Clifton Scannell Emerson Associates

Engineering Planning Report - Drainage & Water Services

VDC DUB11 SUBSTATION – KILCARBERRY

Client: Vantage Data Centers

Date: 14th October 2021

Job Number: 21_115

CONSULTING ENGINEERS

Civil Engineering | Structural Engineering | Transport Engineering | Environmental Engineering | Project Management | Health and Safety

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Project Number:	21_115
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1 Introduction

The following report is being submitted as part of the planning application for the Dub11 Substation in Profile Park, county Dublin. The report outlines the proposals for drainage services and water supply for the development.

1.1 Development Description

The proposed development primarily comprises the provision of two no. 110kV underground transmission lines and a 110kV Gas Insulated Switchgear (GIS) substation compound along with associated and ancillary works and is described as follows:

The proposed 110kV GIS Substation Compound is to be located on lands to the south of those that are subject of an application for 2 no. data centres under South Dublin County Council Reg. Ref. SD21A/0241 and to the south of Falcon Avenue within Profile Park, and within an overall landholding bound to the north by Falcon Avenue, Profile Park; to the west by Casement Road, Profile Park; and to the east and south by undeveloped lands; and partly by the Digital Reality complex to the south-east within Profile Park, Clondalkin, Dublin 22. The site of the proposed development has an area of c. 3.19 hectares.

The proposed 110kV Gas Insulated Switchgear (GIS) Substation Compound includes the provision of a two storey GIS Substation building (with a gross floor area of 1,477sqm) (known as the Kilcarbery Substation), three transformers with associated ancillary equipment and enclosures, a single storey Client Control Building (with a gross floor area of 51.5sqm), lightning masts, car parking, associated underground services and roads within a 2.6m high fenced compound and all associated construction and ancillary works.

One proposed underground single circuit 110kV transmission line will connect the proposed Kilcarbery 110kV GIS Substation to the existing 110kV Barnakyle Substation to the west. The proposed transmission line covers a distance of approximately 274m within the townlands of Aungierstown and Ballybane, and Kilbride and will pass under the internal road network within Profile Park to where it will connect into the Barnakyle substation.

One proposed underground single circuit 110kV transmission line will connect the proposed Kilcarbery 110kV GIS Substation to the existing 110kV underground Castlebaggot - Barnakyle circuit to the west within the Grange Castle South Business Park. The proposed transmission line covers a distance of approximately 492m within the townlands of Aungierstown and Ballybane, and Kilbride and will pass both under, and to the north of the internal road network within Profile Park and Grange Castle Business Park South where it will connect into the Castlebaggot - Barnakyle circuit at a proposed new joint bay.

The development includes the connections to the two substations (existing and proposed) as well as to the Castlebaggot - Barnakyle circuit, associated underground services, and all associated construction and ancillary works.

Figure 1: Schematic Layout of Proposed Development

2 Surface Water

2.1 Overview

The proposed surface water is designed in accordance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS). All surface water works including connections will be carried out in accordance with the Code of Practice for Development Works – Drainage.

The catchment area of the Substation Compound subject to this planning application comprises different proposed surface finishes as shown in Table 1 below:

Table 1 Proposed Catchment Surface Finish

Ground Finish	Area m^2
Road Hardstand	2,810
Roofs	894
Stone Fill & Gravel	1,060
Concrete Footpath	494
Transformers Concrete Base	5,718

The proposed connection point for positive drainage serving the 110kV GIS substation will be to the permitted manholes which are located in the road to the north, as shown in drawing No. 21_115-CSE-00-XX-DR-C-2110. The catchment area of the transformers will be excluded from discharge to the proposed surface water network and will be connected to the proposed foul network (this will be discussed further in Section 3). Asphalt/Tarmac strips for earthing purposes under the proposed masts and along fence lines will discharge to ground via the adjacent stone fill and gravel areas. As part of the design the area of stone has been maximised with Asphalt/Tarmac strips required as part of the earthing and step & touch safety design.

2.2 Existing Surface Water Network

The existing surface water infrastructure is to the north of the site. There is a 600mm diameter concrete pipe to the north west running east-west, and a 750mm diameter concrete pipe to the north east running west to east. Given the geometry of the site, it will not be possible to tie into the pipe to the north west as its invert level of 73.59m AOD is not deep enough. The proposed surface water will tie into the manhole to the north east of the site, at an invert level of 72.40m AOD. This surface water pipe ultimately discharges into the Griffeen River to the north of the site.

2.3 Proposed Surface Water Network

Surface Water proposals for the development have been developed to mimic the natural drainage patterns of the side and in accordance with the Best Management Practices (BMPs) of Sustainable Drainage Systems (SuDS). The site drainage proposals are shown on drawing 21_115-CSE-00-XX-DR-C-2110 as part of this planning application. A full drawing list is included in Section 5 of this report. The pipe network is designed in accordance with the requirement of t Table 6.4 of the Greater Dublin Strategic Drainage Study (GDSDS) – See Figure 2 below.

Parameter	Surface Water Sewers
Minimum depth	1.2m cover under highways 0.9m elsewhere
Maximum depth	Normally 5m
Minimum sewer size	225mm
Runoff factors for pipe sizing	100% paved and roof surfaces 0% off pervious surfaces
Rainfall for initial pipe sizing	50mm/hr rainfall intensity
Minimum velocity (pipe full)	1.0m/s
Flooding	Checks made for adequate protection * No flooding for return period less than 30 years except where explicitly planned Simulation modelling is required for sites greater than 24ha**
Roughness – ks	0.6mm

Figure 2: Extract from GDSDS – Pipe Design Criteria

The surface water proposals include measures to attenuate and provide extensive treatment of surface water prior to discharge from the site. The measures include silt traps, land drains and oil separators to ensure the highest quality of surface water discharge in both the construction and operation phase of the proposed development.

Water is collected off the roofs through downpipes which connect into 225mm diameter uPVC pipes. Water from the roads is collected through gullies and is connected to the same 225mm diameter pipe network. The water then passes through an underground concrete attenuation tank, before passing through a hydrodynamic solid separator, a proposed hydrobrake and a NSBE010 (or equivalent) silt and oil separator with a silt capacity of 1000 litres and an oil capacity of 150 litres. The use of an underground concrete tank has been proposed based on the restriction of levels and space on site. The tank is placed beneath the proposed roadway serving HGVs (including abnormal delivery and replacement of the proposed transformers which can weigh up to 100 Tonnes), and due to the invert levels of the existing surface water network, there will not be enough cover to enable the use of a Stormtech or similar SUDS system. We also note the site will be heavily congested with underground services linking the proposed GIS Substation, Transformers, Control Building including LV, MV and HV Ducting which limits the location for surface water services.

2.3.1 Water Volumes

It is proposed to limit the discharge from the development to Greenfield runoff rates. The Greenfield runoff rate from the site has been estimated using equations in the Flood Studies Report for the estimation of the mean annual flood, more commonly known as the $Q_{BARrural}$ calculation. Discharge from the site compound will be limited to the Greenfield runoff rate using a vortex flow control unit and surface water will be attenuated within an underground tank in the north of the compound. The attenuated volume has been calculated assuming a 90% runoff rate from the roadways, 100% from roofs and using rainfall data from Met Eireann for Dublin Airport for the 1 in 100 year storm. The rainfall data has been factored up by 10% to allow for climate change.

The calculations for the Greenfield runoff rates and the attenuation volume can be found in **Appendix B**. The required attenuation volume is 285m^3 and the attenuation volume provided within the underground tank is 320m^3.

The finished floor level of the GIS building is 75.70m and the high water level in the attenuation tank will be 74.60m.

3 Proposed Foul Water Drainage

3.1 Overview

The proposed foul water drainage network collects domestic foul water from the GIS building within the Substation Compound. In addition, we note the proposed transformers are bunded and rainfall which passes through the transformer bunds is collected in the foul water network, which passes through a treatment unit (see Section 3.3) before connecting to the main foul water network in accordance with section 17.1.4 of the Greater Dublin Regional code of Practice for Drainage Works.

The proposed foul water network connects to the existing drainage network via the foul manhole (Ø300mm pipe) in road to the north of the site. Suitable oil sensors are fitted to each of the transformer bunds and in the event of an oil leak from the transformers the discharge from the bund will be automatically restricted. The proposed oil detectors will be monitored and maintained and will be connected to a monitored BMS system for immediate action.

Should the local authority require the bunds to be connected to the surface water system this can be accommodated and we request this be conditioned by agreement with the Local Authority.

The proposed foul pipe network has pipe sizes of Ø100mm and Ø225mm. The gradient of these pipes is in accordance with Section 3.6 of the Irish Water Code of Practice IW-CDS-5030-03 (Revision 2 – 2020).

3.2 Existing Foul Network

The existing foul water network is to the north of the site. There is a 300mm diameter uPVC pipe in the southern sidewalk in the road to the north. This pipe flows to the east and is approximately 6m below the existing ground level.

3.3 Proposed Foul Network

Foul water flows from the WC and mess room in the GIS building in a 100mm diameter uPVC pipe at a slope of 1:60. This is designed according to the minimum requirements as set out in Part H for drainage. Flows from the transformer bunds join the network at manhole FMH-02 from which a 225mm diameter uPVC pipe flows to the tie in manhole to the north of the site.

3.4 Pollution Control Measures on Foul Water Network

An additional foul sewer is to be provided from the transformers to capture rainwater. The drainage from transformers will pass through a Full Retention Interceptor (Type NSFA010, 100 litres oil storage capacity; or equivalent) located downstream of Manhole FMH-2.2. Details of the full retention separator are provided in **Appendix C**. The transformers' bunds will provide surface water storage during the 1 in 30 year storm event prior to discharging into the foul main. Reference to Drawing No. 21_115-CSE-00-XX-DR-C-2120. Oil Sensors and shut off valves are are proposed to be provided in the event of an oil leak from the transformers which will be monitored and maintained as discussed above.

4 Proposed Water Supply

4.1 Overview

As noted in Section 1.3 of this report, a connection application has been submitted to Irish Water and has received a connection offer. It is proposed to take a 100mm connection from the external watermain to the north of the site. This main is to feed the GIS building on the site. Water demand calculations can be found in **Appendix A**.

4.2 Existing Watermain

The existing watermain is a 250mm diameter pipe to the north of the site.

4.3 Proposed Watermain

It is proposed to take a 100mm connection from the external watermain to serve the GIS building and Transformer Compound as shown on the attached drawings. We note that water demand is minimal for the development with a single toilet and tea station in the GIS Building.

5 Accompanied Information

5.1 Planning Drawings:

This report should be read in conjunction with the following planning drawings issued in support of this application:

Table 2 Planning Drawings list

Drawing Number	Title
21_115-CSE-00-XX-DR-C-1000	OVERALL SITE LOCATION PLAN
21_115-CSE-00-XX-DR-C-1200	PROPOSED OVERALL SITE LAYOUT PLAN
21_115-CSE-00-XX-DR-C-1210	PROPOSED OVERALL ROUTE LAYOUT PLAN
21_115-CSE-00-XX-DR-C-1220	PROPOSED 110kV ROUTE LAYOUT PLAN & SECTIONS-SHEET 1
21_115-CSE-00-XX-DR-C-1221	PROPOSED 110kV ROUTE LAYOUT PLAN & SECTIONS-SHEET 2
21_115-CSE-00-XX-DR-C-1222	PROPOSED 110kV ROUTE LAYOUT PLAN & SECTIONS-SHEET 3
21_115-CSE-00-XX-DR-C-2100	SITE LOCATION MAP
21_115-CSE-00-XX-DR-C-2101	PROPOSED SITE LAYOUT & SITE LEVELS
21_115-CSE-00-XX-DR-C-2102	PROPOSED SURFACE LAYOUT
21_115-CSE-00-XX-DR-C-2105	PROPOSED FENCING LAYOUT PLAN
21_115-CSE-00-XX-DR-C-2106	PROPOSED 16.5m ARTIC HGV AUTOTRACKING
21_115-CSE-00-XX-DR-C-2107	PROPOSED 10m HGV AUTOTRACKING
21_115-CSE-00-XX-DR-C-2109	PROPOSED CLIENT & SUBSTATION ENTRANCE SIGHT LINES
21_115-CSE-00-XX-DR-C-2110	PROPOSED & EXISTING SURFACE WATER DRAINAGE LAYOUT
21_115-CSE-00-XX-DR-C-2120	PROPOSED & EXISTING FOUL WATER DRAINAGE LAYOUT
21_115-CSE-00-XX-DR-C-2130	PROPOSED & EXISTING WATERMAIN LAYOUT
21_115-CSE-00-XX-DR-C-2200	PROPOSED GRID CONNECTION CABLE ROUTE
21_115-CSE-00-XX-DR-C-2201	PROPOSED RURAL SUPPLY CABLE ROUTE

5.2 Report Appendices

The report appendices are as listed below:

Table 3 Report Appendices

Appendix	Description
Appendix A	Irish Water Pre-Connection
Appendix B	Surface Water Microdrainage Calculations
Appendix C	Proposed Full Retention Separator

Appendix A: Irish Water Pre-Connection

Appendix B: Surface Water Infodrainage Calculations

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)
SMH-11	Manhole	703705.998	730498.847	75.436	1.46
SMH-10	Manhole	703709.615	730489.146	75.42	1.518
SMH-09	Manhole	703657.28	730468.735	75.42	1.919
SMH-08	Manhole	703650.98	730466.051	75.49	2.038
SMH-07	Manhole	703643.038	730486.536	75.46	2.165
SMH-06	Manhole	703656.983	730492.036	75.42	2.232
SMH-05	Manhole	703643.588	730525.868	75.41	2.482
SMH-04	Manhole	703648.72	730530.428	75.40	2.51
SMH-01	Manhole	703673.196	730540.177	75.30	2.598
SMH-03	Manhole	703671.017	730545.18	75.58	2.917
SMH-02	Manhole	703670.204	730547.409	75.48	2.834
PI	Manhole	703668.868	730550.562	75.43	2.903
SMH=01	Manhole	703658.271	730575.573	74.99	2.59

Name	Invert Level (m)	Chamber Shape	Diameter (m)	Manhole Locked
SMH-11	73.976	Circular	1.20	☐
SMH-10	73.902	Circular	1.20	☐
SMH-09	73.501	Circular	1.20	☐
SMH-08	73.452	Circular	1.20	☐
SMH-07	73.295	Circular	1.20	☐
SMH-06	73.188	Circular	1.20	☐
SMH-05	72.928	Circular	1.20	☐
SMH-04	72.89	Circular	1.20	☐
SMH-01	72.702	Circular	1.20	☐
SMH-03	72.663	Circular	1.20	☐
SMH-02	72.646	Circular	1.20	☐
PI	72.522	Circular	1.20	☐
SMH=01	72.40	Circular	1.20	☐

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

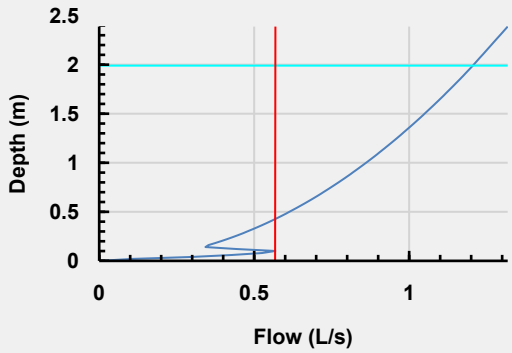
Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
SMH-11	Inlet (1)	Catchment Area	(None)	No Restriction
SMH-10	Inlet	P1.000 Catchment Area (1)	(None)	No Restriction
SMH-09	Inlet	P1.001 Catchment Area (3)	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
SMH-08	Inlet	P1.002 P2.000	(None)	No Restriction
	Inlet (1)	Catchment Area (9)	(None)	No Restriction
SMH-07	Inlet	P1.003 Catchment Area (8)	(None)	No Restriction
	Inlet (1)	Catchment Area (7)	(None)	No Restriction
SMH-06	Inlet	P1.004	(None)	No Restriction
	Inlet (1)	P3.000	(None)	No Restriction
	Inlet (2)	Catchment Area (6)	(None)	No Restriction
SMH-05	Inlet	P1.005 Catchment Area (12) Catchment Area (15) Catchment Area (20)	(None)	No Restriction
	Inlet (1)	P4.000 Catchment Area (11) Catchment Area (14) Catchment Area (13)	(None)	No Restriction
	Inlet (2)	Catchment Area (17)	(None)	No Restriction
SMH-04	Inlet	P1.007 Catchment Area (21)	(None)	No Restriction
	Inlet (2)	Catchment Area (19)	(None)	No Restriction
SMH-01	Inlet	P1.008	(None)	No Restriction
	Inlet (1)	Catchment Area (18) Catchment Area (22)	(None)	No Restriction
SMH-03	Inlet	P1.009	(None)	No Restriction
SMH-02	Inlet	P1.010	(None)	No Restriction
PI	Inlet	P1.011	(None)	No Restriction
SMH=01	Inlet	P1.012	(None)	No Restriction

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
SMH-11	Outlet	P1.000	Free Discharge
SMH-10	Outlet	P1.001	Free Discharge
SMH-09	Outlet	P1.002	Free Discharge
SMH-08	Outlet	P1.003	Free Discharge
SMH-07	Outlet	P1.004	Free Discharge
SMH-06	Outlet	P1.005	Free Discharge
SMH-05	Outlet	P1.006	Free Discharge
SMH-04	Outlet	P1.008	Free Discharge
SMH-01	Outlet	P1.009	Free Discharge
SMH-03	Outlet	P1.010	Free Discharge
SMH-02	Outlet	P1.011	Hydro-Brake®
	Invert Level (m)	72.65	
	Design Depth (m)	1.99	
	Design Flow (L/s)	1.2	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☐	
	Unit Reference	CHE-0042-1200-1990-1200	
PI	Outlet	P1.012	Free Discharge



Tank

Type : Tank

Dimensions

Exceedence Level (m)	75.40
Depth (m)	2.51
Base Level (m)	72.89
Freeboard (mm)	800
Initial Depth (m)	0.00
Porosity (%)	100
Average Slope (1:x)	0.00
Total Volume (m³)	326.039

Depth (m)	Area (m²)	Volume (m³)
0.000	190.666066	0.000
2.493	190.666066	475.331

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	P1.006
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	P1.007
Outlet Type	Free Discharge

Advanced

Perimeter	Square
Length (m)	19.01

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Connections Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Name	Length (m)	Connection Type	Slope (1:x)	Manning's n	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)	Downstream Cover Level (m)
P1.000	10.35	Pipe	140.000	0.013	225	75.436	73.976	75.42
P1.001	56.17	Pipe	140.000	0.013	225	75.420	73.902	75.42
P1.002	6.85	Pipe	140.000	0.013	225	75.420	73.501	75.49
Branch: P2.000								
P2.000	16.92	Pipe	75.865	0.013	225	75.590	73.710	75.49
P1.003	21.97	Pipe	140.000	0.013	225	75.490	73.452	75.46
P1.004	14.99	Pipe	140.000	0.013	225	75.460	73.295	75.42
Branch: P3.000								
P3.000	50.18	Pipe	110.277	0.013	225	75.385	73.660	75.42
P1.005	36.39	Pipe	140.000	0.013	225	75.420	73.188	75.41
Branch: P4.000								
P4.000	30.13	Pipe	95.635	0.013	225	75.770	73.243	75.41
P1.006	2.92	Pipe	140.000	0.013	225	75.410	72.928	75.40
P1.007	2.37	Pipe	140.000	0.013	225	75.400	72.907	75.40
P1.008	26.35	Pipe	140.000	0.013	225	75.400	72.890	75.30
P1.009	5.46	Pipe	140.000	0.013	225	75.300	72.702	75.58
P1.010	2.37	Pipe	140.000	0.013	225	75.580	72.663	75.48
P1.011	3.42	Pipe	140.000	0.013	225	75.480	72.646	75.43
P1.012	27.16	Pipe	222.649	0.013	225	75.425	72.522	74.99

Name	Downstream Invert Level (m)	Flow Restriction (L/s)
P1.000	73.902	
P1.001	73.501	
P1.002	73.452	
Branch: P2.000		
P2.000	73.487	
P1.003	73.295	
P1.004	73.188	
Branch: P3.000		
P3.000	73.205	
P1.005	72.928	
Branch: P4.000		
P4.000	72.928	
P1.006	72.907	
P1.007	72.890	
P1.008	72.702	
P1.009	72.663	
P1.010	72.646	
P1.011	72.622	1.3
P1.012	72.400	

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SMH-11	75.436 73.976	Diameter / Length: 1.20					Manhole - Access not Required
E:703705.998 N:730498.847	1.46		{a} P1.000	Pipe	73.98	Diam/Width:225	Not Applicable
SMH-10	75.42 73.902	Diameter / Length: 1.20	{1} P1.000	Pipe	73.90	Diam/Width:225	Manhole - Access not Required
E:703709.615 N:730489.146	1.518		{a} P1.001	Pipe	73.90	Diam/Width:225	Not Applicable
SMH-09	75.42 73.501	Diameter / Length: 1.20	{1} P1.001	Pipe	73.50	Diam/Width:225	Manhole - Access not Required
E:703657.28 N:730468.735	1.919		{a} P1.002	Pipe	73.50	Diam/Width:225	Not Applicable
SMH-08	75.49 73.452	Diameter / Length: 1.20	{1} P1.002 {2} P2.000	Pipe Pipe	73.45 73.49	Diam/Width:225 Diam/Width:225	Manhole - Access not Required
E:703650.98 N:730466.051	2.038		{a} P1.003	Pipe	73.45	Diam/Width:225	Not Applicable
SMH-07	75.46 73.295	Diameter / Length: 1.20	{1} P1.003	Pipe	73.29	Diam/Width:225	Manhole - Access not Required
E:703643.038 N:730486.536	2.165		{a} P1.004	Pipe	73.29	Diam/Width:225	Not Applicable

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SMH-06	75.42 73.188	Diameter / Length: 1.20	{1} P1.004	Pipe	73.19	Diam/Width:225	Manhole - Access not Required
E:703656.983 N:730492.036	2.232		{2} P3.000	Pipe	73.21	Diam/Width:225	
			{a} P1.005	Pipe	73.19	Diam/Width:225	Not Applicable
SMH-05	75.41 72.928	Diameter / Length: 1.20	{1} P1.005	Pipe	72.93	Diam/Width:225	Manhole - Access not Required
E:703643.588 N:730525.868	2.482		{2} P4.000	Pipe	72.93	Diam/Width:225	
			{a} P1.006	Pipe	72.93	Diam/Width:225	Not Applicable
SMH-04	75.40 72.89	Diameter / Length: 1.20	{1} P1.007	Pipe	72.89	Diam/Width:225	Manhole - Access not Required
E:703648.72 N:730530.428	2.51		{a} P1.008	Pipe	72.89	Diam/Width:225	Not Applicable
SMH-01	75.30 72.702	Diameter / Length: 1.20	{1} P1.008	Pipe	72.70	Diam/Width:225	Manhole - Access not Required
E:703673.196 N:730540.177	2.598		{a} P1.009	Pipe	72.70	Diam/Width:225	Not Applicable

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Manhole Schedule Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Name	Cover Level (m) Invert Level (m)	Manhole Size (m)	Connection Details				Type
Coordinates (m)	Depth (m)		Incoming Connections	Connection Type	Connection Invert (m)	Connection Size (mm)	Junction Type
			Outgoing Connections				Cover
SMH-03	75.58 72.663	Diameter / Length: 1.20	{1} P1.009	Pipe	72.66	Diam/Width:225	Manhole - Access not Required
E:703671.017 N:730545.18	2.917		{a} P1.010	Pipe	72.66	Diam/Width:225	Not Applicable
SMH-02	75.48 72.646	Diameter / Length: 1.20	{1} P1.010	Pipe	72.65	Diam/Width:225	Manhole - Access not Required
E:703670.204 N:730547.409	2.834		{a} P1.011	Pipe	72.65	Diam/Width:225	Not Applicable
PI	75.43 72.522	Diameter / Length: 1.20	{1} P1.011	Pipe	72.62	Diam/Width:225	Manhole - Access not Required
E:703668.868 N:730550.562	2.903		{a} P1.012	Pipe	72.52	Diam/Width:225	Not Applicable
SMH=01	74.99 72.40	Diameter / Length: 1.20	{1} P1.012	Pipe	72.40	Diam/Width:225	Manhole - Access not Required
E:703658.271 N:730575.573	2.59						Not Applicable

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: SW drainage Flow Path: Flow Path	Company Address:		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (km²)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (km²)
Catchment Area	SMH-11		Time of Concentration	0.00027	100	0	100	0.00027
Catchment Area (1)	SMH-10		Time of Concentration	0.00014	90	0	90	0.00013
Catchment Area (3)	SMH-09		Time of Concentration	0.00027	100	0	100	0.00027
Catchment Area (2)	SMH-09		Time of Concentration	0.00049	90	0	90	0.00044
Branch: P2.000								
Catchment Area (10)	SMH-7.1		Time of Concentration	0.00004	90	0	90	0.00004
Catchment Area (9)	SMH-08		Time of Concentration	0.00041	90	0	90	0.00037
Catchment Area (8)	SMH-07		Time of Concentration	0.00031	100	0	100	0.00031
Catchment Area (7)	SMH-07		Time of Concentration	0.00024	90	0	90	0.00022
Branch: P3.000								
Catchment Area (5)	SMH-6.1		Time of Concentration	0.00038	90	0	90	0.00034
Catchment Area (4)	SMH-6.1		Time of Concentration	0.00028	100	0	100	0.00028
Catchment Area (6)	SMH-06		Time of Concentration	0.00024	90	0	90	0.00022
Branch: P4.000								
Catchment Area (16)	SMH-5.1		Time of Concentration	0.00011	90	0	90	0.00010
Catchment Area (12)	SMH-05		Time of Concentration	0.00059	50	0	50	0.00030
Catchment Area (15)	SMH-05		Time of Concentration	0.00046	100	0	100	0.00046
Catchment Area (20)	SMH-05		Time of Concentration	0.00019	50	0	50	0.00010
Catchment Area (11)	SMH-05		Time of Concentration	0.00018	90	0	90	0.00017
Catchment Area (14)	SMH-05		Time of Concentration	0.00016	100	0	100	0.00016
Catchment Area (13)	SMH-05		Time of Concentration	0.00004	50	0	50	0.00002
Catchment Area (17)	SMH-05		Time of Concentration	0.00034	90	0	90	0.00031
Catchment Area (21)	SMH-04		Time of Concentration	0.00012	50	0	50	0.00006
Catchment Area (19)	SMH-04		Time of Concentration	0.00005	90	0	90	0.00004
Catchment Area (18)	SMH-01		Time of Concentration	0.00019	90	0	90	0.00017
Catchment Area (22)	SMH-01		Time of Concentration	0.00012	50	0	50	0.00006
TOTAL		**0.0**		**0.00564**				**0.00482**

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Network Design Criteria Storm Phase: SW drainage	Company Address:		

Flow Options

Peak Flow Calculation	Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Level	Level Inverts
Min. Cover Depth (m)	1.20
Min. Slope (1:x)	1000.00
Max. Slope (1:x)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☑
Reduce Channel Depths	☑

Pipe Size Library

Default

Add. Increment (mm)	75

Diameter (mm)	Min. Slope (1:x)	Max. Slope (1:x)
100	0.00	0.00
150	0.00	0.00

Manhole Options

Apply Offset	☐
Synchronise Manhole Invert Levels	☑

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Outfall Details Storm Phase: SW drainage	Company Address:		

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
SMH=01	Free Discharge		

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Title: Rainfall Analysis Criteria	Company Address:		

Runoff Type	Dynamic
Output Interval (mins)	1
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform First Flush Analysis	☐

Rainfall

FSR

Type: FSR

Region	Scotland and Ireland
M5-60 (mm)	17.0
Ratio R	0.300
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
1.0	0
30.0	0
100.0	10

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880
2880	5760

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Title: UK and Ireland Rural Runoff Calculator	Company Address:		

ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (km²)	0.006
SAAR (mm)	775.0
Soil	0.3
Region	Ireland Greater Dublin
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Ireland Greater Dublin	1.2	1.2	1.0	2.6	3.2

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: SW drainage	Company Address:		

Critical Storm

Inflow	Storm Event	Inflow Area (km^2)	Max. Inflow (L/s)	Total Inflow (m^3)
Catchment Area	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	10.2	4.736
Catchment Area (1)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	4.9	2.282
Catchment Area (2)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	16.8	7.778
Catchment Area (3)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	10.3	4.777
Catchment Area (4)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	10.7	4.968
Catchment Area (5)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	13.1	6.074
Catchment Area (6)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	8.4	3.876
Catchment Area (7)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	8.3	3.846
Catchment Area (8)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	11.7	5.426
Catchment Area (9)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	14.2	6.574
Catchment Area (10)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	1.4	0.658
Catchment Area (11)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	6.3	2.924
Catchment Area (12)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	11.4	5.253
Catchment Area (13)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	0.8	0.360
Catchment Area (14)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	6.1	2.814
Catchment Area (15)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	17.8	8.241
Catchment Area (16)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	3.7	1.723
Catchment Area (17)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	11.9	5.493
Catchment Area (18)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	6.4	2.963
Catchment Area (19)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	1.7	0.775

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: SW drainage	Company Address:		

Catchment Area (20)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	3.7	1.690
Catchment Area (21)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	2.3	1.080
Catchment Area (22)	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	0.00	2.4	1.105

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: SW drainage	Company Address:		

Critical Storm

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: SW drainage	Company Address:		

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
SMH-11	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.44	73.98	74.86	0.88	12.9	1.001	0.000	9.4	4.917	Surcharged
SMH-10	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.42	73.90	74.86	0.96	17.1	1.083	0.000	14.1	7.708	Surcharged
SMH-09	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.42	73.50	74.83	1.33	35.5	1.501	0.000	28.3	20.131	Surcharged
SMH-08	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.49	73.45	74.80	1.35	41.6	1.523	0.000	38.7	27.955	Surcharged
SMH-07	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.46	73.30	74.64	1.35	48.7	1.525	0.000	50.1	36.055	Surcharged
SMH-06	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.42	73.19	74.46	1.27	71.3	1.433	0.000	72.1	50.240	Surcharged
SMH-05	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.41	72.93	74.39	1.46	5.7	1.649	0.000	5.7	408.590	Surcharged
SMH-04	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.40	72.89	74.39	1.50	1.1	1.692	0.000	1.1	287.393	Surcharged
SMH-01	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.30	72.70	74.39	1.68	1.1	1.905	0.000	1.1	306.739	Surcharged
SMH-03	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.58	72.66	74.39	1.72	1.1	1.949	0.000	1.1	305.608	Surcharged
SMH-02	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.48	72.65	74.39	1.74	1.1	1.968	0.000	1.1	304.432	Surcharged
SMH=01	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	74.99	72.40	72.43	0.03	1.1	0.000	0.000	1.1	304.342	OK
SMH-5.1	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.77	73.24	74.39	1.14	0.1	1.293	0.000	0.1	8.137	Surcharged
SMH-6.1	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.39	73.66	74.53	0.87	23.9	0.987	0.000	19.1	10.861	Surcharged
SMH-7.1	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	75.59	73.71	74.80	1.09	15.3	1.233	0.000	5.1	1.824	Surcharged
PI	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	75.43	72.52	72.55	0.03	1.1	0.034	0.000	1.1	304.342	OK

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: SW drainage	Company Address:		

Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Tank	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	74.39	74.39	1.50	1.50	5.7	285.254	0.000	0.000	1.1	279.117	13	OK

VDC Dub11 Substation Kilcarberry:	Date: 08/12/2021		
	Designed by: DAB	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: SW drainage	Company Address:		

Critical Storm

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
P1.000	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-11	SMH-10	75.4	74.86	0.22	4.751	0.7	0.25	9.4	Surcharged
P1.001	FSR: 100 years: Increase Rainfall (%): +10: 30 mins: Summer	Pipe	SMH-10	SMH-09	75.4	74.68	0.22	8.509	0.4	0.39	14.7	Surcharged
P1.002	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-09	SMH-08	75.4	74.83	0.22	19.587	0.8	0.75	28.3	Surcharged
P1.003	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-08	SMH-07	75.5	74.80	0.22	26.820	1.0	1.02	38.7	Surcharged
P1.004	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-07	SMH-06	75.5	74.64	0.22	36.055	1.3	1.32	50.1	Surcharged
P1.005	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-06	SMH-05	75.4	74.46	0.22	50.031	1.8	1.9	72.1	Surcharged
P1.008	FSR: 30 years: Increase Rainfall (%): +0: 30 mins: Summer	Pipe	SMH-04	SMH-01	75.4	73.23	0.22	1.424	0.2	0.16	6.2	Surcharged
P1.009	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Summer	Pipe	SMH-01	SMH-03	75.3	73.25	0.22	2.504	0.4	0.16	5.9	Surcharged

P1.010	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Summer	Pipe	SMH-03	SMH-02	75.6	73.25	0.22	1.661	0.5	0.08	3.0	Surcharged
P4.000	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Summer	Pipe	SMH-5.1	SMH-05	75.8	73.53	0.22	1.526	0.1	0.11	4.9	Surcharged
P3.000	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Summer	Pipe	SMH-6.1	SMH-06	75.4	74.40	0.22	9.674	0.5	0.45	19.5	Surcharged
P2.000	FSR: 30 years: Increase Rainfall (%): +0: 15 mins: Winter	Pipe	SMH-7.1	SMH-08	75.6	74.05	0.22	0.474	0.2	0.11	5.5	Surcharged
P1.006	FSR: 100 years: Increase Rainfall (%): +10: 15 mins: Winter	Pipe	SMH-05	Tank	75.4	73.56	0.22	76.100	3.0	3.18	120.6	Surcharged
P1.007	FSR: 1 years: Increase Rainfall (%): +0: 15 mins: Winter	Pipe	Tank	SMH-04	75.4	73.01	0.11	1.420	0.6	0.16	6.1	OK
P1.011	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	Pipe	SMH-02	PI	75.5	74.39	0.03	304.405	0.4	0.03	1.1	Surcharged
P1.012	FSR: 100 years: Increase Rainfall (%): +10: 2880 mins: Winter	Pipe	PI	SMH=01	75.4	72.55	0.03	304.342	0.4	0.04	1.1	OK

Appendix C: Proposed Full Retention Separator

Full Retention NSF RANGE

APPLICATION

Full retention separators are used in high risk spillage areas such as:

- Fuel distribution depots.
- Vehicle workshops.
- Scrap Yards

PERFORMANCE

Kingspan Klargester were the first UK manufacturer to have the required range (3-30 l/sec) certified to EN 858-1 in the UK. The NSF number denotes the flow at which the separator operates.

The British Standards Institute (BSI) have witnessed the performance tests of the required range of separators and have certified their performance, in relation to their flow and process performance to ensure that they met the effluent quality requirements of EN 858-1. Larger separator designs have been determined using the formulas extrapolated from the test range.

Each full retention separator design includes the necessary volume requirements for:

- Oil separation capacity.
- Silt storage capacity.
- Automatic closure device.
- Oil storage volume.
- Coalescer (Class I units only).

Klargester full retention separators treat the whole of the specified flow.

FEATURES

- Light and easy to install.
- Class I and Class II designs.
- 3-30 l/sec range independently tested and performance sampled, certified by the BSI.
- Inclusive of silt storage volume.
- Fitted inlet/outlet connectors.

- Oil alarm system available.
- Vent points within necks.
- Extension access shafts for deep inverts.
- Maintenance from ground level.
- GRP or rotomoulded construction (subject to model).

To specify a nominal size full retention separator, the following information is needed:-

- The calculated flow rate for the drainage area served. Our designs are based on the assumption that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the influent is not pumped.
- The required discharge standard. This will decide whether a Class I or Class II unit is required.
- The drain invert inlet depth.
- Pipework type, size and orientation.

SIZES AND SPECIFICATIONS

UNIT NOMINAL SIZE	FLOW (l/s)	DRAINAGE AREA (m^2) PPG-3 (0.018)	STORAGE CAPACITY (litres) SILT	OIL	UNIT LENGTH (mm)	UNIT DIA. (mm)	BASE TO INLET INVERT (mm)	BASE TO OUTLET INVERT	MIN. INLET INLET (mm)	STANDARD PIPEWORK DIA. (mm)
NSFP003	3	170	300	30	1700	1350	1420	1345	500	160
NSFP006	6	335	600	60	1700	1350	1420	1345	500	160
NSFA010	10	555	1000	100	2610	1225	1050	1000	500	200
NSFA015	15	835	1500	150	3910	1225	1050	1000	500	200
NSFA020	20	1115	2000	200	3200	2010	1810	1760	1000	315
NSFA030	30	1670	3000	300	3915	2010	1810	1760	1000	315
NSFA040	40	2225	4000	400	4640	2010	1810	1760	1000	315
NSFA050	50	2780	5000	500	5425	2010	1810	1760	1000	315
NSFA065	65	3610	6500	650	6850	2010	1810	1760	1000	315
NSFA080	80	4445	8000	800	5744	2820	2500	2450	1000	300
NSFA100	100	5560	10000	1000	6200	2820	2500	2450	1000	400
NSFA125	125	6945	12500	1250	7365	2820	2500	2450	1000	450
NSFA150	150	8335	15000	1500	8675	2820	2550	2450	1000	525
NSFA175	175	9725	17500	1750	9975	2820	2550	2450	1000	525
NSFA200	200	11110	20000	2000	11280	2820	2550	2450	1000	600

Rotomoulded chamber construction GRP chamber construction

Full Retention Separators

NSF RANGE

Kingspan NSF range achieved on average <1mg/l under EN 858-1 testing conditions

Performance

Kingspan were the first UK manufacturer to have the required range (3-30 l sec) certified to BS EN 858-1 in the UK. The NSF number denotes the flow at which the separator operates. The British Standards Institute (BSI) have witnessed the performance tests of the required range of separators and have certified their performance, in relation to their flow and process performance to ensure that they meet the effluent quality requirements of BS EN 858-1. Larger separator designs have been determined using the formulas extrapolated from the test range.

Each full retention separator design includes the necessary volume requirements for:

- Oil separation capacity
- Oil storage volume
- Silt storage capacity
- Coalescer (Class I units only)
- Automatic closure device.

Kingspan full retention separators treat the whole of the specified flow.

Features

- Light and easy to install
- 3-30 l/sec range independently tested and performance sampled, certified by the BSI
- Inclusive of silt storage volume
- Fitted inlet/outlet connectors
- Oil alarm system available
- Vent points within necks
- Extension access shafts for deep inverts
- Maintenance from ground level
- GRP or rotomoulded construction (subject to model)

To specify a nominal size full retention separator, the following information is needed:

- The calculated flow rate for the drainage area served. Our designs are based on the assumptions that any interconnecting pipework fitted elsewhere on site does not impede flow into or out of the separator and that the influent is not pumped
- The required discharge standard
- The drain invert inlet depth
- Pipework type, size and orientation.

Technical Specifications

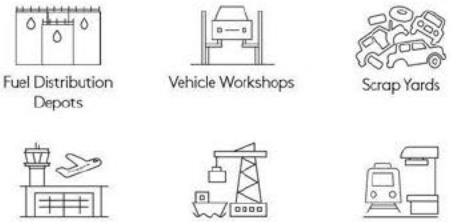
Unit Nominal Size	Flow (l/s)	Drainage Area (m²) PPG3 (0.018)	Storage Capacity (Ltrs)		Maximum Total Capacity (litres)	Length (mm)	Unit Dia. (mm)	Base to Inlet Invert (mm)	Base to Outlet Invert (mm	Min. Inlet Invert (mm)	Standard Pipework Dia. (mm)	No. of Coalescer Assemblies
			Silt	Oil								
NSFA210	210	11,667	21,000	2100	59,060	11,991	2820	2550	2450	1000	600	5
NSFA225	225	12,500	22,500	2250	63,000	12,760	2820	2550	2450	1000	600	5
NSFA240	240	13,333	24,000	2400	67,000	13,527	2820	2550	2450	1000	600	5
NSFA255	255	14,167	25,500	2550	71,000	14,295	2820	2550	2450	1000	600	6
NSFA270	270	15,000	27,000	2700	75,000	15,065	2820	2550	2450	1000	600	6
NSFA285	285	15,833	28,500	2850	79,000	15,833	2820	2550	2450	1000	600	6

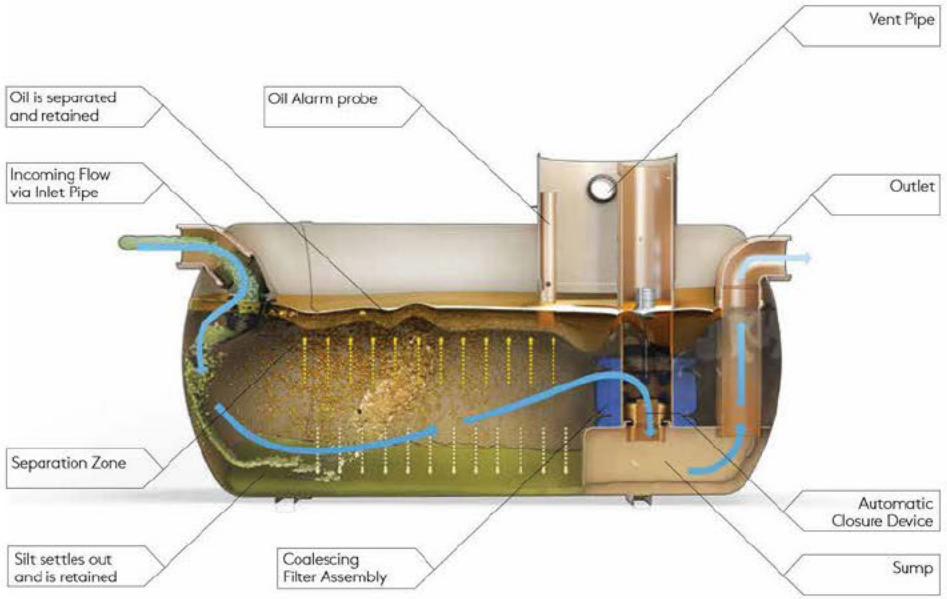
Model Reference	Flow (l/s)	Drainage Area (m2) PPG-3 (0.018)	Storage Capacity (Ltrs)		Length (mm)	Diameter (mm)	Manhole Cover Dimensions (mm)	Base Inlet Invert (mm)	Base to Outlet Invert (mm)	Min Inlet Invert (mm)	Standard Pipework Diameter (mm)
			Silt	Oil							
Polyethylene Chamber Construction											
NSFP003	3	170	300	30	1700	1350	600	1410	1335	550	160
NSFP006	6	335	600	60	1700	1350	600	1410	1335	550	160
GRP Chamber Construction											
NSFA010	10	555	1000	100	2610	1225	600	1050	1000	500	200
NSFA015	15	835	1500	150	3910	1225	600	1050	1000	1000	200
NSFA020	20	1115	2000	200	3200	2010	600	1810	1760	1000	315
NSFA030	30	1670	3000	300	3915	2010	600	1810	1760	1000	315
NSFA040	40	2225	4000	400	4640	2010	600	1810	1760	1000	315
NSFA050	50	2780	5000	500	5425	2010	600	1810	1760	1000	315
NSFA065	65	3160	6500	650	6850	2010	600	1810	1760	1000	315
NSFA080	80	4445	8000	800	5744	2820	600	2500	2450	1000	315
NSFA100	100	5560	10000	1000	6200	2820	600	2500	2450	1000	400
NSFA125	125	6945	12500	1250	7365	2820	600	2500	2450	1000	450
NSFA150	150	8335	15000	1500	8675	2820	600	2500	2450	1000	525
NSFA175	175	9725	17500	1750	9975	2820	600	2500	2450	1000	525
NSFA200	200	11110	20000	2000	11,280	2820	600	2500	2450	1000	600

** Systems to cater for larger flow rates are available on request. Email water-ME@kingspan.com for further information*
** Some units have more than one access shaft – diameter of largest shown.*

Applications

Full retention separators are used in high risk spillage areas such as:





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