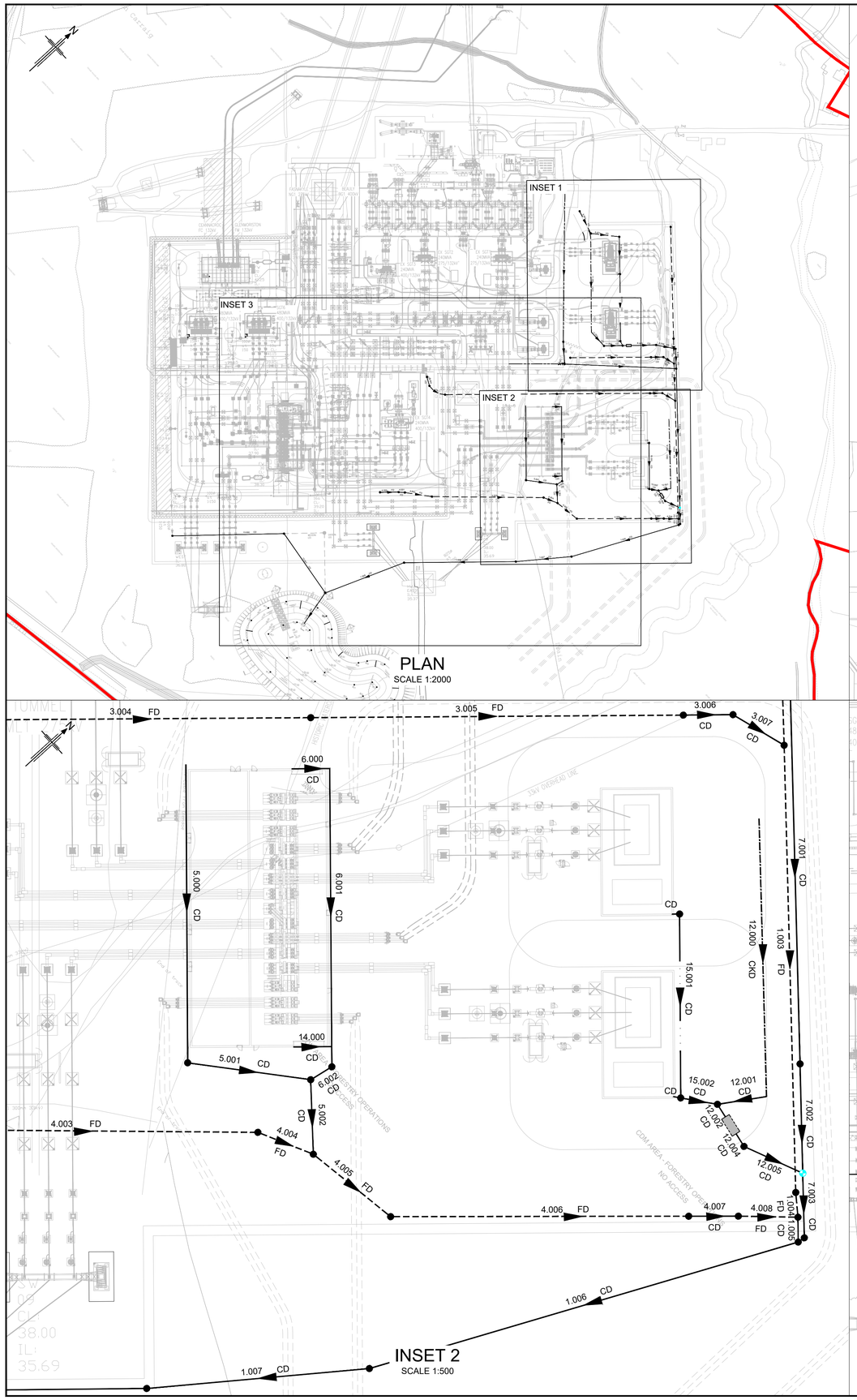
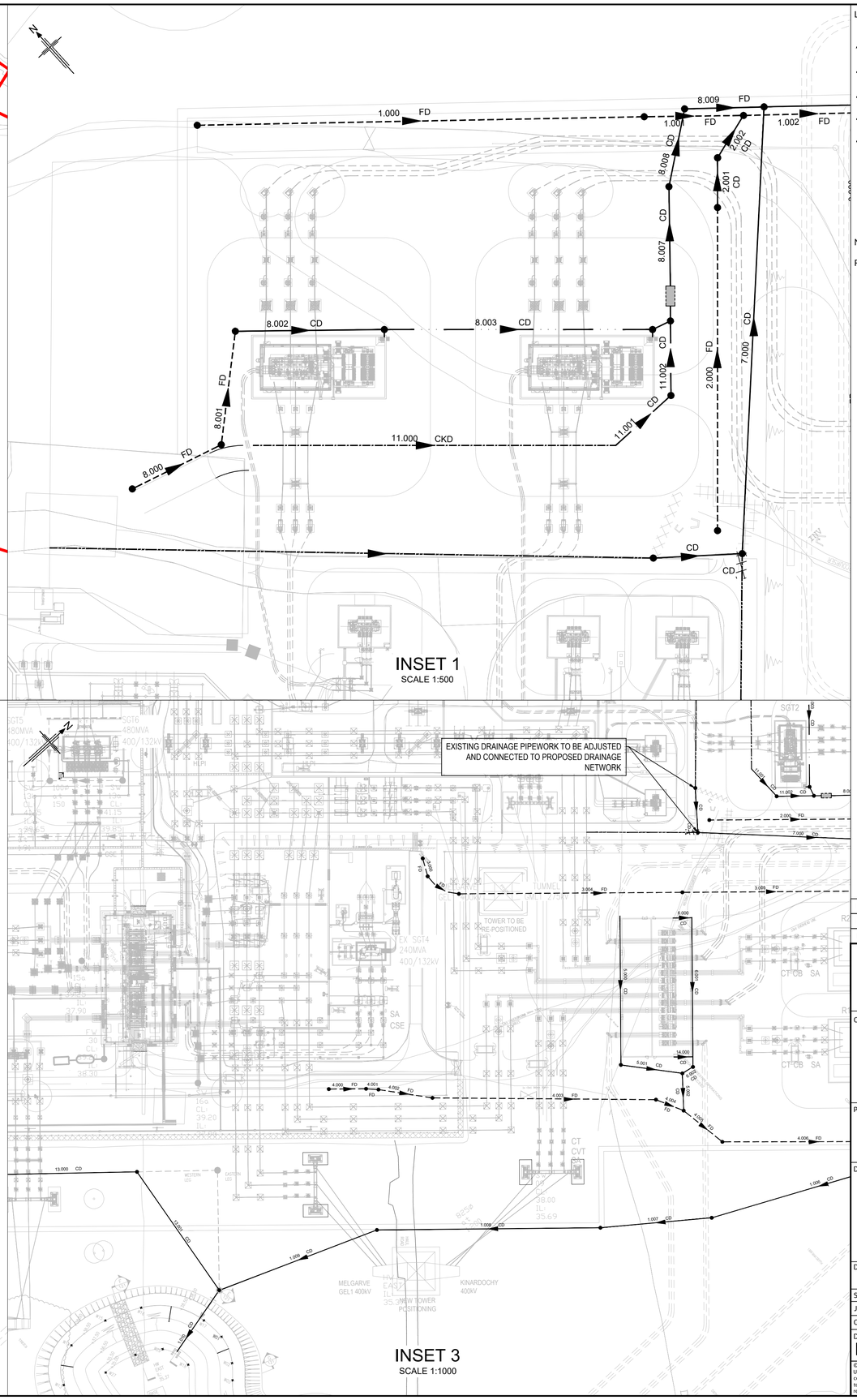
Appendix B. Indicative Surface Water Drainage Layout and Pipe Schedule



PLAN
SCALE 1:2000



INSET 1
SCALE 1:500

INSET 2
SCALE 1:500

INSET 3
SCALE 1:1000

Legend:

- Proposed Filter Drain (FD)
- Proposed Carrier Drain (CD)
- Proposed Combined Kerb Drain (CKD)
- Oily Water Drainage
- Existing Drainage
- Chamber
- Penstock 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
P02	2023-11-15	UPDATE TO LAYOUT	AW	RH	GD	MD
P01	2023-10-26	FIRST ISSUE	AW	RH	GD	MD

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Client: Scottish & Southern Electricity Networks TRANSMISSION

Project: FORT AUGUSTUS SUBSTATION PLATFOM 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	P01
Client No.	N/A		

Drawing number: B2413736-JAC-HDG-PD-DE-CI-001

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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)	US/CL (m)	US D.Depth (m)	Comments
1.000	Filter Drain	225	90.000	0.892	100.9	40.128	41.553	1.200	
1.001	Filter Drain	225	20.000	0.132	151.4	39.236	40.661	1.200	
2.000	Filter Drain	225	65.000	0.544	119.5	39.857	41.282	1.200	
2.001	Carrier Drain	300	10.000	0.031	322.6	38.334	40.738	2.104	
2.002	Carrier Drain	300	10.000	0.031	322.6	38.303	40.652	2.049	
1.002	Filter Drain	300	30.000	0.254	118.1	38.272	40.550	1.978	
3.000	Filter Drain	150	7.500	0.133	56.2	39.855	41.205	1.200	
3.001	Filter Drain	150	5.000	0.150	33.3	39.721	41.071	1.200	
3.002	Filter Drain	150	5.000	0.065	76.4	39.571	40.921	1.200	
3.003	Filter Drain	150	5.000	0.065	76.4	39.506	40.856	1.200	
3.004	Filter Drain	225	90.000	0.685	131.4	39.365	40.839	1.249	
3.005	Filter Drain	300	75.000	0.396	189.6	38.605	41.040	2.135	
3.006	Carrier Drain	300	10.000	0.053	189.6	38.210	40.589	2.079	
3.007	Carrier Drain	300	12.000	0.063	189.6	38.157	40.503	2.046	
1.003	Filter Drain	300	90.000	0.287	313.6	37.869	40.381	2.212	
1.004	Filter Drain	300	5.000	0.011	454.5	37.507	39.845	2.038	
4.000	Filter Drain	150	15.000	0.275	54.5	38.707	40.057	1.200	
4.001	Filter Drain	150	5.000	0.113	44.4	38.432	39.782	1.200	
4.002	Filter Drain	225	22.000	0.289	76.1	38.319	39.669	1.125	
4.003	Filter Drain	300	90.000	0.713	126.2	37.955	39.656	1.401	
4.004	Filter Drain	300	12.000	0.063	189.6	37.167	40.048	2.581	
5.000	Carrier Drain	225	60.000	0.556	107.9	39.260	40.685	1.200	
5.001	Carrier Drain	225	25.000	0.149	167.7	38.704	40.129	1.200	
6.000	Channel Drain	150	7.640	0.076	100.9	39.554	40.904	1.200	ACO MultiDrain or similar to be installed across access to GIS building
6.001	Carrier Drain	225	60.000	0.623	96.3	39.403	40.923	1.295	
6.002	Carrier Drain	225	5.000	0.225	22.2	38.780	40.205	1.200	
5.002	Carrier Drain	300	15.000	0.047	319.1	38.405	40.174	1.469	
4.005	Filter Drain	300	19.958	0.062	321.9	36.954	39.994	2.740	
4.006	Filter Drain	300	59.997	0.187	320.8	36.892	39.844	2.652	
4.007	Carrier Drain	300	10.000	0.031	322.6	36.705	39.818	2.813	
4.008	Filter Drain	300	12.000	0.031	387.1	36.599	39.818	2.919	
1.005	Carrier Drain	300	5.000	0.086	58.1	36.493	39.816	3.023	
7.000	Carrier Drain	450	90.000	0.674	133.5	39.578	41.303	1.275	
8.000	Filter Drain	150	20.000	0.263	76.1	39.850	41.200	1.200	
8.001	Filter Drain	150	23.000	0.231	99.6	39.587	41.200	1.463	
8.002	Carrier Drain	150	30.000	0.301	99.6	39.356	41.159	1.653	
9.000	Carrier Drain	150	1.500	0.016	94.6	39.812	41.162	1.200	Oily Water Drainage
8.003	Carrier Drain	225	54.000	0.321	168.2	38.980	41.147	1.942	Oily Water Drainage
10.000	Carrier Drain	150	1.500	0.015	98.9	39.684	41.034	1.200	Oily Water Drainage
8.004	Carrier Drain	225	4.000	0.046	86.3	38.659	41.021	2.137	Oily Water Drainage
11.000	Combined Kerb Drain	150	73.000	0.817	89.4	39.840	41.190	1.200	ACO KerbDrain or Similar
11.001	Carrier Drain	150	15.000	0.168	89.4	39.023	41.209	2.037	Oily Water Drainage
11.002	Carrier Drain	150	15.000	0.168	89.4	38.855	41.115	2.110	Oily Water Drainage
8.005	Carrier Drain	300	3.000	0.012	250.0	38.537	40.986	2.149	Oily Water Drainage
8.006	Oil Separator		4.015	0.017	236.2	38.525	40.960	2.135	Pipe 8.006 has been modelled as a tank between MH9 and MH10
8.007	Carrier Drain	300	20.000	0.062	322.6	38.508	40.926	2.118	
8.008	Carrier Drain	300	16.000	0.066	243.1	38.446	40.755	2.009	
8.009	Carrier Drain	300	16.000	0.066	243.1	38.380	40.805	2.125	
7.001	Carrier Drain	450	90.000	0.634	142.0	38.904	40.629	1.275	
7.002	Carrier Drain	525	22.000	0.035	628.6	38.120	39.995	1.350	
12.000	Combined Kerb Drain	150	56.000	0.554	100.9	38.995	40.345	1.200	ACO KerbDrain or Similar
12.001	Carrier Drain	150	10.000	0.099	100.9	38.441	39.957	1.366	Oily Water Drainage
12.002	Carrier Drain	150	3.000	0.030	100.9	38.341	39.948	1.457	Oily Water Drainage
12.003	Oil Separator		4.015	0.040	100.9	38.312	39.934	1.472	Pipe 12.003 has been modelled as a tank between MH53 and MH54
12.004	Carrier Drain	150	3.000	0.030	100.9	38.272	39.914	1.492	
12.005	Carrier Drain	150	13.000	0.129	100.9	38.242	39.899	1.507	
7.003	Carrier Drain	600	13.000	0.035	371.4	37.663	39.867	1.604	Upstream Manhole (MH60) to contain penstock pollution control device
7.004	Carrier Drain	600	1.500	1.643	0.9	38.050	40.197	1.547	
1.006	Carrier Drain	600	90.000	0.180	500.0	36.107	39.986	3.279	
1.007	Carrier Drain	600	45.000	0.090	500.0	35.927	39.900	3.373	
1.008	Carrier Drain	600	90.000	0.180	500.0	35.837	39.800	3.363	
1.009	Carrier Drain	600	68.000	0.286	237.6	35.657	39.800	3.543	
13.000	Carrier Drain	600	90.000	0.180	500.0	37.550	39.800	1.650	
13.001	Carrier Drain	600	58.000	1.924	30.1	37.370	39.800	1.830	
1.010	Carrier Drain	600	30.000	2.696	11.1	35.371	37.800	1.829	Outfall to Infiltration Basin
14.000	Channel Drain	150	7.119	0.071	100.9	38.903	40.253	1.200	ACO MultiDrain or similar to be installed across access to GIS building
15.000	Carrier Drain	150	1.500	0.017	85.9	38.936	40.286	1.200	Oily Water Drainage
15.001	Carrier Drain	150	37.000	0.431	85.9	38.918	40.278	1.210	Oily Water Drainage
16.000	Carrier Drain	150	1.500	0.121	12.4	38.608	39.958	1.200	Oily Water Drainage
15.002	Carrier Drain	225	7.500	0.146	51.4	38.412	39.956	1.319	Oily Water Drainage

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 From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) 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

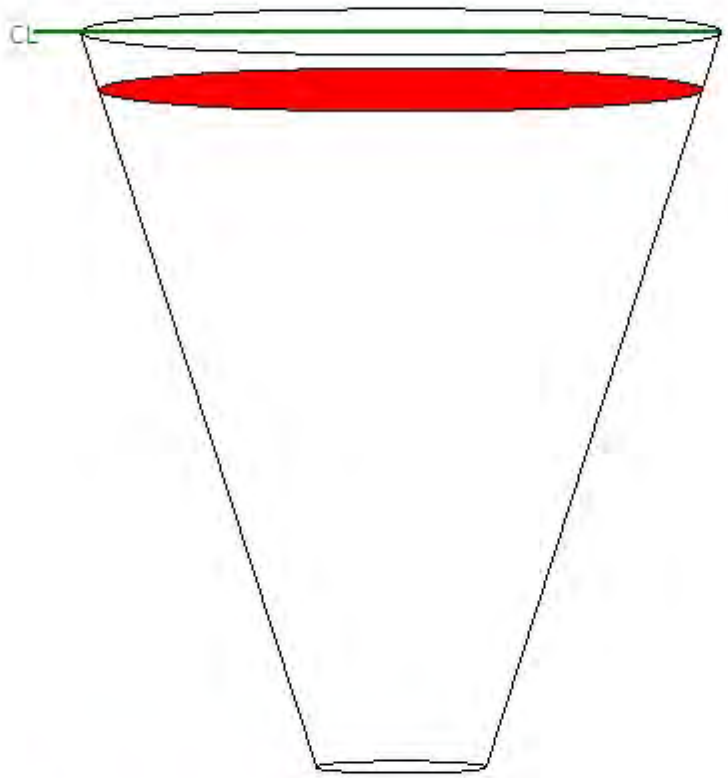
Storage is Online Cover Level (m) 38.600

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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within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation, to avoid damage to the tank structure.

Don't forget that there must be access for service vehicles during installation and desludging.
If the tank can only be installed where it will be subjected to a traffic load, then contact our sales team for details of any special requirements.

HOW SHOULD I HANDLE THE TANK?

Care should be taken when handling the Septic Tank. The tank should be lifted using a rope or sling passed through the lifting points provided on the tank. The tank must be carefully lifted from the delivery vehicle and set down on to level ground. Do not roll the tank off the delivery vehicle. Carry out an inspection for any damage before accepting the tank, and inspect again prior to installation, paying particular attention to the inlet and outlet pipes. During storage of the tank on site do not allow it to rest on these pipes at any time. The tank should always be filled with clean water during backfilling. It is desirable to temporarily cover all openings in the tank to prevent the ingress of debris during installation.

WHAT ABOUT EXCAVATION

INSTALLATION SHOULD ONLY BE CARRIED OUT BY A COMPETENT CONTRACTOR.

The septic tank is supplied with a standard neck extension giving an Inlet Invert of 500-1000mm from the top of the manhole cover to the bottom of the inlet pipe.
Excavate a hole according to the table below. Normal safety precautions must be adopted during excavation. Excavate a trench for the inlet and outlet pipework noting; the inlet invert selected, and that the outlet pipe is 50mm lower than the inlet pipe.

If the excavation is in unstable ground, take particular precautions to avoid a collapse of the sides of the excavation. Guidance on excavation to these depths and the safety measures required are given in BS6031, BS8000: Part 1 and HSE Construction Summary Sheet.
Make sure that any water collecting in the hole is pumped out during installation.

Tank Excavation Dimension

Tank Model	**Standard Overall Height** (mm)	**Length** (mm)	**Width** (mm)
GST020SzGK	1765	3500	1680
GST028SzGK	2255	2980	1630
GST035SzGK	2255	3500	1680
GST040SzGK	2255	3860	1715

WHAT ABOUT DESLUDGING

The tank has been specially designed to allow easy access for ease of cleaning when required. The tank is desludged in the usual way by suction tanker.

When desludging, which should be undertaken at least once a year, care should be taken to avoid damage to the tank by the hose nozzle. The tank should not be emptied completely, so that a residual amount is left to provide the micro-organisms to break down the sewage. The tank should be refilled with water.