associated with the site.

Mill Road/Marsh Road Urban Design Framework Plan 2017 includes a map outlining flood risk to Mill Road/Marsh Road lands in accordance with ‘The Planning System & Flood Risk Management Guidelines’. This map does not indicate any areas within the site as being potential areas of flood risk and indicate that the site is in Flood Zone “C”.

### 8.3.4 Water quality

The EPA (Environmental Protection Agency) records, do not specify a water quality status for the Stameen River which runs circa 300m north of the site.

EPA maps indicate a good water quality status for the Boyne River, west of the M1.

The EPA maps indicate a poor water quality status for the River Nanny approximately 4 km south to the site, as indicated in Figure 8.4 below.

## 8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development comprises 357 residential units (169 no. houses, 52 no. duplex units, and 136 no. apartments), a childcare facility and associated infrastructure including a link street and a surface water outfall pipe on a site area of circa 13ha. The application is under consideration through the SHD (Strategic Housing Development) planning process, with An Bord Pleanála. This application also seeks to amend a link street approved under Meath County Council Planning Reference LB180620 (commercial development and link street through the “Mill Road / Marsh Road Framework Plan lands”).

For further information regarding the infrastructure demands of the proposed development refer to DBFL “Infrastructure Design Report”.

### 8.4.1 Hydrology

The proposed development is designed to limit surface water runoff from the site to greenfield runoff and to store flows exceeding this in underground attenuation tanks and detention basins for up to a 1% AEP (Annual Exceedance Probability). The development layout is also designed to accommodate overland flow paths, with water directed away from properties. SuDS features such as swales, bioretention areas, green roofs and permeable paving are incorporated into the drainage design for the scheme. These measures protect or enhance water quality, are sympathetic to the environment, provide a habitat for wildlife and encourage natural ground water recharge.

The allowable surface water runoff ( $Q_{bar}$ , greenfield runoff rate) for the subject site has been calculated as circa 30l/s and the storage volume required to accommodate runoff from a 1%AEP (Annual Exceedance Probability) is calculated using *Microdrainage* software as approximately 2600m<sup>3</sup>. This includes an allowance for climate change comprising a 10% increase in rainfall figures, as required in the GSDS (Greater Dublin Strategic Drainage Study). Refer to the DBFL “Infrastructure Design Report” submitted with the planning application for detailed calculations of the allowable outflow from the site and the storage requirements.

There are three surface water outfall points identified for receiving attenuated surface water runoff from the subject site with catchment areas associated with each. These include:

- (i) Outfall “A”: The existing 1050mm diameter surface water pipe (existing MH S4) adjacent to the railway line at the north west corner of the site, via the surface water outfall pipe approved under LB180620.
- (ii) Outfall “B”: The existing ditch runs along the northern boundary of the lands adjacent to the most western section of the link street, which forms the northern boundary of Gaelscoil An Bhradáin Feasa before crossing Mill Road and continuing in an easterly direction towards the Stameen River. This ditch is currently piped under Mill Road and continues in a north and easterly direction towards the Stameen River, via a surface water pipe through private front gardens. Preliminary investigations indicate that this piped section is sub-standard. It is therefore proposed to construct a new surface water outfall in a westerly direction to the Stameen River via Mill Road.

- (iii) Outfall “C”: The existing ditch along the south-eastern boundary of the commercial development approved under LB180620 and adjacent to Colpe Road, which crosses Mill Road in a culvert and continues in an easterly direction. This ditch originally drained lands to the south west of the railway line, however following development of these lands the catchment area reduced significantly and runoff to this ditch also reduced, with runoff from the section of Colpe Road between the bridge and Mill Road now being the primary source of runoff.

The proposed works include a new surface water drainage network for this section of road which would discharge attenuated runoff to the ditch between the realigned section of Mill Road and the existing Mill Road, (Outfall “C”). This ditch is currently culverted under Mill Road in a culvert of 0.46m wide x 0.9m high, which has settled resulting in the upstream end of the culvert being lower than the downstream end. It is therefore proposed to remove this culvert and to replace it with a new surface water culvert.

There are three surface water catchments “A”, “B” and “C” corresponding to the three surface water outfalls.

#### **8.4.2 Hydrogeology**

The integration of SuDS features with traditional drainage methods, is a strategy of both the Local Area Plan for the Southern Environs of Drogheda and the County Development Plan. SUDs features encourage groundwater recharge and replicate natural drainage systems. SUDs features proposed for the subject site include swales, green roofs, permeable paving, bioretention area and three detention basins.

Taking into consideration the results of the site investigations, and the estimated depth of drainage required for foul and surface water drainage, it is likely that the development will require some rock removal.

#### **8.4.3 Flood risk**

The “Site Specific Flood Risk Assessment” by DBFL Consulting Engineers, assesses the proposed development in the context of the ‘Planning System and Flood Risk Management Guidelines’. This report is included as a standalone report and it confirms that in accordance with the “Guidelines”, the subject site is located within Flood Zone ‘C’. Flood Zone C lands are suitable for all types of land use, including residential developments which are classified as “highly vulnerable” in the “Guidelines”. Therefore, the development meets the requirements of The FRA Guidelines, the proposed development is suitable for this type of flooding zoning and the Planning Guidelines Sequential Approach is passed and a justification test is not required.

#### **8.4.4 Potable Water**

The water supply resources in Meath are provided both from surface water and ground water abstractions i.e. from rivers, lakes and boreholes. The daily domestic demand generated by the proposed development is estimated at circa 150m<sup>3</sup>.

#### **8.4.5 Wastewater**

Wastewater generated by the proposed development will discharge to Drogheda Wastewater Treatment Plant, Marsh Road for treatment and to the Boyne Estuary for final disposal. The estimated daily foul loading generated by the development is circa 160m<sup>3</sup>.

### **8.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT**

#### **8.5.1 Construction Impacts**

Potential impacts that may arise during the construction phase without mitigation are noted below:

- Excavation of soil and sub-soil layers for a large area of the proposed development site. The removal of the

overburden and the replacement with hard standing areas (roads, footpaths and houses) will reduce the ability of the lands to recharge groundwater. The majority of surface water runoff will therefore be collected and positively discharged from the development to the existing storm water network and existing ditch system. It is likely that this activity will have a slight, adverse, permanent, residual, impact on groundwater.

- The development will require new surface water drainage to accommodate surface water runoff from the development. This will include surface water attenuation tanks and detention basins. Due to the general impermeable soil type throughout the site, discharges to the ground in the detention basins would be limited, with surface water collected on site, and positively drained to the existing ditch system and the existing 1050mm diameter surface water pipe via attenuated outlets. Surface water collected on site would also be lost through evaporation. It is likely that this activity will have a slight, adverse, permanent, residual, impact on the existing storm water network and existing ditch system.
- 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. This will result in increased silt and pollutant levels into existing nearby watercourses. It is likely that this activity would have a slight, adverse, temporary, residual impact on the existing storm water network and existing ditch system.
- Heavy rain fall or a high level of ground water could produce ponding in open trenches. Discharge of this water pumped from excavations to existing streams could reduce the capacity of the existing surface water network. This impact may be characterised as a likely, slight, temporary, adverse impact.
- Discharge of wash water from concrete trucks and discharge of vehicle wheel wash water will contaminate the groundwater. This impact may be characterised as a temporary, regionally short-term moderate impact. It is likely that this activity would have a temporary, adverse, slight, adverse, impact on groundwater and local watercourses within the area.
- Dangerous substances such as oils and fuels may enter the surface water drainage system.

### 8.5.2 Operational Impacts

Potential operational phase impacts without mitigation are noted below:

- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff and flood risk downstream. It is likely that this activity would have a slight, permanent, adverse, impact on groundwater and the existing storm water network and existing ditch system.
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas). The likely impact may be characterised as imperceptible, temporary and adverse.
- Contamination risks arising from development use / leaking pipes / contaminated surface water runoff. The likely adverse impact arising from this activity may be characterised as imperceptible and temporary.
- The existing culvert under Mill Road will be replaced with a suitably sized culvert with correct upstream and downstream invert levels to remove the current backfall arrangement. The likely impact may be characterised as a slight, permanent, favourable impact.
- The hydraulic demand on the public potable water supply and treatment facility would increase. It is likely that this activity would have a slight, permanent, adverse, impact on the public water extraction and treatment facility.

- The hydraulic loading and demand on Drogheda Wastewater Treatment Plant would increase. This is assessed by Irish Water in their confirmation of feasibility. It is likely that this activity would have a slight, permanent, adverse, impact on Drogheda Wastewater Treatment Plant.

## 8.6 'DO NOTHING' IMPACT

If the development did not proceed there would be no additional impact on the existing water environment. The land use would remain unchanged, i.e. greenfield agricultural. The flood risk (or lack thereof) to the site and adjoining areas would be the same as the existing scenario.

## 8.7 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

### 8.7.1 Construction phase

#### **W CONST1:**

To minimise the impact of the construction phase on the water environment, the following mitigation measures should be implemented.

- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- 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 seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Concrete batching will take place off site or in a designated area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features.
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage in order to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Spill kits should be kept in designated areas for re-fuelling of construction machinery.
- Dewatering measures should only be employed where necessary.
- Hydrobrake flow controls and petrol interceptors should be constructed on each surface water outfall before the outfalls are made operational.

### 8.7.2 Operational phase

#### **W OPER1:**

- The design of proposed site levels (roads, FFL etc.) has been carried out to replicate existing surface contours, break lines etc. where possible and therefore not concentrating additional surface water flow in a particular location.

- Surface water runoff from the site will be attenuated to the greenfield runoff rate as recommended in the Greater Dublin Strategic Drainage Study (GSDSDS). Surface water discharge rates will be controlled by a Hydrobrake flow control device, with attenuation tanks and detention basins provided to store runoff from a 1 in 100-year return period event (1%AEP). SUDs features are implemented in the surface water drainage network to reduce the rate of runoff from hard standing areas and to improve the quality of surface water runoff. For detailed information refer to the “Infrastructure Design Report” prepared by DBFL.
- Surface water runoff from the development to be collected by an appropriately designed system with contaminants removed prior to discharge i.e. petrol interceptor.
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and petrol interceptor will be required during the Operational Phase to ensure the proper working of the development’s networks and discharges.
- Waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential runoff. Operational waste should be removed from site using licenced waste management contractors.
- Water conservation methods to be implemented such as the use of low flush toilets.

## **8.8 PREDICTED IMPACT FOLLOWING MITIGATION**

Where the mitigation measures outlined in Sections 8.7.1 & 8.7.2 have been applied, the residual impact is considered to be imperceptible.

## **8.9 POTENTIAL CUMULATIVE IMPACTS**

### **8.9.1 Construction Impacts**

Existing and approved developments in the area have been reviewed (including the commercial development approved under LB180620 and the temporary post primary school approved under LB190739), and it is considered that there are no potential cumulative impacts envisioned during the construction phase.

### **8.9.2 Operational Impacts**

Potential cumulative operational phase impacts without mitigation are noted below:

- The surface water drainage network in the link street which outfalls to existing open drain / ditch to the west of Mill Road includes an allowance for attenuated surface water flow from the commercial development approved under LB180620 (attenuated to existing greenfield runoff).
- The hydraulic loading and demand on the public Water Extraction and Treatment Facility from the proposed development, and other developments in the area is assessed by Irish Water in their confirmation of feasibility. It likely that this activity would have a not significant, permanent, adverse, impact on the municipal water extraction and treatment facility.
- The hydraulic loading and demand on Drogheda Wastewater Treatment Plant from the proposed development, and other developments in the area is assessed by Irish Water in their confirmation of feasibility. It likely that this activity would have a not significant, permanent, adverse, impact on Drogheda Wastewater Treatment Plan and its receiving water, the Boyne Estuary.

## 8.10 MONITORING

### 8.10.1 Construction phase

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

- Adherence to 'Construction Management Plan'. If construction works are found to be not in accordance with the aforementioned plan, then the developer will ensure that measures are put in place to ensure compliance.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of run-off from the site including pumping / dewatering. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.) If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content). If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- A dust management programme should be implemented during the construction phase of the development. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.

### 8.10.2 Operational phase

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

- The taking in charge of the water infrastructure will ensure the system is regularly inspected and maintained. If specific maintenance is required on the water network, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- The performance of all SuDS features will be monitored by the relevant authorities during the life of the development. If specific maintenance is required for SuDS features, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Monitoring of the installed 'Hydrobrake' (flow control) and gullies will be required to prevent contamination and increased runoff from the site. If specific maintenance is required on the surface water 'Hydrobreak' and on gullies, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Although no specific monitoring will be required as part of the proposed development, it is envisaged that EPA Monitoring will continue in the area through the life of the development.

## 8.11 REINSTATEMENT

Where proposed works are impacting on the existing hydrological environment, reinstatement should be carried out in accordance with the finished development or the existing arrangement as appropriate.

## 8.12 INTERACTIONS

- There are interactions between water and land and soils with changes in depth and type of overburden over rock impacting the protection provided to aquifers. The likely impact will be permanent not significant and adverse.
- There are interactions between water and land and soils, with some surface water conveyed and stored in SuDS features such as swales and detention basins and discharging to the ground where possible. The likely impact will be permanent slight and favourable.
- There are interactions between water and material assets build services, with attenuated surface water runoff from the western portion of the site outfalling to the surface water drainage network and foul flows from the site discharging to the foul sewerage network. The likely impact will be permanent slight and adverse.
- There are interactions between water and material assets with potable water for the development supplied from surface water and ground water abstractions. The likely impact will be permanent slight and adverse.

## 8.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No particular difficulties were identified during the compilation of this chapter.

## 8.14 REFERENCES

- Environmental Protection Agency (EPA), 2000, EPA Geo Portal, Available at <http://gis.epa.ie/>, Accessed 26<sup>th</sup> June 2019.
- Office of Public Works (OPW), 2000, Flood and Erosion Mapping, Available at <http://www.opw.ie/en/flood-risk-management/floodanderosionmapping/>, Accessed 26<sup>th</sup> June 2019.
- Flooding.ie, 2009, The planning System and Flood Risk Management, Available at <http://www.flooding.ie/media/The%20Planning%20System%20and%20Flood%20Risk%20Management.PDF>, Accessed 26<sup>th</sup> June 2019.
- Greater Dublin Regional Code of Practice for Drainage Works, Available at <http://www.dublincity.ie/main-menu-services-water-waste-and-environment-drains-sewers-and-waste-water/greater-dublin-regional>, Accessed 26<sup>th</sup> June 2019.
- Meath County Council, 2009-2015, 'Local Area Plan for the Southern Environs of Drogheda 2009-2015' (LAP).
- Meath County Development Plan, 2013-2019.
- Environmental Protection Agency (EPA) 2017 Guidelines.
- Department of Housing, Planning, and Local Government, 2018, "Guidelines on Environmental Impact Assessment for Planning Authorities and An Bord Pleanála".

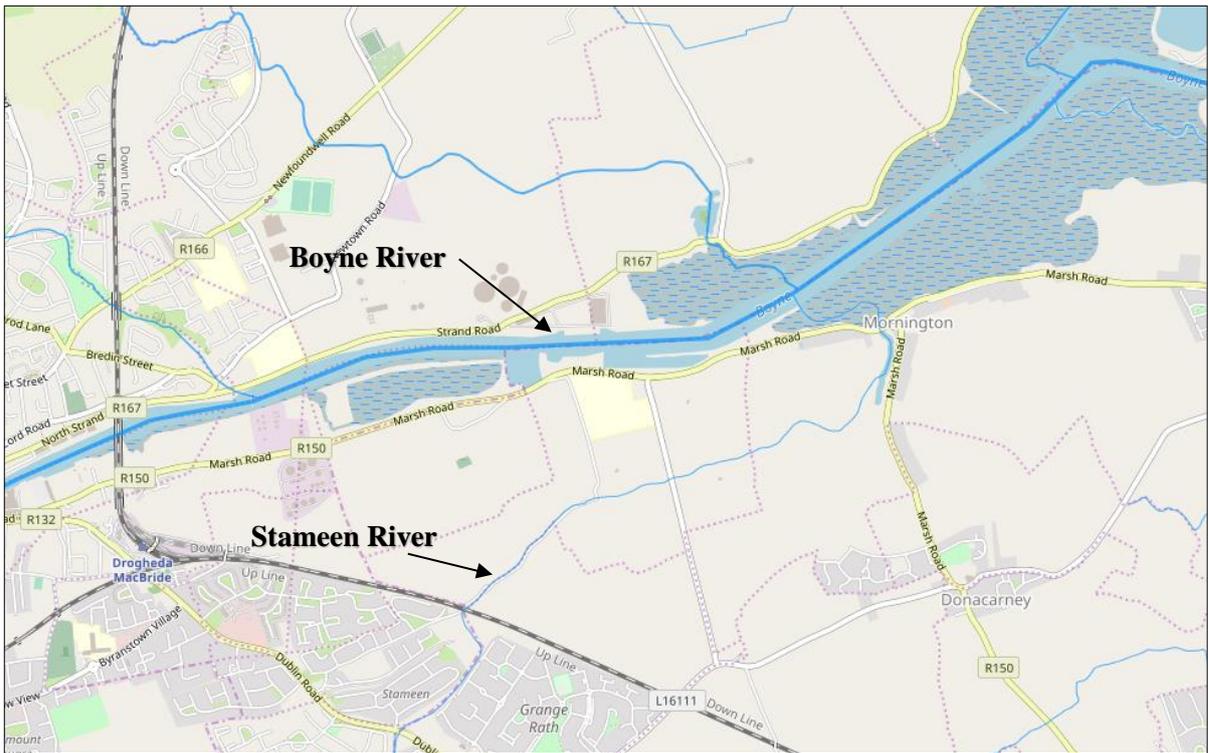


Figure 8.1: Extract from EPA Online Mapping Service (Courtesy of GSI)

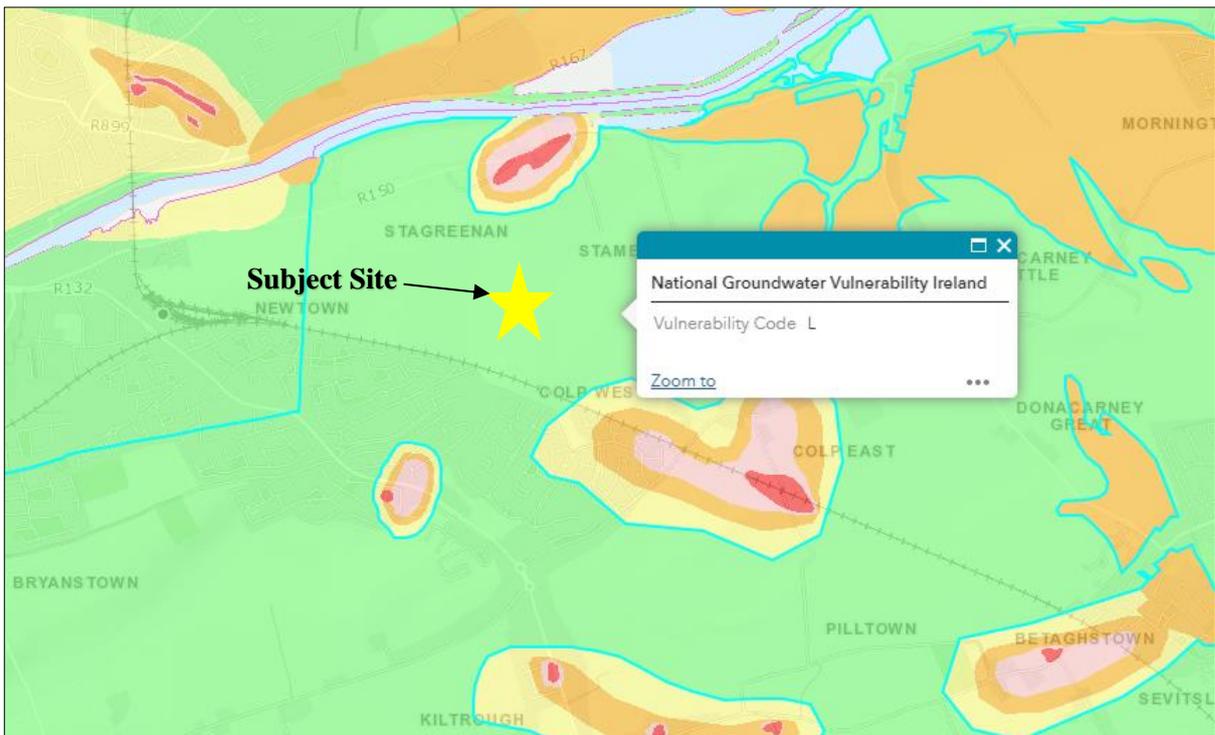


Figure 8.2: Groundwater Vulnerability Map Courtesy of GSI

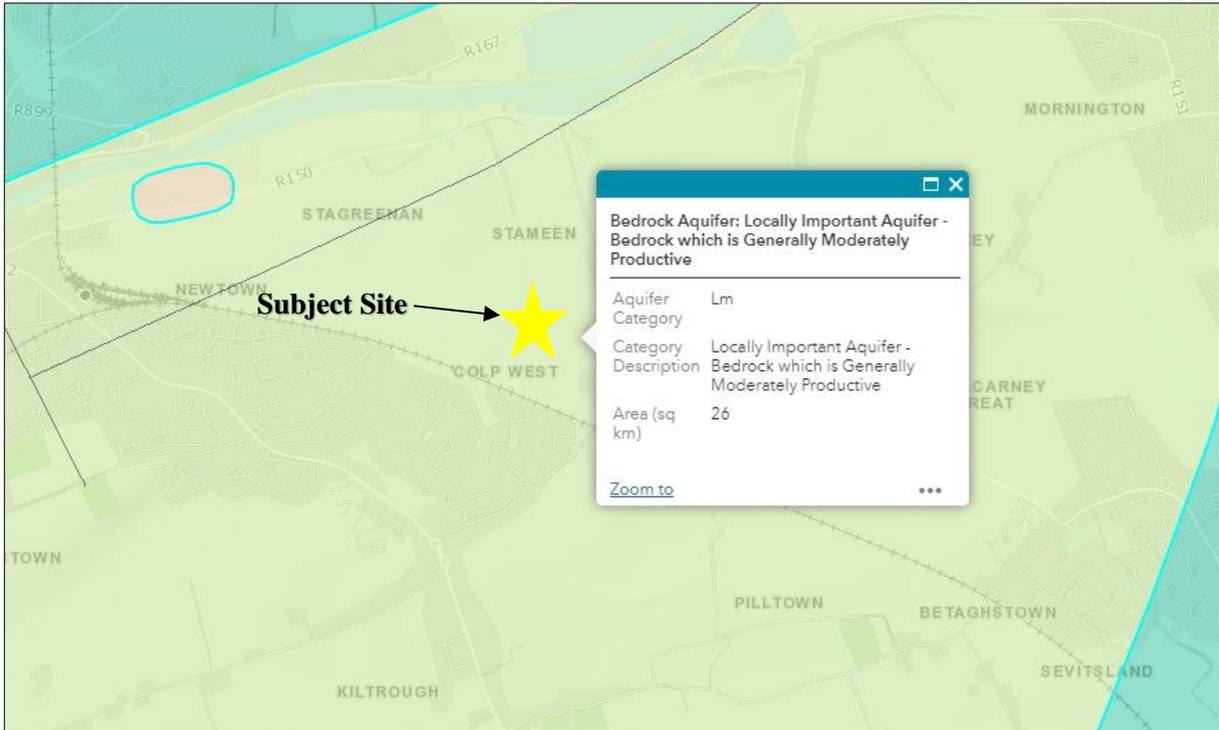


Figure 8.3: Groundwater resources (Aquifers) Courtesy of GSI

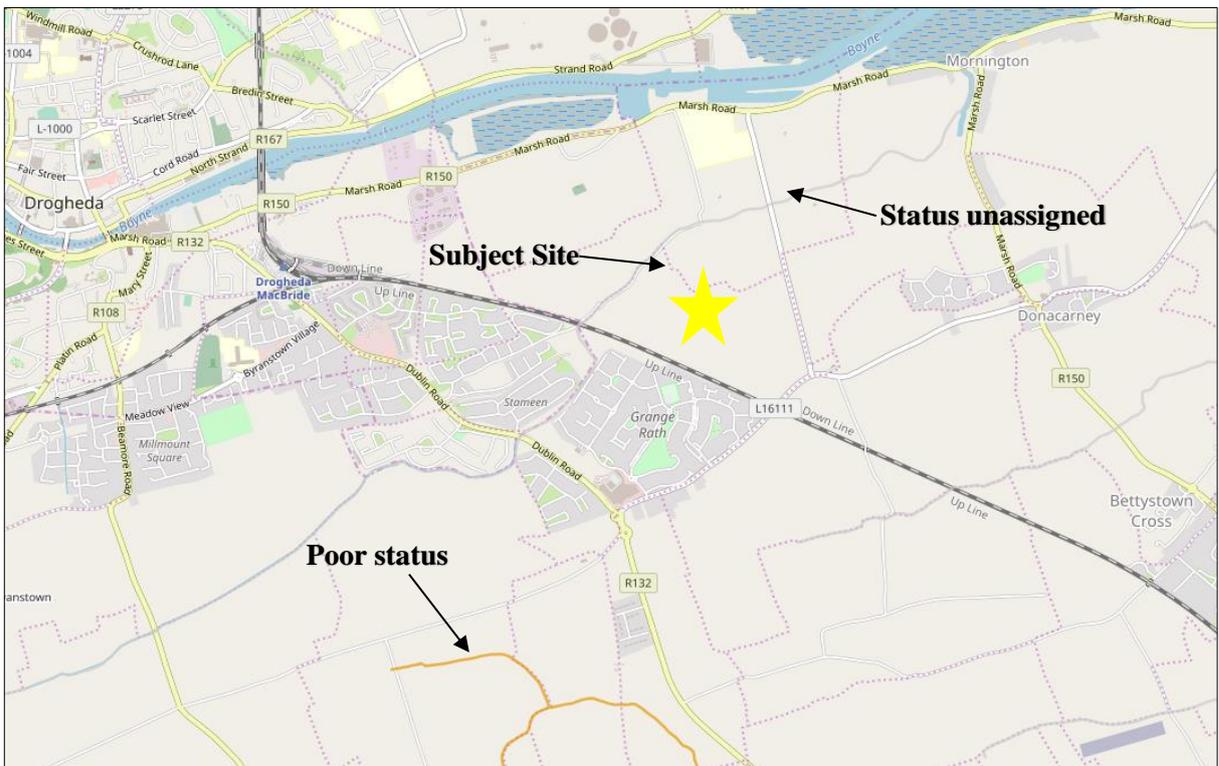


Figure 8.4: River Water Quality– 2010 to 2012 Courtesy of EPA Maps