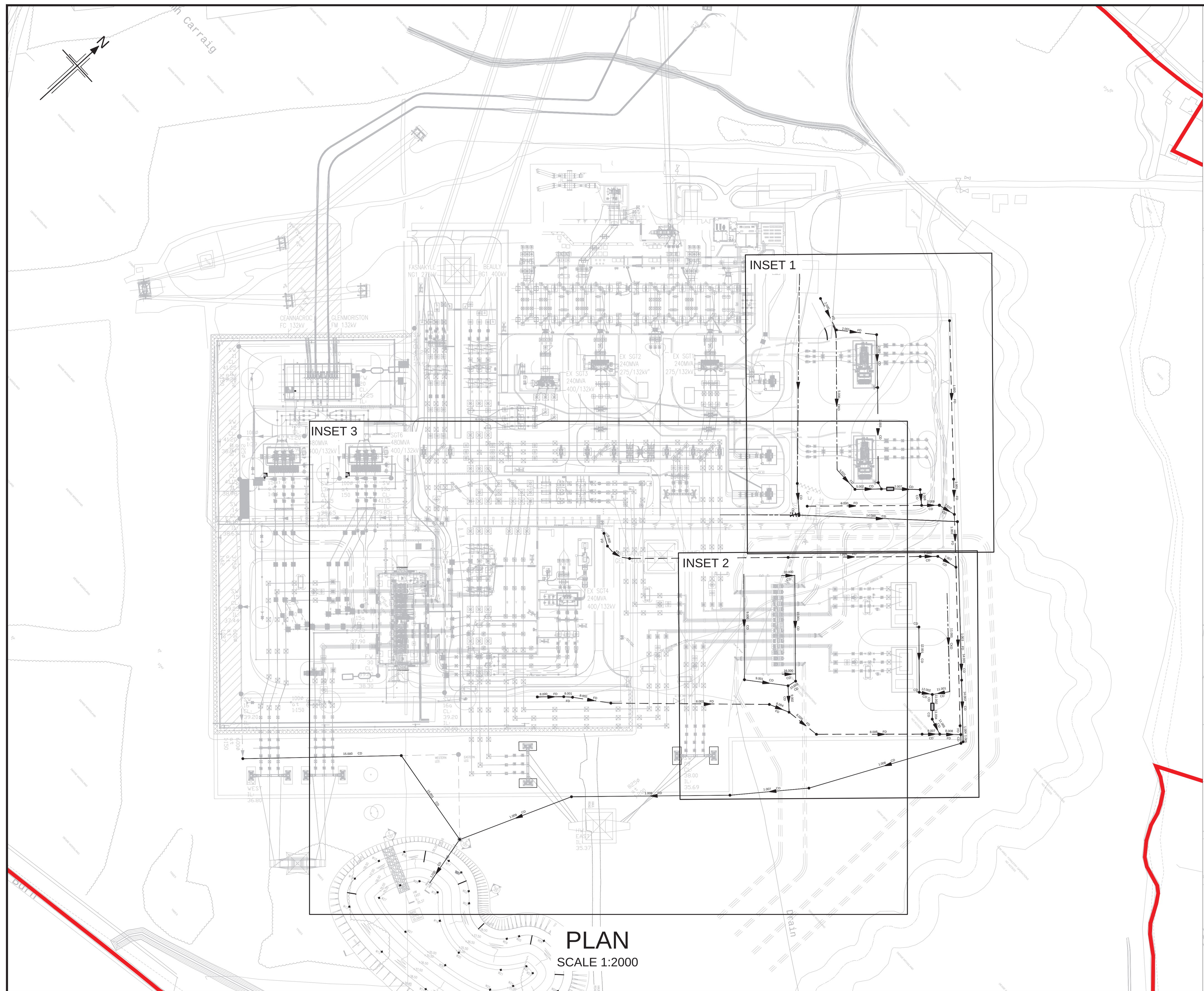
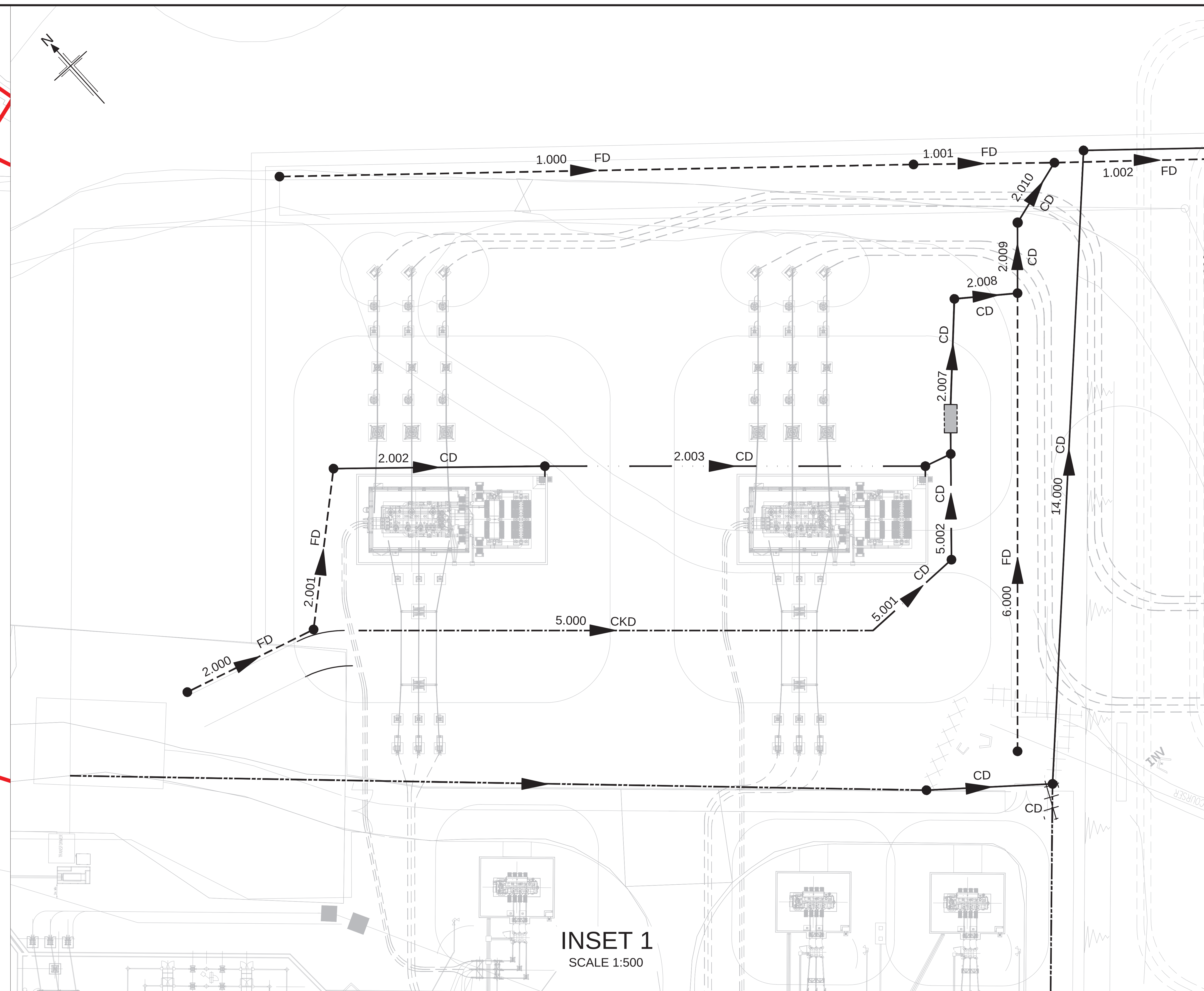
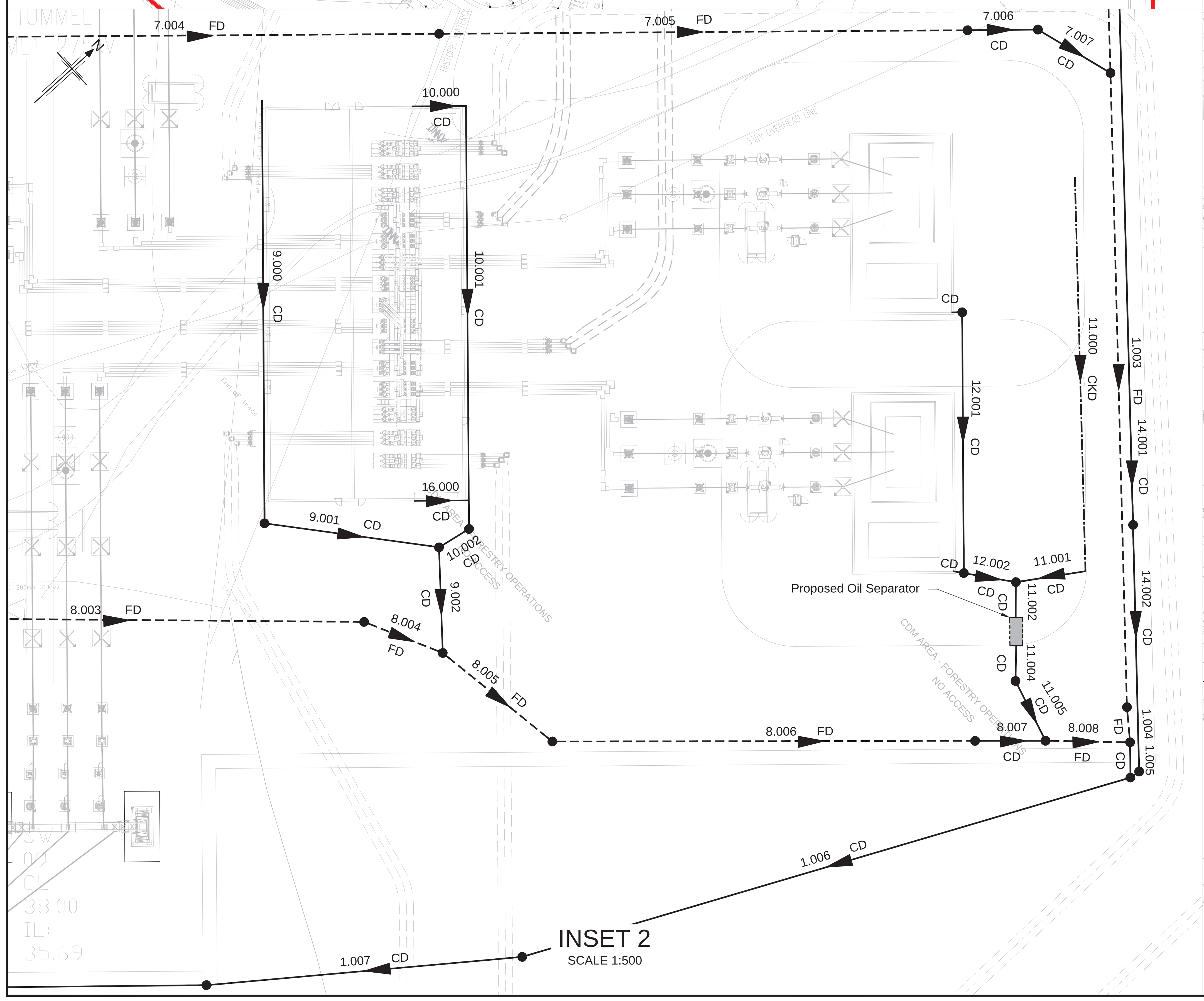
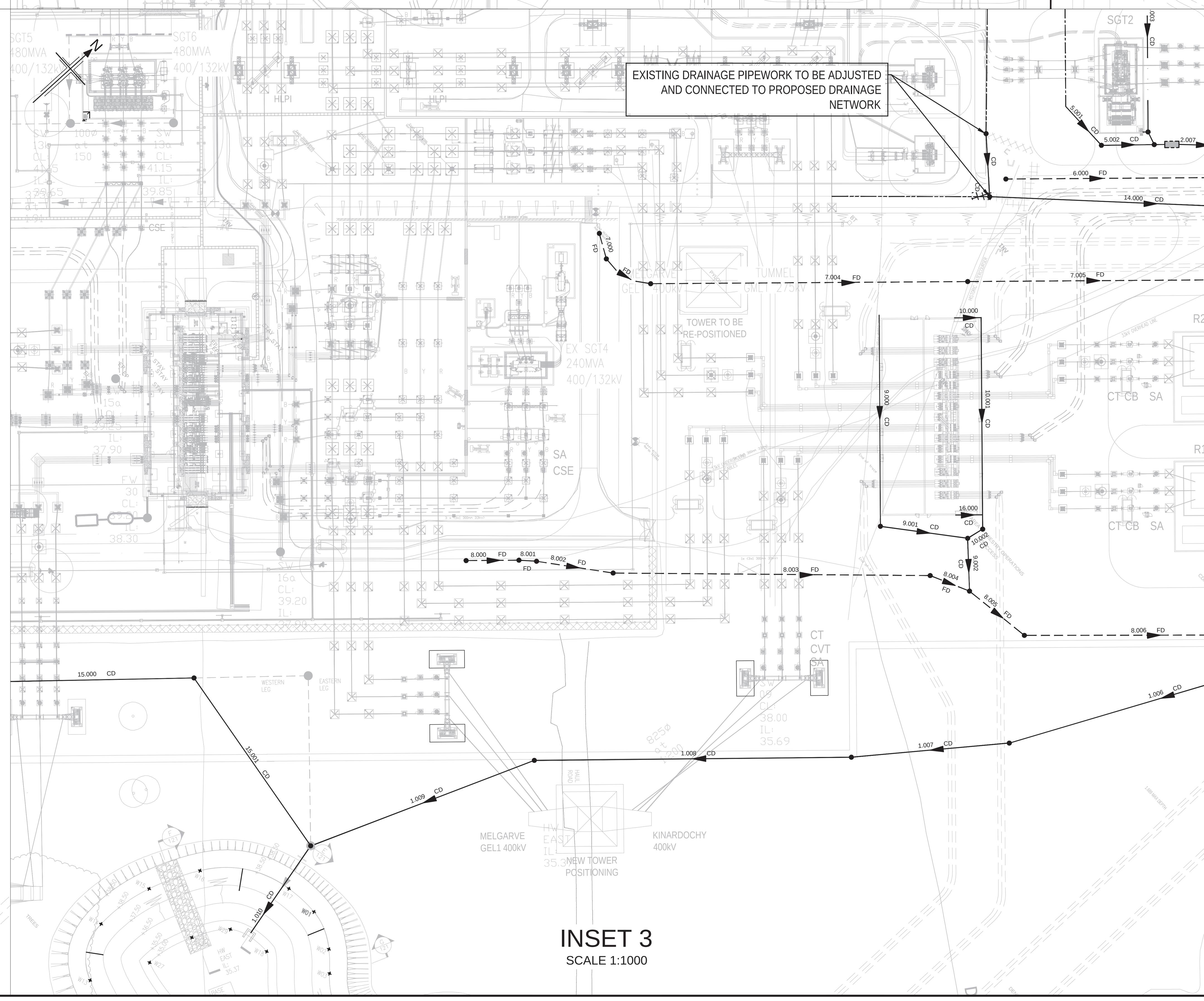
Appendix B. Indicative Surface Water Drainage Layout and Pipe Schedule









Legend:

- FD — Proposed Filter Drain (FD)
- CD — Proposed Carrier Drain (CD)
- CKD — Proposed Combined Kerb Drain (CKD)
- Oily Water Drainage
- Existing Drainage
- Chamber
- Oil Separator

Notes:

Please refer to drainage schedule for pipe sizing.

Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd
P01	2023-10-26	FIRST ISSUE	AW	RH	GD	MD

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95 Bothwell Street, Glasgow, G2 7HX
Tel:+44 (0) 141 243 8000 Fax:+44(0)141 226 3109
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Client
Scottish & Southern Electricity Networks
TRANSMISSION

Project
FORT AUGUSTUS SUBSTATION
PLATFOM PLATFORM EXTENSION

Drawing title
INDICATIVE SURFACE WATER DRAINAGE LAYOUT SHEET 1 OF 1

Drawing status	FOR INFORMATION	Suitability	
Scale	AS SHOWN	DO NOT SCALE	
Jacobs No.	B2413736	Rev	
Client No.	N/A	P01	

Drawing number
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Fort Augustus Substation Extension (LT519) - Surface Water Drainage Pipe Schedule

Pipe Number	Pipe Type	Pipe DIA (mm)	Pipe Length (m)	Fall (m)	Slope (1:X)	US/IL (m)	DS/IL (m)	US/CL (m)	US D.Depth (m)	Comments
1.000	Filter Drain	225	90.000	0.892	100.9	40.128	39.236	41.553	1.200	
1.001	Filter Drain	225	20.000	0.132	151.4	39.236	39.104	40.661	1.200	
2.000	Filter Drain	150	20.000	0.263	76.1	39.850	39.587	41.200	1.200	
2.001	Carrier Drain	150	23.000	0.231	99.6	39.587	39.356	41.200	1.463	
2.002	Carrier Drain	150	30.000	0.301	99.6	39.356	39.055	41.159	1.653	
3.000	Carrier Drain	150	1.500	0.016	94.6	39.812	39.797	41.162	1.200	Oily Water Drainage
2.003	Carrier Drain	225	54.000	0.321	168.2	38.980	38.659	41.147	1.942	Oily Water Drainage
4.000	Carrier Drain	150	1.500	0.015	98.9	39.684	39.668	41.034	1.200	Oily Water Drainage
2.004	Carrier Drain	225	4.000	0.046	86.3	38.659	38.612	41.021	2.137	Oily Water Drainage
5.000	Combined Kerb Drain	150	73.000	0.817	89.4	39.840	39.023	41.190	1.200	ACO KerbDrain or Similar
5.001	Carrier Drain	150	15.000	0.168	89.4	39.023	38.855	41.209	2.037	Oily Water Drainage
5.002	Carrier Drain	150	15.000	0.168	89.4	38.855	38.687	41.115	2.110	Oily Water Drainage
2.005	Carrier Drain	300	3.000	0.012	250.0	38.537	38.525	40.986	2.149	Oily Water Drainage
2.006	Oil Separator		4.015	0.017	236.2	38.525	38.508	40.960	2.135	Pipe 2.006 has been modelled as a tank between MH9 and MH10
2.007	Carrier Drain	300	15.000	0.062	241.9	38.508	38.446	40.926	2.118	
2.008	Carrier Drain	300	9.000	0.037	243.2	38.446	38.409	40.794	2.047	
6.000	Filter Drain	225	65.000	0.544	119.5	39.857	39.313	41.282	1.200	
2.009	Carrier Drain	300	10.000	0.031	322.6	38.334	38.303	40.738	2.104	
2.010	Carrier Drain	300	10.000	0.031	322.6	38.303	38.272	40.652	2.049	
1.002	Filter Drain	300	30.000	0.254	118.1	38.272	38.018	40.550	1.978	
7.000	Filter Drain	150	7.500	0.133	56.2	39.855	39.721	41.205	1.200	
7.001	Filter Drain	150	5.000	0.150	33.3	39.721	39.571	41.071	1.200	
7.002	Filter Drain	150	5.000	0.065	76.4	39.571	39.506	40.921	1.200	
7.003	Filter Drain	150	5.000	0.065	76.4	39.506	39.440	40.856	1.200	
7.004	Filter Drain	225	90.000	0.685	131.4	39.365	38.680	40.839	1.249	
7.005	Filter Drain	300	75.000	0.396	189.6	38.605	38.210	41.040	2.135	
7.006	Carrier Drain	300	10.000	0.053	189.6	38.210	38.157	40.589	2.079	
7.007	Carrier Drain	300	12.000	0.063	189.6	38.157	38.094	40.503	2.046	
1.003	Filter Drain	300	90.000	0.287	313.6	37.869	37.582	40.381	2.212	
1.004	Filter Drain	300	5.000	0.011	454.5	37.507	37.496	39.845	2.038	
8.000	Filter Drain	150	15.000	0.275	54.5	38.707	38.432	40.057	1.200	
8.001	Filter Drain	150	5.000	0.113	44.4	38.432	38.319	39.782	1.200	
8.002	Filter Drain	225	22.000	0.289	76.1	38.319	38.030	39.669	1.125	
8.003	Filter Drain	300	90.000	0.713	126.2	37.955	37.242	39.656	1.401	
8.004	Filter Drain	300	12.000	0.063	189.6	37.167	37.104	40.048	2.581	
9.000	Carrier Drain	225	60.000	0.556	107.9	39.260	38.704	40.685	1.200	
9.001	Carrier Drain	225	25.000	0.149	167.7	38.704	38.555	40.129	1.200	
10.000	Channel Drain	150	7.640	0.076	100.9	39.554	39.478	40.904	1.200	ACO MultiDrain or similar to be installed across access to GIS building
10.001	Carrier Drain	225	60.000	0.623	96.3	39.403	38.780	40.923	1.295	
10.002	Carrier Drain	225	5.000	0.225	22.2	38.780	38.555	40.205	1.200	
9.002	Carrier Drain	300	15.000	0.047	319.1	38.405	38.358	40.174	1.469	
8.005	Filter Drain	300	20.000	0.062	321.9	36.954	36.892	39.994	2.740	
8.006	Filter Drain	300	60.000	0.187	320.8	36.892	36.705	39.844	2.652	
8.007	Carrier Drain	300	10.000	0.031	322.6	36.705	36.674	39.818	2.813	
11.000	Combined Kerb Drain	150	56.000	0.554	100.9	38.995	38.441	40.345	1.200	Oily Water Drainage
11.001	Carrier Drain	150	10.000	0.099	100.9	38.441	38.341	39.957	1.366	Oily Water Drainage
12.000	Carrier Drain	150	1.500	0.017	85.9	38.936	38.918	40.286	1.200	Oily Water Drainage
12.001	Carrier Drain	150	37.000	0.431	85.9	38.918	38.487	40.278	1.210	Oily Water Drainage
13.000	Carrier Drain	150	1.500	0.121	12.4	38.608	38.487	39.958	1.200	Oily Water Drainage
12.002	Carrier Drain	225	7.500	0.146	51.4	38.412	38.266	39.956	1.319	Oily Water Drainage
11.002	Carrier Drain	300	5.000	0.021	241.9	38.191	38.171	39.948	1.457	Oily Water Drainage
11.003	Oil Separator		4.015	0.017	241.9	38.171	38.154	39.920	1.449	Pipe 11.003 has been modelled as a tank between MH40 and MH41
11.004	Carrier Drain	300	5.000	0.021	241.9	38.154	38.134	39.896	1.442	
11.005	Carrier Drain	300	9.500	0.039	241.9	38.134	38.094	39.867	1.434	
8.008	Filter Drain	300	12.000	0.031	387.1	36.599	36.568	39.818	2.919	
1.005	Carrier Drain	300	5.000	0.086	58.1	36.493	36.407	39.816	3.023	
14.000	Carrier Drain	450	90.000	0.674	133.5	39.578	38.904	41.303	1.275	
14.001	Carrier Drain	450	90.000	0.634	142.0	38.904	38.270	40.629	1.275	
14.002	Carrier Drain	525	35.000	0.070	500.0	38.120	38.050	39.995	1.350	
14.003	Carrier Drain	525	1.500	1.643	0.9	38.050	36.407	40.197	1.622	
1.006	Carrier Drain	525	90.000	0.180	500.0	36.107	35.927	39.986	3.354	
1.007	Carrier Drain	525	45.000	0.090	500.0	35.927	35.837	39.900	3.448	
1.008	Carrier Drain	525	90.000	0.180	500.0	35.837	35.657	39.800	3.438	
1.009	Carrier Drain	525	68.000	0.286	237.6	35.657	35.371	39.800	3.618	
15.000	Carrier Drain	600	90.000	0.180	500.0	37.550	37.370	39.800	1.650	
15.001	Carrier Drain	600	58.000	1.924	30.1	37.370	35.446	39.800	1.830	
1.010	Carrier Drain	600	30.000	2.696	11.1	35.371	32.675	37.800	1.829	Outfall to Infiltration Basin
16.000	Channel Drain	150	7.119	0.071	100.9	38.903	38.833	40.253	1.200	ACO MultiDrain or similar to be installed across access to GIS building

Appendix C. Micro Drainage Output

Summary of Results for 1000 year Return Period (+42%)

Half Drain Time : 417 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
15 min Summer	36.499	1.499	131.7	3278.2	O K
30 min Summer	36.986	1.986	163.6	4845.1	O K
60 min Summer	37.428	2.428	193.6	6510.4	O K
120 min Summer	37.798	2.798	219.8	8100.4	O K
180 min Summer	37.974	2.974	232.4	8922.4	O K
240 min Summer	38.073	3.073	239.6	9401.8	O K
360 min Summer	38.175	3.175	247.1	9911.6	O K
480 min Summer	38.235	3.235	251.6	10221.4	O K
600 min Summer	38.273	3.273	254.4	10418.5	O K
720 min Summer	38.297	3.297	256.2	10542.1	O K
960 min Summer	38.316	3.316	257.6	10643.3	Flood Risk
1440 min Summer	38.290	3.290	255.7	10505.0	O K
2160 min Summer	38.185	3.185	247.9	9965.2	O K
2880 min Summer	38.063	3.063	238.9	9354.4	O K
4320 min Summer	37.826	2.826	221.8	8227.9	O K
5760 min Summer	37.616	2.616	206.8	7297.3	O K
7200 min Summer	37.436	2.436	194.2	6544.1	O K
8640 min Summer	37.281	2.281	183.5	5927.9	O K
10080 min Summer	37.144	2.144	174.2	5413.2	O K
15 min Winter	36.499	1.499	131.7	3279.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
15 min Summer	140.388	0.0	26
30 min Summer	104.935	0.0	40
60 min Summer	72.274	0.0	68
120 min Summer	47.207	0.0	126
180 min Summer	36.325	0.0	186
240 min Summer	30.047	0.0	244
360 min Summer	22.910	0.0	314
480 min Summer	18.861	0.0	378
600 min Summer	16.208	0.0	442
720 min Summer	14.317	0.0	510
960 min Summer	11.773	0.0	650
1440 min Summer	8.915	0.0	928
2160 min Summer	6.722	0.0	1328
2880 min Summer	5.491	0.0	1736
4320 min Summer	4.123	0.0	2512
5760 min Summer	3.365	0.0	3248
7200 min Summer	2.879	0.0	3976
8640 min Summer	2.538	0.0	4752
10080 min Summer	2.285	0.0	5448
15 min Winter	140.388	0.0	26

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Summary of Results for 1000 year Return Period (+42%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Volume (m³)	Status
30 min Winter	36.988	1.988	163.7	4850.0	O K
60 min Winter	37.431	2.431	193.8	6522.6	O K
120 min Winter	37.805	2.805	220.2	8130.2	O K
180 min Winter	37.984	2.984	233.2	8969.1	O K
240 min Winter	38.087	3.087	240.7	9469.9	O K
360 min Winter	38.187	3.187	248.0	9974.2	O K
480 min Winter	38.236	3.236	251.6	10222.9	O K
600 min Winter	38.266	3.266	253.9	10381.0	O K
720 min Winter	38.279	3.279	254.8	10447.1	O K
960 min Winter	38.273	3.273	254.4	10415.5	O K
1440 min Winter	38.193	3.193	248.5	10003.1	O K
2160 min Winter	38.015	3.015	235.4	9116.8	O K
2880 min Winter	37.828	2.828	221.9	8235.4	O K
4320 min Winter	37.487	2.487	197.8	6754.0	O K
5760 min Winter	37.204	2.204	178.3	5637.7	O K
7200 min Winter	36.970	1.970	162.5	4788.6	O K
8640 min Winter	36.773	1.773	149.5	4127.0	O K
10080 min Winter	36.607	1.607	138.6	3602.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Time-Peak (mins)
30 min Winter	104.935	0.0	40
60 min Winter	72.274	0.0	68
120 min Winter	47.207	0.0	124
180 min Winter	36.325	0.0	182
240 min Winter	30.047	0.0	238
360 min Winter	22.910	0.0	342
480 min Winter	18.861	0.0	388
600 min Winter	16.208	0.0	464
720 min Winter	14.317	0.0	542
960 min Winter	11.773	0.0	696
1440 min Winter	8.915	0.0	990
2160 min Winter	6.722	0.0	1416
2880 min Winter	5.491	0.0	1824
4320 min Winter	4.123	0.0	2604
5760 min Winter	3.365	0.0	3392
7200 min Winter	2.879	0.0	4112
8640 min Winter	2.538	0.0	4848
10080 min Winter	2.285	0.0	5552

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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	1000	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.900
M5-60 (mm)	15.600	Shortest Storm (mins)	15
Ratio R	0.200	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+42

Time Area Diagram

Total Area (ha) 10.758

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	4	0.267	4	8	6.944	8	12	3.470	12	16	0.077

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Model Details

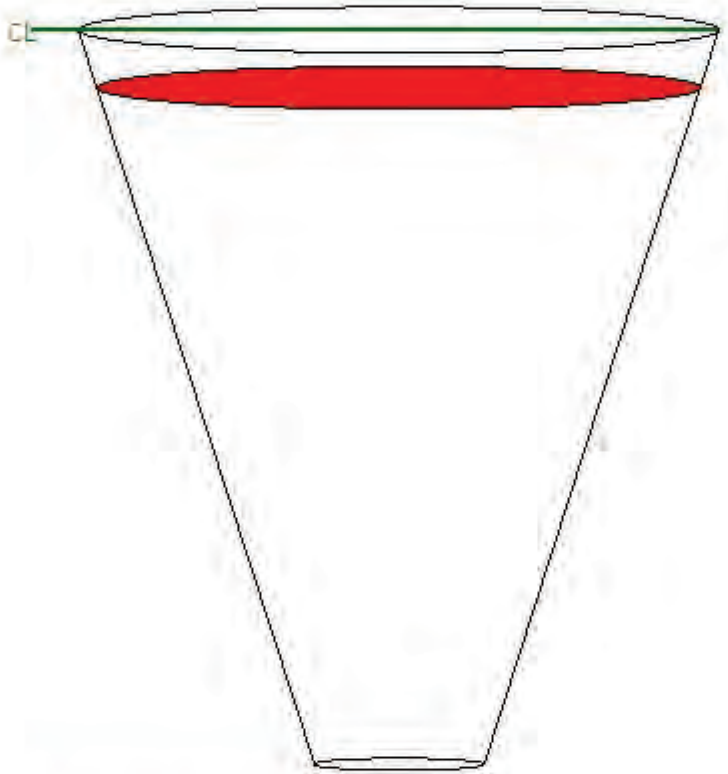
Storage is Online Cover Level (m) 38.600

Infiltration Basin Structure

Invert Level (m) 35.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.20160 Porosity 1.00
Infiltration Coefficient Side (m/hr) 0.20160

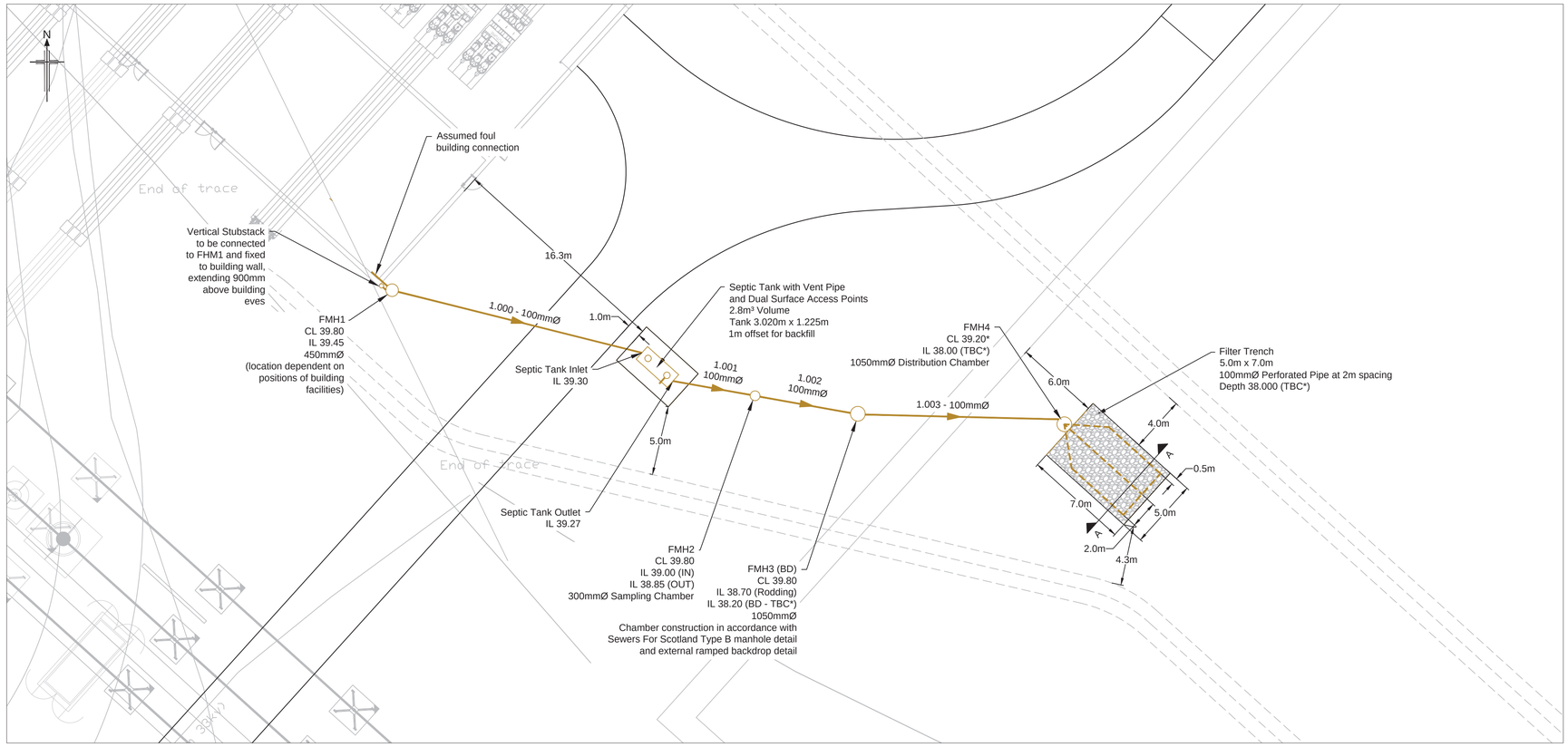
Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1516.6	3.600	5709.6

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Appendix D. Foul Water Layout and Construction Details

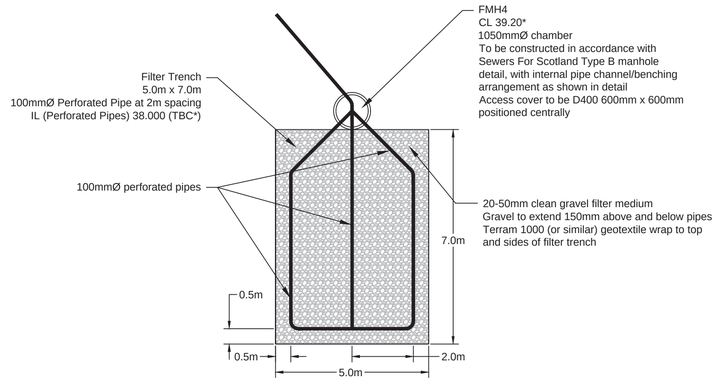


PLAN VIEW
1:200 @ A1

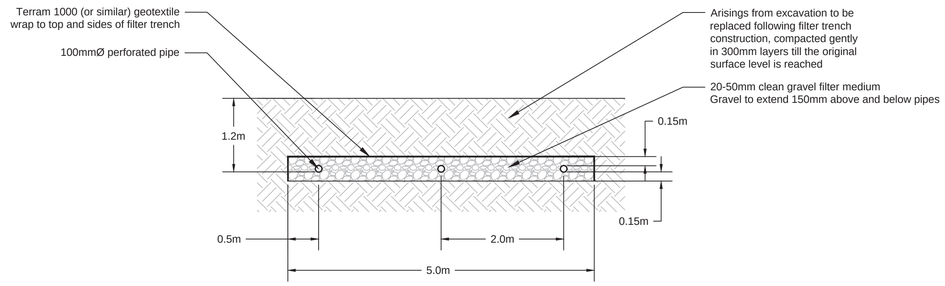
Chamber Number	Chamber Type	Cover Level (m)	Easting (m)	Northing (m)	MH Depth (m)	Manhole Dia. (mm)	Pipe Out Number	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In Number	Pipes In Invert Level (m)	Pipes In Dia (mm)	Comments
FMH1	PVC	39.80	235777.15	808286.25	0.35	450	1.000	39.45	100	Building	39.45	100 (TBC)	Vertical substack to be fitted to FMH1
Tank	N/A	39.80	235796.26	808280.73	See detail	See detail	1.001	39.27	100	1.000	39.30	100	See tank detail
FMH2	PVC	39.80	235803.29	808278.65	0.95	300	1.002	38.85	100	1.001	39.00	100	Sampling chamber
FMH3	Type B SfS	39.80	235810.69	808277.36	1.60	1050	1.003	38.20	100	1.002	38.70	100	Pipe In - backdrop - rodding
										1.002	38.20	100	Pipe in - backdrop - ramped
FMH4	Type B SfS	39.20	235825.56	808276.60	1.20	1050	Perforated (3)	38.00	100 (3)	1.003	38.00	100	Distribution chamber

Pipe Number	Pipe Size (mm)	U/S Chamber	D/S Chamber	Length (m)	Fall (1:X)	Pipe Type
1.000	100	FMH1	Tank Inlet	18.095	120.00	PVC
1.001	100	Tank Outlet	FMH2	5.650	21.00	PVC
1.002	100	FMH2	FMH3	6.640	44.00	PVC
1.003	100	FMH3	FMH4	13.936	70.00	PVC

CHAMBER AND PIPE SCHEDULE



PLAN VIEW - FILTER TRENCH
1:100 @ A1



SECTION A-A - FILTER TRENCH
1:50 @ A1

KEY

- Proposed Foul Carrier Pipe
- Proposed Foul Chamber
- Proposed Perforated Pipe
- Proposed Filter Trench

NOTES

1. Do not scale from this drawing.
2. All dimensions are in metres, unless otherwise stated.
3. The Contractor shall identify and locate all existing/proposed underground/overground utilities within the works area prior to construction commencement, and develop appropriate method statements and risk assessments to address utility constraints during the construction stage.
4. All proposed underground pipework, excluding perforated filter trench pipes, to have Class Z bedding and surround applied in accordance with Sewers For Scotland standard bedding details.
5. All pipe trench backfilling operations following pipe laying to be in accordance with Sewers For Scotland standards.
6. FMH3 (BD) and FMH4 to be constructed in accordance with Sewers For Scotland Type B manhole details, but with a reduced 1050mm chamber size. Access covers on aforementioned chambers shall be 600mm x 600mm D400 class, centrally positioned.
7. FMH1 to be PVC 450mmØ unit modified to suit required depth, with manufacturer supplied access cover to D400 class. Chamber to be installed in accordance with manufacturers instructions.
8. FMH2 to be PVC 300mmØ sampling chamber unit (150mm invert drop) modified to suit required depth, with manufacturer supplied access cover to D400 class. Chamber to be installed in accordance with manufacturers instructions.
9. Septic tank used in the design is a Kingspan STH028 Shallow Dig Septic Tank with 2.8m³ volume. Should the Contractor wish to utilise a different tank supplier, they shall consult with the Designer to ensure the suitability of the tank and inlet/outlet invert levels. The Contractor shall install the tank in accordance with the Manufactures tank drawings and installation instructions (see Kingspan Drawing DS1203 and Kingspan 015710 Shallow Dig Septic Tanks Installation & Maintenance Guidelines documentation supplied supplemental to this drawing).
10. Septic tank anchoring to be either concrete surround or anchor blocks and strapping with gravel backfill, installed in accordance with manufacturer instructions (see Kingspan Drawing DS1203 and Kingspan 015710 Shallow Dig Septic Tanks Installation & Maintenance Guidelines documentation supplied supplemental to this drawing). At the time of the design being developed, groundwater levels in the proposed tank area were unknown, thus the anchoring solution should be discussed and agreed with the Client (SSE) prior to construction commencement.
11. Septic tank access covers and venting pipework shall be be tank manufacturer supplied components and installed in accordance with manufacturer instructions. Access covers to be D400 loading class.

*Ground levels used in the foul design to be validated by the Contractor prior to construction commencement. Should variations to levels shown on the drawing be apparent, the Contractor is to consult the Designer.

Rev	Rev. Date	Purpose of revision	Orig	Check'd	Rev'd	Apprv'd
P01	2023-11-09	FIRST ISSUE	RG	AT	AT	MD

Jacobs
95 Bothwell Street, Glasgow. G2 7HX
Tel:+44 (0) 141 243 8000 Fax:+44(0)141 226 3109
www.jacobs.com

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Project: FORT AUGUSTUS PLATFORM EXTENSION

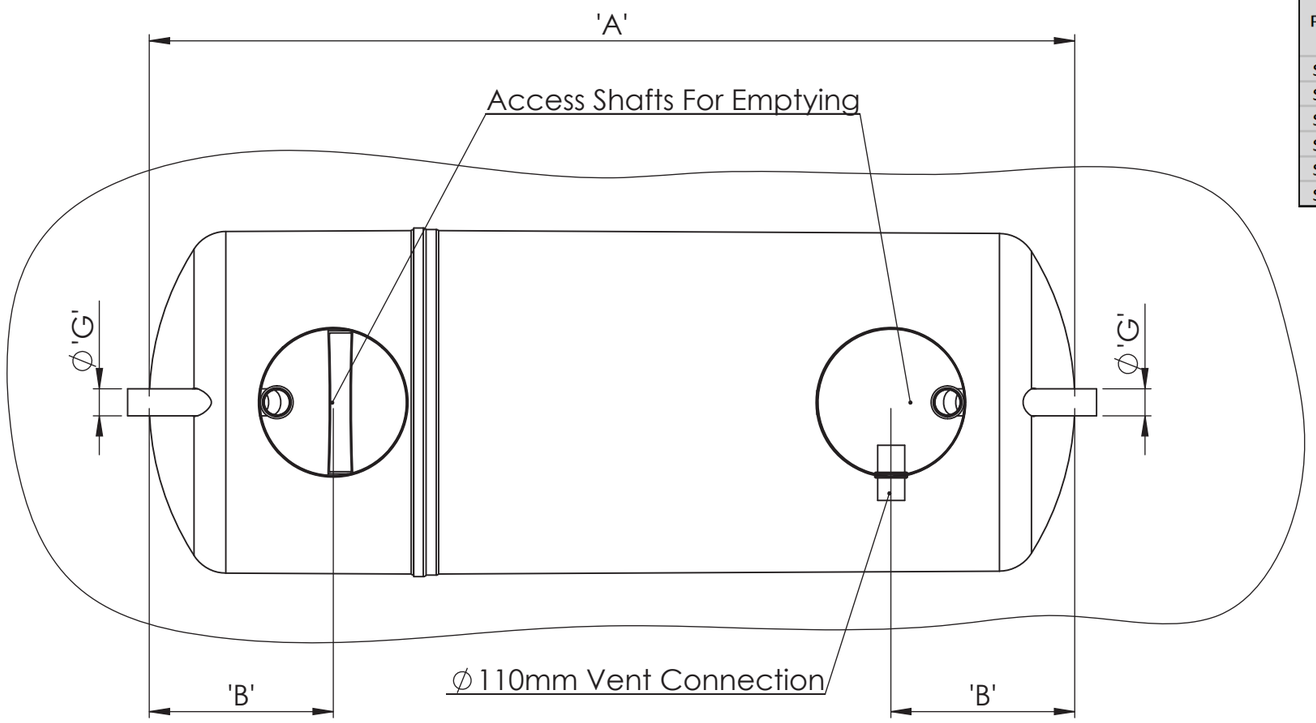
Drawing title: FOUL DRAINAGE DESIGN

Drawing status: FOR INFORMATION
Suitability: SO

Scale	See Drawing	DO NOT SCALE
Jacobs No.	B2413736	Rev P01
Client No.	9605	

Drawing number: B2413736-JAC-HDG-PD-DE-CI-002

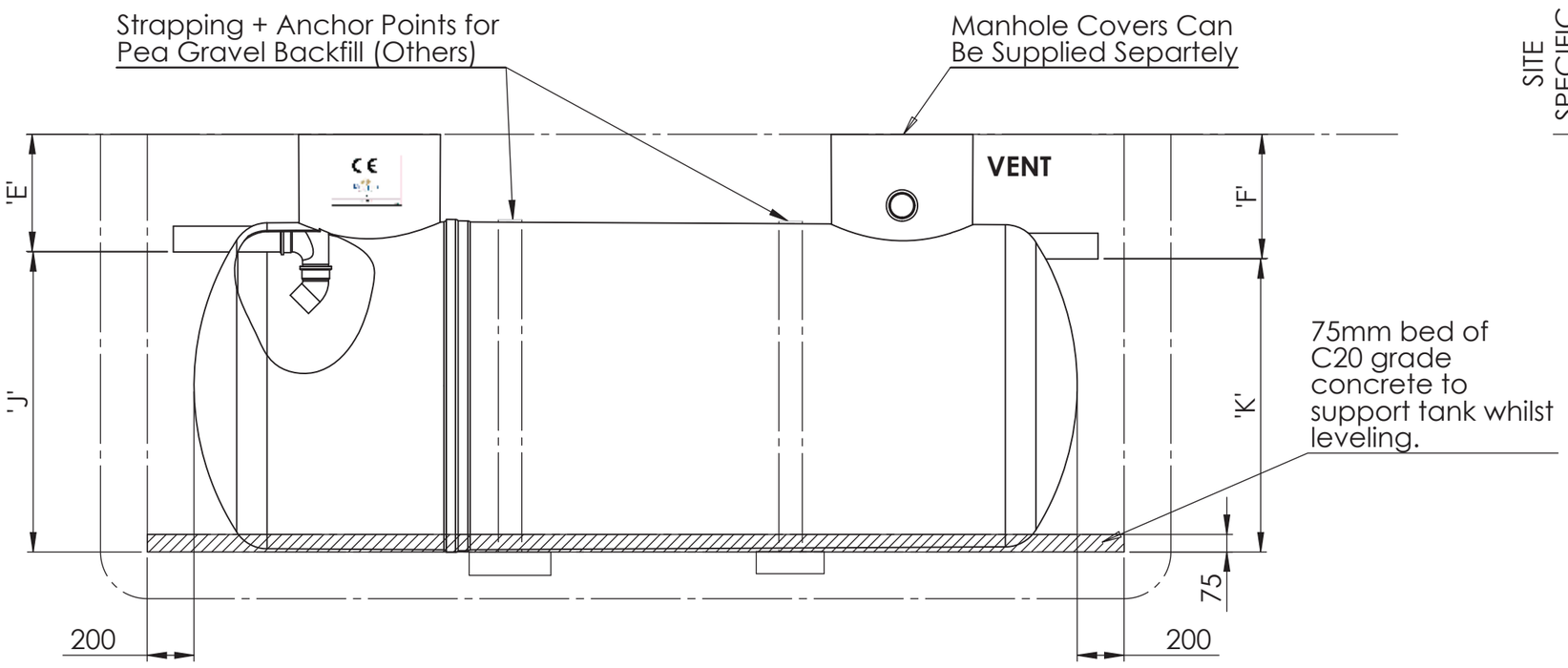
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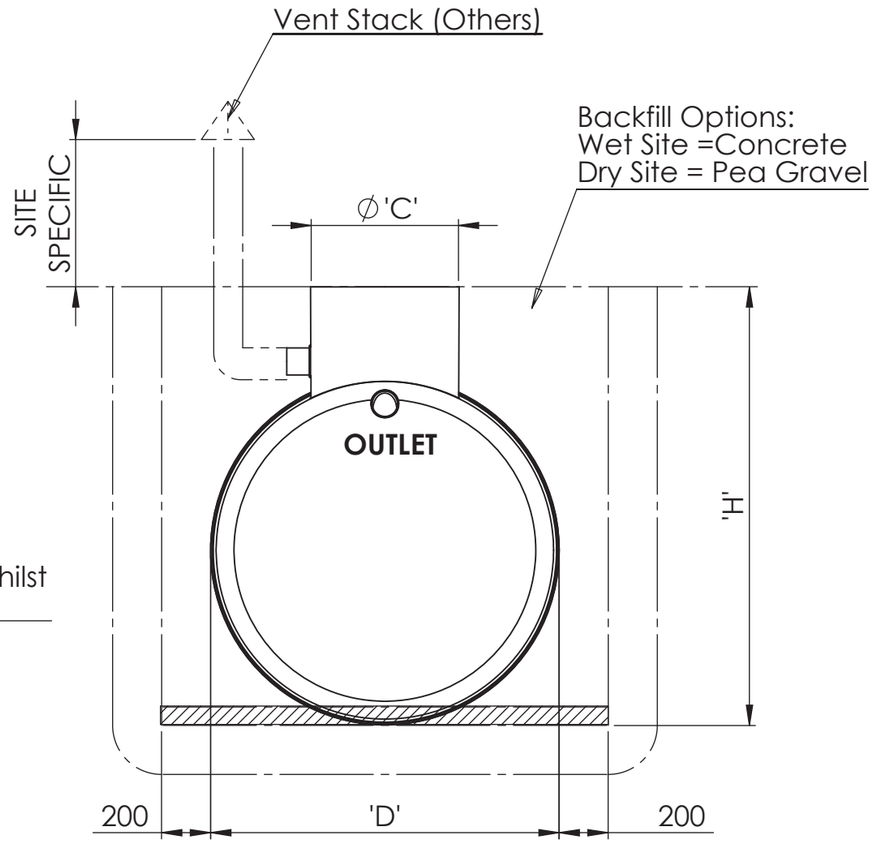


Product Information Table											
Product	Volume (L)	Empty Weight (kg)	Dimensions (mm)								
			'A'	'B'	'C'	'D'	'E'	'F'	'G' SEE NOTE 7	'H'	'J'	'K'
STH028	2800	165	3020	600	Ø460	Ø1225	500	530	Ø110	1560	1060	1030
STH038	3800	185	3900	600	Ø460	Ø1225	500	530	Ø110	1550	1050	1020
STH048	4800	195	3775	750	Ø600	Ø1425	500	530	Ø110	1750	1250	1220
STH057	5700	205	4275	750	Ø600	Ø1425	500	530	Ø110	1750	1250	1220
STH071	7150	280	3230	675	Ø600	Ø1920	500	550	Ø160	2190	1690	1640
STH091	9150	325	3965	675	Ø600	Ø1920	500	550	Ø160	2190	1690	1640

Notes:

1. Tanks have an inlet invert depth of 0.5m as standard. Upon request this may be extended up to 1.5m via neck GRP riser pieces.
2. This drawing should be used for dimensional information only. Refer to installation guidelines for full tank installaton.
3. Additional ventilation can be achieved on the incoming drain, via a stack pipe. Position to suit specific site conditions.
4. Confirm with local building regulations if additional venting is required.
5. If backfilling with peashingle on wet sites the tank must be strapped down using suitabel anchoring points and strapping (by others)
6. Product is tested and approved to EN 12566-1 (99.7% Efficency)
7. STH028, 038, 048 & 057 Available with Ø160mm pipework, this is not as tested, and base to inlet invert, base to outlet invert and overall height will reduce by 40mm.





Please check with Kingspan Environmental that this drawing is the latest issue				
Issue	Date	Drawn by	Approved by	Description
07	02/09/22	JMcM	JMcM	ECR189/ECN1626 - Remove Tank Feet
06	15/07/22	JMcM	JMcM	CN0361 - No Feet Trial

LN Number :	Tolerance (unless stated) :
Finish :	Thickness : n/a
Weight : 163.80 Kg	Surface Area : m²
Modelled By : Name	Material : Various

All Dimensions In mm | Scale: Do Not Scale | Third Angle Projection

A:\Wastewater\Engineering\Drawing Data\02 - Sales Drawings\DS\DS - 12\DS1203

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Drawing : DS1203

STH Shallow Dig Septic Tank Range

Kingspan

015710
Shallow Dig Septic Tanks (EN12566-1 Approved) Installation & Maintenance Guidelines

Kingspan Water & Energy Service Contact Numbers:

GB: 0333 240 6868

NI: 028 3836 4600

IRL: 0818 543 500

Enclosed Documents

DS1203	**Shallow Dig Septic Tanks (2800, 3800, 4800, 5700, 7150 & 9150 Litres)**
DS1335	**Shallow Dig Septic Tanks (2800, 3800, 4800, 5700, 7150 & 9150 Litres) - Norway**

Issue	Description	Date
05	ECR 189 / ECN1626 – Remove Tank Feet	September 2022
04	ECN 1621	August 2022

HEALTH & SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following these guidelines.

We recommend the use of a dust mask and gloves when cutting GRP components.

Electrical work should be carried out by a qualified electrician.

Contaminated surface water can contain substances harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Access covers should be selected with reference to the location of the unit and traffic loads to be accommodated. These are not (normally) part of the units supply.

When covers are removed precautions must be taken against personnel falling into the unit.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses. Ensure that the working area is adequately lit.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

MAINTENANCE

The correct ongoing maintenance is essential for the proper operation of the equipment. Operators who rely on high level alarms to prompt them to empty the unit run the risk of polluting, should the alarm not work, hence the ongoing maintenance of the alarm systems is fundamental if pollution incidents are to be avoided.

The removal of sludge and liquid from the unit should be carried out by a contractor holding the relevant permits to transport and dispose of such waste. The contractor should refer to the guidelines in this document.

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1.0 Introduction

1.1 Kingspan shallow installation septic tanks are designed to be installed in areas where shallow dig depths are required due to minimal invert levels or difficult ground conditions. Typically, in areas where granite rock strata is close to the surface.

1.2 The septic tanks have two manhole shafts for ease of emptying,

1.3 These Guidelines cover Septic tanks where a discharge is permitted to a correctly sized and designed soakaway system.

1.4 The use of Borehole soakaways with Kingspan sewage treatment products is only acceptable when the Environment Agency discharge license allows it. Borehole soakaways are not accepted under building regs or BS6297 meaning it is only under special circumstances that the EA allows this type of soakaway

1.5 Should you require information regarding soakaway system design and sizing please contact us.

1.6 Large capacity septic tanks do require extensive suitable areas of land. In the UK BS: 6297 provides drainage field designs. In Ireland, the single house EPA manual provides design guidance. Percolation test methods to identify soil suitability are slightly different in UK and Ireland.

1.7 Equipment selection and application guidance is provided in the UK by the Environment Agency Pollution Prevention Guidelines PPG 4 or in Ireland by the EPA manuals.

1.8 You may require permission to install a tank, and permission to discharge. Consult your local authority as the installation may require Planning and Building Control approval. In the UK, you will need to be aware of publication DETR 3/99 (Welsh office 10/99) “Planning requirement in respect to use of non mains sewerage incorporating septic tanks in new development and building regulations H2”. In Ireland, circular letter SP/03 for the protection of groundwater. These documents require detailed site assessments.

1.9 Septic tanks are covered within the UK by H2 Building regulations 2000. A building inspector may wish to examine the site before, during or after tank installation and may require site of percolation test results.

1.10 In Ireland, building regulations 1997, Technical guidance document H details the regulations for septic tanks.

1.11 Septic tanks shall be of adequate capacity, impermeable to liquids and adequately ventilated.

1.12 Tanks should be so sited and constructed that they are not prejudicial to the health of any person, will not contaminate any watercourse, underground water or water supply. They must have adequate means of access for maintenance and emptying.

1.13 Septic tanks serving <50 population, i.e., an influent volume of less than 10m3 per day should meet the requirements of EN12566 part 1 or part 4. Larger tanks should meet the relevant requirements of EN 12255.

1.14 Buildings which utilise Septic tanks should have a notice affixed within the building. This notice should advise the estimated emptying frequency and the need to use a licensed waste disposal contractor. The owner is legally responsible for ensuring that the system does not cause pollution, a health hazard or a nuisance.

1.15 These guidelines represent Best Practice for the installation of the above units. Many years of specialist experience has led to the successful installation of thousands of units it must be noted, however, that these Guidelines are necessarily of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, a qualified specialist (e.g., Civil engineering consultant) must verify any information or advice given by employees or agents of the company regarding the design of an installation.

1.16 Our septic tanks are structurally tested in accordance with EN 12566-1, which specifies structural stability testing for both wet and dry sites using granular backfill 3-8mm. However, in GB it would be typical for tanks to be installed in concrete due to rising water table, and it can generally be assumed that buoyancy prevention of concrete backfill is more advantageous than the granular backfill materials used in testing.

2.0 Handling & Storage

2.1 Care must be taken to ensure that units are not damaged during delivery and handling on site.

2.2 The design requirements of our products will frequently mean that the centre of gravity of the unit is “offset”. Care must therefore be taken to ensure that the unit is stable when lifting. Rainwater may also collect inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.

2.3 When lifting units, use webbing slings of a suitable specification. DO NOT USE CHAINS.

2.4 A suitable spreader bar should be used to ensure that units are stable and that loads are evenly distributed during lifting. When lifting units, a spreader bar should be used where the slings would otherwise be at an angle > 30 degrees to the vertical.

2.5 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.

2.6 We accept no responsibility for the selection of lifting equipment.

2.7 Whenever units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects, which may damage the unit. The units must be placed on ground, which is flat and level to evenly support the base of the unit. Do not roll units. The unit has two stability feet at its base.

3.0 Site Planning

The following points should be considered before installation of the equipment:

3.1 The discharge should have the consent of the relevant Environmental Regulator. See Environment Agency Guidelines PPG4.

3.2 The installation should have Planning and Building Control approval. See DETR 3/99 Planning requirement in respect to use of none- mains sewerage incorporating septic Tanks in new development and building regulations H2.

3.3 Position the unit at the maximum distance from habitation. Distances in excess of 15m are usually the minimum acceptable to the planners, but this varies depending on your local authority. The installation must be sited so as not to be prejudicial to health, nor to contaminate water supplies.

3.4 See BS EN 752-4 Drain & sewer systems outside Buildings.

3.5 Consider placing inspection points in the drain line before and after Units.

3.6 Tanks and treatment systems installed in series should be set with appropriate falls between them. Allow a minimum of 50mm, if not more. Connecting pipework should never run uphill.

3.7 Consider venting of the unit. Comply with local regulations. Larger tanks serving multiple properties should have a vent fitted to the neck to enable localized high-level venting.

3.8 Uncontaminated run off such as roof and surface water should be excluded from the unit to avoid over frequent filling. Separate drains must be provided for surface water which must NOT enter the unit.

3.9 Ground conditions and water table level should be assessed. If the water table will be above the base of the unit at any time of the year, adequate concrete backfill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the backfill, and an appropriate installation method devised to avoid this.

3.10 If the discharge is to a soakaway, a porosity test should be carried out as part of the assessment of suitability for sub-soil drainage. UK – See BS6297, Ireland EPA Manual.

3.11 The unit must be installed at a level that will allow connection to the incoming drain and a free discharge at the system outlet.

3.12 Do not install the unit deeper than necessary. The minimum invert depth of the unit is shown on the relevant equipment drawing.

3.13 Sample/Inspection chambers may be required.

3.14 Adequate access to the unit must be provided for routine maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.

3.15 There must be at least 1 meter of clear, level ground all around the access covers to allow for routine maintenance.

3.16 Provide electrical supply for alarm system. (If required)

3.17 Installation should only be carried out by suitably qualified and experienced contractors in accordance with current Health and Safety Regulations. Electrical work should be carried out by a qualified electrician, working to the latest edition of IEE.

3.18 Manhole covers and frames should suit the duty for the intended location.

4.0 Installation – General

4.1 When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipework should be designed to minimize the risk of damage from differential movement of the unit(s) and/or surrounding material.

4.2 The excavation must be deep enough to provide bedding and cover depth as determined by the type of surface pavement and loading. Asphalt and concrete pads should extend a minimum of 300mm horizontally beyond the unit in all directions.

4.3 In situations where the excavation will not maintain a vertical wall, it will be necessary to shore up the side walls of the excavation with suitable trench sheets and bracing systems to maintain a vertical wall from the bottom to the top of the excavation. DO NOT completely remove the shoring system until the backfilling is complete, but before the concrete fully hardens.

4.4 In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be dewatered using suitable pumping equipment and this should continue until the installation is complete.

4.5 During installation care must be taken to ensure that the body of any unit is uniformly supported so that point loads through the unit are avoided.

4.6 The concrete Specification is a general specification. It is not a site-specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M^3 220 - 230 Kg/M^3
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

5.0 Unit Installation

5.1 Excavate a hole of sufficient length and width to accommodate the tank and a minimum 150mm concrete surround and to a depth that allows for the burial depth of the unit plus concrete base slab of 300mm.

5.2 Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.

5.3 When the concrete base slab has set enough to support the installed load, install a 75mm deep level bed of C20 grade concrete. This will provide support for the tank and allow the tank to be levelled up when installed. Lower the unit onto the slab using suitable webbing slings and lifting equipment. The selection of lifting equipment is the responsibility of the installer considering unit weight, length, height and distance of lift.

5.4 Pour no more than 300mm depth of clean water into the unit, avoiding shock loads. DO NOT OVERFILL, the unit is not designed to hold water whilst unsupported.

5.5 Place concrete backfill to approximately 300mm depth under and to the sides of the tank ensuring good compaction to remove voids. Concrete backfill must be manually compacted; we DO NOT recommend the use of vibrating lances. Allow initial concrete set to occur before proceeding. Ensure concrete fills the voids underneath the tank and feet.

5.6 Continue adding concrete backfill, simultaneously keeping the internal water level no more than 300mm above the backfill level at all times, until the backfill is just below the underside of the outlet drain, giving sufficient room to connect the inlet and outlet pipework.

5.7 Connect inlet and outlet drains and vent pipes when safe access to the backfill can be gained.

5.8 The inlet & outlet pipe (110mmDia) should be extended to ground level.

5.9 The maximum recommended inlet invert is 500mm.

5.10 Continue backfilling with concrete over the tank body to the required level. Build up a shell of concrete, minimum 150mm thick, around the access shaft(s), inlet/outlet pipe and alarm access tube (as applicable). Temporarily strut the access shaft to avoid distortion.

5.11 Do not install in trafficked areas unless a suitable top slab has been designed and constructed. The top slab should bear on a suitable foundation to prevent superimposed loads being transmitted to the unit and access shafts. Loads applied to covers and frames must bear on the top slab, not the access shaft.

5.12 Trafficked Areas, the tank should be installed at a suitable distance from any trafficked areas so as to prevent superimposed loading by vehicles.

5.13

5.14 The unit should be filled with clean water up to the invert level of the outlet pipe. Check that there is a discharge.

5.15 Leave until the concrete is fully cured. Septic tanks are now ready for use. Do not empty the tank until the concrete backfill has cured to an adequate strength (typically 1 - 2 days minimum).

6.0 Operation

6.1 The unit should be filled with clean water up to the invert level of the outlet pipe. Check that there is a discharge.

6.2 Leave Septic tanks have both an inlet and outlet. Separated solids both floating and sinking are retained within the tank. Separated liquid discharges through the outlet into a soakaway system.

6.3 Septic tanks are sized according to a population equivalent formula. Users should be aware that their sewage enters a septic tank so that they can dispose of their waste considerately. Not everything is suitable for disposal into the tank, for example oils, fats and grease, medications should not be disposed of. We can provide User leaflets with more information for individual householders on request.

6.4 In addition, properties should display a notice within the building see section on notices.

7.0 Maintenance

7.1 Septic tanks accumulate solids and must be emptied periodically. The period between emptying depends up on the population served by the tank or, the amount of use to which the tank is put. Generally, the period is at least 6 months, however, tanks which are over utilized may require more frequent emptying. Tanks which are not emptied will release solids which will block the drainage filed and might lead to pollution.

7.2 All sludge should be removed when the unit is emptied. Solids should not be allowed to accumulate in more than half the tank as this reduces the retention time and separation efficiency and will detrimentally affect the soakaway system. DO NOT EXTEND THE EMPTYING FREQUENCY, as this can lead to blocked drainage fields/soakaways.

7.3 The following calculation can be used to estimate emptying frequency.

Tank volume (in liters) divided by 2 divided by 1.2 = Population x No of days

E.g., 26000 litre tank

26000 / 2 = 13000 / 1.2 =10833

7.4 If the population being served by the tank is 30, then the tank needs emptying approx. every 360 days

7.5 If the population is 80, then the tank needs to be emptied approx. every 135 days.

7.6 Different allowances/calculations should be made for non-domestic inputs such as pubs and other commercial premises. Consult us.

7.7 The waste should be removed under the terms of The Waste Management Code of Practice. The Code imposes a duty of care on the waste producer to ensure that the cleansing contractor is registered with the Environment Agency and that the final disposal of the waste is to a licensed facility. Owners have a responsibility to use licensed waste contractors.

7.8 Covers should be replaced.

7.9 Our site engineers are available to carry out inspection, service and maintenance visits. We recommend regular maintenance contracts for units with complex operational or electrical requirements. A service to supervise tank emptying is also available. Contact details are provided on the cover sheet.

8.0 Warranty

Taken from 'Kingspan's Terms & Conditions of Sale'

The company will replace or, at its option, properly repair without charge any goods which are found to be defective and which cause failure in normal circumstances of use within a period of twelve months from the date of delivery.

This warranty is conditional upon:

(a) the Buyer notifying the Company of any claim within Seven days of the failure becoming discernible.
(b) the Company being allowed a reasonable opportunity to inspect the goods so as to confirm that they are defective.
(c) the goods not having been modified, mishandled or misused and being used strictly in accordance with any relevant instructions issued by the Company.

The Company's liability under this Clause is limited to the repair or replacement of the defective goods, and does not cover costs of transport, installation or associated site costs, if applicable.

The Company's liability to replace or repair the goods is in lieu of and excludes all other warranties and conditions, and in particular (but without limitation) the Company shall have no liability of any kind for consequential loss or damage.

For any further advice, please contact the Warranty department on 0844 225 2785

A Warranty Form is included in this package, to register your unit for Warranty. Please complete ALL sections of the Form and return it at your earliest convenience.

Also within this package are Notices, describing the necessary maintenance of the plant in use. This should be fixed within the building.

Our service provider: Kingspan Water & Energy Services: 0844 846 0500

NOTICES:

SEPTIC TANK

The foul drainage from this property discharges to a Septic Tank and an irrigation system / soak-away.

The tank requires monthly inspections of the outlet chamber or sample chamber to observe that the effluent is free-flowing and clear. The soak-away should also be inspected regularly.

The septic tank requires emptying at least once every 12 months by a licensed contractor.

THE OWNER OF THE PROPERTY IS LEGALLY RESPONSIBLE FOR ENSURING THAT THE SYSTEM DOES NOT CAUSE POLLUTION, A HEALTH HAZARD OR A NUISANCE.

We recommend that a separate log is kept of all service visits, the log should detail the date and any action taken, e.g., Regular maintenance service, breakdown visit, de-sludge volume removed.

This notice should be fixed by the owner within the building alerting current and future owners to the maintenance requirement. (Building regulation H2 (1.57)

Please contact Kingspan Water & Energy Services on +44 (0) 844 846 0500 to arrange a maintenance service or to request replacement operating instructions.