Hydrological Impact Report

Strategic Housing Development
Carley's Bridge, Enniscorthy, Co. Wexford

March 2022

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Hydrological Impact Report

Client: Torca Developments Ltd.

Location: Carley's Bridge, Enniscorthy, Co. Wexford

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CARLOW OFFICE: INNOVATION CENTRE, GREEN ROAD, CARLOW, R93 W248
Tel: 059 91 33084 Email: info@iece.ie Web: www.iece.ie

NEWRY OFFICE: 1 RDC HOUSE, WIN BUSINESS PARK, NEWRY, BT35 6PH
Tel: 048 302 57974 Email: info@iece.ie Web: www.iece.ie

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1. Introduction

IE Consulting was requested by Torca Developments Limited to undertake a desktop Hydrological (Hydrology and Hydrogeology) Impact Report (HIR) for a proposed Strategic Housing Development site at Carley's Bridge, Enniscorthy, Co. Wexford.

The proposed Strategic Housing Development will comprise a residential development of 233 no. units (53 no., 3-4 bed houses and 180 no. 1/2/3 bed duplexes/apartments). Provision of a creche. Associated car parking, bicycle parking, and open spaces/landscaping. Vehicular and pedestrian accesses provided via Carley's Bridge Road to the north west, pedestrian/cyclist access via Carley's Bridge Road to the north and Millbrook Residential Estate to the east of the site. All associated site works including boundary treatments, plant, bin stores, site services and connections to facilitate the development.

The purpose of this HIR is to assess the potential hydrological risk to the proposed development site and to assess the impact that development of the site may or may not have on the hydrological regime of the area.

2. Site Description

The proposed development site is located at Carley's Bridge, Enniscorthy, Co. Wexford. The site is bounded to the north by the Carley's Bridge Road and existing residential dwellings, to the east by existing residential dwellings, to the south by a tributary of the River Lyre and to the west by the River Urrin and the River Lyre. The total area of the proposed development site is approximately 8.71 hectares.

The location of the proposed development site is illustrated on *Figure 1* below and shown on Drawing Number *IE2066-001-B* in *Appendix A.*

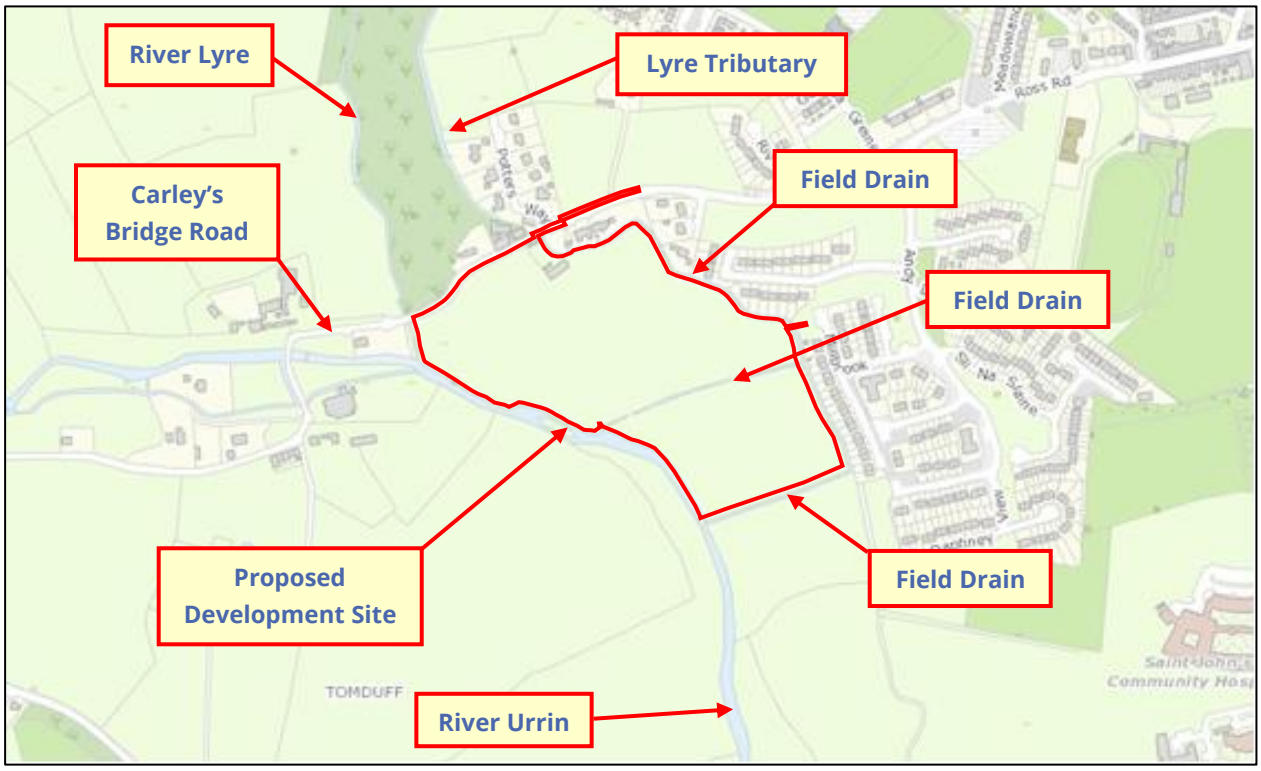


Figure 1 - Site Location

3. Existing Environment

3.1. Topography

The proposed development site slopes steeply from the northern boundary of the site to the southern boundary of the site at an average gradient of approximately 7.1% (1 in 14).

Existing ground elevations range from approximately 20.313m OD (Malin) in the northern area of the site to 2.631m OD (Malin) in the southern area of the site.

3.2. Hydrology

The most immediate and significant hydrological feature in the vicinity of the proposed site is the River Urrin, which flows adjacent to the south-western boundary of the proposed development site in a north-west to south-east direction as shown in *Figure 2* below. The catchment area of River Urrin was delineated and found to be approximately 114km^2 to a point downstream of the site. An Assessment of the River Urrin upstream catchment area indicates that the catchment is predominantly rural in nature with urban development accounting for approximately 0.28% of the total catchment area.

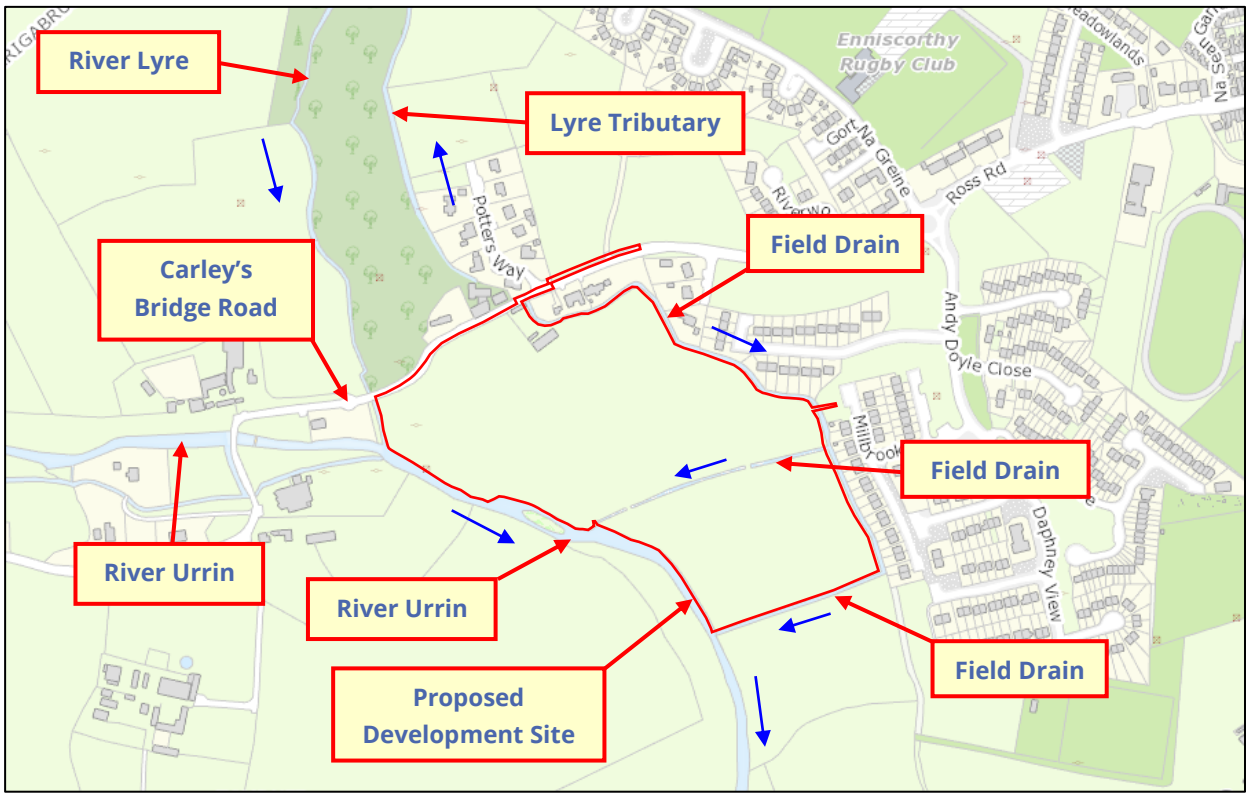


Figure 2 - Watercourses in the vicinity of the Proposed Development Site

The River Lyre joins the River Urrin at the north western corner of the site and has a catchment area of approximately 9.29km^2. It is also predominantly rural with urban development accounting for 0.0164% of the total catchment area.

The River Urrin flows along the south western boundary of the proposed development site. From there the river continues to flow for approximately 1.3km in a south easterly direction before converging with the River Slaney. The River Slaney is a part of the Slaney River Special Area of Conservation and the Wexford Harbour and Slobs Special Protection Area as illustrated below in *Figure 3*.

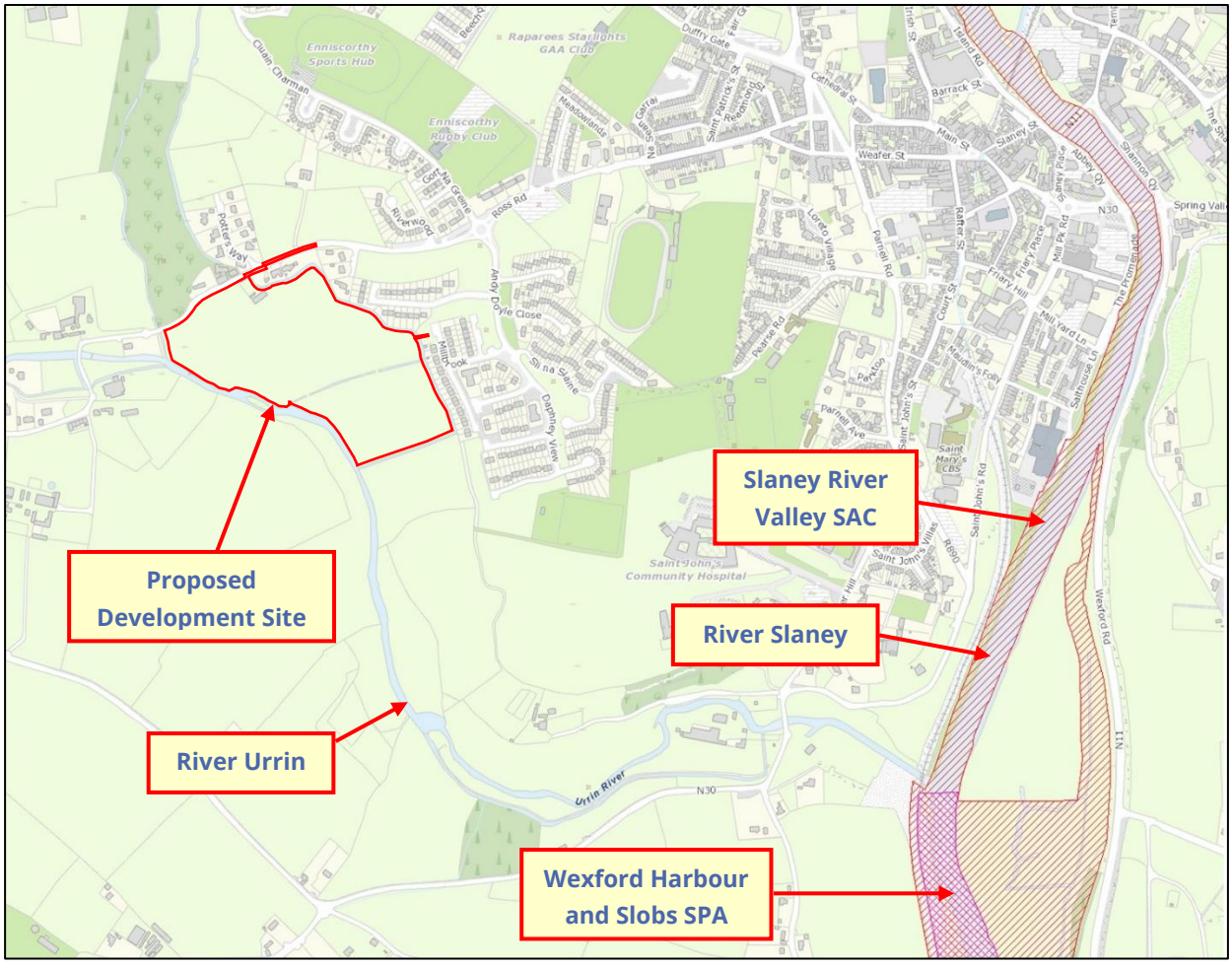


Figure 3 - Special Areas of Conservation and Special Protection Areas

3.2.1. Lyre Tributary

The South Eastern Region Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the final version of the flood maps were issued in July 2016. Flood risk extent and depth maps for further assessment areas within Enniscorthy have also been produced.

OPW CFRAMS predictive flood map number O12ENN_EXFCD_F0_03 illustrates predictive extreme fluvial flood extent zones associated with the River Urrin, River Lyre and Lyre Tributary in the vicinity of the proposed development site.

Figure 4 below (extracted from CFRAMS flood map *O12ENN_EXFCD_F0_03*), illustrates the predicted extreme 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the proposed development site.

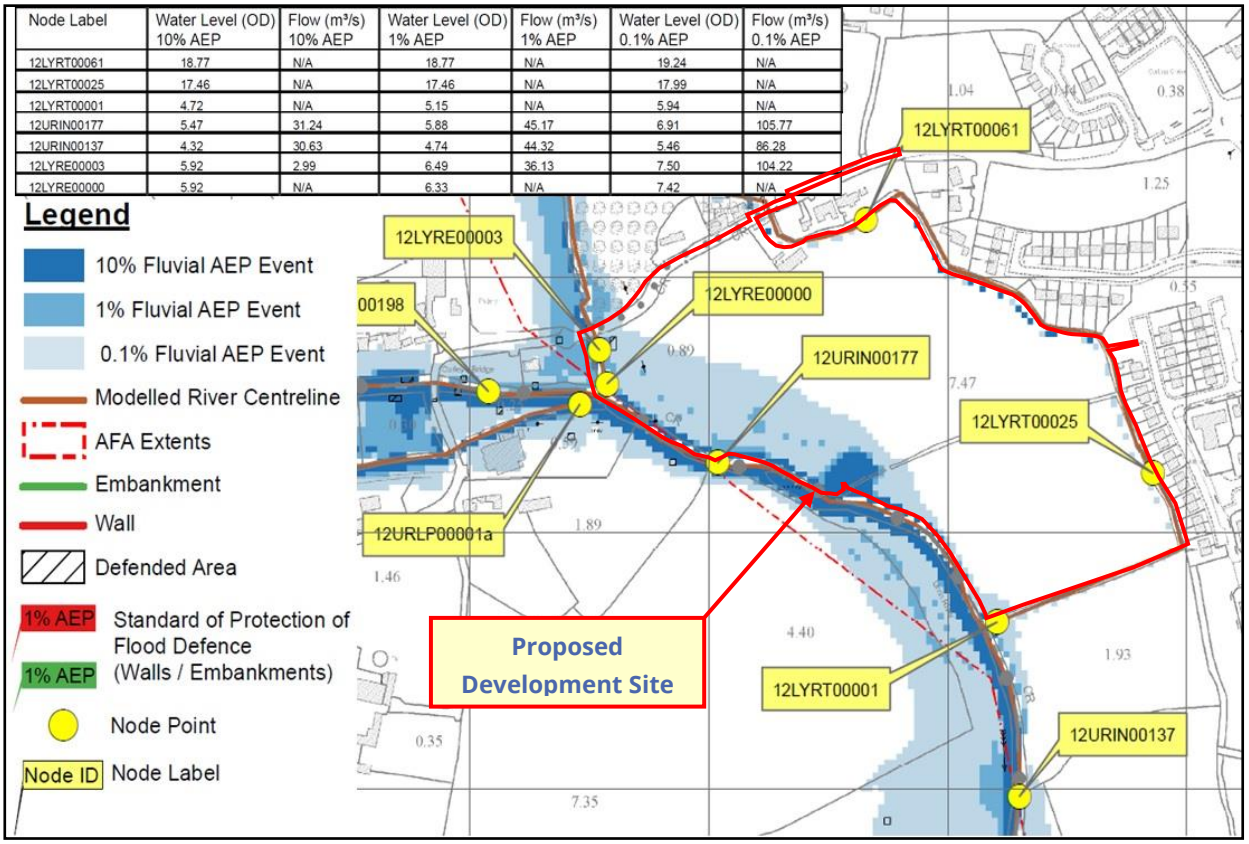


Figure 4 - CFRAMS Fluvial Flood Maps

The CFRAMS flood extent map illustrated in *Figure 4* above indicates a narrow line of potential fluvial flooding along the northern boundary of the site, which is associated with the Lyre Tributary. This watercourse is elevated above most of the site and therefore there is potential for flood waters to overtop this channel and spill downhill into the site.

The Lyre tributary was modelled as part of the South Eastern CFRAM Study for the Enniscorthy area. An extract from the CFRAMS Hydraulics Report (reference IBE0601Rp0014, Appendix A.2) displays a long section through the modelled reach of the Lyre Tributary adjacent to the northern boundary of the site as illustrated in *Figure 5* below. This long section shows the predicted 1 in 1000 year (0.1% AEP) flood level along this modelled reach length.

The long section presented also does not appear to make sense in terms of the gradient in the channel. It indicates that the Lyre Tributary flows in a southerly direction and has a negative gradient for the first 507m of channel as shown in *Figure 5* below.

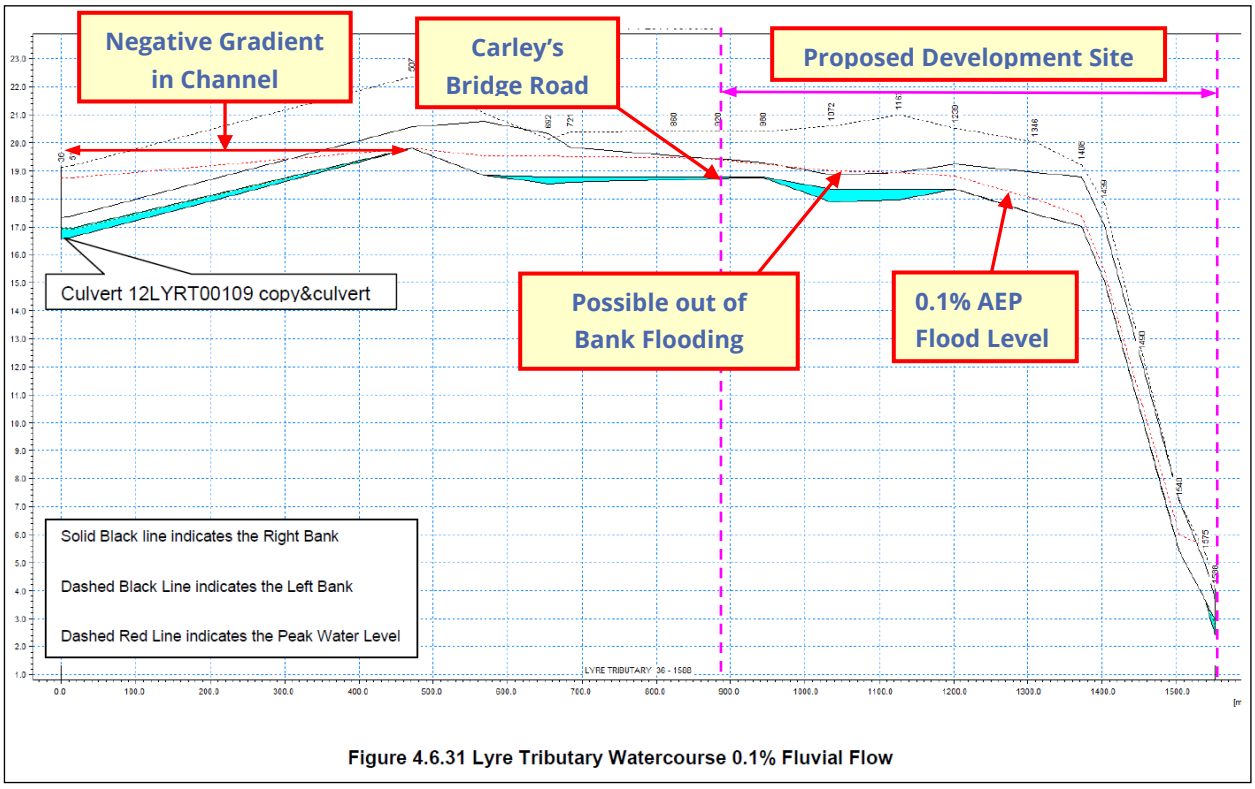


Figure 5 - CFRAMS Model Long Section of Lyre Tributary for 0.1% AEP Event

The CFRAMS Hydraulics Report states in Section 4.6.6 (d) that "*The Lyre Tributary (LYRT) model was extended upstream to better represent the channel as the first cross-section at 507.235 m had a dry bed. This helped create a better representation in the model simulations as the channel link was much shorter and a more gradual slope could be applied to the rise in bed level, helping with the model run. The two cross-sections placed upstream of the original were copies of the first cross-section on the channel, with the whole section lowered to match the bed level of the linking section from the Lyre River as this was needed for the model simulations to run. This meant the first stretch of the Lyre Tributary would be able to hold water in extreme flooding events, which is more representative of the watercourse in reality. This involved adding a culvert to pass under a road at the upstream end of the branch. The culvert was input as a 0.8 m diameter pipe of length 7 m at 39.744 m. These culvert dimensions were obtained by using Google Maps and the scale provided with it.*"

It is unclear from the above text extracted from the CFRAMS Hydraulics Report whether in fact the 0.8m culvert at Node Point 12LYRT00109 (located 790m north of the site on the Lyre Tributary) was

surveyed or if the diameter was assumed. It is also unclear where along the Lyre Tributary cross sections of the river channel were surveyed along its length. *Figure 6* below, which was extracted from the CFRAMS Hydraulics Report, shows the Model Schematisation for the Enniscorthy area. It does appear to show modelled cross sections along the Lyre Tributary but there is no indication if these sections were surveyed on the ground or were extracted from a LiDAR derived DTM.

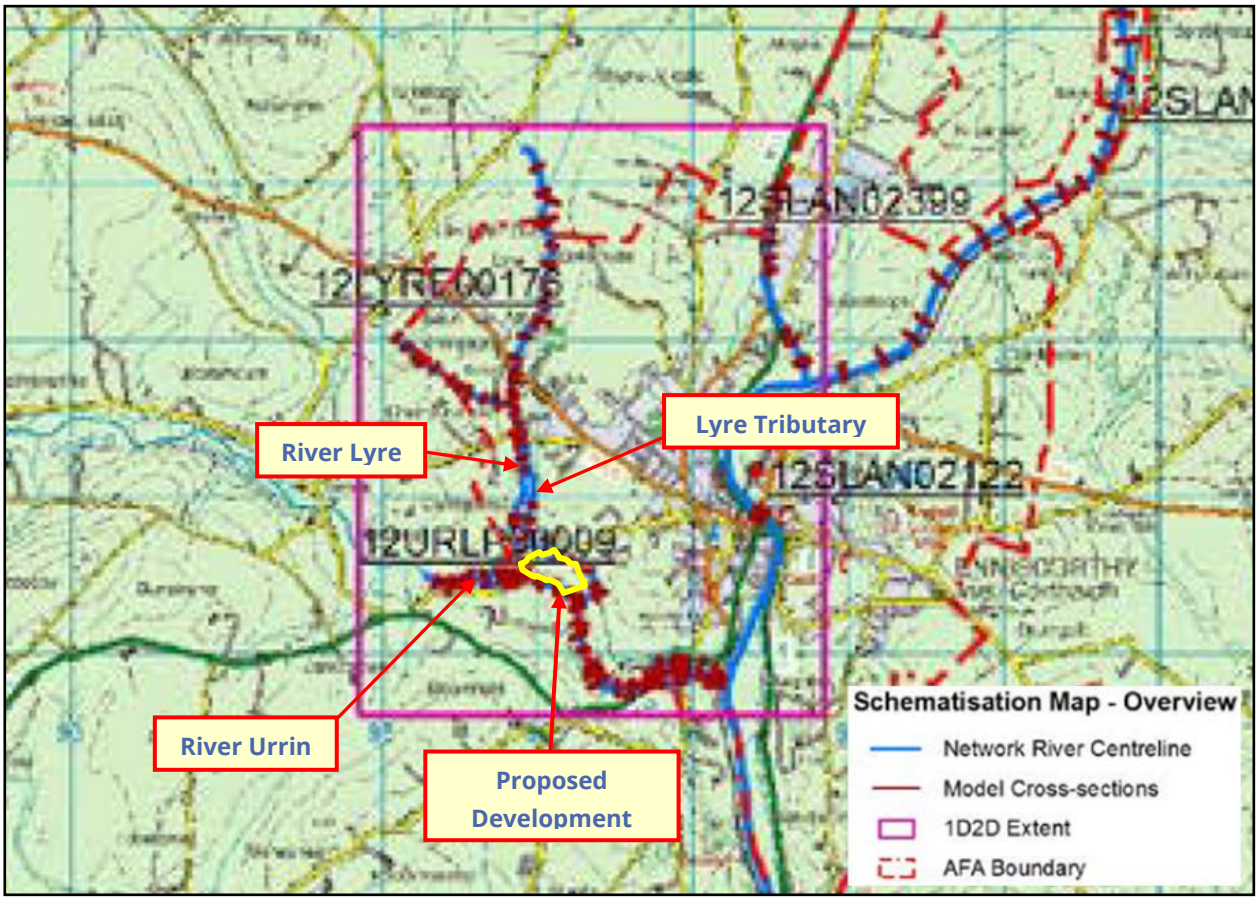


Figure 6 - CFRAMS Model Schematisation

The long section in *Figure 5* above indicates that there may be out of bank flooding along its length within the boundary of the proposed development site. However, the model does not appear to consider any hydraulic structure to represent a road crossing along the reach at Carley's Bridge Road adjacent to the site. There is also no mention of a culvert in this location in the CFRAMS Hydraulics Report.

The presence of a hydraulic structure under Carley's Bridge Road was investigated by a Hydrological Engineer from IE Consulting and no culvert or bridge was found on site. The channel representing the Lyre Tributary does not appear to cross the road at all at this location. The topographical survey of the channel also did not identify the presence of culvert or bridge traversing the site or road at

this location as shown in *Figure 7* below. The channel within the site was also observed to be completely dry where the channel commences within the site, which is shown in *Figure 8* below.

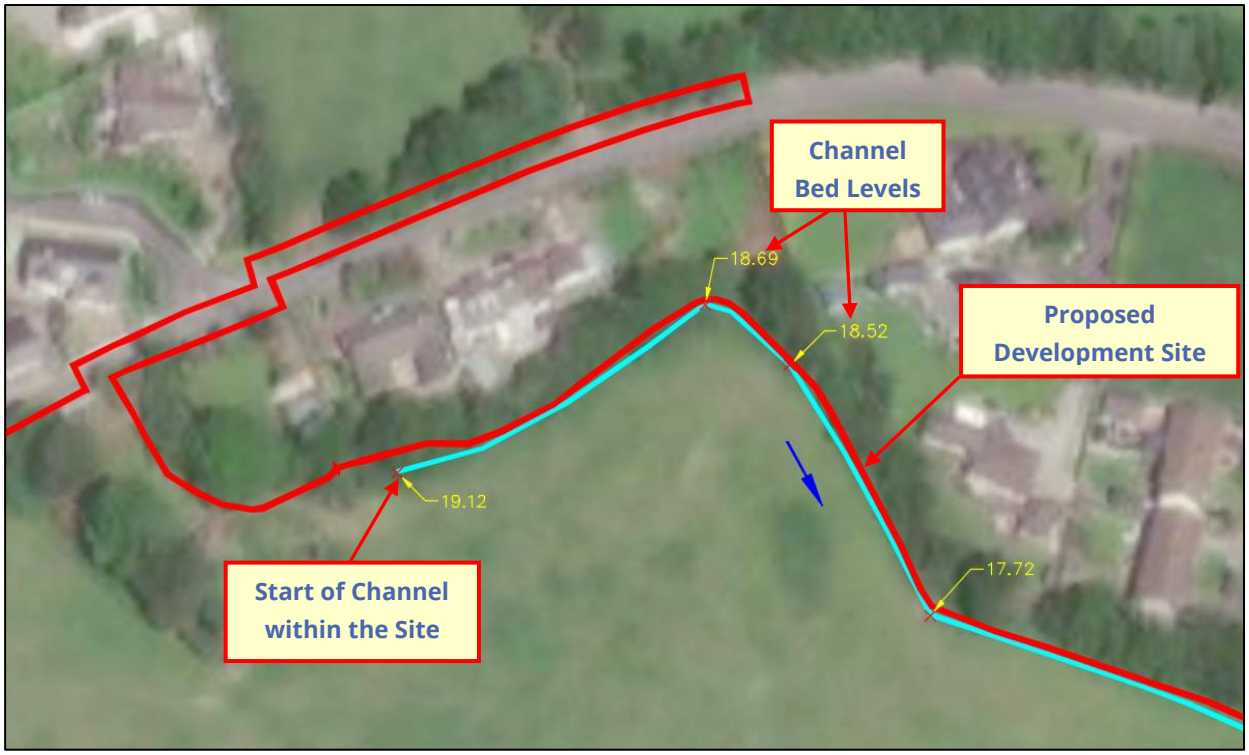


Figure 7 - Surveyed Channel Extents within the Site

Figure 8 - Start of Channel within the Site

Based on the evidence above it is more reasonable to conclude that the section of the Lyre Tributary to the north of Carley's Bridge Road flows in a northerly direction based on the flood levels indicated on the node points and the overall gradient of the topography, and then discharges into the main Lyre River channel to the north of CFRAMS Node Point 12LYRT00109 as shown below in *Figure 9* below.

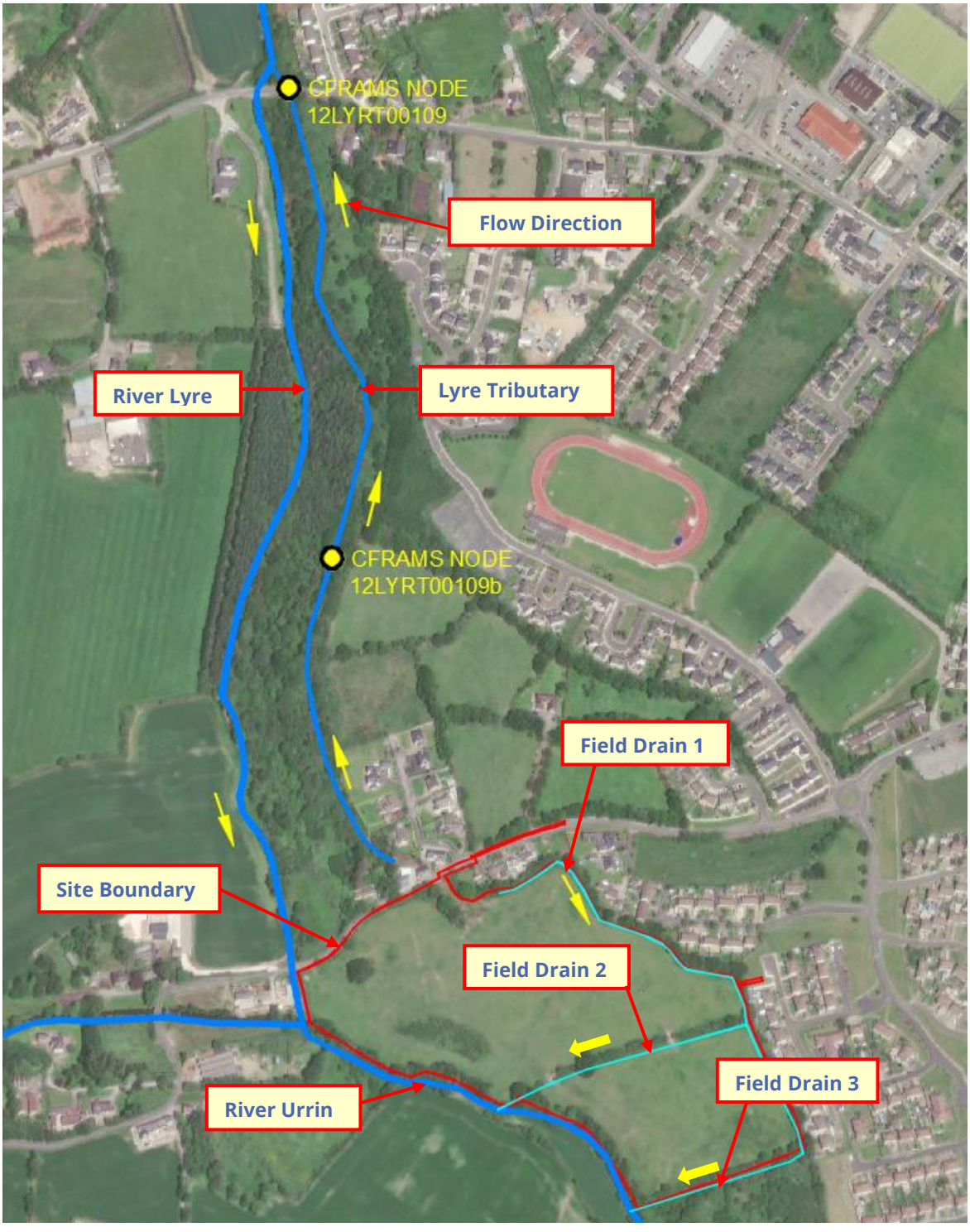


Figure 9 - Lyre Tributary

The channel located within the site was observed to be dry along most of the channel length. It is likely that this channel acted as a field drain for the lands to the north in the past prior to any development in the area.

A Site Specific Flood Risk Assessment has also been prepared as part of this planning application which has shown that the potential flood risk to the site from these channels is low.

3.2.2. Field Drains

There is a field drain that crosses the site (Field Drain 2) and also a second drain that flows adjacent to the eastern and southern boundary of the site (Field Drain 1 & Field Drain 3), which are referred to in the CFRAM Study as the Lyre Tributary, as shown in *Figure 9* above. As discussed in Section 3.2.1 above the Lyre Tributary does not cross Carley's Bridge Road and therefore these channels are field drains only.

The topographical survey indicates that the channel along the northern boundary discharges into Field Drain 2. There was little or no flow observed on site in these channels and as such these channels only drain the lands on either side of it.

3.3. Existing Drainage Infrastructure

An urban drainage infrastructure map was obtained from Wexford County Council, an extract of which is illustrated in *Figure 10* below. The following drainage infrastructure has been identified in the vicinity of the proposed development site:

- 375mm stormwater pipe located along the eastern boundary of the site;
- 600mm stormwater pipe crossing the centre of the site;
- 700mm stormwater pipe located along the southern boundary of the site;
- 300mm foul sewer located along northern boundary of the site; and
- 225mm & 450mm foul sewer located along the eastern boundary of the site.

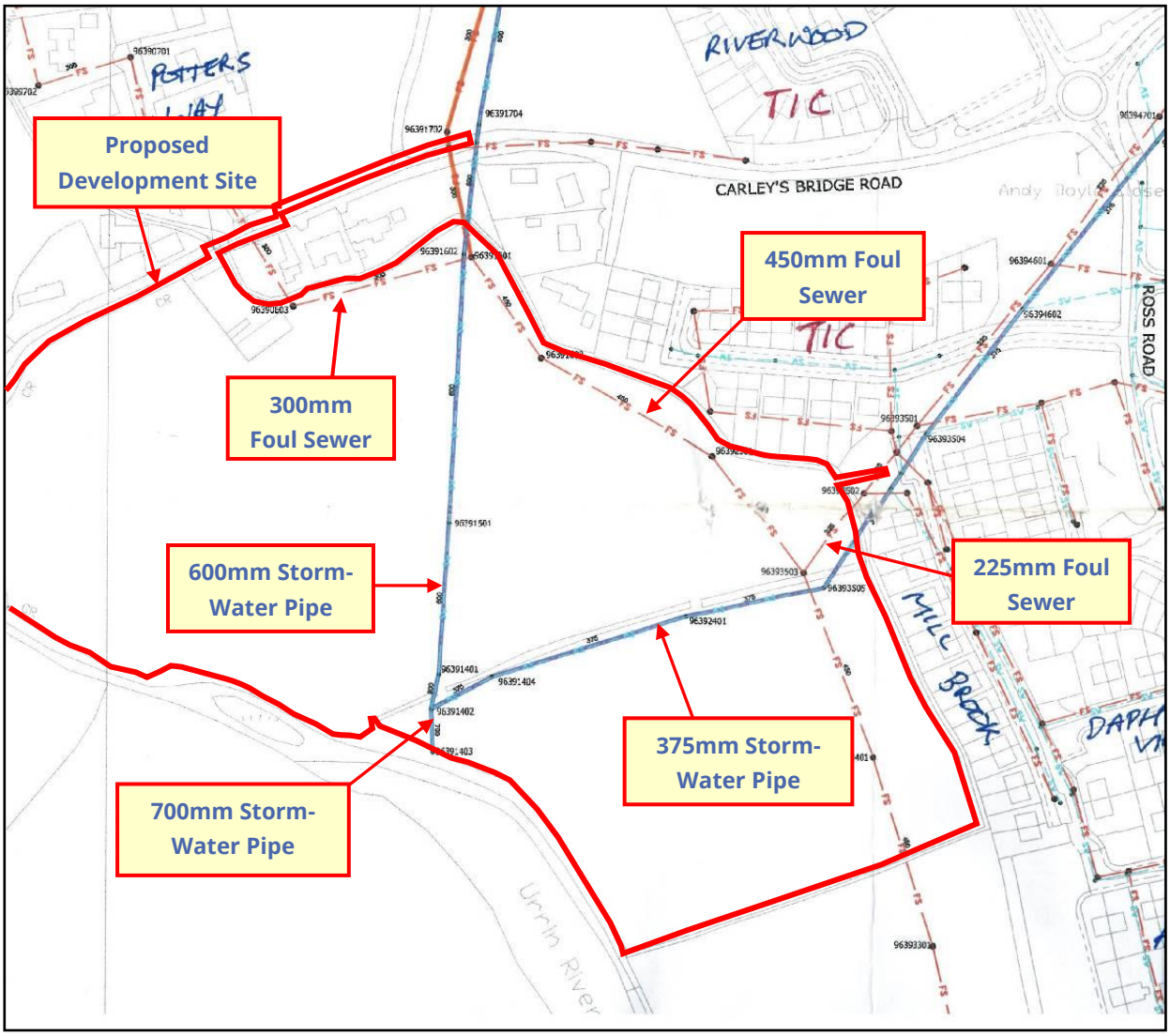


Figure 10 - Urban Drainage Records from Wexford County Council

A water supply infrastructure map was obtained from Wexford County Council, an extract of which is illustrated in *Figure 11* below. The following water supply infrastructure has been identified in the vicinity of the proposed development site:

- 150mm water main located along Carley's Bridge Road adjacent to the northern boundary of the site.
- 100mm water-main located in Urrin Valley housing estate close to the eastern boundary of the site.

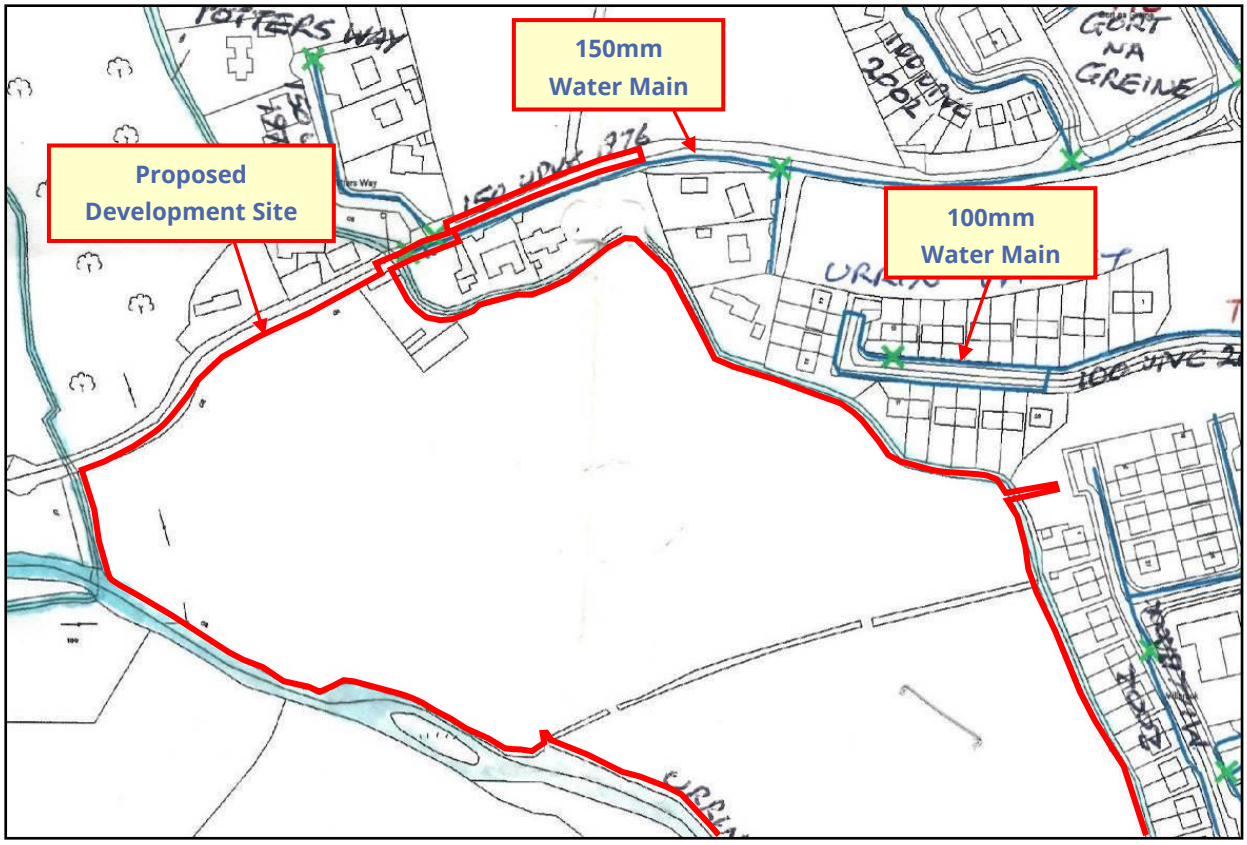


Figure 11 - Water Main Records from Wexford County Council

3.4. Aquifer Description & Superficial Deposits

The Geological Survey of Ireland web service was reviewed to classify the bedrock underlying the site. The geology within the site of proposed development forms a part of the Campile Formation. As illustrated below in *Figure 12* it is predominantly underlain by Middle-Upper Ordovician Slate, Sandstone, Greywacke, Conglomerate, intruded by volcanic rocks along a triangular wedge at the north of the site.

Figure 12 - Bedrock Geology

The GSI Aquifer classification scheme is designed to describe both the resource potential (regionally or locally Important, or poor) and groundwater flow types (through fissures, karst conduits or intergranular). The Campile Formation is described as a Regionally Important Aquifer: Fissured Bedrock. Regionally Important Aquifers are capable of supplying regionally important abstractions such as large public water supplies. Landscapes associated with regionally important aquifers are characterised by well-developed underground drainage networks, with most flow taking place in solutionally enlarged conduits/interconnected fractures/fissure zones. Groundwater often discharges from these aquifers via large springs and there is generally a strong interconnection between surface and groundwater in such aquifers.

The GSI/ Teagasc subsoil mapping database illustrates that the site is predominately underlain by shale till from the lower Paleozoic, see *Figure 13* below. There is also a narrow strip of undifferentiated alluvium soils which run along the south western boundary of the site of proposed development associated with the watercourse.

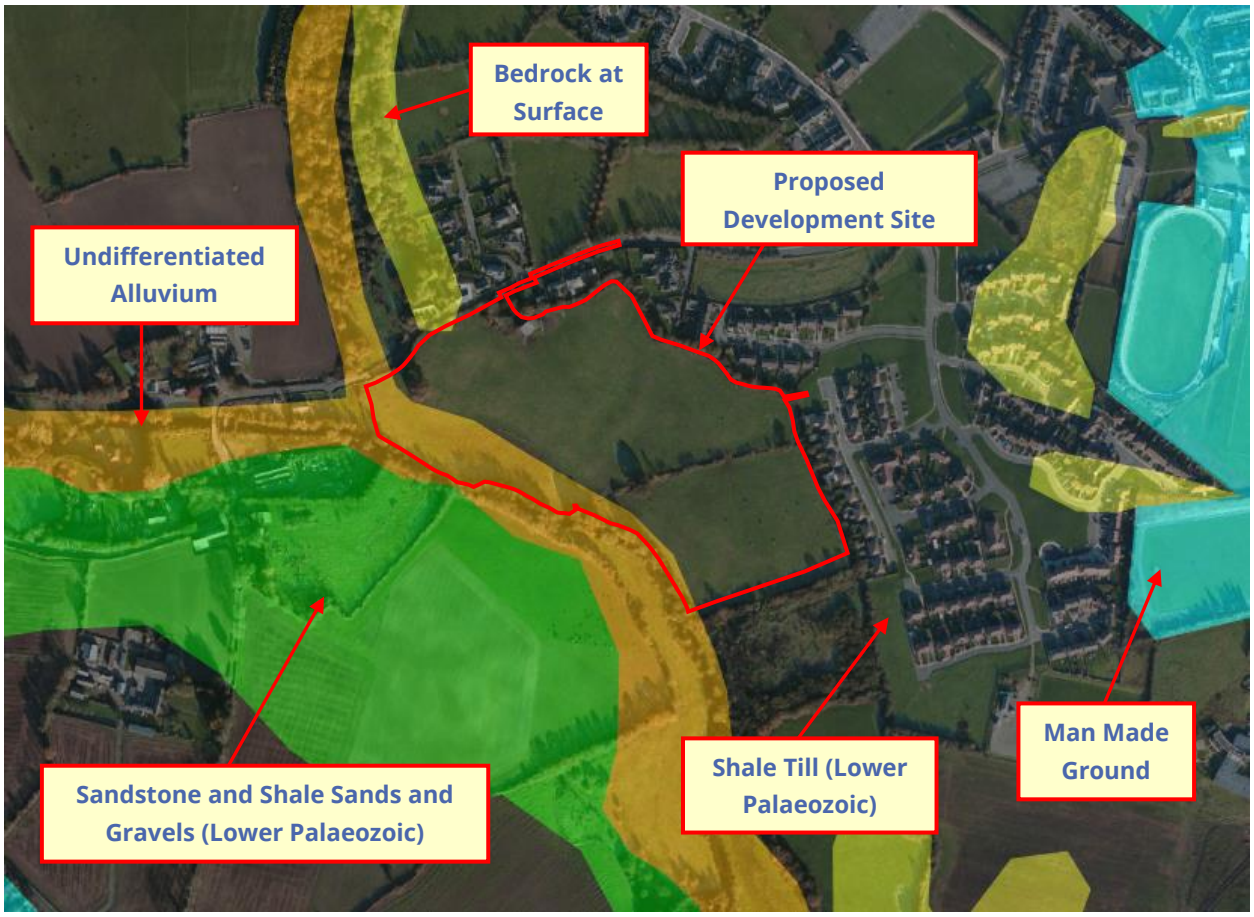


Figure 13 - Subsoils map

Aquifer vulnerability identifies areas where groundwater is most at risk from potential contamination. The GSI vulnerability maps were based on the type and thickness of subsoils along if whether there are any karst features present. As illustrated below in *Figure 14* the site is predominantly categorised as moderate vulnerability, with the south eastern and north western corners of the site having a high vulnerability. There is a small amount of extreme vulnerability in the north western corner of the site associated with rock closer to the surface.

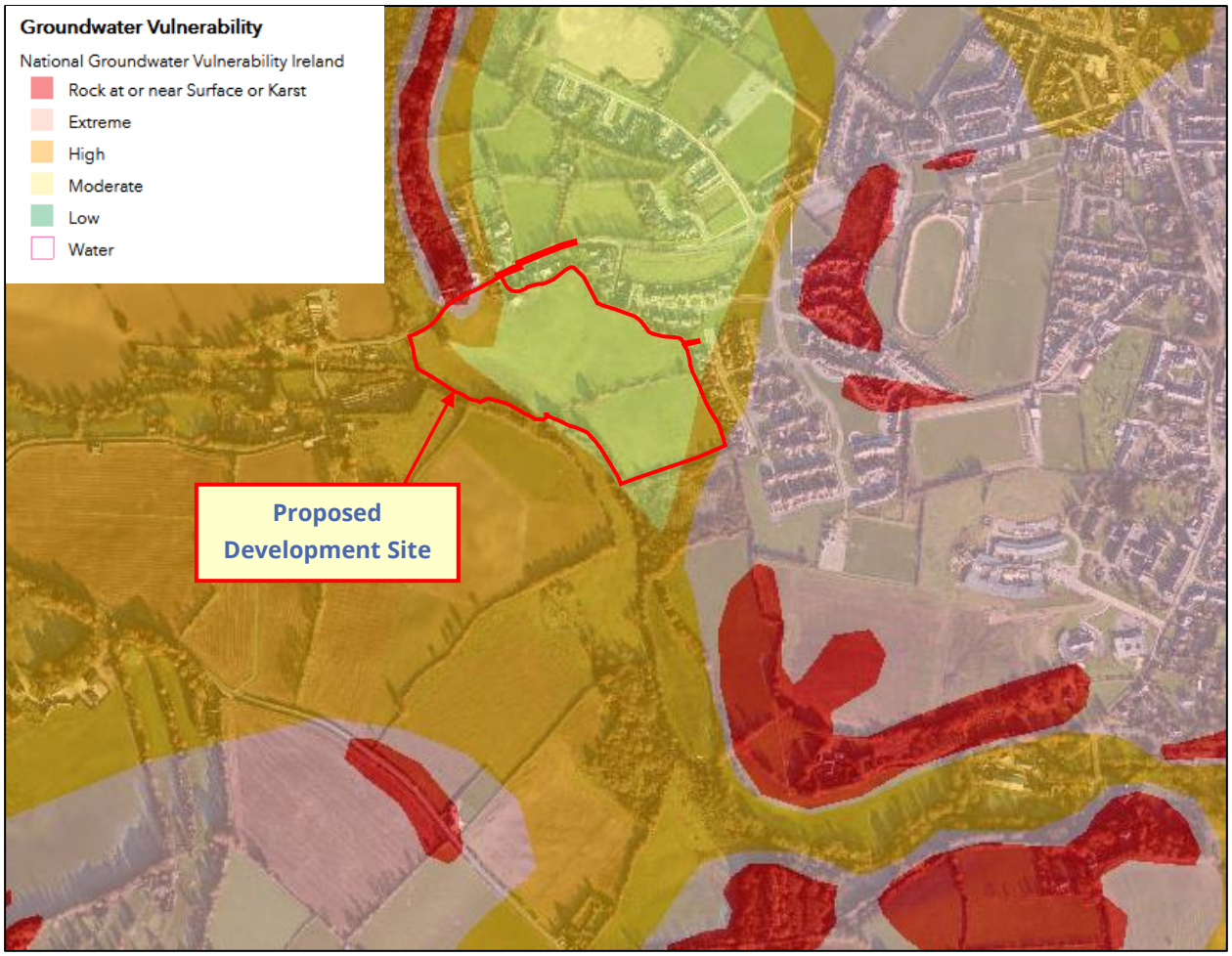


Figure 14 - Groundwater Vulnerability

The GSI uses five groundwater vulnerability categories – Extreme rock at or near surface or karst (X), Extreme (E), High (H), Moderate (M) and Low (L) for mapping purposes and in the assessment of risk to ground waters. The classifications are based on the thickness and permeability of the sub-soils overlying the aquifer. The classification is presented below in *Table 1*.

Depth to Rock	**Hydrogeological Requirements for Groundwater Vulnerability**				
	Diffuse Recharge			**Recharge Point**	**Unsaturated Zone**
	High Permeability *(sand/gravel)*	**Moderate Permeability** *(sandy subsoil)*	**Low Permeability** *(clayey subsoil, clay, peat)*	***(swallow holes, loosing streams)***	***(sand & gravel aquifers only)***
0-3 m	Extreme	Extreme	Extreme	Extreme (30 m radius)	Extreme
3 – 5 m	High	High	High	N/A	High
5 – 10 m	High	High	Moderate	N/A	High
>10 m	High	Moderate	Low	N/A	High

i. *N/A = not applicable.*
ii. *Release point of contaminants is assumed to be 1 – 2 m below ground surface.*
iii. *Permeability classifications relate to the engineering behaviour as described by BS5930.*
iv. *Outcrop and shallow subsoil (i.e., generally <1.0 m) areas are shown as sub-category of extreme vulnerability.*

(amended from Deakin and Daly (1999) and DELG/EPA/GSI (1999)

Table 1: Groundwater Vulnerability Classification (GSI, 2019)

3.5. Water Quality

The EPA mapping for both the River Urrin and the River Lyre classify both watercourses as having moderate water quality and is at risk of not having a good status based on the Water Framework Directive (WFD) requirements.

There are two gauges located on the River Urrin which are monitored by the EPA as part of the national monitoring programme (EPA Station - RS12U010400 and EPA Station - RS12U010500). These gauges measure several parameters (Alkalinity-total (as CaCO3), Ammonia-Total (as N), BOD - 5 days (Total), Chloride, Conductivity @25°C, Dissolved Oxygen, Nitrate (as N), Nitrite (as N), ortho-Phosphate (as P) – unspecified, pH, Temperature, Total Hardness (as CaCO3), Total Oxidised Nitrogen (as N), and True Colour).

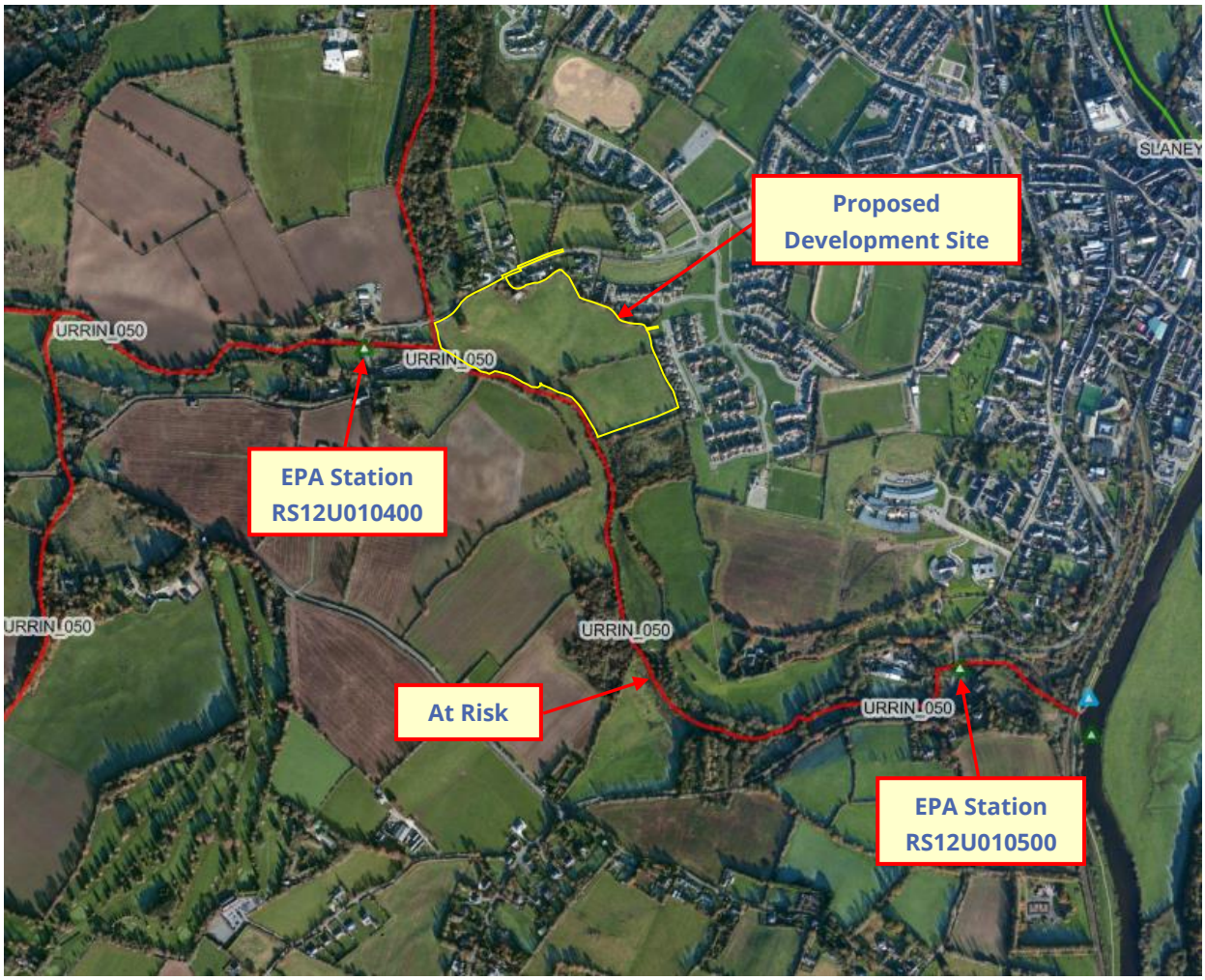


Figure 15 - EPA Water Framework Directive Risk Status

4. Proposed Development Infrastructure

4.1. Proposed Development Site Description

The proposed Strategic Housing Development will comprise a residential development of 233 no. units (53 no., 3-4 bed houses and 180 no. 1/2/3 bed duplexes/apartments). Provision of a creche. Associated car parking, bicycle parking, and open spaces/landscaping.

Vehicular and pedestrian accesses provided via Carley's Bridge Road to the north west, pedestrian/cyclist access via Carley's Bridge Road to the north and Millbrook Residential Estate to the east of the site. All associated site works including boundary treatments, plant, bin stores, site services and connections to facilitate the development.

A copy of the Proposed Site Layout Plan is provided in *Appendix A*.

The existing foul line will be retained in the proposed development scenario. The proposed foul drainage for the development will be connected to a proposed foul pumping station located along the southern boundary of the proposed development site. Foul water pumped from the pump station to the existing foul pipeline in the south eastern corner of the site. The proposed foul drainage network and pump station layouts have be agreed and approved by Irish Water.

In order to accommodate the proposed development layout the existing stormwater pipelines crossing the site will diverted to within road ways and areas of proposed open space. The existing stormwater pipes will be decommissioned. The proposed stormwater drainage system will serve the proposed estate roofs, roads, drains and field drains within the site. The stormwater drains will be connected to two proposed storage capacity attenuation systems, which also have a hydrobrake fitted to the outlet pipes to ensure the stormwater discharging from the site is limited to greenfield runoff rate.

A copy of the proposed foul and stormwater layout is included in *Appendix B*.

The proposed watermains will be connected to the existing watermain in the northern corner of the site. The proposed water main layouts and connection point have be agreed and approved by Irish Water.

A copy of the proposed watermain layout has been included in *Appendix B*.

The development will be carried out in accordance with:

- Irish Water "Code of Practice for Wastewater Infrastructure – Doc No. IW-CDS-5030-03"
- Irish Water "Wastewater Infrastructure Standard Details – Doc No IW-CDS-5030-01",
- Irish Water "Code of Practice for Water Infrastructure – Doc No. IW-CDS-5020-03"
- Irish Water "Water Infrastructure Standard Details – Doc No IW-CDS-5020-01",
- "Recommendations for site development works for housing areas" published by the department of Environment and Local Government, November 1998.

5. Conceptual Site Model

A Conceptual Site Model (CSM) has been prepared following a desk top review of the site and surrounding environment. The conceptual model is summarised below and is illustrated in *Figure 16* below.

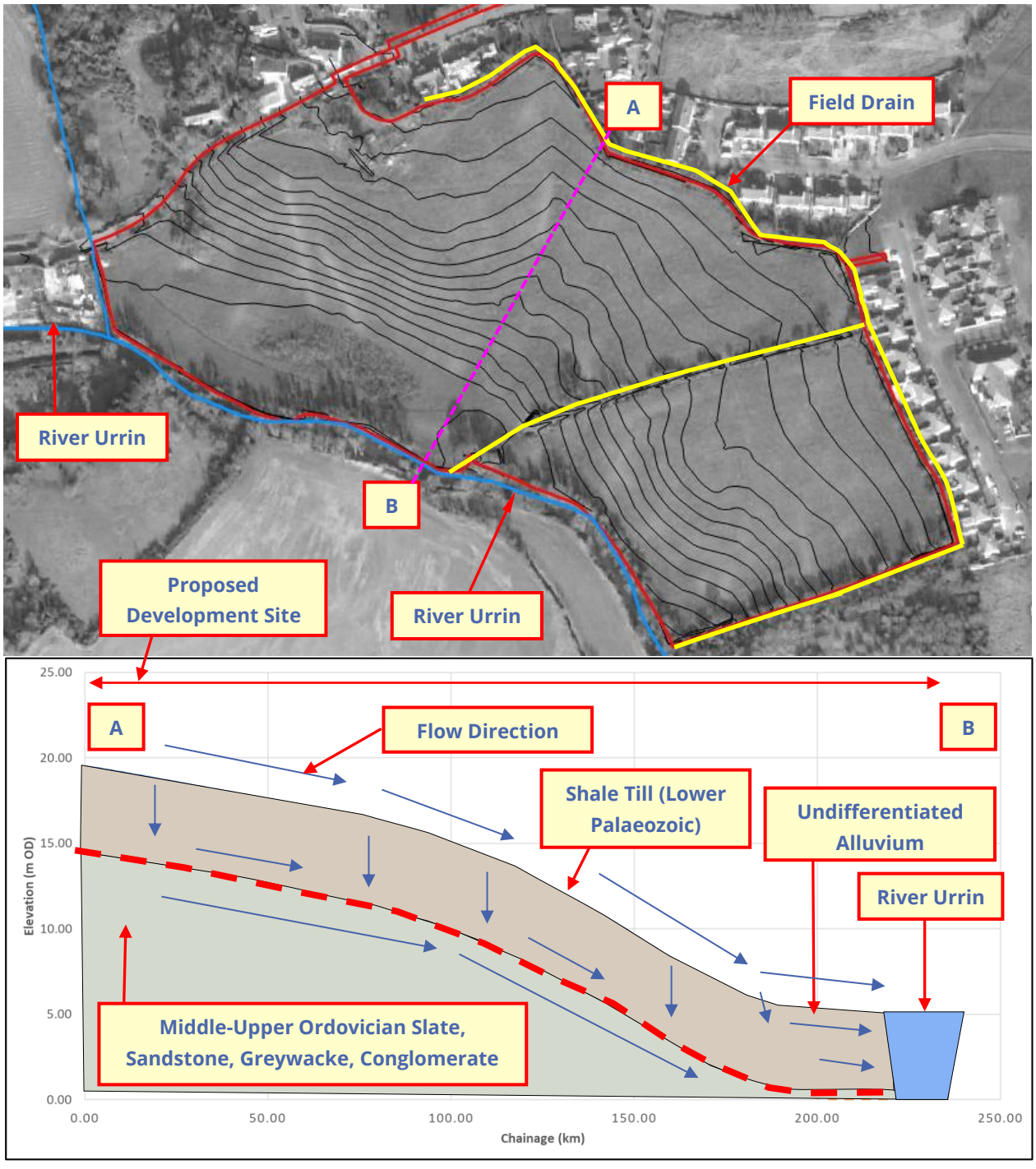


Figure 16 - Conceptual Site Model

No geotechnical data has been collected for the site. Therefore, the depths to the aquifer have been estimated based on the aquifer vulnerability and permeability designation. The site is predominantly composed of a low permeability subsoil overlying aquifer underneath that subsoil. The groundwater vulnerability is moderate. As illustrated above in *Table 1* the GSI web service estimates the depth to Rock to be between 5 to 10 meters.

The conceptual model is summarised below:

- The topography of the site of proposed development site slopes from the northern boundary to the southern boundary towards the River Urrin.
- The site geology forms a part of the Campile Formation and is predominantly composed of Middle-Upper Ordovician Slate, Sandstone, Greywacke, Conglomerate.
- The subsoils within the site are predominantly shale till with a band of alluvium soils running along the southern boundary of the site next to the River Urrin.
- According to the GSI web service the aquifer has a moderate vulnerability and is overlain by a subsoil with a low permeability.
- The River Urrin runs along the southern boundary of the site and flows in a north western to south eastern direction.
- There are field drains located within and around the site of proposed development which slope from the northern boundary of the site to the southern boundary, into the River Urrin.
- There are no wells mapped within 100 meters of the site of proposed development according to the GSI web service.
- The nearest site of ecological importance is the Slaney Special Protected Area (SPA) and the Wexford Special Area of Conservation (SAC) which are located approximately 1100m beyond the eastern boundary of the site of proposed development site.

From this data the conventional Source - Pathway - Receptor (S-P-R) model was applied to assess potential impacts on environmental receptors because of the proposed housing development. Potential S-P-R links were assessed for both the construction stage of the development (short-term) and the competed stage (long-term).

On the basis of this information any activities on the site are considered to present a low to moderate risk to the underlying aquifer. This means that the surface water environment is at a higher risk of impact.

5.1. Assessment of Plausible Sources

5.1.1. Construction

The following sources are considered plausible for the construction stage,

- Re-fuelling of construction vehicles are expected to be undertaken off-site or at a designated bunded refuelling area. However, as a worst case scenario it is assumed a rupture could occur in a fuel oil tank which would result in fuel spilling into the ground. This would be a single short-term event.
- Leakage could occur from construction site equipment (fuel, paint, etc). As a worst case scenario, it is assumed 300 litres of fuel spilling onto the ground. This would be a single short-term event.
- Wet cement would be required during construction. Concrete and cement are highly alkaline and corrosive and can have a significant negative impact on water quality. This is a single short term event.
- Construction will include activities such as site levelling, service trench construction, excavation, etc. Unmitigated run-off could contain a high concentration of suspended solids during earthworks. The increase in suspended solids would result in an increase in turbidity which in turn could affect the water quality. This is a single short term event.

5.1.2. Completed

The following sources are considered plausible for the completed stage:

- The replacement of the greenfield surfaces (grass field) with hard standing surfaces will cause an increase risk in pluvial flooding. This is a single long term event.
- The proposed development consists of 233 residential buildings which have corresponding car parking spaces. Leakage of petrol/ diesel may occur from these areas due to poorly maintained cars, refuelling gardening equipment, etc. Leakage could also occur from household chemicals (detergents, paint, fuel, etc). This is a single long term event.

5.2. Assessment of Pathways

The following pathways have been assessed:

- The site is predominantly underlain by moderately vulnerable aquifer, with small portions of the site in the south eastern and north western corners of the site having a high vulnerability.
- There are field drains located within and around the proposed development area which drain to the River Urrin. These could act as a pathway during the construction stage of the development.
- The River Urrin runs along the south western boundary of the proposed development site.
- The proposed storm drainage layout includes two storage capacity attenuation systems. These attenuation tanks use hydrobrakes attached to the outlets to limit the flow leaving the attenuation tank to the greenfield rate before discharging into the River Urrin.

5.3. Assessment of Receptors

The following receptors have been assessed:

- The surrounding surface water bodies such as the River Urrin, River lyre and the Slaney River along with the dependent ecosystems.
- Underlying Aquifer
- Slaney River Special Area of Conservation (Slaney SAC)
- Wexford Harbour and Slobs Special Protection Area (Wexford SPA)

5.4. Assessment of Source Pathway Receptor Linkages

Table 2 below summarises the possible linkages (S-P-R) considered as part of this assessment.

Source	Pathway	Receptor	Pre-Mitigation Impact	Mitigation Measures
Construction Stage				
Leakage of fuel from refuelling tanks on site	Runoff overland or via the field drains located within and around the pre-development site. The River Urrin runs along the south western boundary of the proposed development site and could carry contaminants to the Slaney Vertical migration through subsoils overlying an aquifer of moderately vulnerability.	Surrounding watercourses and dependent ecosystems. Slaney SPA and Wexford SAC. Underlying aquifer.	Accidental spillage during refuelling is a significant pollution risk to groundwater and surrounding environment. The pre-mitigation impact is expected to be short term, with a medium impact on the receptors.	No storage of fuel or polluting chemicals will occur within 50 meters of the surface water network (Urrin River and surrounding drains) and will be stored in specially designed bunded refuelling areas. Only a designated person will be authorised to refuel machinery on the site. The containers and bunding areas used to store hydrocarbons and other chemicals will be capable of storing 110% of the volume to be stored. Fuel and chemical storage tanks will be inspected regularly for leaks or signs of damage. An emergency spill kit with oil boom, absorbers, etc. will be available at the site. A specific team of staff will be trained in it use in the event of a spill. The post mitigation measures impact is expected to be short term, with a imperceptible impact on the receptors.
Leakage of fuel from construction vehicles along with leakage from other chemicals (paints, asphalt, foul drainage from site offices and compounds, etc).			Leakage from construction vehicles could be due to poorly maintained vehicles, while leakage from other chemicals (paints, detergents, sealants, etc) could be due to poor storage or accidental spillage. The pre mitigation impact is expected to be short term with a low impact on the receptors as the volume of spillage is expected to be small.	All plant and machinery will be serviced before being mobilised to site. No plant or machinery maintenance will be completed on site. Care should be taken when refuelling and a drip tray should be always used. Only a designated person should be authorised to refuel machinery on the site. Foul drainage from site offices and compounds should be linked to the existing foul drainage system where possible. If this is not possible then the waste should be contained and disposed of off-site in an appropriate manner in line with the relevant statutory regulations. The post mitigation measures impact is expected to be short term, with a imperceptible impact on the receptors.
Runoff contaminated with cement products.			Runoff with a high amount of cement products present could affect the pH balance of the receiving watercourse which in turn impacts the surrounding aquatic ecosystem. The pre mitigation impact is expected to be short term with a moderate impact on the receptors.	No batching of wet-cement will occur on the site. No washing of machinery used in concrete transport or concrete operations will be allowed on site. Where concrete is delivered on site only the chute will be cleaned on site, using the smallest volume of water possible. A designated area will be used to wash the chute which will be suitable lined to prevent cement travelling through to the groundwater or flowing as runoff towards the surface water bodies. The post mitigation measures impact is expected to be short term, with an imperceptible impact on the receptors.

Runoff high in suspended solids due to ground works			Based on the steep slope of the topography, moderate vulnerability of the aquifer and low permeability of the subsoil most of the surface water falling on the site will runoff the surface and into the local drains and watercourses. Once construction starts and earth works are started this will release suspended solids into those drains and watercourses. This in turn will cause an increase in the watercourse's turbidity with effects the water quality and the aquatic ecosystem. The pre mitigation impact is expected to be short term with a moderate impact on the receptors.	Before earthworks begin silt fencing should be placed down gradient of the construction areas and where drains and drainage patterns are present. These should be embedded into the local soil. No pumped construction water will be discharged into the surface watercourses. Where pumped water must be discharged a silt bag will be used and the water will be discharged into an enclosed area of double silt fencing. Earthworks will occur during periods of low rainfall to reduce the run-off generated on site. Daily monitoring of the excavation/earthworks and associated water management systems will be completed by a suitably qualified person during the construction phase. Good construction practices such as wheel washing and dust suppression on site roads will be performed to minimise the impact of suspended solids. If a high level of sediment/ contamination is noted in the watercourse all construction will be stopped until the source of the sediment is found, and the issue is corrected. The post mitigation measures impact is expected to be short term, with a imperceptible impact on the receptors.
Completed Stage				
Reduced groundwater flow/ surface water flow due to the replacement of existing greenspace with impermeable hardstanding surfaces (roads, roofs, footpaths, etc).	Indirect runoff through the storm and foul water drainage system to the River Urrin. The River Urrin runs along the western boundary of the proposed development site.	Surrounding Watercourses and dependent ecosystems Slaney SPA and Wexford SAC	The replacement of the greenfield surfaces (grass field) with hard standing surfaces will cause an increased risk in pluvial flooding If the water is not drained from the site. There will also be an increase in the sites runoff rate and volume due to how much quicker the site will respond to rainfall. This would cause the surrounding watercourses to have to deal with a larger volume of water then was occurring in the pre-development scenario. This could impact the surrounding aquatic ecosystem. The pre mitigation impact is expected to be long term with a low impact on the receptors.	The risk of pluvial flooding will be addressed in the proposed development scenario with a suitably designed stormwater drainage system. This drainage system should be regularly maintained and cleaned to prevent any blockage forming. The proposed SuDs includes two storage capacity attenuation systems capable of storing 1114m^3 and 480m^3 of storm water. The size of these attenuations tanks will be designed to account for the increase in runoff rate due to the larger percentage of hardstanding areas. The outfall of the attenuation tanks will be fitted with a hydrobrake to limit the flow leaving the site and matching it the greenfield rate while it discharges into the River Urrin. The post mitigation measures impact is expected to be long term, with an imperceptible impact on the receptors.
Leakage/ Runoff from fuel and household chemicals (paint, detergents, etc).	Vertical migration through the moderately vulnerable aquifer.	Underlying Aquifer	Surface water runoff from roads and car parking areas can contain higher levels of hydrocarbons and contaminates. Leakage and runoff from household chemical is likely to be small in volume and limited in area of effect. The pre mitigation impact is expected to be long term with a low impact on the receptors.	All roads and car parks are to be designed to intercept and capture runoff through the storm water drainage system. The runoff is expected to contain small amount of household chemicals and fuels. All footpath and road drainage water will pass through a suitably sized hydrocarbon interceptors. These interceptors can be located downstream of the attenuation system if the attenuation system is located offline. The post mitigation measures impact is expected to be long term, with an imperceptible impact on the receptors.

Table 2 - Pollutant Linkage Assessment

6. Conclusions

A conceptual site model (CSM) has been prepared following a desk top review of the site and surrounding environment. Based on the CSM, plausible Source-pathway-receptor linkages have been assessed assuming both no mitigation measures being applied and with the recommended mitigation measures. Both the construction stage and the completed stage have also been assessed.

There is a link between the proposed development site to the Slaney SPA and the Wexford SAC through the Urrin River.

A review of the source pathway links concludes that if no mitigation measures are taken the impact of the proposed development during the construction stage is likely to be short term and have a moderate impact on the surrounding environment. Once the development has been complete the main impact of the development is expected to be long term with a negligible impact on the environment.

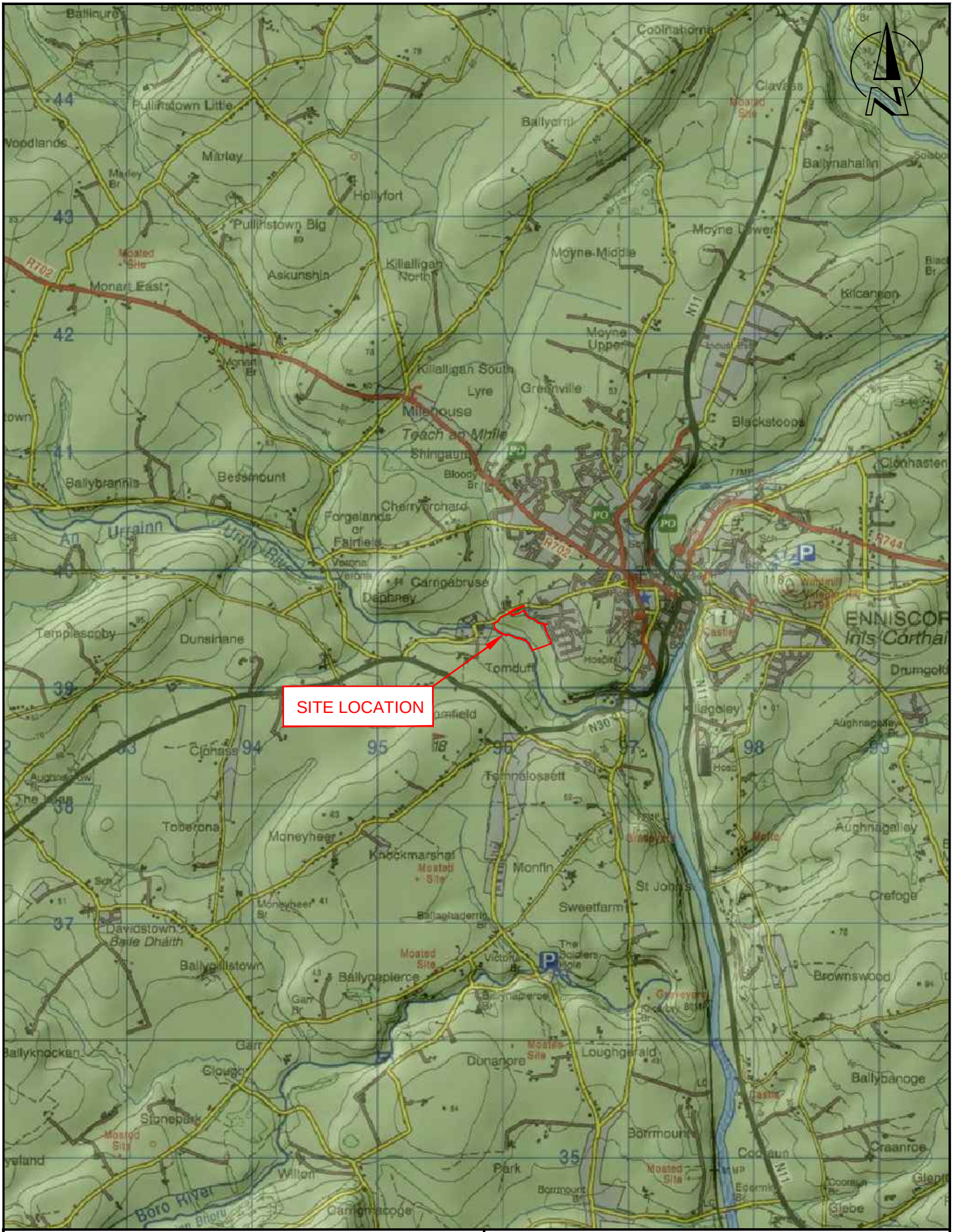
If the mitigation measures are implemented the impact of the construction stage will be short term with negligible impacts on the environment. Once the development is complete the mitigation measures will be long term with a negligible impact on the environment.

Appendices

Appendix A. Drawings

IE2066-001-B Site Location

Proposed Site Layout Plan



IE Consulting Innovation
Centre, Green Road,
Carlow, R93 W248.
Ph: 059-9133084
E-mail: info@iece.ie
Web: www.iece.ie

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title:	FLOOD RISK ASSESSMENT
Project Address:	CARLEY'S BRIDGE, ENNISCORTHY, CO WEXFORD
Client:	TORCA DEVELOPMENTS LIMITED
Drg. Title:	SITE LOCATION MAP

Dwg.Scale:	Date:	Dwg.No:	Job No:	Revision:	Dwg.By:
1:50,000	19/08/21	IE2066-001	IE2066	B	NOM

NOTES RELEVANT TO PARTICULAR JOB STAGE:

SKETCH AND DESIGN STAGE
ALL DRAWINGS ARE FOR DISCUSSION PURPOSES ONLY. DRAWINGS ARE NOT TO BE USED FOR ANY OTHER PURPOSE.

PLANNING STAGE
ALL DRAWINGS ARE FOR PLANNING APPLICATION PURPOSES ONLY. DRAWINGS ARE NOT TO BE USED FOR ANY OTHER PURPOSE. ANY CHANGES MADE TO THESE DRAWINGS ARE SUBJECT TO IMMEDIATE REVIEW BY BRIAN DUNLOP ARCHITECTS TO ENSURE THAT THE AMENDED DRAWING MAY HAVE PLANNING IMPLICATIONS. FIGURED DIMENSIONS ONLY TO BE USED FROM THIS DRAWING.

CONSTRUCTION STAGE
ALL DRAWINGS ARE FOR CONSTRUCTION PURPOSES ONLY. DRAWINGS ARE NOT TO BE USED FOR ANY OTHER PURPOSE. DRAWINGS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANTS DRAWINGS FOR ANY WORK. BRIAN DUNLOP ARCHITECTS TO BE INFORMED OF ANY DISCREPANCIES IMMEDIATELY. FIGURED DIMENSIONS ONLY TO BE USED FROM THIS DRAWING.

N

LOCATION OF SITE NOTICE MARKED 'X'

'X'

NEW 2m WIDE FOOTPATH TO NORTH OF CARLEY'S BRIDGE ROAD. REFER TO DRAWINGS AND DOCUMENTS PREPARED BY TRANSPORT INSIGHTS FOR DETAILS

REFER TO DRAWINGS AND DOCUMENTS PREPARED BY TRANSPORT INSIGHTS FOR DETAILS ON CROSSING POINT AND ROAD MODIFICATIONS

NEW PEDESTRIAN ENTRANCE TO PROPOSED DEVELOPMENT FROM CARLEYS BRIDGE ROAD.

COMMUNAL OPEN SPACE FOR BUILDINGS 10 & 16. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS.

NEW 2m WIDE FOOTPATH ALONG CARLEY'S BRIDGE ROAD FOR FULL WIDTH OF SITE SUBJECT TO THE APPLICATION. REFER TO DRAWINGS AND DOCUMENTS PREPARED BY TRANSPORT INSIGHTS FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDING 11. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

REFER TO DRAWINGS AND DOCUMENTS PREPARED BY TRANSPORT INSIGHTS ON SIGHTLINES AT PROPOSED DEVELOPMENT ENTRANCE

PEDESTRIAN ENTRANCE TO RIVERSIDE PARK FROM CARLEYS BRIDGE ROAD. REFER TO DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

RIVERSIDE WALK - REFER TO DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

RIVERSIDE AMENITY SPACE - REFER TO DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 1 & 2. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 3 & 4. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 5 & 6. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 7 & 8. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 17 & 18. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 19 & 20. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDING 21. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

COMMUNAL OPEN SPACE FOR BUILDINGS 1 & 2. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS.

COMMUNAL OPEN SPACE FOR BUILDING 21. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS.

COMMUNAL OPEN SPACE FOR BUILDINGS 22 & 23. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS.

COMMUNAL OPEN SPACE FOR BUILDINGS 24 & 25. REFER TO DWG No. 1768-P-015A AND DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS.

CRECHE AREA

GENTLY SLOPING PATH FROM RIVERSIDE PARK TO MILLBROOK THROUGH LANDSCAPED AREA REFER TO ACCOMPANYING DRAWINGS PREPARED BY LANDSCAPE DESIGN SERVICES FOR DETAILS

PROPOSED PEDESTRIAN LINK TO MILLBROOK ESTATE

MILLBROOK

BLUE DASHED LINE INDICATES EXISTING FOUL WATER LINE TO BE RETAINED WITH 5m WAYLEAVE ON BOTH SIDES. REFER TO DRAWINGS AND DOCUMENTS PREPARED BY SWEENEY CONSULTING ENGINEERS FOR DETAILS

EXISTING FOUL WATER LINE TO BE RETAINED WITH 5M CLEAR ACCOMPANYING DRAWINGS PREPARED BY LANDSCAPE DESIGN SERVICES AND INDEPENDENT TREE SURVEYS FOR DETAILS

ROAD 1 ROAD 2 ROAD 3 ROAD 5 ROAD 6 ROAD 7

Uinn River

DRAWING LEGEND & SCHEDULE

- AREA SUBJECT TO APPLICATION OUTLINED IN RED: 87,000 SQ M (8.7 HECTARES). NET DEVELOPMENT AREA = 6.64 HECTARES (SITE AREA LESS AREA SOUTH OF ROAD 1 ADJACENT TO RIVER).
- EXISTING FOUL LINE TO BE RETAINED DASHED IN BLUE
- CROSSING POINTS INDICATED IN BLUE
- HOMEZONE AREA. REFER TO LANDSCAPE DESIGN SERVICES LANDSCAPE ARCHITECTS FOR DETAILS ON FINISH
- PRIVATE GARDENS. REFER TO HOUSING QUALITY ASSESSMENT FOR GARDEN AREAS TO INDIVIDUAL UNITS.
- SD = SET DOWN PARKING SPACES FOR CRECHE
- EC = ELECTRIC CAR CHARGING POINTS FOR APARTMENTS
- UNIT NUMBER / HOUSE TYPE (e.g. 217 C)
- UNIT NUMBERS / BUILDING NUMBER (e.g. 40-55 20)
- FINISHED GROUND FLOOR LEVEL OF BUILDINGS (e.g. FFL 8.600)
- PROPOSED GROUND FLOOR LEVEL (e.g. FGL 12.000)
- SECTION LINES - REFER TO DWG NO'S 1768-P-060-064 FOR SITE SECTIONS/ELEVATIONS (e.g. 01 / 060)
- BICYCLE SHELTER TYPE 1 (SHELTERED AND GATED ENCLOSURES) = 111 No. SPACES
- BICYCLE SHELTER TYPE 2 (SHELTERED ENCLOSURE ONLY) = 114 No. SPACES
- EXISTING TREES TO BE RETAINED SHOWN THUS: REFER TO ACCOMPANYING DRAWINGS AND DOCUMENTS PREPARED BY INDEPENDENT TREE SURVEYS FOR DETAILS

SITE SCHEDULES

ACCOMMODATION SCHEDULE

ACCOMMODATION PROVISION:	*NUMBER*
4 BEDROOM HOUSES	8
3 BEDROOM HOUSES	45
2 BEDROOM DUPLEX HOUSES	27
3 BEDROOM DUPLEX HOUSES	63
1 BEDROOM APARTMENTS	72
2 BEDROOM APARTMENTS	13
3 BEDROOM APARTMENTS	5
TOTAL RESIDENTIAL UNITS	**233**

DEVELOPMENT DENSITY: 35 UNITS / HECTARE BASED ON NET DEVELOPMENT AREA OF 6.64 HECTARES NOTED ABOVE. REFER TO DWG No. 1768-P-020A FOR EXTENT OF NET DEVELOPMENT AREA.

TOTAL CAR PARKING SPACES = 352; 1.51 PER UNIT

TOTAL BICYCLE PARKING SPACES = 497 (383 WITHIN BUILDINGS OR GATED ENCLOSURES + 114 WITHIN SHELTERED ENCLOSURES)

PUBLIC OPEN SPACE = 24,000 SqM (27.5% OF OVERALL SITE AREA). REFER TO DWG No. 1768-P-015A FOR OPEN SPACE KEY PLAN SHOWING LOCATIONS OF DESIGNATED PUBLIC OPEN SPACES AND COMMUNAL OPEN SPACES.

NOTES

DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS AS PER ENCLOSED DRAWING REGISTER AND THE HOUSING QUALITY ASSESSMENT DOCUMENT BY BDA.

REFER TO DWG NO. 1768-P-500A FOR DETAILS ON BIN STORES.

REFER TO DRAWINGS AND DOCUMENTS PREPARED BY LANDSCAPE DESIGN SERVICES LANDSCAPE ARCHITECTS FOR LANDSCAPING PROPOSAL AND FOR BOUNDARY DETAILS.

REFER TO DRAWINGS AND DOCUMENTS PREPARED BY SWEENEY CONSULTING ENGINEERS FOR DETAILS ON SITE SERVICES.

01 / 010 SITE LAYOUT PLAN
1:500 @ A0

REV	NOTE	DATE
B	ISSUED FOR SHD APPLICATION	MAR 2022
A	ISSUED FOR SHD APPLICATION	OCT 2021

CLIENT:
TORCA DEVELOPMENTS

DEVELOPMENT:
RESIDENTIAL DEVELOPMENT

LOCATION:
CARLEYS BRIDGE, ENNISCORTHY, Co. WEXFORD

DRAWING TITLE:
PROPOSED SITE LAYOUT PLAN

brian dunlop architects

Address: 15 Patrick Street, Kilkenny
Telephone: 056 7913015
E-Mail: info@bdarchitects.ie
Website: www.bdarchitects.ie

PLANNING DRAWINGS

Job No.	1768
Dwg No.	1768-P-010
Date	SEPT 2021
Scale	1:500 @ A0
Drawn By	J KELLY
Issued By	BD
Checked By	BD

PRACTICE ACCREDITED IN CONSERVATION G3 NAI

Appendix B. Proposed Drainage System

Proposed Foul and Stormwater Systems

Proposed Watermain System

A1

NOTES:

1. SWEENEY CONSULTING ENGINEERS DRAWINGS TO READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS.
2. THE DEVELOPMENT SHALL BE CARRIED OUT IN ACCORDANCE WITH THE "IRISH WATER - WATER INFRASTRUCTURE STANDARD DETAILS - DOC NO. IW-CDS-5020-01" AND THE "IRISH WATER CODE OF PRACTICE FOR WATER INFRASTRUCTURE - DOC NO. IW-CDS-5020-03".

LEGEND

- Denotes 150mm Watermain
- SV — Denotes Sluice Valve
- BM — Denotes Bulk Meter
- WH — Denotes Washout Hydrant
- FH — Denotes Fire Hydrant
- AV — Denotes Air-Valve
- BB — Denotes Proposed Boundary Box for House Connection (20mm internal bore)
- BB — Denotes Proposed Boundary Box for Apartment Connection (50mm internal bore) Individual apartments to be metered within the apartment block

Watermain and service pipes to be MDPE pipes of type PE-80 and with an SDR-11 rating and to the sizes outlined above, however exact watermain size to be agreed with Irish Water prior to works on site commencing.

Sluice Valve, Fire Hydrant & Air-Valve layout within the proposed development to be agreed with Irish Water prior to works on site commencing.

All proposed tree pits located within 3.0m of any watermain pipeline to be lined on all sides with "ReRoot 1000" by GreenBlue Urban or similar.

PROPOSED WATERMAIN LAYOUT

SCALE 1:750

Rev	Date	Revision Details:-
-	-	-

SWEENEY CONSULTING ENGINEERS
145 THE FAYTHE, WEXFORD, IRELAND. Y35 CC97
PHONE: (053) 9147429 EMAIL: martin@sce.ie

PROJECT:
NEW RESIDENTIAL DEVELOPMENT AT CARLEYS BRIDGE ROAD, ENNISCORTHY, CO. WEXFORD

Drawing Title:
PROPOSED WATERMAIN LAYOUT

Issued For:
PLANNING

Client:
TORCA DEVELOPMENTS LTD

Date:	Drawn By:	Checked By:
23.03.2022	MS	SD

Scale:	Drawing no.:	Revision:
AS SHOWN	SCE-001P	-

A1

NORTH

Existing Field Drain to be connected to existing stormwater pipeline

Existing foul line to be retained

Existing storm line to be retained

S120: Proposed Manhole on existing storm pipeline to divert pipeline to S119

Existing foul line to be retained

Zone A

Existing storm pipeline to be decommissioned (DASHED)

Proposed 600mm diameter pipeline to provide access tunnel for wildlife.

Waters from existing Field Drain to be diverted through proposed 900mm diameter pipeline (DASHED)

Proposed 1114m³ Storage Capacity Attenuation System for Zone A. Invert level of system between 5.75m and 6.71m. Top Water level between 6.65m and 7.61m

Proposed 900mm diameter pipeline from Urrin River to S120. Pipeline to pass through/under attenuation system in a sealed pipeline

Existing storm line to be retained

Existing foul line to be retained

S109: Proposed Manhole on existing storm pipeline to divert pipeline to S108

S110: Proposed Manhole on existing Field Drain to divert waters to S109. Construct headwall at watercourse to channel watercourse flows into S110

Proposed 900mm diameter pipeline from S110 to existing Field Drain (DASHED)

Install non-return valve to end of pipe

Fit 2 no. Hydrobrakes to outlet pipes from S20 to limit the flow leaving S20 to 15.7 l/s at low level and 11.6 l/s at high level. See Detail

Kingspan Klargester NSBE040 Bypass Oil Separator or similar

Reshape/Clear existing Field Drain from the Urrin River to S100

Proposed 600mm diameter pipeline to provide access tunnel for wildlife.

Existing storm pipeline to be decommissioned (DASHED)

Zone B

Foul rising main to discharge to F100 in accordance with STD-WW-29 Rev 3

Proposed 480m³ Storage Capacity Attenuation System for Zone B Invert level of system between 5.61m and 6.51m. Top Water level between 6.45m and 7.35m

F101: Proposed manhole on existing foul pipeline

Foul Vent Stack at boundary from Manhole F100 in accordance with STD-WW-34 REV 2

100mm Foul rising main to discharge to F100

Type 3 Foul Pumping Station incorporating emergency storage tank of 112m³.

Fit 2 no. Hydrobrakes to outlet pipes from S1 to limit the flow leaving S1 to 5.2 l/s at low level and 3.8 l/s at high level. See Detail

Kingspan Klargester NSBE020 Bypass Oil Separator or similar

Urrin River

LEGEND

- Existing Storm Pipeline to be Decommissioned (DASHED) or Retained
- Proposed Estate Roofs & Roads Storm Drain
- Proposed Storm Drains and watercourses for diverted Existing Watercourses and diverted pipelines.
- Existing Foul Pipeline to be Retained
- Proposed Estate Foul Drain
- Proposed 100mm Diameter Foul Rising Main
- Proposed House Storm Connection
- Proposed 100mm Diameter House Foul Connection (Inspection Chamber) installed in accordance with Irish Water's Standard Details STD-WW-01 Rev 2 and STD-WW-03 Rev 2.
- Proposed Apartment Storm Connection
- Proposed 150mm Diameter Apartment Foul Connection (Inspection Chamber). Exact arrangement of inspection chambers for apartment buildings to be agreed with Irish Water Field Engineer prior to construction.

Unplasticised PVC pipes and fittings to comply with the provisions of IS EN 1401 2009/2012 shall be used for proposed foul and storm drainage pipelines.

The overall site has been divided into Zone A and Zone B for stormwater and attenuation design purposes.

All proposed tree pits located within 3.0m of any foul water or storm water pipeline to be lined on all sides with "ReRoot 1000" by GreenBlue Urban or similar.

PROPOSED FOUL & STORM LAYOUT

SCALE 1:750

NOTES:

1. SWEENEY CONSULTING ENGINEERS DRAWINGS TO READ IN CONJUNCTION WITH ARCHITECTURAL DRAWINGS.
2. THE DEVELOPMENT SHALL BE CARRIED OUT IN ACCORDANCE WITH THE "IRISH WATER - WASTEWATER INFRASTRUCTURE STANDARD DETAILS - DOC NO. IW-CDS-5030-01", THE "IRISH WATER - CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE - DOC NO. IW-CDS-5030-03" AND THE " RECOMMENDATIONS FOR SITE DEVELOPMENT WORKS FOR HOUSING AREAS" PUBLISHED BY THE DEPARTMENT OF ENVIRONMENT AND LOCAL GOVERNMENT, NOVEMBER 1998.

Rev	Date	Revision Details:-
-	-	-

SWEENEY CONSULTING ENGINEERS

145 THE FAYTHE, WEXFORD, IRELAND. Y35 CC97
PHONE: (053) 9147429 EMAIL: martin@sce.ie

PROJECT:
NEW RESIDENTIAL DEVELOPMENT AT CARLEYS BRIDGE ROAD, ENNISCORTHY, CO. WEXFORD

Drawing Title:
PROPOSED FOUL & STORM LAYOUT

Issued For:
PLANNING

Client:
TORCA DEVELOPMENTS LTD

Date:	Drawn By:	Checked By:
23.03.2022	MS	SD

Scale:	Drawing no.:	Revision:
AS SHOWN	SCE-002P	-