DOSA

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RESIDENTIAL DEVELOPMENT, COUNTESS ROAD, KILLARNEY, TRALEE, CO. KERRY

DRAINAGE IMPACT ASSESSMENT

DATE 05/06/2026

REVISION 4

JOB NO. 7334

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DOCUMENT CONTROL

PROJECT NAME: Residential Development, Countess Road, Killarney, Tralee, Co. Kerry

PROJECT NUMBER: 7334

REVISION	DATE	FILE NAME: Residential Development, Countess Road, Killarney, Tralee, Co. Kerry			
4	05.06.2026	DESCRIPTION: Drainage Impact Assessment			
			PREPARED	CHECKED	APPROVED
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		DATE	27.06.2018	27.06.2018	27.06.2018
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1 Introduction

DOSA Consulting Engineers were engaged as Engineers for the proposed development at Countess Road, Killarney, Co. Kerry.

The purpose of this Drainage Impact Assessment report is to provide details of the Storm Water elements associated with the proposed development.

1.1 Site Location

The subject site (currently greenfield) to the south-east of the Killarney town centre. The subject land is bordered to the north by the Countess Road, to the south, east & west by existing residential dwellings and by greenfield lands to the south-east. A snapshot of the site location is outlined in Figure 1.1 below.



Figure 1.1 – Context Map

1.2 Scope of Assessment

This report deals with the following aspects associated with this development:

- Existing Site
- Site Investigations
- Soil Type Classification
- Storm Water Drainage Design
- Sustainable urban Drainage Systems (SuDS)
- Flood Risk Assessment and Exceedance Flows
- SuDS Maintenance

1.3 Site Topography

The topography of the site slopes from the south and the north to a low point in the middle of the south and then slopes downwards towards the western boundary. The elevation height along the perimeter on the northern boundary rises from +34.50m to +35.75m at its high point, the southern boundary rises from +31.50m to +38.75m at the high point, the eastern boundary rises from +31.50m to +38.75m at the high point and then down to levels of +29.0m along the western boundary. A snapshot of the site topography is outlined in Figure 1.3 below.



Figure 1.3 – Site Topography

1.4 Proposed Development

The proposed development will consist of the construction of a residential development of 259 no. residential units with ancillary single storey creche, landscaping and all associated site development works.

The proposed development includes the demolition of 2 no. existing two-storey semi-detached dwelling houses and an existing ruinous structure on the site and construction of 103 no. two storey houses (3-bed units), comprising of 27 no. terraced units, 62 no. end of terrace units, and 14 no. side entry units, 82 no. courtyard apartment units over 2 no. storeys (42 no. 1-bed units, 40 no. 2-bed units), and 74 no. apartment units (34 no. 1-bed units, 40 no. 2-bed units) in 2 no. part 3 storey and part 4 storey blocks.

Vehicular access to the proposed development will be via one entrance from Countess Road (L3904) to the north, with the entrance design including improvement works on the public road inclusive of a raised crossing point. The design includes pedestrian/cycle infrastructure to/from Countess Road and internally within the development site and to adjoining areas.

Ancillary site works include car parking, provision of bicycle parking and bin storage facilities serving the proposed apartment/courtyard apartment buildings and creche, 2 no. ESB substations, landscaping, water services and drainage infrastructure (including foul and storm network upgrades in Countess Grove), and all associated site development works. The proposed development also provides for the demolition of an existing site boundary walls along Countess Road.

A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.

A snapshot of the proposed development is outlined in Figure 1.4 below.

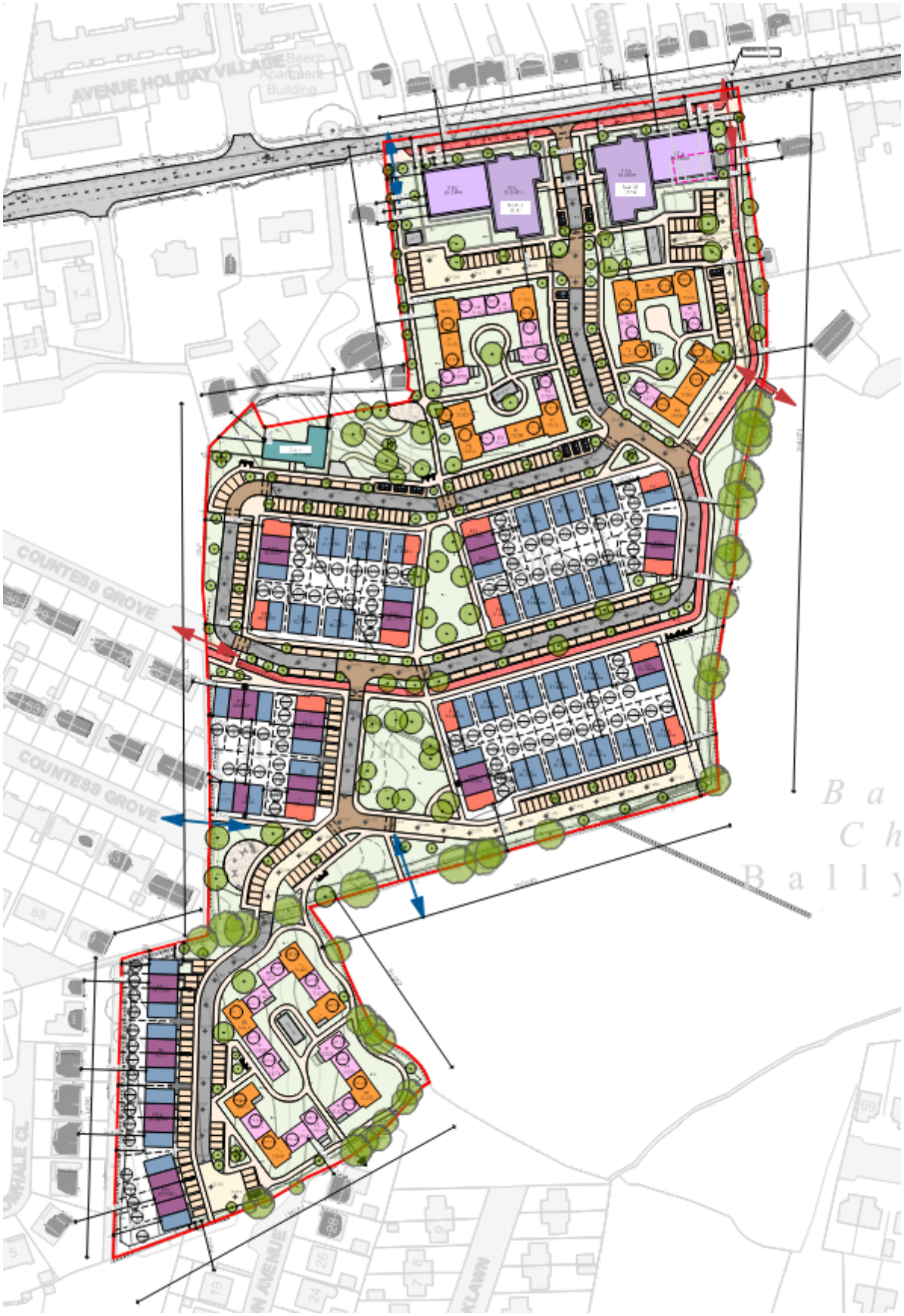


Figure 1.4 – Proposed Development

1.5 Principle Design Considerations

During the design of the storm water drainage for the proposed site, including SuDS, the following key documents / standards were taken into consideration.

- Kerry County Council Development Plan
- CIRIA report C753 The SuDS Manual-v6
- Greater Dublin Strategic Drainage Study (GDSDS)
- Rainwater Management Plans – Guidance for Local Authorities
- Nature-Based Management of Urban Rainfall and Urban Surface Water Discharges - A National Strategy.
- Inland Fisheries Irelands Planning for Watercourses in the Urban Area – (CDP Para 11.221)- IFI

2 Existing Site Hydrology

2.1 Watercourses within the Vicinity of the Site

The Site is situated within the Laune-Maine-Dingle Bay Catchment [Catchment_ID: 22] and the Flesk_SC_020 subcatchment [Subcatchment_ID: 22_6].

As per EPA maps, there are no hydrological features of note within 500m of the Site. There is a single hydrological feature within 1km of the Site. This feature is not hydrologically connected to the Site.

- Flesk River (Kerry)_020

The Flesk River (Kerry)_020 is located ca. 650m to the south of the Site, at its closest point. This river flows in a south-westerly direction, and drains into Lough Leane, ca. 2km downstream of the Site which discharges to the estuary via the Laune River near Killorglin.



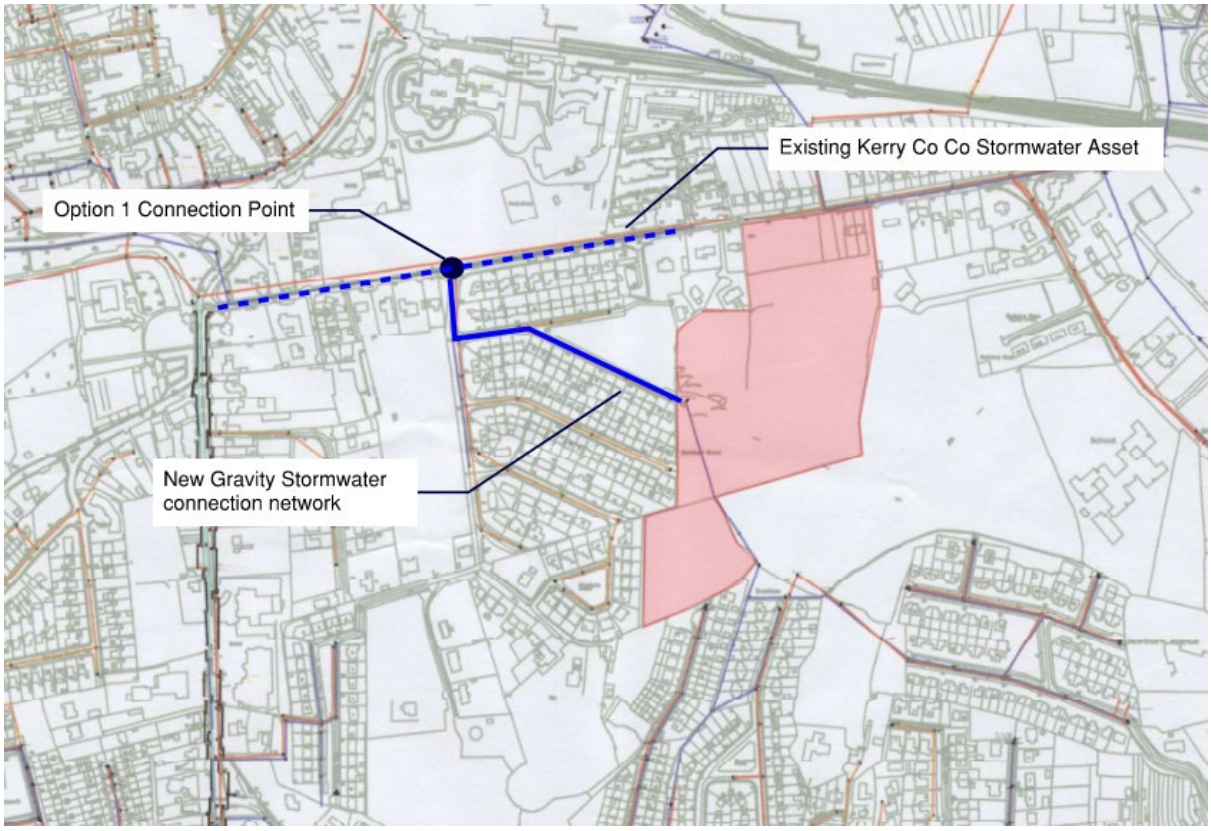
Figure 2.1– Watercourse in the Vicinity of the Site

3 Surface Water Overview

3.1 Stormwater Outfall Options

3.1.1 Stormwater Outfall Option 1

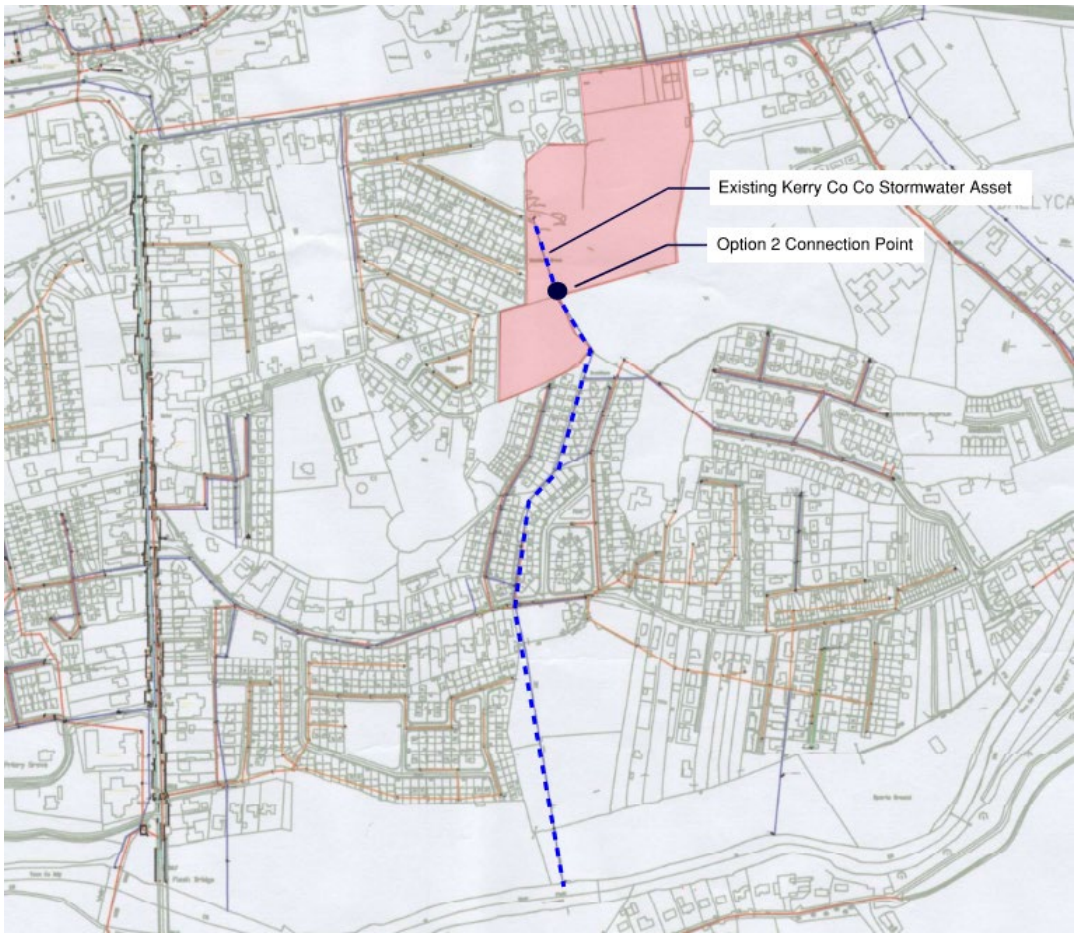
The runoff from the entire developed site will discharge to the existing Kerry County Council public stormwater network on the Countess Road via the existing Countess Grove estate. Confirmation from Kerry County Council that the Countess Grove estate is in the charge of Kerry County Council is included in Appendix C of this Assessment. This stormwater outfall is indicated on the Proposed Stormwater & Foul Sewer Layout - Option 1 (1-3) Drawing No.'s 7334-0020, 7334-0021 & 7334-0022. There is a synergy in discharging to this stormwater network as it follows the same route as the proposed gravity foul discharge route. During meetings and discussions with council they have expressed their concerns regarding the useability of the existing green area in Countess Grove due to waterlogging. This discharge pipe provides an outfall connection point for the possibility of subsurface drainage works to the green area if desired by the council at a future date. Stormwater discharge to the piped network is restricted over and above that of greenfield rates. (i.e. less stormwater discharged than at present from the site. This is a result of sizing the attenuation to that of predevelopment greenfield rate and ignoring the added benefit of the nature-based drainage solutions provided – permeable paving, green/blue roofs & infiltration methods.



3.1.2 Stormwater Outfall Option 2

There is an existing stormwater network that traverses the site and discharges stormwater from a low point on the site. Investigation works carried out on site indicate that this pipe is 600mm in diameter. The system has been designed so that it would be possible to discharge the runoff from

the entire developed site to this existing network that currently traverses the site and discharges south to the River Flesk. This route is through adjoining lands, adjoining estates via the rear gardens of the Doire Coile and Brooklawn estate to the south. This stormwater outfall is indicated on the Proposed Stormwater & Foul Sewer Layout - Option 2 (1-3) Drawing No.'s 7334-0090, 7334-0091 & 7334-0092. It is schematically represented in eth figure below.



3.1.3 Dedicated Stormwater Network serving Countess Road

As part of the development, it is proposed to install a 450mm stormwater network to serve Countess Grove to the northern boundary of the site. This pipe will connect into the existing network that currently traverses the site as outlined in Section 3.1.2 above. This stormwater network is indicated on the Proposed Stormwater & Foul Sewer Layout - Option 1 (1-3) Drawing No.'s 7334-0020, 7334-0021 & 7334-0022. This is a request by Kerry Co Co and as such is being provided as a dedicated pipe for their use in the future. The allowance and provision of same future proofs a dedicated storm route for any stormwater rediverted or connected from the north. It will also potentially provide a separation option for foul and storm if upgrading works are carried out to the existing systems to the north. The 450mm pipe will have a minimum capacity of 323.4 l/second traversing the site which will greatly exceed the proposed runoff from the proposed development site of 28.50 l/second. This proposed pipe will provide a dedicated stormwater asset to Kerry County Council and will benefit the wider area by providing a direct outfall to the River Flesk for any future connection to this network along Countess Road.

3.2 Surface Water Design

This report should be read in conjunction with the Infrastructure Report submitted as part of the application. Attenuation Tank Sizes and Petrol Interceptor Sizing/Specifications have been included as part of the Stormwater Network Design in this report.

The completed development site is a mix of soft landscaping and hard paving or roofing. The existing topography is such that it is a single catchment. Groundwater flow direction is interpreted to be to the northwest to Southeast, providing baseflow to WFD Sub catchment – Flesk (Kerry)_SC_020. (extracted from EPA Mapping).

The drainage design for the proposed development has been designed to mitigate any effects of urban stormwater runoff on the environment by reducing the runoff rate from the development to less than the current Greenfield runoff rate. This will be achieved by utilising an attenuation system to attenuate surface water to restrict the outflow to the equivalent of the existing agricultural runoff and the additional proposed SuDS measures outlined below will restrict this runoff even further. The nature-based SuDS principles proposed thusly will have a positive impact from a sustainable impact. Despite this the volumetric capacity of the attenuation system has included the runoff from these areas in its calculations as a design contingency. The calculations of the various SuDS elements proposed are contained in Appendix B of this report.

The proposed storm water drainage system has been designed to cater for all surface water runoff from all hard surfaces within the proposed development including roadways, roofs, parking areas etc. The development has been split into a number of catchment areas.

The proposed surface water drainage network will collect surface water runoff from the site via a piped network prior to discharging off site via the attenuation tanks, flow control devices and separator arrangement. Final discharge rates will be at Qbar greenfield run-off rates.

Prior to entering the system, the stormwater generated will be treated through a number of nature-based solutions in line with adopted SuDs measures.

The storm sewer network was designed using Innovyze MicroDrainage modelling software. Outputs from the storm sewer design can be found in the Appendices of the Infrastructure Report.

All flow velocities within the network fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment. The storm water network and attenuation tanks are designed to accommodate the 100-year return period plus an additional 20% to account for the effects of climate change.

3.3 Proposed Sustainable Urban Drainage (SuDS) Strategy

For the proposed development a "SuDS triangle" was utilised to ensure all three functions are provided for within the SuDS strategy.

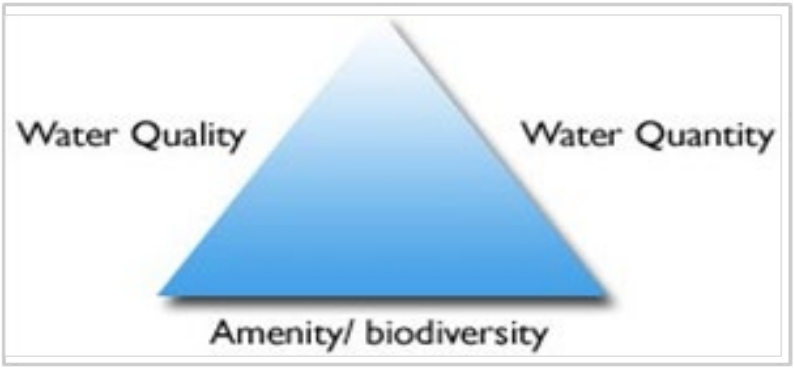


Figure 2.1– SuDS Triangle

By considering the three functions of the triangle, a SuDS system will allow for water quality treatment through natural processes by.

- Encouraging infiltration (where appropriate) and attenuating peak flows.
- Improving water quality by providing treatment to storm water prior to discharge.
- Providing habitat and function where possible for those using the area (including wildlife).

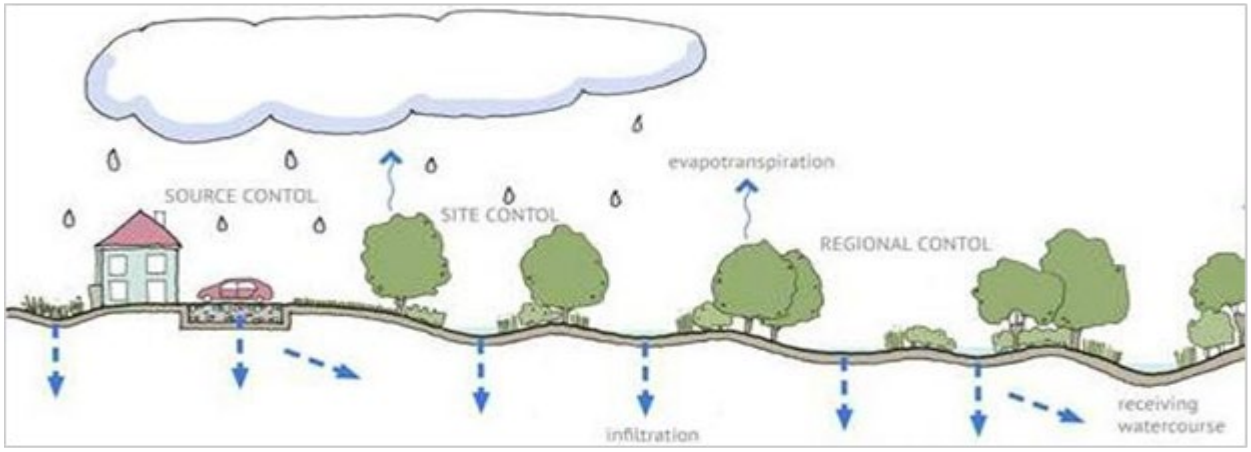


Figure 2.2– SuDS Treatment Train

The principles of a SuDS treatment train were used during the design of the surface water drainage system. The treatment train as illustrated in the image below provides an understanding of prevention and source control to reduced water run-off from a site and improve water quality.

Criterion 1: River Water Quality Protection

Satisfied by providing stormwater attenuation tanks and treatment of surface water run-off by SUDS features such full retention fuel/oil separators at surface water discharge points.

Criterion 2: River Regime Protection

Satisfied by attenuating surface water run-off in association with flow control devices prior to discharge off site at Greenfield runoff rate. Site critical duration storm used to assess attenuation volume.

Criterion 3: Level of Service (Flooding) for the Site

Satisfied by reviewing available flood hazard information (e.g., CFRAM Study as outlined in Appendix C) relating to the site's proximity to tidal and fluvial flood plains (up to 1 in 100-year flood event).

Criterion 4: River Flood Protection

Satisfied by attenuating surface water discharge to greenfield runoff rates, addressing flood risk associated with the 1 in 100-year storm and avoiding development in flood plains.

Following a comprehensive review of the design of the storm water drainage system we considered all options under the SuDS guidance policies referred to in the Greater Dublin Drainage Strategy. A preliminary feasibility of the applicable SuDS Techniques was conducted using the facility on the website of Irishsuds.ie (Guidance and Tools). The preliminary analysis indicated that the following techniques were possibly suitable Attenuation Tanks, Basins, Permeable Paving, Soakaways, Swales and Rainwater Harvesting.

Each proposal was examined and evaluated on its merits / suitability under site specific constraints for use in the proposed development site. Our design approach summary is as follows:

3.4 SuDS Appraisal

The SuDS selection process used for this site is in accordance with SuDS selection flow chart, Volume 3, Section 6.5, Figure 48 of the GDSDS. The characteristics of the site are utilised to select the various SuDS techniques that would be applicable.

It should be noted that the infiltration results are poor, and these affect the efficiency of the proposed SuDS based solutions using infiltration as a disposal method. The drainage proposal maximises the available potential of nature-based solutions despite this, and attenuation volumes are designed for the 1 in 100-year event despite the implementation and proposed use of nature-based solutions. This ensures that the drainage system is both robust and futureproofed.

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

3.4.1 Permeable Pavement

Permeable pavement reduces the overall impermeable area of the hard-standing area, which will reduce the impact of the discharge and improve the quality of the effluent from the proposed development. Permeable paving will be proposed only in areas which will not be taken in charge by Kerry County Council after they have previously issued a preference not to use in Public Areas.

3.4.2 Rainwater Harvesting

In relation to rainwater harvesting an option is to provide a water butt with each individual dwelling. This could be located to the rear of each unit. This water butt will only have the ability to catch the rear sloping side of the dwelling, and the reuse would be for watering plants. The intention would be that these are provided retrospectively by the homeowner.

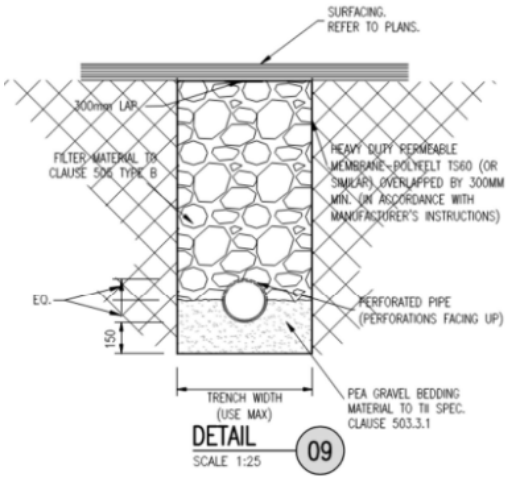
3.4.3 Infiltration Basins

Infiltration basins are constructed in green spaces to compliment the SuDs strategy. These are vegetated depressions designed to store runoff on the surface and infiltrate it gradually into the

ground. They are dry except in periods of heavy rainfall. Discussions with Kerry County Council indicated a preference not to use due to safety concerns

3.4.4 Filter Drain

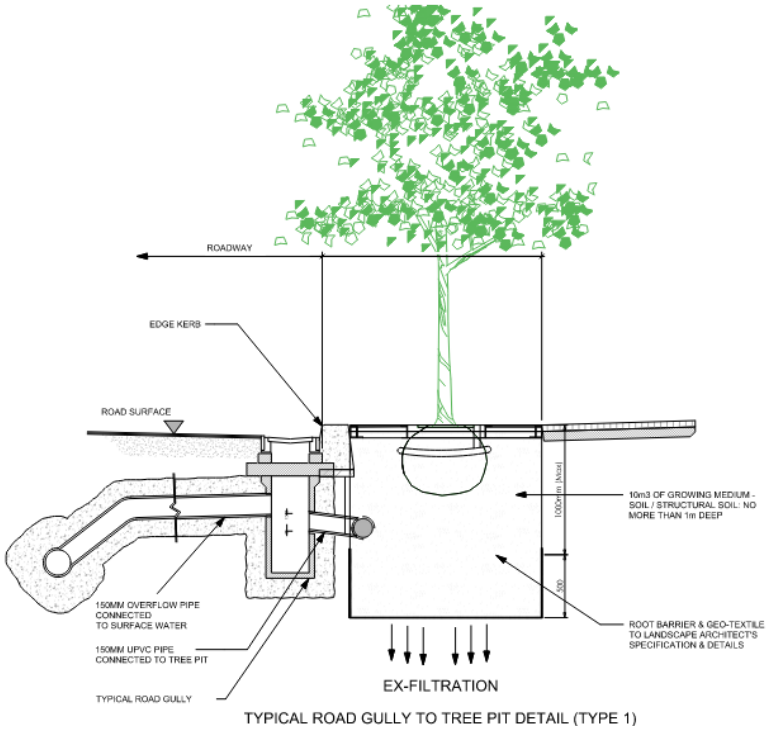
Trenches filled with permeable material and a perforated collection pipe at the invert with an optional permeable 'sandy' topsoil at surface. These will treat, convey and attenuate runoff at source, and can infiltrate to the ground where the subgrade is suitable. These systems will allow some form of storage for small rainfall events and can result in water evaporation and adsorption in small quantities, therefore there will be less run-off from these areas in small rainfall events thus mimicking the natural response for this catchment. These will be located along the proposed pedestrian/cycle pathways where feasible and will allow groundwater to recharge to its natural state. These drains will also be used along the line of the existing maintenance drains on site which is highlighted further in Section 3.2.10.



TYPICAL FILTER DRAIN DETAIL

3.4.5 Tree Pits

Trees can be planted within a range of infiltration SuDS components to improve their performance, as root growth and decomposition increase soil infiltration capacity. Alternatively, they can be used as standalone within soil-filled tree pits, tree planters or structural soils, collecting and storing runoff and providing treatment via filtration and phytoremediation. Tree pits and planters will be designed to collect and attenuate runoff by providing additional storage within the underlying structure. The soils around trees can also be used to filter out pollutants from runoff directly. Tree pits are proposed to be in green space areas to treat and control runoff, while at the same time providing amenity value to adjacent pedestrian, and residential zones. It is also proposed, where possible to fit tree pits along the estate road to drain and treat surface water runoff from the road network. This will allow for treatment of first flush and low flows while high flows will discharge into the surface water network during extreme rainfall events. Rainwater gullies will still be provided downstream of any tree pit to drain runoff during an extreme rainfall event.



TYPICAL ROAD GULLY TO TREE PIT DETAIL (TYPE 1)

3.4.6 Flow Control Device

It is proposed to provide a vortex style Hydro-Brake, or similar approved, at the outfall of the surface water catchment to restrict the outflow of water from the subject site. The Hydro-Brake operates like a large orifice under low flow conditions, and a small orifice under higher flow / higher head conditions when a vortex air core forms within the device and throttles the flow. The restricted outlets will be designed to the following

Contributing Area	Permissible Outflow (l/sec)
Catchment Area No. A	6.90 l/sec
Catchment Area No. B	2.90 l/sec
Catchment Area No. C	3.90 l/sec
Catchment Area No. D	9.40 l/sec
Catchment Area No. E	5.40 l/sec

3.4.7 Petrol Interceptor

It is proposed to provide a petrol interceptor upstream of the attenuation tanks to ensure that any remaining hydro-carbons or pollutants within the runoff from trafficked areas are treated prior to outfall to the existing watercourse. It is proposed to provide a Conder Bypass Separator Types or similar approved.

In conclusion the water quality from this catchment should be of a high quality due to the above-mentioned measures, which are applied in a treatment train to treat the water before discharge at a restricted rate to the local network.

The above measures ensure a suitable management train is provided.

3.4.8 Swales

Broad, shallow drainage channels covered in grass which can treat, convey and attenuate runoff, at source, and can infiltrate to the ground where the subgrade is suitable. Swales can also promote biodiversity. They are normally located adjacent to roads and hard-standing areas. The site layout is such that it is difficult to provide swales as green areas in general do not abut roads.

3.4.9 Rain Gardens

Raingardens will be constructed in green spaces to compliment the SuDS strategy. These are vegetated depressions designed to store runoff on the surface and infiltrate it gradually into the ground. In this development they are intended to be dry and without the capacity of storage of any water. Infiltration design will be such that there is no water retention/storage. They will be located at a number of locations around the site and drainage provided to the substrata to ensure runoff is directed to the attenuation system. This SuDS measure will have ecological and aesthetic benefits.

3.4.10 Existing Ditches, Maintenance Drains, Trees and Hedgerows Within Site

Within the site where possible, existing ditches, trees and hedgerows are to be maintained. It is not proposed to Incorporate these existing drainage features into the proposed overall SuDS strategy. It is possible to retain a no. of ditches and hedgerows but not any drainage ditches.

The retention of existing trees and hedgerows will also assist in the reduction of surface water runoff by evapotranspiration.

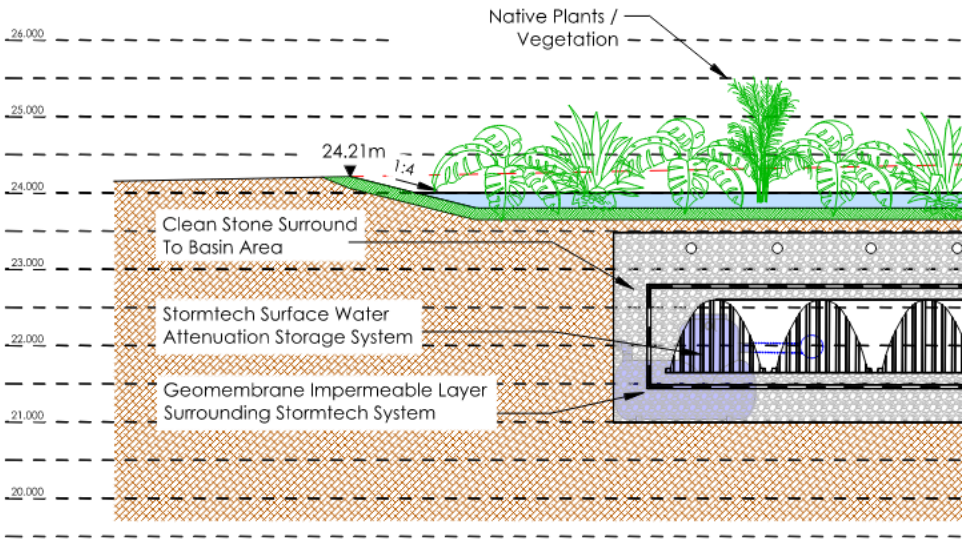
3.4.11 Attenuation Tanks

The proposed attenuation system attenuates surface water to restrict the outflow to the equivalent of the existing agricultural runoff. This ensures the development will not give rise to any impact downstream of the site. These systems will be impermeable and no infiltration of the runoff to the ground is proposed. These systems will be used under the large open spaces within the development. The proposed systems will have adequate soil cover so that appropriate landscaping can be planted and play equipment installed in these open spaces.

The capacity of the attenuation tanks is designed to cater for the capacity required for a 1 in 100-year ARI event. These capacities are summarised as follows:

Tank No.	Capacity (m^3)	Restricted Outlet (l/sec)
A	700.0	6.90 l/sec
B	420.0	2.90 l/sec
C	210.0	6.80 l/sec (3.90l/sec & 2.90 l/sec)

D	650.0	9.40 l/sec
E	430.0	28.50 l/sec (6.90l/sec & 2.90 l/sec& 3.90 l/sec& 9.40 l/sec& 5.40 l/sec)



3.5 Management Train

The management train commences with source control through the provision of possible rain-water butts in the rear gardens. This will also reduce the water consumption required of each housing unit. This employment of these source controls along with the usage of localised tree pits will aid to reduce the peak runoff rate, placing less stress on the facilities downstream.

The second stage of the management train, site control, is provided by the introduction of the hydrocarbon interceptors and swales in open areas which provide a degree of treatment before discharging to the attenuation system.

The attenuation tanks offer a third stage of treatment, regional control, by slowing the storm water discharge down and removing additional silts which may remain in the storm water.

It should be noted that the infiltration results are poor and the affect the efficiency of the proposed SuDS based solutions using infiltration as a disposal method. The drainage proposal maximises the available potential of nature-based solutions despite this and attenuation volumes are designed for the 1 in 100 year event despite the implementation and proposed use of nature-based solutions. This ensures that the drainage system is both robust and futureproofed.

3.6 Surface Water System

The existing Kerry County Council public stormwater network on Countess Road has been chosen as the most suitable surface water discharge point for the proposed development with an option for an alterative outfall as outlined in Section 3.1.

In order to reduce the effects of the surface runoff on potential flooding, a Stormwater Management Plan will be applied to surface water discharges into adjacent watercourses. The Stormwater Management Plan can be applied to control the rate of runoff from new development. The maximum permitted surface water outflow from the new development is to be restricted to that of the existing Greenfield site by the usage of attenuation storage.

Control of runoff by attenuation methods requires a hydraulic control to restrict the magnitude of flows passing downstream, together with an upstream storage capacity to contain the volume of runoff held back by the hydraulic control. The flows are proposed to be attenuated in the surface water system by adopting a flood storage attenuation tank along with restricted outlets as the control devise. The storage volume required has been designed using the computer aided design package Windes 10.4.

The attenuation strategy for the site is for the detention of flows in interlinked attenuation tanks.

3.7 Surface Water Drainage Network

The surface water drainage network for the proposed development was modelled using the Microdrainage software application. The surface water pipe lengths, slopes, contributing impermeable areas, upstream invert levels, upstream cover levels and pipe diameters were entered into the model using the drawings supplied.

3.8 Design Criteria:

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

- Return period for pipe work design 2 years
- Return period for attenuation design 100 years
- Soil Type 2
- Allowable Outflow 28.50 l/second
- Time of entry 5 minutes
- M5 – 60 21.500 mm
- Ratio "r" 0.244
- Pipe Friction (Ks) 0.6 mm
- Minimum Velocity (based on pipe flowing full) 1.0 m/s
- Rainfall Runoff from Roads and Footpaths 100%
- Rainfall Runoff from Roofs 80%
- Rainfall Runoff from Driveways 80%
- Rainfall Runoff from Green Areas 20%
- Rainfall Depth Factored for Climate Change (as per GDSDS) 20%

(in accordance with GDSDS Volume 2, Chapter 6, Table 6.2 – see below)

Climate Change Category	Characteristics
River flows	20% increase in flows for all return periods up to 100 years
Sea level	400+mm rise (see Climate Change policy document for sea levels as a function of return period)
Rainfall	10% increase in depth (factor all intensities by 1.1)
	Modify time series rainfall in accordance with the GDSDS climate change policy document

Table 6.2 Climate Change Factors to be Applied to Drainage Design

4 Flooding & Exceedance Flows

4.1 Flood Risk

A search for recorded flood events near the subject site was carried out 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 4.0. 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 it does show instances of historical flooding around Killarney town.

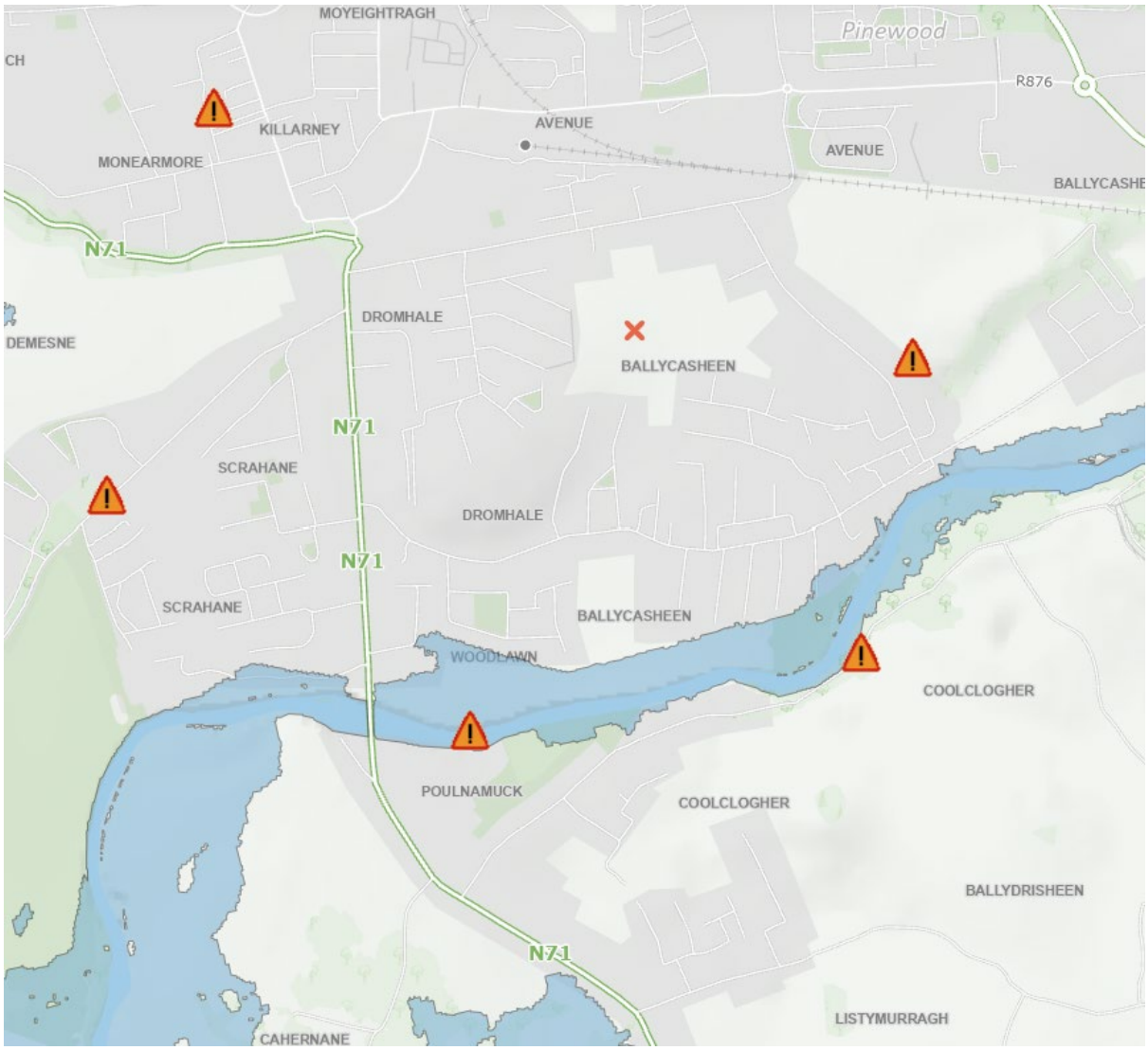


Figure 5.0– Floodmaps.ie Map

4.2 Results of Predictive Flood Extent Mapping

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 Flood Maps associated with the FRMP's are currently being finalised and will be made available online to view when the Draft Plans are published for consultation. The subject lands lie outside the CFRAM Mapping but are contained in the existing available Flood Mapping. Database.

Figure 4.1 below is an extract 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.

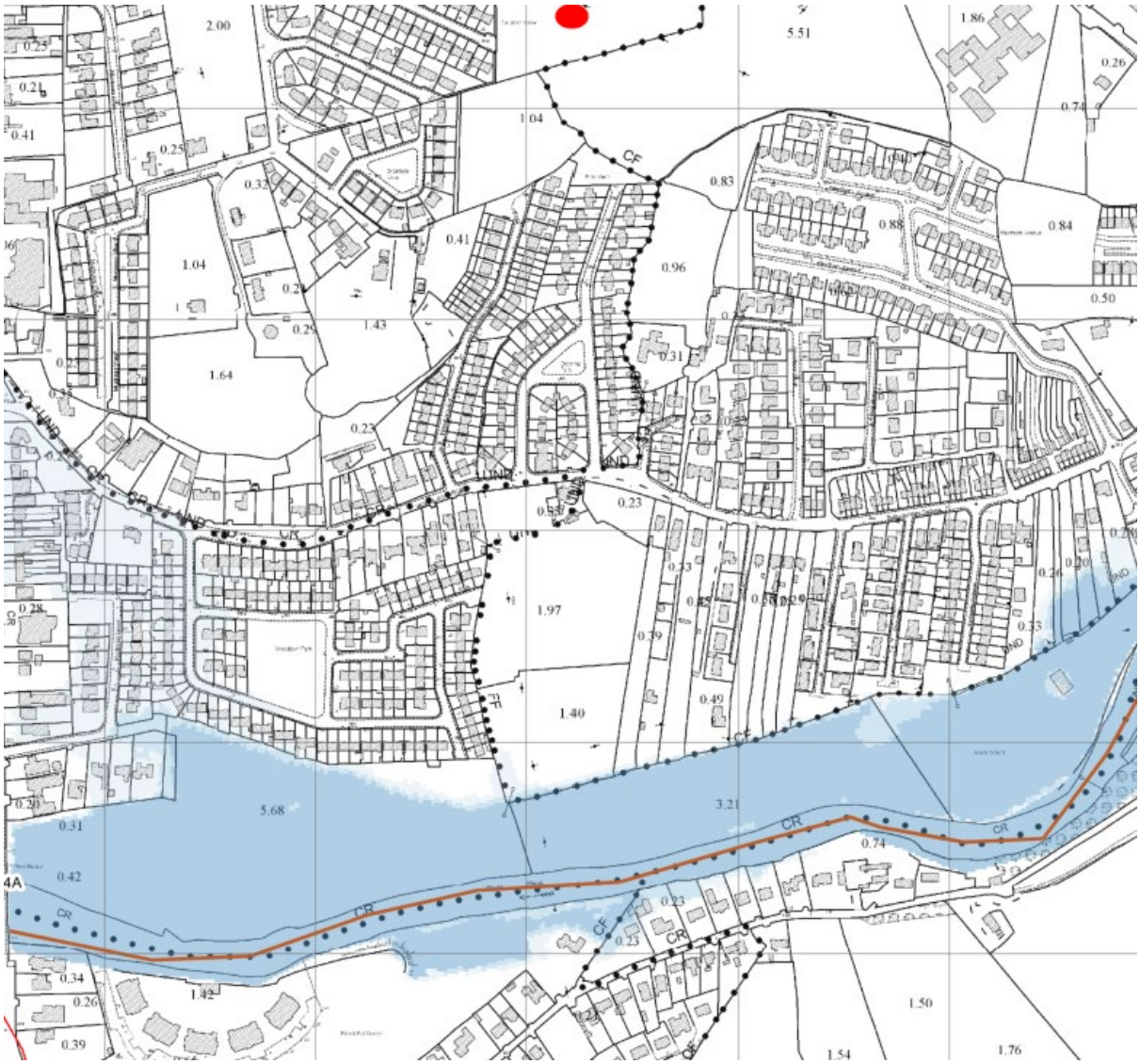


Figure 4.1: Extract Fluvial Flood Extent Map



Figure 4.2: Aerial Highlighting Flood Extent Map

5 Maintenance Regime for SuDS Devices

The SuDS features proposed above for the site will require the following maintenance: SuDS Management and maintenance have been addressed in broader context in a separate report "SuDS Management & Maintenance Plan" which accompanies the planning submission. Cross reference should be made with this report in relation to same. It is proposed that the maintenance regime proposed is carried out by the developer until such time as the estate and works have been taken in charge. At this point in time, it would be envisaged that responsibility would fall to the local authority upon completion of the taking in charge process.

5.1.1 Wet Swales:

Requires regular inspection of inlets and outlets, vegetation, mulching and the removal of nuisance plants and rubbish as necessary. Trees and vegetation should be trimmed every 2 years. Swale surface should be spiked, scarified and removed of 'thatch' every 3 years with regular inspection of surface infiltration to avoid areas of ponding. Repair erosion at inlets and outlets and re-turf surfacing as required. Wet swales will be maintained from adjacent access roads.

5.1.2 Underground attenuation systems

Inspection of the system should be conducted monthly for the first 3 months and then annually to ensure the system is working correctly. Debris should be removed monthly from the catchment surface where it may cause risk to the performance of the underground attenuation system. As required sediment from pre-treatment (catch pit) manholes prior to the attenuation system should be removed to ensure on going performance of the system. The inside of the tank should be surveyed every 5 years or as required if performance is reduced with any sediment build up removed if necessary. The attenuation tanks will require regular maintenance to ensure continuing operation to design performance standards.

5.1.3 Tree Pits

Maintenance of trees will be greatest in the first few years, which will include regular inspection of tree condition including inlets and outlets, removal of invasive vegetation and possibly irrigation during long dry periods.

5.1.4 Filter Drains

Inspection of the system should be conducted half yearly on the inlet / outlet pipework and any control systems for blockages. Inspection of pre-treatment systems including should be conducted every 6 months for catch pits manholes prior to the filter drain with removal of silt or other build-ups. Removal of silt build-up may be required more frequent. Perforated pipework should be cleared of blockage if required.

5.1.5 Hydrobrake Manhole:

Normally little maintenance is required as there are no moving parts within a hydrobrake, however, after installation, hydrobrakes should be inspected to ensure the hydrobrake orifice is not blocked on a monthly basis for three months and thereafter at six monthly intervals and hosed down if required. Remove rubbish or debris from hydrobrake if present. Hydro-Brake Flow Controls are

fitted with a pivoting by-pass door, which allows the manhole chamber to be drained down should blockages occur.

5.1.6 Petrol Interceptor:

Systems should be visually inspected for every rainfall event for 30 days after installation and the amount of sediment measured to give the operator an idea of the expected rate of deposition. Systems should then be inspected every 6 months to verify the appropriate level of maintenance. Floating debris and solids should be removed, and the sump cleaned with a conventional sump vacuum cleaner. Filter media should be replaced, and sediments, oils and grease should be removed where required.

Appendix A –Schematic SuDS Train



Proposed SUDS Layout

Scale : 1:500

Legend:

- Tree Pit
- Permeable Paving
- Swale
- Filter Drain
- Attenuation
- Hydrocarbon Interceptor

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CLIENT: Dipharma Unlimited Company.

PROJECT: Development at Countess Road, Killarney, Co. Kerry

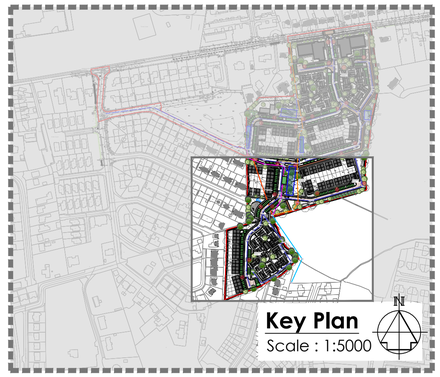
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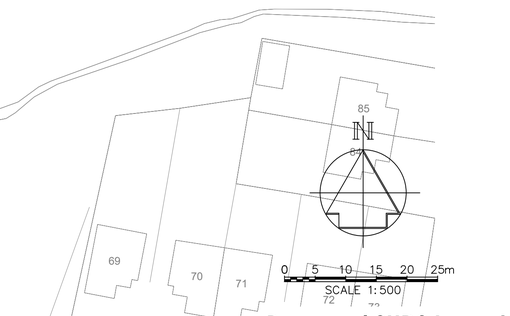
SHEET: A1

SCALE: 1:500

PROJECT NO. 7334 _ DRAWING NO. 0040 _ STATUS/ISSUE F







Proposed SUDS Layout

Scale : 1:500

Legend:

- Tree Pit
- Permeable Paving
- Swale
- Filter Drain
- Attenuation
- Hydrocarbon Interceptor

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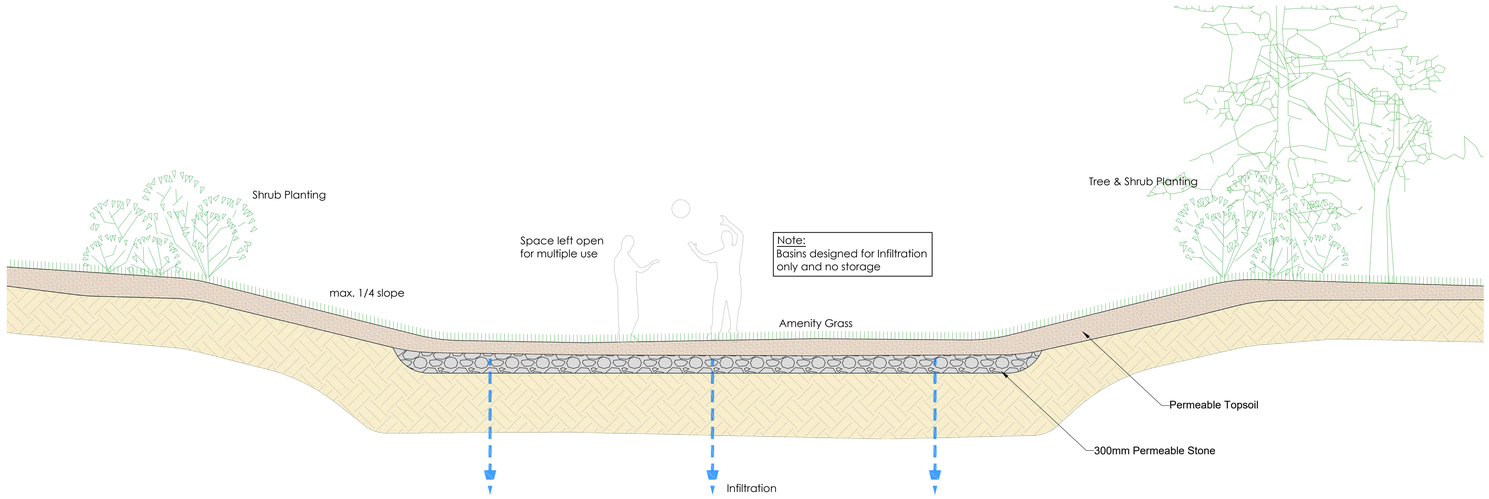
PROJECT: Development at Countess Road, Killarney, Co. Kerry

DRAWING TITLE: Schematic SUDS Layout (2 of 2)

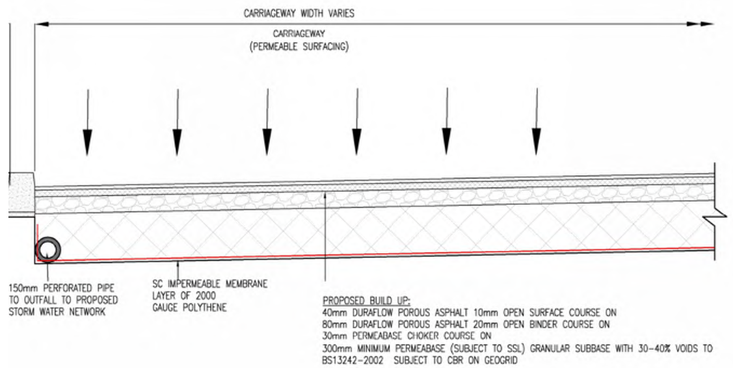
SHEET: A1

SCALE: 1:500

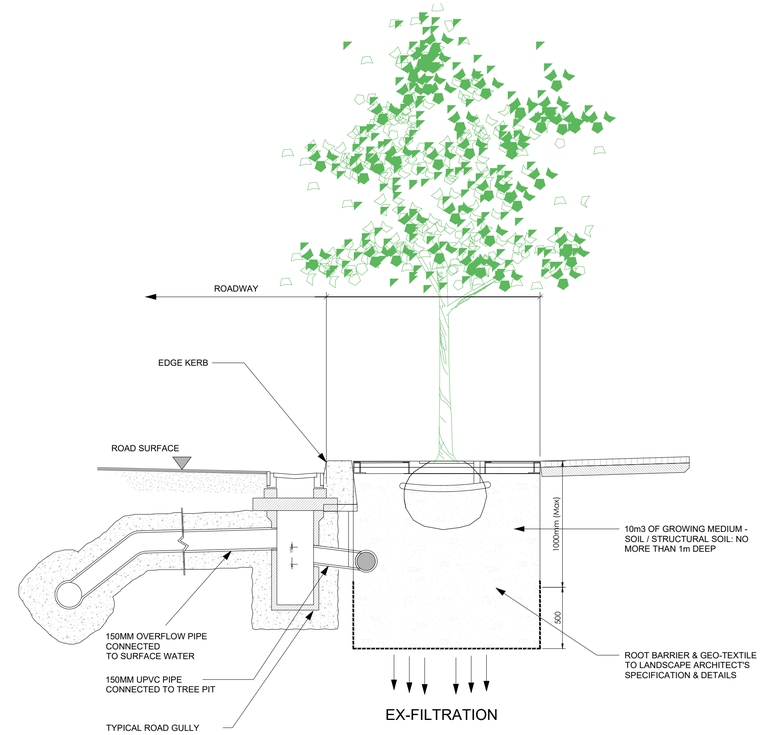
PROJECT NO. 7334 _ DRAWING NO. 0041 _ STATUS/ISSUE F



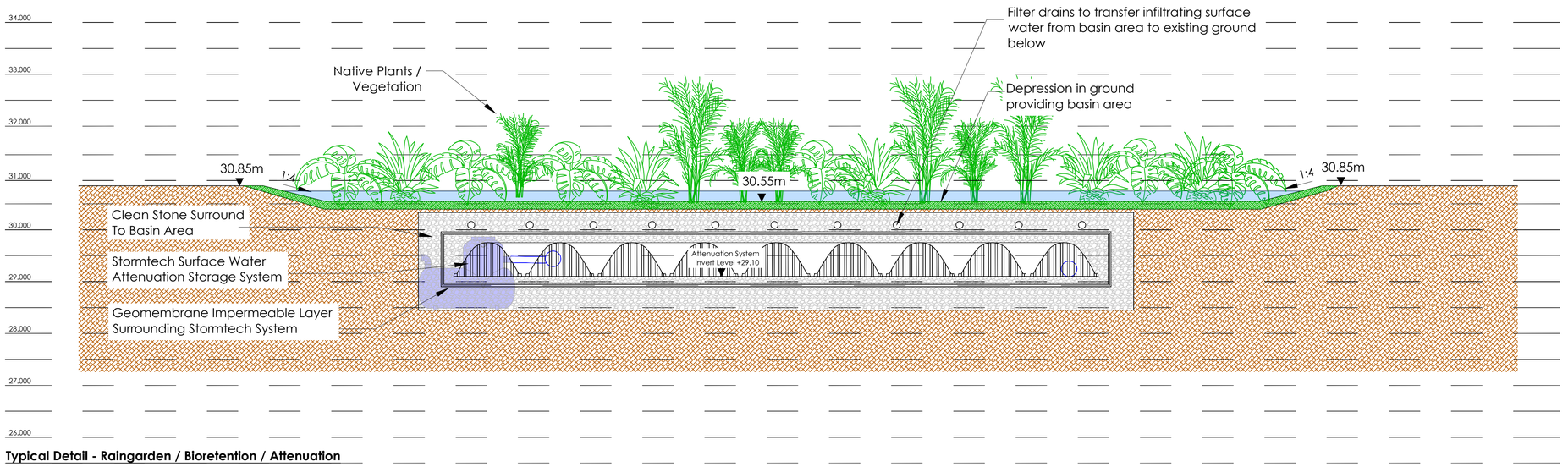
Typical infiltration Basin Detail
Scale 1:50



Typical Permeable Surfacing Section
Scale : NTS



Typical Tree Pit Detail
Scale 1:25



Typical Detail - Raingarden / Bioretention / Attenuation
Scale 1:50

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CLIENT: Dipharma Unlimited Company.

PROJECT: Development at Countess Road, Killarney, Co. Kerry

DRAWING TITLE: Schematic SUDS Sections & Details

SHEET: A1

SCALE: NTS

PROJECT NO. 7334 _ DRAWING NO. 0042 _ STATUS/ISSUE D

Appendix B –SuDS Calculations

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **9.9** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.360**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.8** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **600** mm
Width of pit	w = **1200** mm
Length of pit	l = **5000** mm
Percentage free volume	V_{free} = **30** %
Soil infiltration rate	f = **249.×10^{-9}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **3720000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Note: The following Z2 table values are user defined.

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.36;	8.1;	1.93;	15.7;	0.15;	0.00;	0.15
10	0.51;	11.5;	1.97;	22.7;	0.22;	0.00;	0.22
15	0.62;	14.0;	1.98;	27.7;	0.27;	0.00;	0.27
30	0.79;	17.8;	1.95;	34.8;	0.34;	0.00;	0.34
60	1.00;	22.6;	1.91;	43.1;	0.42;	0.00;	0.42
120	1.22;	27.5;	1.87;	51.5;	0.51;	0.01;	0.50
240	1.48;	33.4;	1.82;	60.9;	0.60;	0.01;	0.59
360	1.67;	37.7;	1.79;	67.4;	0.66;	0.02;	0.64
600	1.90;	42.9;	1.76;	75.3;	0.74;	0.03;	0.71
1440	2.42;	54.6;	1.70;	92.9;	0.92;	0.08;	0.84

Required storage volume	S_{req} = **0.84** m^3
Soakaway storage volume	S_{act} = l × d × w × V_{free} = **1.08** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume	t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 125hr 57min 7s

FAIL - Soakaway discharge time greater than 24 hours

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **23.7** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.360**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.8** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **0** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **300** mm
Width of pit	w = **5800** mm
Length of pit	l = **5100** mm
Percentage free volume	V_{free} = **30** %
Soil infiltration rate	f = **24.9×10^{-6}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **3270000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Note: The following Z2 table values are user defined.

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.36;	6.8;	1.90;	12.9;	0.30;	0.02;	0.28
10	0.51;	9.6;	1.96;	18.8;	0.45;	0.05;	0.40
15	0.62;	11.7;	1.97;	23.0;	0.55;	0.07;	0.47
30	0.79;	14.9;	1.98;	29.4;	0.70;	0.15;	0.55
60	1.00;	18.8;	1.94;	36.5;	0.87;	0.29;	0.57
120	1.22;	22.9;	1.91;	43.7;	1.04;	0.59;	0.45
240	1.48;	27.8;	1.87;	52.0;	1.23;	1.17;	0.06
360	1.67;	31.4;	1.84;	57.7;	1.37;	1.76;	0.00
600	1.90;	35.7;	1.80;	64.4;	1.53;	2.93;	0.00
1440	2.42;	45.5;	1.74;	79.3;	1.88;	7.03;	0.00

Required storage volume	S_{req} = **0.57** m^3
Soakaway storage volume	S_{act} = l × d × w × V_{free} = **2.66** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume	t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 58min 21s

PASS - Soakaway discharge time less than or equal to 24 hours

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **4.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.360**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.8** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **300** mm
Width of pit	w = **2000** mm
Length of pit	l = **2000** mm
Percentage free volume	V_{free} = **30** %
Soil infiltration rate	f = **249.×10^{-9}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **1200000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Note: The following Z2 table values are user defined.

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.36;	8.1;	1.93;	15.7;	0.06;	0.00;	0.06
10	0.51;	11.5;	1.97;	22.7;	0.09;	0.00;	0.09
15	0.62;	14.0;	1.98;	27.7;	0.11;	0.00;	0.11
30	0.79;	17.8;	1.95;	34.8;	0.14;	0.00;	0.14
60	1.00;	22.6;	1.91;	43.1;	0.17;	0.00;	0.17
120	1.22;	27.5;	1.87;	51.5;	0.21;	0.00;	0.20
240	1.48;	33.4;	1.82;	60.9;	0.24;	0.00;	0.24
360	1.67;	37.7;	1.79;	67.4;	0.27;	0.01;	0.26
600	1.90;	42.9;	1.76;	75.3;	0.30;	0.01;	0.29
1440	2.42;	54.6;	1.70;	92.9;	0.37;	0.03;	0.35

Required storage volume S_{req} = **0.35** m^3

Soakaway storage volume S_{act} = l × d × w × V_{free} = **0.36** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 162hr 41min 17s

FAIL - Soakaway discharge time greater than 24 hours

SOAKAWAY DESIGN

In accordance with BRE Digest 365 - Soakaway design

Tedds calculation version 2.0.05

Design rainfall intensity

Location of catchment area	Other
Impermeable area drained to the system	A = **30.0** m^2
Return period	Period = **100** yr
Ratio 60 min to 2 day rainfall of 5 yr return period	r = **0.360**
5-year return period rainfall of 60 minutes duration	M5_60min = **18.8** mm
Increase of rainfall intensity due to global warming	$p_{climate}$ = **20** %

Soakaway / infiltration trench details

Soakaway type	Rectangular
Minimum depth of pit (below incoming invert)	d = **1000** mm
Width of pit	w = **1700** mm
Length of pit	l = **1700** mm
Percentage free volume	V_{free} = **95** %
Soil infiltration rate	f = **249.×10^{-9}** m/s
Wetted area of pit 50% full	a_{s50} = l × d + w × d = **3400000** mm^2

Table equations

Inflow (cl.3.3.1)	I = M100 × A
Outflow (cl.3.3.2)	O = a_{s50} × f × D
Storage (cl.3.3.3)	S = I - O

Note: The following Z2 table values are user defined.

Duration, D (min)	Growth factor Z1	M5 rainfalls (mm)	Growth factor Z2	100 year rainfall, M100 (mm)	Inflow (m^3)	Outflow (m^3)	Storage required (m^3)
5	0.36;	8.1;	1.93;	15.7;	0.47;	0.00;	0.47
10	0.51;	11.5;	1.97;	22.7;	0.68;	0.00;	0.68
15	0.62;	14.0;	1.98;	27.7;	0.83;	0.00;	0.83
30	0.79;	17.8;	1.95;	34.8;	1.04;	0.00;	1.04
60	1.00;	22.6;	1.91;	43.1;	1.29;	0.00;	1.29
120	1.22;	27.5;	1.87;	51.5;	1.54;	0.01;	1.54
240	1.48;	33.4;	1.82;	60.9;	1.83;	0.01;	1.81
360	1.67;	37.7;	1.79;	67.4;	2.02;	0.02;	2.00
600	1.90;	42.9;	1.76;	75.3;	2.26;	0.03;	2.23
1440	2.42;	54.6;	1.70;	92.9;	2.79;	0.07;	2.71

Required storage volume S_{req} = **2.71** m^3

Soakaway storage volume S_{act} = l × d × w × V_{free} = **2.75** m^3

PASS - Soakaway storage volume

Time for emptying soakaway to half volume t_{s50} = S_{req} × 0.5 / (a_{s50} × f) = 444hr 35min 20s

FAIL - Soakaway discharge time greater than 24 hours

Appendix C –Kerry Co Co Letter on Countess Grove

COMHAIRLE CONTAE CHIARRAÍ
KERRY COUNTY COUNCIL

Guthán | Tel 066 7183500 Suíomh | Web www.kerrycoco.ie

Our Ref: **606** 25/CO'C

Your Ref: 7334 / LOT

20th August, 2025

Denis O'Sullivan & Associates,
Consulting Engineers,
Joyce House,
Barrack Square,
Ballincollig,
Co. Cork.

Re: Road at Countess Grove, Killarney.

Dear Sirs,

I refer to your recent letter in relation to the above.

I wish to confirm that the road highlighted on the attached map is in the charge of Kerry County Council.

I attach Receipt for €80.00 received.

Yours faithfully,

Fiona O'Neill
S.E., Roads & Transportation Dept.

Guthán */ Tel. 066 7183588*
Rphost */ Email roads@kerrycoco.ie*

Comhairle Contae Chiarraí
Áras an Chontae,
Trá Lí,
Co. Chiarraí.

Kerry County Council,
County Buildings,
Tralee,
Co. Kerry.

Revenue Section
Kerry Co Council
Aras an Chontae
Tralee

11/08/2025 11:06:22

Receipt No. : CO/0/332649

Denis O Sullivan & Asso
Joyce House
Barrack Sq
Ballincollig,
Co. Cork
Ref: 606/25
Property: Countess, Killarney

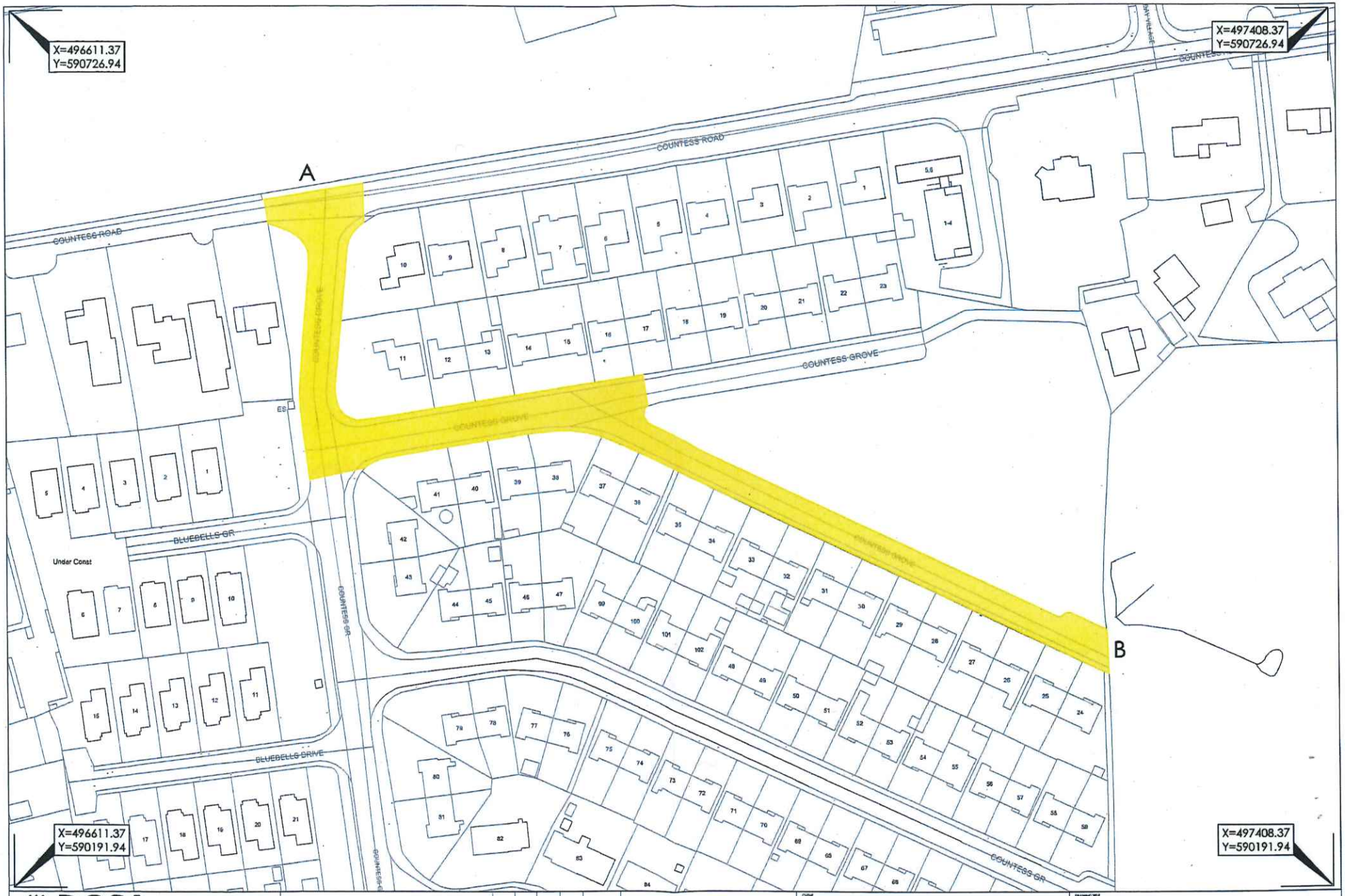
Roads & Service Queries		80.00
GOODS	80.00	
VAT Exempt/Non-vatable		

Total : 80.00 EUR

Tendered :
Cheque 80.00
aib
506267

Change : 0.00

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A	D.O'S.	L.O'T.	L.O'T.	06.08.'25	Issued For Information

CLIENT: Tadgh Twohig
PROJECT: Countess Road, Killarney, Co. Kerry
DRAWING TITLE: Taken In Charge Confirmation
SHEET: A3
SCALE: 1:1000
PROJECT NO: 7334
DRAWING NO: 1004
REVISION: A