DOSA

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RESIDENTIAL DEVELOPMENT AT KILNAP, OLD WHITECHURCH ROAD, CORK.

SITE SPECIFIC FLOOD RISK ASSESSMENT

DATE 25/06/2024

REVISION 2

JOB NO. 6254

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1 Introduction

1.1 General

DOSA Consulting Engineers was commissioned by Murnane & O'Shea to undertake a site-specific Flood Risk Assessment (FRA) for a Planning Application Old Whitechurch Road, Kilnap, Cork. This FRA should be read in conjunction with DOSA's Infrastructure Report.

1.2 Objectives

The aim of the FRA is to identify, quantify and communicate to decision makers and other stakeholders the risk of flooding associated with the proposed development.

The FRA has been carried out in accordance with

- 'The Planning System and Flood Risk Management Guidelines' (hereafter referred to as the FRM Guidelines) published in November 2009 jointly by the then Department of the Environment, Heritage and Local Government, DEHLG, (now the Department of the Environment, Community and Local Government, DECLG) and the Office of Public Works (OPW).
- Circular PL 2/2014 Flooding Guidelines (This circular advises on the use of OPW mapping in assessing planning applications and clarifies the advice given in the 2009 guidelines for planning authorities: The Planning System and Flood Risk Management)

The Council is the owner of the site at Kilnap off the Old Whitechurch Road (OWR). It comprises of some 22 hectares (54 acres) of a southerly sloping site zoned residential in the Cork City Development Plan located in the North of the City ("Development Site"). The Development Site is ideally located at the north-western gateway to the City near the proposed North Ring Road. It is located within a reasonable cycling and walking distance of the Blackpool Retail and Business Park while at the same time bounding the Glenamought Valley. The Development Site should create a sustainable residential neighbourhood, which would derive character from its location, topography, amenity, urban design quality and would be a most attractive place to live at the Northern gateway to the City.

Pre-enabling works have been carried out by the Council and the site has been fully serviced from an infrastructural aspect.

The site currently has the following infrastructure in place

- Access
- Foul Connection Infrastructure
- Stormwater Connection Infrastructure
- Water Connection Infrastructure
- Utility Infrastructure

A snapshot of the overall council landholding is outlined in Figure 2.1 below.

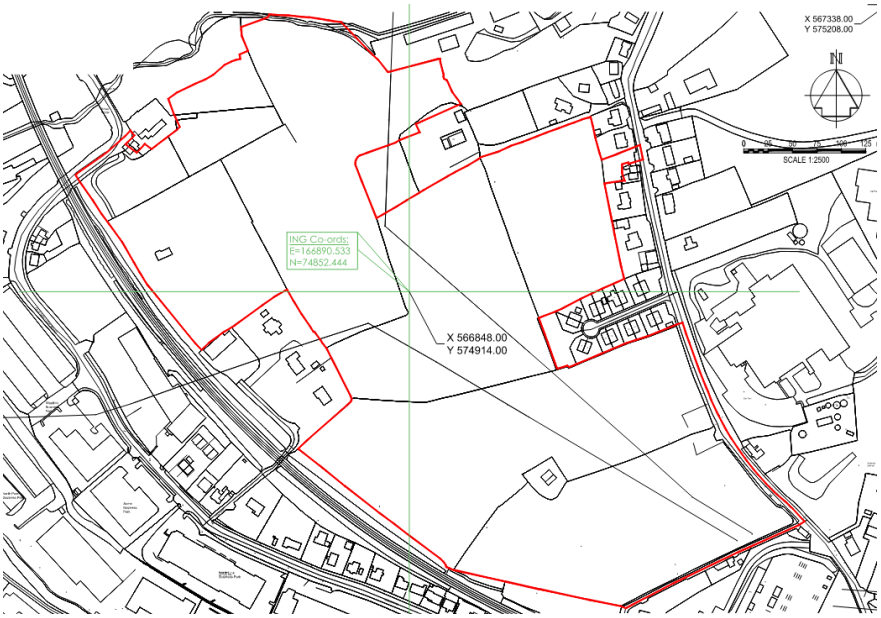

Figure 2.1 – Context Map

1.3 Development Description

Phase one of the development is 3.7 ha, with a developable area of 2.74 ha. It is situated approximately 3.5 km north of Cork City Centre, in an area characterised by commercial and residential use. It is located off the N20 and a new road that meanders through the site to connect Old Mallow Road in the north with Old Whitechurch Road in the Southeast.

The proposed development will consist of 1 no. accessible 4 bed detached, 72 no. 3 bed semi-detached, 8 no. 3 be townhouses, 6 no. 2 bed townhouses, 4 no. 3 bd duplex apartments & 4 no. 1 bed apartments. The form, architecture and scale of the development is consistent with the immediate context and it will enhance the visual amenity of the site as a whole.

2 *Flood Risk Assessment Methodology*

2.1 Methodology

The methodology used for the flood risk assessment for the proposed development is based on 'The Planning System and Flood Risk Management, Guidelines for Planning Authorities' (2009)'. The FRM Guidelines require the planning system at national, regional and local levels to:

- Avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider sustainability grounds that justify appropriate development.
- Adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and then mitigation of flood risk; and
- Incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The sequential approach (see Figure 3.1 of the FRM Guidelines below) in flood risk management requires the following three steps to identify the necessity for the justification test for a development:

- Step 1: Identification of the Flood Zone at the proposed development site (Section 2.23 of the FRM Guidelines);
- Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines); and
- Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development.

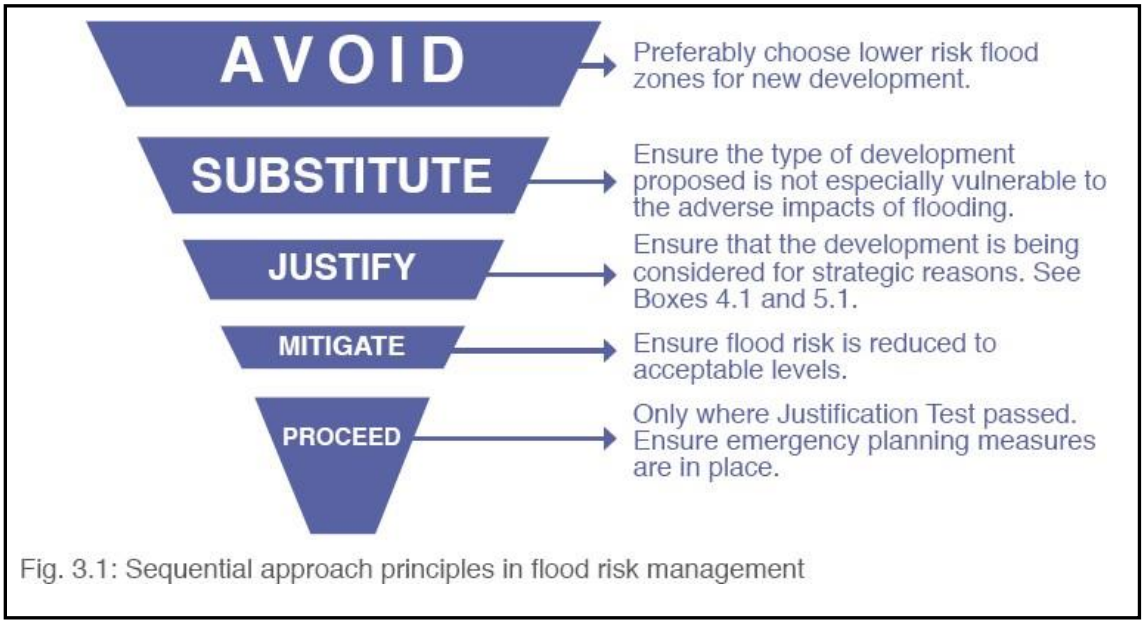

Figure 2.1 – Extract of Figure 3.1 of the FRM Guidelines

While Figure 3.1 of The FRM Guidelines sets out the broad philosophy underpinning the sequential approach in the flood risk management, Figure 3.2 of the Guidelines (shown below) describes the mechanism of the sequential approach for use in the planning process.

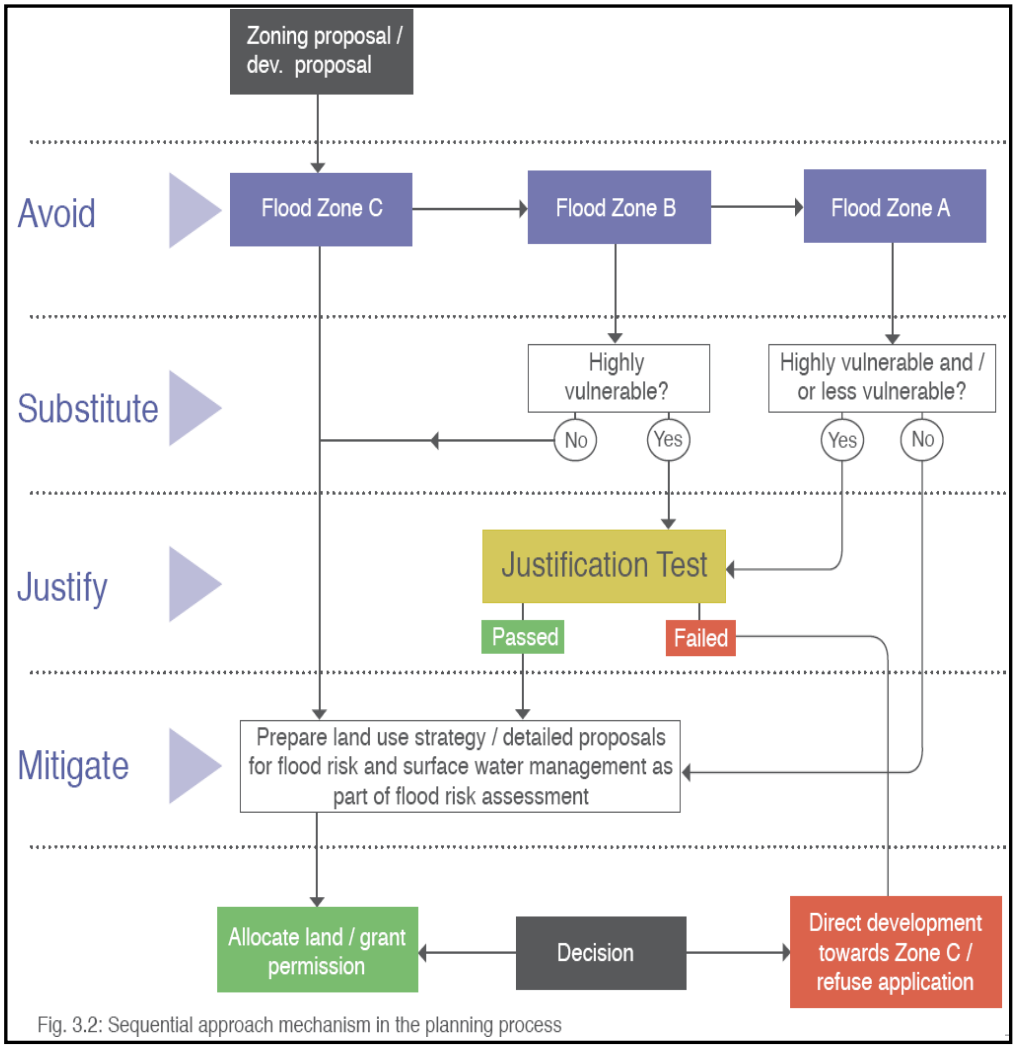

Figure 2.2 – Extract of Figure 3.2 of the FRM Guidelines

According to the FRM Guidelines, Flood Zones are graphical areas within which the likelihood of flooding is in a particular range. They are a key tool in flood risk management within the planning process as well as in flood warning and emergency planning. There are three Flood Zones, namely,

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% AEP or 1 in 100 year for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 year and 1% AEP or 1 in 100 year for river flooding and between 0.1% AEP or 1 in 1000 year and 0.5% AEP or 1 in 200 year for coastal flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding).

Flood Zones A, B and C are based on the current assessment of the 1% AEP and the 0.1% AEP fluvial events and the 0.5% AEP and 0.1% AEP tidal events, without the inclusion of climate change

factors. Table 3.1 of the FRM Guidelines (see below) shows the classification of the vulnerability to flooding of different types of development.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).

*Uses not listed here should be considered on their own merits

Table 3.1 Classification of vulnerability of different types of development

Figure 2.3 – Extract of Table 3.1 of the FRM Guidelines

Table 3.2 of the FRM Guidelines (shown below) identifies the types of development that would be appropriate for each Flood Zone and those that would be required to meet the Justification Test. Since dwelling houses are classified as Highly vulnerable development' the section highlighted in Table 3.2 presents the required actions for each flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Figure 2.4 – Extract of Table 3.2 of the FRM Guidelines

The FRM Guidelines (Chapter 2) outlines the following three stages of flood risk assessment:

- Stage 1: Flood risk identification – to identify whether there may be any flooding or surface water management issues relating to the proposed development site that may warrant further investigations.
- Stage 2: Initial flood risk assessment – to confirm sources of flooding that may affect the proposed development site, to appraise the adequacy of existing information and to determine what surveys and modelling approach is appropriate to match the spatial resolution required and complexity of the flood risk issues. This stage involves the review of existing studies and hydraulic modelling to assess flood risk and to assist with the development of FRM measures.
- Stage 3: Detailed flood risk assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development, of its potential impacts on flood risk elsewhere and of the effectiveness of any proposed mitigation measures. This will typically involve use of an existing or construction of a hydraulic model across a wide enough area to appreciate the catchment wide impacts and hydrological process involved.

2.2 Data Collection

Data required for the flood risk assessment was obtained from various sources, as described below.

- The historic flood data was obtained from the National Flood Hazard Mapping website www.floodmaps.ie;
- The Subsoil and Aquifer vulnerability data was obtained from the Geological Survey of Ireland website www.gsi.ie;
- National CFRAM Study;
- Greater Dublin Strategic Drainage Study

3 *Existing Hydrological Environment*

3.1 Relevant Hydrological Features

A review of Historical Ordinance Survey Ireland information (www.osi.ie) was conducted to determine if the OSI 6- inch Maps indicated historic water courses / surface water features within the site. The maps indicate an existing watercourse approximately 50m north of the site. Refer to Figure 3.1 below

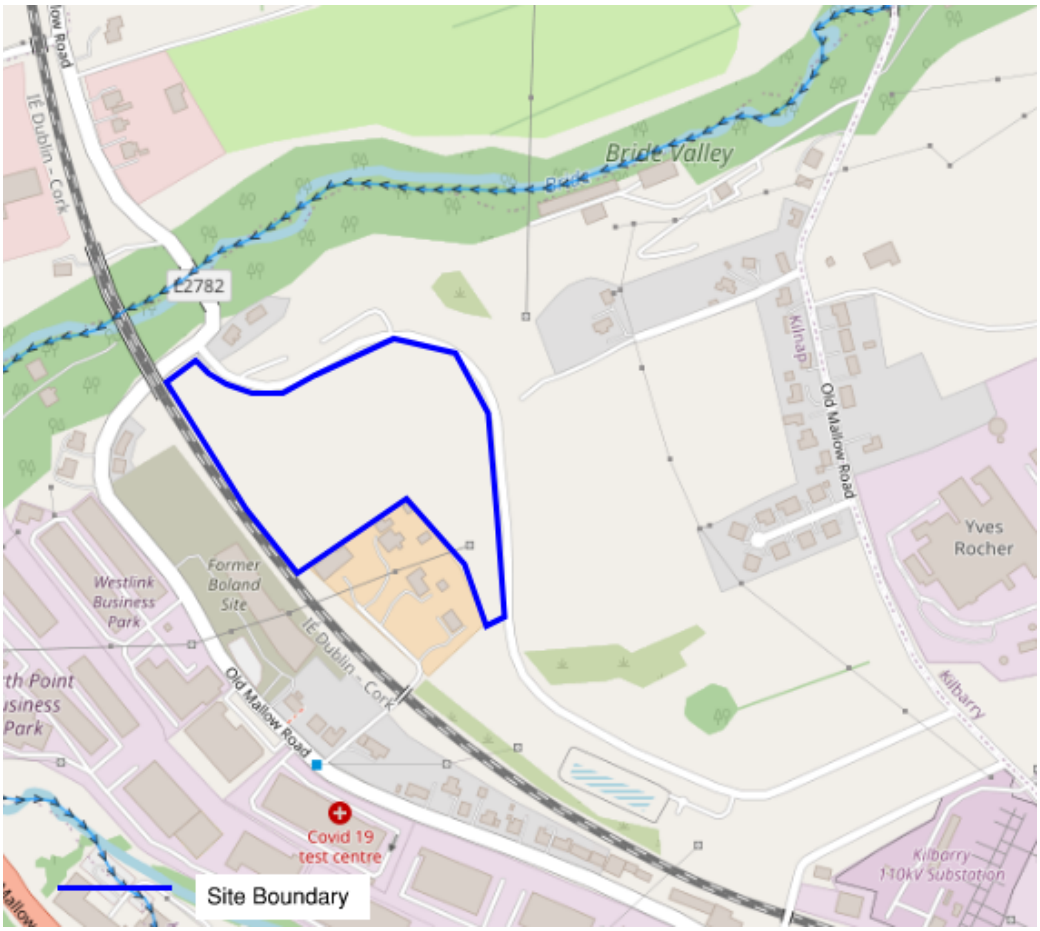

Figure 3.1: Hydrological Features of the Area

The site is within hydrometric area19 (Lee, Cork Harbour and Youghal Bay). Hydrometric area No19 includes the surface catchment drained by the River Lee and all streams entering tidal water in Cork Harbour and Youghal Bay and between Knockaverry and Templebreedy.Local catchments. The site is in the catchment of the Lee, Cork Harbour and Youghal Bay (EPA Segment Code 19_District Code IESW).The surface water catchment is shown on Figure 1.4

The Bride (Cork City) river is made up of two sections .Bride (Cork City)_010 rises to the west of the subcatchment in Ballycannon townland, flowing east to its confluence with Bride (Cork City)_020 at Blackstone Bridge. Bride (Cork City)_020 flows generally south, flowing in to Lee (Cork) Estuary Upper at Christy Ring Bridge. There is one tributary within the waterbody (Glen river) which rises in the east near the old Youghal road and merges with the main channel in the Blackpool area. A third river waterbody (Glennamought Trib (Bride)_010) joins Bride (Cork City)_020 in a culverted stretch

near North Point Business Park. The discharge and catchment area of the site is to this waterbody - (Glennamought Trib (Bride)_010)

Figure 3.2 – Catchments

3.2 Area Flooding

A search for recorded flood events near the subject site was conducted using the OPW's website, www.floodmaps.ie and using a general internet search. The OPW floodmaps.ie website provides information on recorded flood events nationwide. Refer to Figure 3.2 below for an extract of the OPW www.floodmaps.ie recorded flood incidences for the area. A search of the subject site does not show any instances of historic flooding within the subject site. The nearest recoded flooding event is to the northeast, which is over 1km upstream of the subject site.

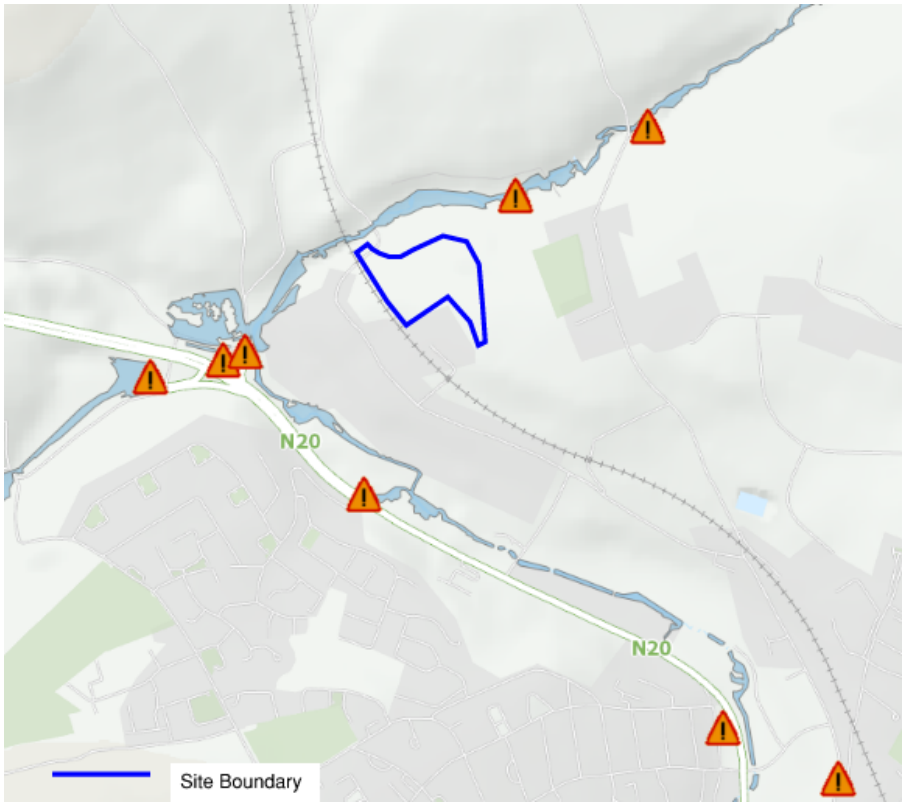

Figure 3.2– Floodmaps.ie Map

3.3 Existing Flood Studies

3.3.1 CFRAM Study

The OPW, as lead agency for flood risk management in Ireland, is producing Flood Risk Management Plans (FRMP), in line with National Flood Policy and the requirements of the EU Floods Directive. Draft FRMP's are currently being produced by the OPW under the CFRAM Study. The Draft FRMP's make use of the information provided through the flood maps that have previously been produced under the CFRAMS Programme and previous parallel projects. The Draft FRMP's set out a range of proposed measures and actions to manage and reduce flood risk within the catchments and coastal reaches covered by each Draft Plan, focusing on the 300 areas of potentially significant flood risk around Ireland that were identified under the PFRA. The subject lands are contained in the existing available online Flood Mapping Database.

Figures 3.3 & 3.3.1 below are extracts from the flood extent mapping showing the flood extent concerning the proposed development site. The map shows that the flood extent of the nearest watercourse does not extend to the proposed development site and demonstrates that the site lies significantly outside of the 0.1% Fluvial AEP event and is therefore located within Flood Zone C.

3.3.2 River Bride (Blackpool) Flood Relief Scheme

The OPW and ARUP are currently working on this scheme in context of Storm Babet and the flooding that occure in the area downstream of the site in October 2023.They are currently investigating why flood water came out of banks upstream of the Commons Inn during this storm event as the flooding pattern did not match the predicted model results or previous flood events. Nothwithstanding this the current site would have been included in this model with the designed

outfall rates. (currently only attenuation some roads areas The proposed planning will provide additional storage and reduce the outflow values to greenfield runoffs (reducing from 29.85l/s to 9.35l/s & 20.10l/s to 9.3l/s)thus reducing existing flows to the outfall and improving the downstream scenario from that currently discharging from the site.

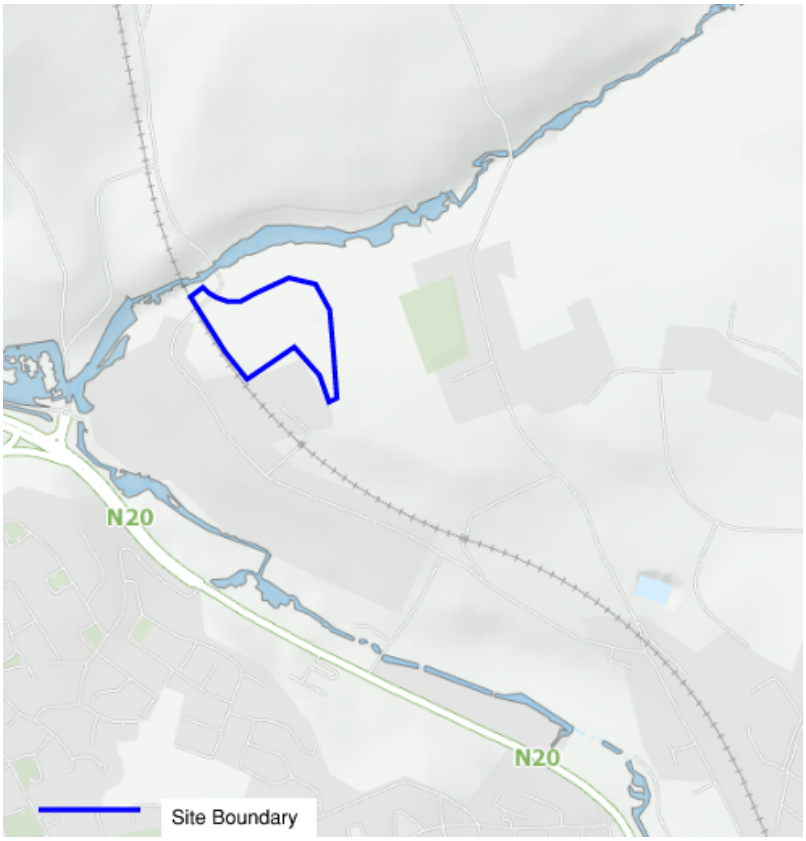

Figure 3.3: Extract Fluvial Flood Extent Map

Figure 3.3.1: Aerial Highlighting Flood Extent Map

4 Flood Risk Assessment

4.1 Introduction

As outlined in Section 2 of this report the FRM guidelines identifies three stages of Flood Risk Assessment namely;

- Stage 1: Flood Risk Identification
- Stage 2: Initial Flood Risk Assessment
- Stage 3: Detailed Flood Risk Assessment

4.2 Flood Risk Identification

According to the FRM Guidelines, flood risk identification is the process for deciding whether a plan or project requires further investigation. This is a desk-based exercise based on existing information. All the existing information is described in Section 3 and the identification of flood risk from each of the five sources of flooding (coastal, fluvial (river), groundwater, pluvial (rainfall) and from artificial drainage systems) is considered. It should be noted that the existing watercourses are adjacent steeply sloping natural ground to both the east and west. Proposed FFLs will be approximately 27 m above the watercourses and therefore at no risk from flooding.

4.2.1 Fluvial Flood Risk

The available Flood Map database indicate that all dwellings within the proposed development site lies outside of the 0.1% AEP fluvial flood event and hence is located within Flood Zone C for fluvial flood risk, where the risk of flooding is low.

4.2.2 Groundwater Flood Risk

A desktop review of the Groundwater Flooding Maps on the GSI website indicate no historical evidence of groundwater flooding at the site. Groundwater risk is therefore not considered to be significant.

4.2.3 Pluvial Flood Risk

The Flood Maps data shows no indication of previous pluvial related flooding at the site. During extreme rainfall events the application of SuDs principles will ensure surface water is managed sufficiently and sustainably discharged to the drainage network in accordance with the GDSDS. With these mitigation measures in place pluvial flood risk is not considered to be significant.

4.3 Initial Flood Risk Assessment

The Flood Risk Assessment has identified that there is a low flood risk to the site. Under the sequential approach identified in the FRM Guidelines a three-step approach is required to confirm the appropriateness of the development in terms of flood risk.

Step 1: Identification of the Flood Zone at the proposed development site

Using the Flood Zone criteria from the FRM Guidelines and as defined in previously, the flood zones for the site were determined.

- Flood Zone A – where the probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100-year for river flooding or 0.5% or 1 in 200 for coastal flooding);
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100-year for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200-year for coastal flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000-year for both river and coastal flooding).

As discussed previously, the proposed development site lies within Flood Zone C – where risk of flooding is lowest.

The lowest proposed FFL has been proposed to be set at 57.75m, which gives a freeboard of approximately 27m above the watercourse level.

The minimum Freeboard required above the 1% AEP flood level as per the GDSDS is 500mm, (0.5m). Modelling hasn't been carried out but in this case is deemed unnecessary. Therefore, in this instance a freeboard well in excess of the GDSDS requirements is provided. No proposed dwellings are located in Flood Zone A or B. The extent of the predicted 1% and 0.1% AEP Flood Events are shown across adjacent lands on the north-western section of the site. A Justification Test is not required as it falls outside the site but one has been carried out as an added level of design development. (refer to section 6.0 of this report).

Step 2: Identification of the vulnerability of the type of the proposed development (Table 3.1 of the FRM Guidelines)

The different types of proposed infrastructure are then assigned a vulnerability classification according to the definitions in 'Table 3.1 – Classification of vulnerability of different types of development' of the FRM Guidelines. As described in Section 1.2 above, the proposed development is dwelling houses. This is classified as 'highly vulnerable development'.

Step 3: Using the matrix of vulnerability versus Flood Zone (Table 3.2 of the FRM Guidelines), identify the necessity for the justification test for the proposed development

The proposed development site is located in Flood Zone C and is categorized as Highly Vulnerable Development. Table 3.2 of the FRM guidelines and Figure 3.3 – Sequential approach mechanism in the planning process (FRM guidelines) stipulate that a justification test is not required for such a development and is deemed appropriate development for the flood zone categories. Table 4.3 below highlights the matrix of vulnerability versus flood zone.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Table 3.2: Matrix of vulnerability versus flood zone to illustrate appropriate development and that required to meet the Justification Test.

Table 4.3: Matrix of Vulnerability versus Flood Zone to illustrate appropriate development

5 *Detailed Flood Risk Assessment*

5.1 General

As the Initial Flood Risk Assessment considers all proposed dwellings within the site to be located in Flood Zone C, the Detailed Flood Risk Assessment Stage will only consider pluvial flood risk to dwellings in relation to the following;

- Proposed Surface Water Management Measures and SuDS
- Flood Exceedance.
- Impact on Adjacent Areas.
- Climate Change.
- Access and Egress for Emergency Services during Flood Events.
- Residual Risks.
- Effectiveness of Flood Mitigation Measures.

Following from Stage 2 – Initial Flood Risk Assessment, it was determined that there is no requirement to undertake a detailed flood risk assessment on the proposed development. The vulnerability matrix as shown in Figure 4.3 identifies that there is no need for a Justification Test to be undertaken.

5.2 Surface Water Management Measures and SuDS

Surface water runoff from the development will be attenuated to greenfield runoff rates (Q-bar) before discharging to the Watercourses to the north of the site.

The proposed surface water drainage network has been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates from the proposed surface water drainage network will be controlled by a Hydrobrake type flow control device or similar and associated underground attenuation storage (attenuation tank and oversized pipe). Surface water will also pass through a specified separator placed before attenuation systems.

5.2.1 SuDS Methodologies

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

- Attenuation of the 100-year return period storms within the attenuation tanks.
- Installation of a vortex flow control device (Hydrobrake or equivalent), limiting surface water discharge from the site to predevelopment runoff.
- Surface water discharge will also pass via a Class 1 full retention fuel / oil separator (sized in accordance with permitted discharge from the site and in accordance with IS EN 858).
- Permeable Paving
- Tree Pits

5.2.2 Surface Water Attenuation Storage

Surface water runoff from the overall development lands will be attenuated to allowable greenfield runoff rate (Qbar). The rate of surface water runoff from the site will be restricted to greenfield runoff rates and the attenuation system sized accordingly. This infrastructure has been provided by Cork City Council as part of a previous enabling works contract. However upgrade works to

increase storage volumes and retrict the outflow to greenfield runoff rates will be incorporated as part of the proposals.

For storms greater than the 1% AEP, the development's drainage network design will be exceeded and areas with low ground levels may begin to flood. Generally, proposed road levels fall towards the site's north-eastern boundary and overland flow is therefore directed towards the existing stream.

Details of existing and proposed amendments are included in the drawings in Appendix A

5.3 Impact on Adjacent Areas

The proposed development layout was designed to minimise the impact on adjacent areas. The development's storm-water drainage design attenuates discharges to green-field run-off rates in accordance with the GDSDS accepted design guidelines. Storms greater that the 1% AEP (exceeding the design capacity of the site's drainage system) may result in overland flow being directed toward the adjoining lands to the north.

The site current is a serviced site with existing attenuation only catering for some hardstanding and public roads. The proposed planning will provide additional storage and reduce the outflow values thus reducing existing flows to the outfall.

5.4 Climate Change

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

- Pluvial flood risk - drainage system and attenuation storage design allow for 20% increase in rainfall intensities as requested by Cork City Council and recommended the GDSDS.

5.5 Access and Egress for Emergency Services During Flood Events

Access and egress to the site is provided primarily by way of the proposed connection to link street provided by Cork City Council as part of a previous enabling works contract. This link Street connects Old Mallow Road to Old Whitechurch Road.

All of the estate roads will be located in Flood Zone C. It is expected that the proposed dwellings can be safely accessed during storm events up to 0.1% AEP event from the development road network.

5.6 Residual Risk

Remaining residual flood risks, following the detailed assessment include the following:

1. Pluvial flooding from the private drainage system related to a pipe blockage, flood exceedance or mechanical failure;
2. Pluvial flooding from the development's drainage system for storms in excess of the 1% AEP storm event;

5.7 Mitigation Measures

Proposed mitigation measures to address residual flood risks are summarised below:

M1	Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.
M2	In the event of storms exceeding the 1% AEP design capacity of the attenuation system, possible overland flow routing towards open space areas should not to be blocked. At these locations the site's boundaries should be permeable to facilitate flood routing onto adjacent public spaces.
M3	Proposed residential development shall be set above the Flood Zone B (0.1% AEP) including an appropriate freeboard:

5.7.1 Effectiveness of Mitigation Measure

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

Should extreme pluvial flooding occur that is in excess of the development's attenuation capacity (i.e., greater than 1% AEP), then overland flow routes directed towards open space areas are provided in order to protect the proposed development.

6 *Justification Test*

This Justification Test is outlined below and has been carried out in accordance with Section 5.15 of the OPW's Guidelines for Planning Authorities (see extract below).

Box 5.1 Justification Test for development management (to be submitted by the applicant)

When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   - (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   - (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   - (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   - (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.

Note: See section 5.27 in relation to major development on zoned lands where sequential approach has not been applied in the operative development plan.

Refer to section 5.28 in relation to minor and infill developments.

Justification Test as per Section 5.15 of the OPW's Guidelines for Planning Authorities		
1.	The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.	Yes, the proposed site is identified as New/proposed residential in the Cork City Development Plan.
2(i)	The development has been subject to an appropriate FRA that demonstrates: ***The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;***	The development site lies outside Flood Zones A & B A number of SuDS Methodologies are being proposed as part of the surface water drainage proposals for the site. These include attenuation of surface water runoff to greenfield runoff rates. Refer to Section 5.2 Surface Water Management Measures and SuDS.
2(ii)	The development has been subject to an appropriate FRA that demonstrates: ***The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;***	As mentioned previously all residential units are located in Flood Zone C and therefore considered appropriate. The GDSDS requires a minimum freeboard of 500mm above the 1% AEP flood level (in order to allow for future climate change). The lowest proposed FFL is 57.75m and approximately 27m the watercourse. Refer to Section 4.2 Initial Fluvial Flood Risk Assessment Risk of flooding to people, property and the environment is therefore considered to be very low.

2(iii)	The development has been subject to an appropriate FRA that demonstrates: ***The development proposed includes measures to ensure that residual risks to the area and / or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency access;***	Residual Risks are identified in **Section 5.6** of this report (pluvial flooding due to pipe blockage and pluvial flooding from the link road's drainage system for storms in excess of the 1% AEP). Proposed Mitigation Measures to address same are outlined in **Section 5.7** of this report (maintenance of drainage system and provision of overland flow routes towards open spaces). All proposed access points to the development are located above the 1% AEP design Flood Level for the site as per the recommendations of the CFRAMS and Flood Risk Management Guidelines. The access points to the proposed development from Old Mallow Road or Old Whitechurch Road will provide access to Emergency Services during flood events
2(iv)	The development has been subject to an appropriate FRA that demonstrates: ***The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.***	Urban Design is addressed in detail in other documents submitted as part of this application. Proposed surface water infrastructure, SuDS Methodologies and flood mitigation measures have been integrated with the overall site layout / open space areas and as such are considered compatible with the achievement of wider planning objectives in relation to development of good urban design The subject site is also identified as residential in the Cork City Development Plan

On completion of the Justification Test outlined above, the proposed site is considered appropriate as each of the criteria from Section 5.15 (Box.5.1) of the OPW's Guidelines for Planning Authorities have been demonstrated.

7 Conclusions

7.1 Summary of Results

A flood risk assessment for the proposed residential development at Old Whitechurch Road, Kilnap Cork has been undertaken in accordance with the methodology recommended in the FRM Guidelines.

The site including all proposed residential dwellings is located in Flood Zone C as defined by the requirements of "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices.

Following the Flood Risk Assessment Stage 2 (Initial Flood Risk Assessment), it was determined that a Justification Test was not required but notwithstanding same, one was carried out.

On completion of the Justification Test (refer to Section 6.0 of this report) the proposed development is considered appropriate.

It is concluded that:

- Proposed residential development is appropriate for the site's flood zone category.
- The sequential approach outlined in Planning System and Flood Risk Management Guidelines has been adhered to.
- As stated above, a conservative approach has been undertaken even though the proposed site including all residential dwellings was found to be in Flood Zone C.
- The proposed site passed the Justification Test in accordance with Box 5.1 of the Guidelines.
- The proposed development will not increase run-off rates when compared with the existing site and satisfies the requirement of the SSFRA to not increase flooding.

In conclusion, the proposed development is considered to have the required level of flood protection up to and including the 1% AEP storm event.

Note: The existing available published flood data has predominantly been extracted from CFRAMs. This indicates no flooding within the site boundaries.

Appendix A –Attenuation Infrastructure

0 5 10 15 20 25 m
SCALE 1:500

Kilnap Bridge

NORTHERN ATTENUATION TANK 2
- STORAGE VOLUME = 320.4m³
- INVERT LEVEL = 42.035mAOD
- DEPTH OF STORAGE = 1.075m
- FLOW CONTROL LIMITED TO 20.1l/s (3.4l/s FOR ROAD + 16.7l/s FOR ATTENUATED DEVELOPMENT FLOWS AT Q_{100})

HYDROCARBON FUEL/OIL SEPARATOR (KLARGESTER NSBE015 O.S.A.)

MANHOLE SMH33 FITTED WITH STORMBRAKE FLOW CONTROL DEVICE LIMITING OUTFLOW TO 20.1l/s

MANHOLE SMH20 FITTED WITH STORMBRAKE FLOW CONTROL DEVICE LIMITING OUTFLOW TO 29.89l/s

NORTHERN ATTENUATION TANK 1
- STORAGE VOLUME = 431.3m³
- INVERT LEVEL = 48.200mAOD
- DEPTH OF STORAGE = 2.15m
- FLOW CONTROL LIMITED TO 29.89l/s (3.69l/s FOR ROAD + 26.2l/s FOR ATTENUATED DEVELOPMENT FLOWS AT Q_{100})

HYDROCARBON FUEL/OIL SEPARATOR (KLARGESTER NSBE015 O.S.A.)

Existing Infrastructure
Scale 1:500

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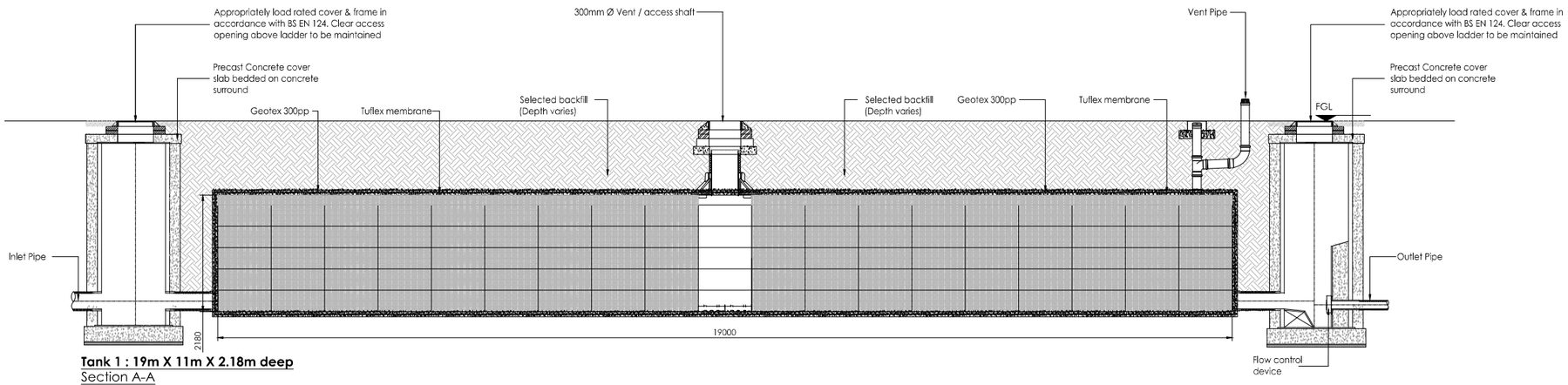
B	K.M.	L.O'T.	L.O'T.	25.07.'24	Issued for Planning

CLIENT

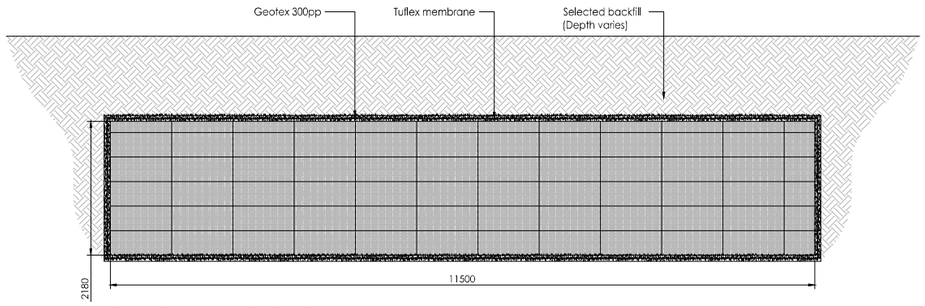
PROJECT: Residential Development at Kilnap, Old Whitechurch road

DRAWING TITLE: Existing Cork City Council Infrastructure

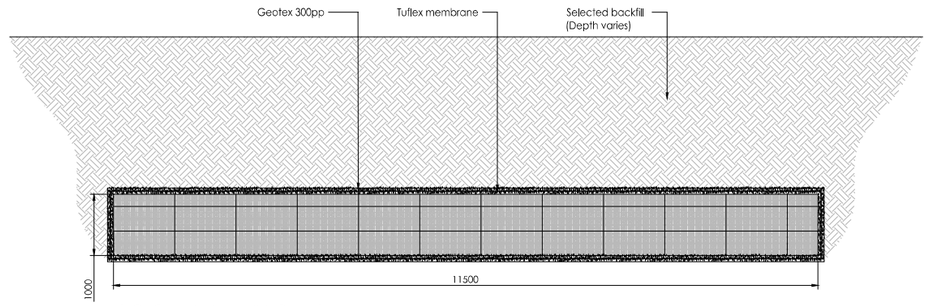
SHEET: A3 | SCALE: 1/500 | PROJECT NO.: 6254 | DRAWING NO.: 0022 | STATUS/ISSUE: B



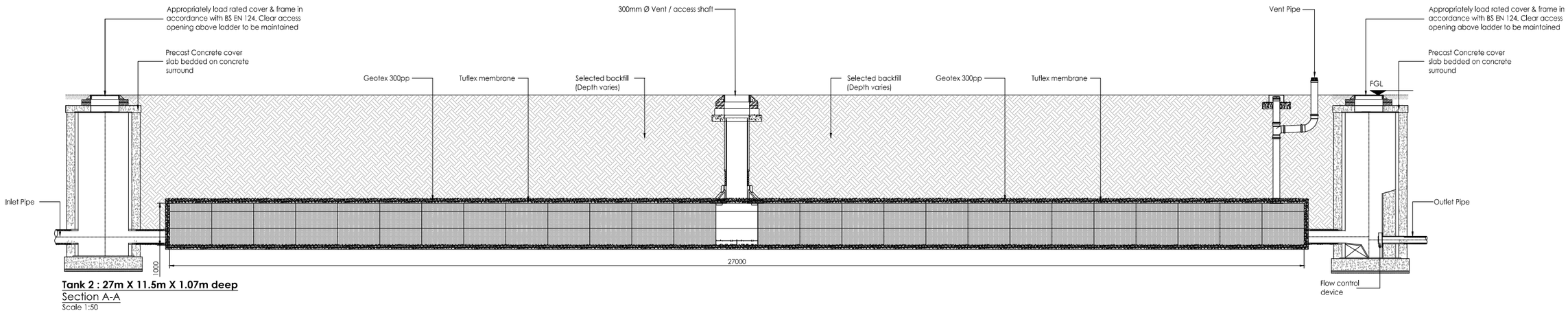
Tank 1 : 19m X 11m X 2.18m deep
Section A-A
Scale 1:50



Tank 1 : 19m X 11m X 2.18m deep
Section B-B
Scale 1:50



Tank 2 : 27m X 11.5m X 1.07m deep
Section B-B
Scale 1:50



Tank 2 : 27m X 11.5m X 1.07m deep
Section A-A
Scale 1:50

Note:
To be read in conjuction with drawing number 6254-0022 - Existing Cork City Council Infrastructure

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CLIENT

PROJECT
Residential Development at Kilnap, Old Whitechurch road

DRAWING TITLE
Existing Attenuation Tank Sections

SHEET
A1

SCALE
1/50

PROJECT NO.	DRAWING NO.	STATUS/ISSUE
6254	0027	A

0 5 10 15 20 25 m
SCALE 1:500

Enniamought River

Kilnap Bridge

Northern Attenuation Tank 2
- Storage volume = 320.4m³
- Invert level = 42.035mAOD
- Depth of storage = 1.075m
- Flow control limited to 20.1l/s (3.4l/s for road + 16.7l/s for attenuated development flows at Q_{100})

Upgrades
Existing Tank volume to be increased by 144m³ and the restricted outlet replaced with an outflow of 9.30 L/s

Existing hydrocarbon fuel/oil separator (Klargester nsbe015 o.s.a.)

Additional storage added to existing tank shown dotted (27m X 6m x 1m = 162m³)

Additional storage added to existing tank shown dotted (27m X 6m x 1m = 162m³)

Manhole smh33 fitted with New Stormbrake flow control device limiting outflow to 9.3l/s

Manhole SMH20 fitted with New Stormbrake flow control device limiting outflow to 9.35l/s

Northern Attenuation Tank 1
- Storage volume = 431.3m³
- Invert level = 48.200maod
- Depth of storage = 2.15m
- Flow control limited to 29.89l/s (3.69l/s for road + 26.2l/s for attenuated development flows at q_{100})

Upgrades
Existing Tank volume to be increased by 68m³ and the restricted outlet replaced with an outflow of 9.35 L/s

Existing Hydrocarbon fuel/oil separator (Klargester nsbe015 o.s.a.)

Proposed Connection point (refer to Drawing 6254-0020)

Proposed Connection point (refer to Drawing 6254-0020)

RG 44.096
RG 44.077
RG 44.286
RG 44.517
RG 44.293
RG 44.78
RG 44.597
RG 44.903
RG 45.268
RG 45.821
RG 46.578
RG 47.299
RG 48.186
RG 49.05
RG 50.103
RG 51.044
RG 51.759
RG 51.706
RG 52.615
RG 52.646
RG 53.537
RG 54.555
RG 55.531
RG 56.478
RG 57.29
RG 45.417
Vent 45.483
Vent 45.586
RG 51.936
Vent 52.695
Vent 53.07
Vent 52.191
27m
6m
19m
2m

Existing Infrastructure Upgrades
Scale 1:500

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CLIENT

PROJECT: Residential Development at Kilnap, Old Whitechurch road

DRAWING TITLE: Proposed upgrade to existing attenuation system

SHEET: A3

SCALE: 1/500

PROJECT NO. 6254 _ DRAWING NO. 0028 _ STATUS/ISSUE A