

Drainage Condition Discharge Technical Note

H5 Premier Inn

for

Airport City Limited Partnership



09/10/2025



COMPLEX CHALLENGES ...
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1.0 INTRODUCTION

This report has been written to support a condition discharge application associated with the erection of a 9-storey hotel on Plot H5 at Chicago Avenue to the north of the Voyager Office Building and south of the Tribe Hotel (Plot H3), Manchester Airport.

The proposed development received Full Planning Consent from Manchester City Council in December 2024 (Ref: 141662/FO/2024).

This Technical Note supports the discharge of planning conditions 8 of the above consent which is referenced below.

Condition 8: Prior to the installation of any surface water drainage scheme at the site, full details of a surface water drainage scheme designed in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards, shall be submitted to and approved in writing by the City Council, as local planning authority. The development shall be constructed and completed in accordance with the approved details prior to the first use of the development.

Reason: To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution. This condition is imposed in light of national policies within the NPPF and NPPG and local policies EN08 and EN14.

The following documents and drawings should be read in conjunction with this report.

ADDBD-ACM-H3-XX-RP-C-00001 P1	Planning Condition 12 Surface Water Drainage Response, AECOM, December 2020
1513-SPW-Z0-ZZ-DR-C-6000 C18	Plot H3 As Built Below Ground Drainage
ACCBBD-ACM-H3-XX-DR-C-25002 P1 H3	Surface Water Catchment Plan
H5PI-PLA-EX-XX-DR-L-13000 P08	H5 Site Levels General Arrangement
H5PI-ROC-PI-XX-DR-C-0500 P07	Drainage General Arrangement
H5PI-ROC-PI-XX-DR-C-0501 P02	Drainage Details Sheet 1
H5PI-ROC-PI-XX-DR-C-0502 P03	Drainage Details Sheet 2
H5PI-ROC-PI-XX-DR-C-0503 P01	Drainage Details Sheet 3
H5PI-ROC-PI-XX-DR-C-0504 P01	Drainage Details Sheet 4
H5PI-ROC-PI-XX-DR-C-0505 P01	H5 Surface Water Catchment Plan

1.1 Existing

The site is located between World Way, Chicago Avenue and Outwood Lane to the north of Manchester Airport. The land currently comprises an existing asphalt car park / area of hardstanding and extends to 0.29ha.



Figure 1.1 Site Layout Plan

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Development Area		The gross site area is approximately 0.29ha. Under the current proposals the site will provide a new 9 storey hotel providing 276 beds and associated facilities.
Existing Surfacing and Current Use		The site is slightly irregular in shape and primarily comprises existing asphalt surfacing associated with its current / former use as a car park. The adjacent site to the north, H3, is currently undergoing development.
Boundaries	North	The H3 hotel development plot forms the northern boundary of the site, beyond which lies the M56 Airport Spur and Outwood Lane.
	South	Voyager House is positioned to the south, beyond which lies Chicago Avenue.
	East	Further surface parking.
	West	Further surface parking, beyond which lies World Way.
Access	Vehicles	Vehicular access is available from Chicago Avenue to the south.
	Pedestrians/Cycles	The site can generally be access on foot from both Chicago Avenue to the south and via the pedestrian footbridge over Outwood Lane to the north.

1.2 Proposed Development

The development area extends to approximately 0.29ha. and comprises the construction of a new 9 storey hotel with associated refuse / plant building and hard / soft landscaping.

The land currently comprises an existing asphalt car park / area of hardstanding with access gained via a barrier-controlled entrance off Chicago Avenue. The site is surrounded by existing parking on both the eastern and western boundaries with the H3 Hotel development plot to the north and Voyager House to the south.

The site is located in Flood Zone 1.

A copy of the current landscape General Arrangement is included in Appendix A.



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1.3 Existing Drainage Regime

The existing site is drained by a network of surface water drainage comprising gullies and below ground pipework. These discharge into a 375/450mm drain which flows in a south westerly direction away from the site. This drain impacts on the development proposals and will need to be diverted to accommodate the proposed structure.

The drainage within the site which serves the existing hard surfacing will be abandoned and removed to facilitate development.

In addition to the above, new foul and surface water drainage networks alongside below ground attenuation tanks have been installed as part of the adjacent H3 plot which will also serve the H5 development.

A copy of the As Built drainage records are provided in Appendix B.

2.0 DRAINAGE PROPOSAL

2.1 Surface Water Management

The strategy for the adjacent H3 hotel development was to restrict surface water run-off rates to existing pre-development figures with a betterment applied and discharge to the existing Manchester Airport surface water drainage system with below ground attenuation provided to cater for storm events up to and including the 100 year plus climate change return period.

This strategy also made allowance within the design for the H5 plot development area with a manhole provided at the plot boundary and a suitable allowance included within the drainage system and below ground attenuation to cater for the additional catchment area. This is illustrated on the extract below of the AECOM catchment drawing provided in their report (ACCBD-ACM-H3-RP-C-00001).

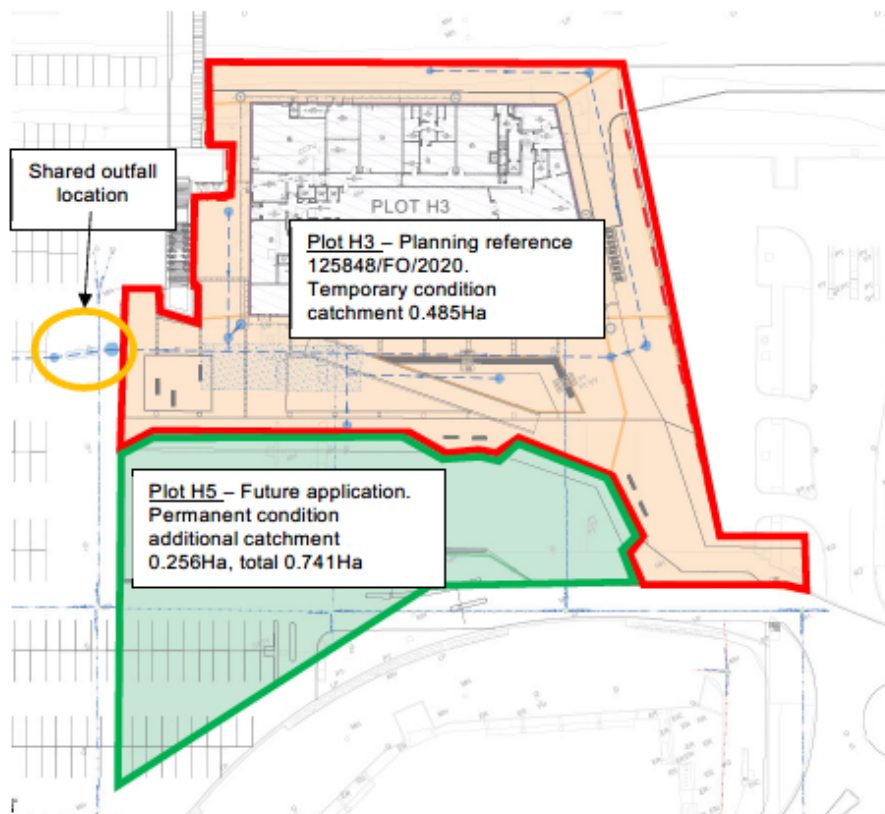


Figure 2.1 AECOM Catchment Plan (ACCBD-ACM-H3-XX-RP-X-00001)

The proposed development and drainage strategy were consented under planning application ref: 125848/FO/2020 and the associated drainage condition (Condition 12) has been discharged by AECOM. A copy of the associated report is provided in Appendix C.

The proposed surface water scheme was developed and installed to cater for both a temporary and permanent phase. During the temporary phase, the installed drainage system operates with a reduced discharge rate to reflect the fact that the additional catchment from the H5 site has not yet been incorporated. Under the permanent phase, once the H5 development has been connected into the system, the discharge rate is increased.

The restricted discharge rates for the temporary (without plot H5) and permanent (with plot H5) scenarios are **11.5 l/s** and **20 l/s** respectively.

The discharge rates have been formally agreed with both MCC Planning and MAG under the discharge of Condition 12 (125848/FO/2020) and are based on the existing Q1 run-off rate with a 50% betterment applied. These were then reduced further to ensure that the development as a whole complies with the 100yr 6-hour volumetric control requirement set out in the National Standards for SuDS.

As noted above, a copy of the as built drainage layout, which includes provision for the H5 plot, can be found in Appendix B. To facilitate the additional drained catchment area, the existing flow control chamber at SWMH-13 will be removed and replaced with a new unit with a maximum discharge rate of **20.0 l/s**. In addition, the bypass separator downstream of the flow control will also be replaced to accommodate the larger flow.

A copy of the H5 surface water drainage proposals is included in Appendix D.

2.2 Design Criteria

The following criteria have been used for the design of the surface water drainage network.

M ₅₋₆₀ (mm)	17.00
Rainfall Ratio (R)	0.400
Global Time of Entry (min)	5.0
Max. Rainfall (mm/hr)	50
Max. Time of Concentration (mm)	30
PIMP (%)	100
Volumetric Run-off Coeff. (Cv)	1.00
Min. Velocity (m/s)	1.0
Pipe Roughness (mm)	0.6
Min. Gradient	1:DN
Climate Change Allowance	40%

2.3 Surface Water Catchment Areas

A list of catchment areas considered within the surface water drainage design are listed below and indicated on RoC drawing H5PI-ROC-PI-XX-DR-C-0505 P01 in Appendix E.

1. H3 Hotel Plot	0.543ha
2. H5 Hotel Roof	0.147ha
3. H5 Hotel Paved Area	0.077ha

TOTAL DRAINED AREA 0.767ha

This represents a slight increase over the area allowed for in the H3 Plot drainage design as noted in section 2.1 above. Consequently, some additional attenuation storage was incorporated in the H5 Plot drainage by way of an oversized pipe along the northern boundary.

Sustainable Drainage Systems

Current policy and best practice encourage the use of Sustainable Drainage Systems (SuDS) and in particular infiltration systems.

The Environment Agency recommends that “surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. This approach involves using a range of techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements.

As indicated in this report, the strategy for the development is to discharge into the existing MAG surface water drainage network at a restricted rate. This is due to the ground conditions precluding any infiltration-based solution and the lack of any watercourse in the vicinity of the site.

Given the nature of the development and building footprint occupying the majority of the gross site area, the options for green SuDS solutions within the drainage design are severely limited. In particular due to the risk of bird strikes open water features are not permitted at the airport for safety reasons.

Attenuation is provided in the form of below ground attenuation tanks with additional attenuation proposed in the form of oversized pipework. Notwithstanding, the potential for permeable pavements with storage in the sub-base layer below will be explored at a later design stage.

2.4 Surface Water Drainage Design

Microdrainage software by Innovyze has been used to design the proposed piped network and attenuation storage.

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The system has been designed to ensure that the design criteria identified above are satisfied and that, where possible, all surface water is retained below ground for storm events up to and including the 100-year return period plus climate change.

The extracts below show the results from Microdrainage for the critical 1 year, 2 year, 30 year +35% CC and 100 year +40% CC storm event ranked by Maximum Level.

Climate change allowances for the 3.3% and 1% AEP events are based on the Upper End Allowances defined by the Environment Agency for the Upper Mersey Management Catchment.

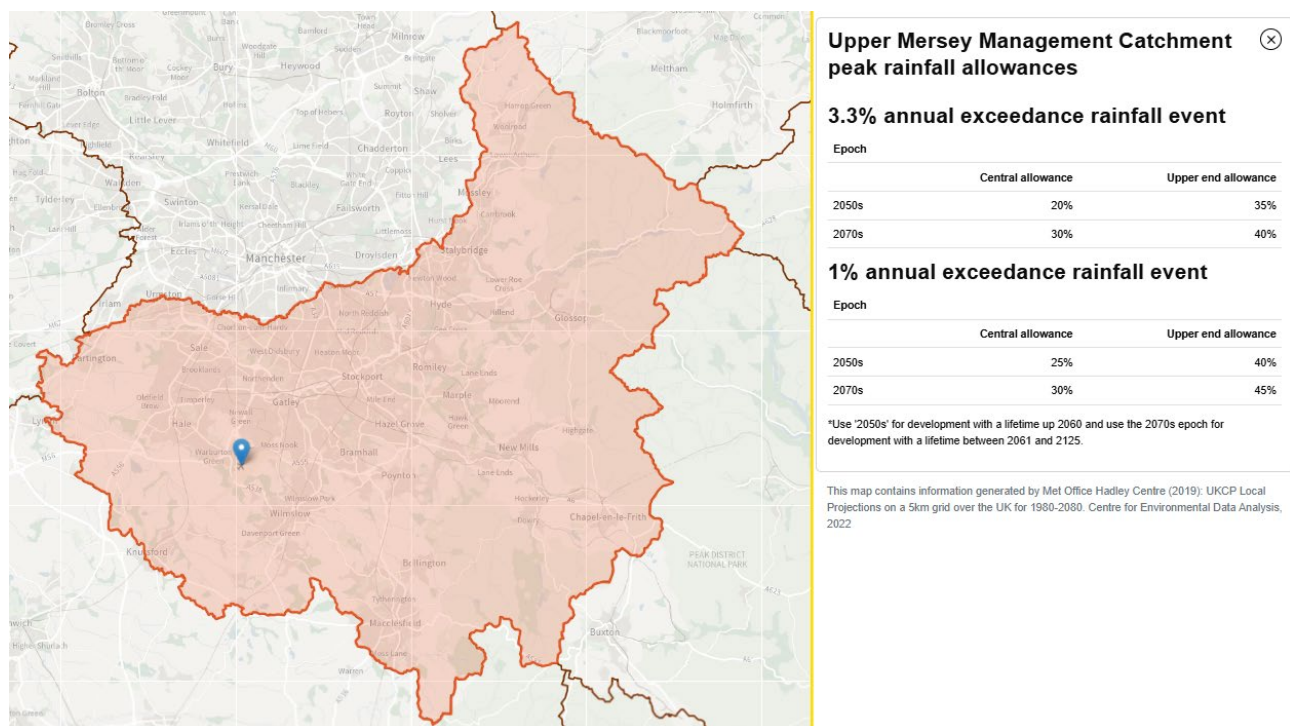


Figure 2.2 – Climate Change Allowances

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1 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	EXTN-SWMH-03	15 minute 1 year Summer I+0%	70.150	69.116	-0.225	0.000	0.00	0.000	0.000		0.0	OK
1.001	EXTN-SWMH-04	15 minute 1 year Summer I+0%	70.163	68.972	-0.176	0.000	0.11	0.071	2.750		5.3	OK
1.002	EXTN-SWMH-05	15 minute 1 year Summer I+0%	70.291	68.648	-0.318	0.000	0.06	0.059	5.097		9.8	OK
2.000	EXTN-SWMH-06	15 minute 1 year Summer I+0%	70.273	69.275	-0.116	0.000	0.11	0.033	1.945		4.4	OK
2.001	EXTN-SWMH-07	15 minute 1 year Summer I+0%	70.110	68.529	-0.290	0.000	0.11	0.203	5.299		10.8	OK
1.003	EXTN-SWMH-08	30 minute 1 year Summer I+0%	70.221	68.465	-0.296	0.000	0.06	8.540	11.431	23	7.8	OK
3.000	EXTN-SWMH-01	15 minute 1 year Summer I+0%	70.105	69.030	-0.073	0.000	0.50	0.081	3.286		7.3	OK
3.001	EXTN-SWMH-02	15 minute 1 year Summer I+0%	70.178	68.694	-0.127	0.000	0.38	0.107	8.786		17.5	OK
4.000	EXTN-SWMH-10	60 minute 1 year Summer I+0%	70.219	68.446	-0.138	0.000	0.04	0.093	1.479		1.4	OK
5.000	1.00	15 minute 1 year Summer I+0%	70.290	69.449	-0.131	0.000	0.04	0.002	0.268		0.6	OK
5.001	1.01	15 minute 1 year Summer I+0%	70.190	69.256	-0.116	0.000	0.11	0.024	0.872		1.8	OK
5.002	1.02	15 minute 1 year Summer I+0%	70.260	69.199	-0.090	0.000	0.34	0.043	2.951		5.8	OK
5.003	1.03	15 minute 1 year Summer I+0%	70.060	68.797	-0.142	0.000	0.29	0.090	4.628		8.9	OK
6.000	1.04	15 minute 1 year Summer I+0%	70.260	69.182	-0.128	0.000	0.05	0.003	0.738		1.7	OK
5.004	J1	15 minute 1 year Summer I+0%	70.200	68.745	-0.147	0.000	0.26	0.131	5.634		11.1	OK*
5.005	1.05	15 minute 1 year Summer I+0%	70.200	68.597	-0.152	0.000	0.23	0.147	5.634		11.0	OK
7.000	1.06	15 minute 1 year Summer I+0%	70.280	69.298	-0.084	0.000	0.39	0.010	2.884		6.5	OK
7.001	1.07	60 minute 1 year Summer I+0%	70.260	68.448	-0.758	0.000	0.02	0.473	15.928		13.9	OK
5.006	1.08	60 minute 1 year Summer I+0%	70.026	68.447	-0.129	0.000	0.17	3.903	25.484		18.1	OK
4.001	EXTN-SWMH-11	60 minute 1 year Summer I+0%	70.179	68.446	-0.058	0.000	0.15	24.945	29.012	34	12.2	OK
1.004	EXTN-SWMH-12	30 minute 1 year Summer I+0%	70.231	68.450	-0.029	0.000	0.25	4.975	52.806		20.7	OK
1.005	1.09	30 minute 1 year Summer I+0%	70.000	68.438	0.088	0.000	0.35	3.004	50.590		18.2	SURCHARGED
1.006	1.10	30 minute 1 year Summer I+0%	70.046	68.166	-0.175	0.000	0.37	0.164	50.325		18.2	OK
1.007	EXTN-SWMH-14	30 minute 1 year Summer I+0%	70.046	68.141	-0.187	0.000	0.30	0.307	49.347		18.1	OK

Figure 2.3 – 1 Year Return Period Critical Results Summary

2 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	EXTN-SWMH-03	15 minute 2 year Summer I+0%	70.150	69.116	-0.225	0.000	0.00	0.000	0.000		0.0	OK
1.001	EXTN-SWMH-04	15 minute 2 year Summer I+0%	70.163	68.978	-0.170	0.000	0.14	0.082	3.559		6.9	OK
1.002	EXTN-SWMH-05	15 minute 2 year Summer I+0%	70.291	68.657	-0.309	0.000	0.07	0.069	6.596		12.7	OK
2.000	EXTN-SWMH-06	15 minute 2 year Summer I+0%	70.273	69.279	-0.112	0.000	0.15	0.038	2.517		5.7	OK
2.001	EXTN-SWMH-07	15 minute 2 year Summer I+0%	70.110	68.541	-0.278	0.000	0.15	0.233	6.857		13.9	OK
1.003	EXTN-SWMH-08	60 minute 2 year Summer I+0%	70.221	68.504	-0.257	0.000	0.05	13.334	21.732	34	6.5	OK
3.000	EXTN-SWMH-01	15 minute 2 year Summer I+0%	70.105	69.043	-0.060	0.000	0.65	0.096	4.253		9.5	OK
3.001	EXTN-SWMH-02	15 minute 2 year Summer I+0%	70.178	68.709	-0.112	0.000	0.49	0.135	11.371		22.6	OK
4.000	EXTN-SWMH-10	60 minute 2 year Summer I+0%	70.219	68.503	-0.081	0.000	0.05	0.157	1.886		1.7	OK
5.000	1.00	15 minute 2 year Summer I+0%	70.290	69.451	-0.129	0.000	0.05	0.003	0.347		0.8	OK
5.001	1.01	15 minute 2 year Summer I+0%	70.190	69.261	-0.111	0.000	0.15	0.027	1.128		2.3	OK
5.002	1.02	15 minute 2 year Summer I+0%	70.260	69.209	-0.080	0.000	0.43	0.051	3.819		7.4	OK
5.003	1.03	15 minute 2 year Summer I+0%	70.060	68.810	-0.129	0.000	0.38	0.105	5.989		11.5	OK
6.000	1.04	15 minute 2 year Summer I+0%	70.260	69.186	-0.124	0.000	0.07	0.003	0.955		2.2	OK
5.004	J1	15 minute 2 year Summer I+0%	70.200	68.758	-0.134	0.000	0.34	0.153	7.291		14.3	OK*
5.005	1.05	15 minute 2 year Summer I+0%	70.200	68.607	-0.142	0.000	0.30	0.171	7.291		14.3	OK
7.000	1.06	15 minute 2 year Summer I+0%	70.280	69.309	-0.073	0.000	0.51	0.011	3.732		8.5	OK
7.001	1.07	60 minute 2 year Summer I+0%	70.260	68.504	-0.702	0.000	0.02	0.669	20.318		17.5	OK
5.006	1.08	60 minute 2 year Summer I+0%	70.026	68.504	-0.072	0.000	0.21	5.689	31.959		22.3	OK
4.001	EXTN-SWMH-11	60 minute 2 year Summer I+0%	70.179	68.502	-0.022	0.000	0.15	33.779	35.860	44	12.1	OK
1.004	EXTN-SWMH-12	60 minute 2 year Summer I+0%	70.231	68.500	0.002	0.000	0.25	6.277	107.232		20.8	SURCHARGED
1.005	1.09	60 minute 2 year Summer I+0%	70.000	68.489	0.138	0.000	0.37	3.235	105.505		18.9	SURCHARGED
1.006	1.10	60 minute 2 year Summer I+0%	70.046	68.168	-0.172	0.000	0.38	0.168	105.290		18.9	OK
1.007	EXTN-SWMH-14	60 minute 2 year Summer I+0%	70.046	68.144	-0.185	0.000	0.32	0.315	104.513		18.9	OK

Figure 2.4 – 2 Year Return Period Critical Results Summary

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30 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	EXTN-SWMH-03	15 minute 30 year Summer I+35%	70.150	69.116	-0.225	0.000	0.00	0.000	0.000		0.0	OK
1.001	EXTN-SWMH-04	15 minute 30 year Summer I+35%	70.163	69.031	-0.117	0.000	0.46	0.171	9.081		23.3	OK
1.002	EXTN-SWMH-05	120 minute 30 year Winter I+35%	70.291	68.999	0.033	0.000	0.07	0.855	35.065		12.1	SURCHARGED
2.000	EXTN-SWMH-06	15 minute 30 year Summer I+35%	70.273	69.305	-0.086	0.000	0.38	0.067	6.424		14.7	OK
2.001	EXTN-SWMH-07	120 minute 30 year Winter I+35%	70.110	69.000	0.181	0.000	0.12	1.474	35.987		11.8	SURCHARGED
1.003	EXTN-SWMH-08	120 minute 30 year Winter I+35%	70.221	68.999	0.238	0.000	0.21	75.741	46.525	96	27.2	SURCHARGED
3.000	EXTN-SWMH-01	15 minute 30 year Summer I+35%	70.105	69.746	0.643	0.000	1.45	0.891	10.852		21.2	SURCHARGED
3.001	EXTN-SWMH-02	15 minute 30 year Summer I+35%	70.178	69.199	0.378	0.000	1.24	1.362	28.994		56.6	SURCHARGED
4.000	EXTN-SWMH-10	120 minute 30 year Winter I+35%	70.219	69.019	0.435	0.000	0.05	0.740	5.707		1.7	SURCHARGED
5.000	1.00	15 minute 30 year Summer I+35%	70.290	69.513	-0.067	0.000	0.12	0.012	0.886		1.9	OK
5.001	1.01	15 minute 30 year Summer I+35%	70.190	69.504	0.132	0.000	0.55	0.392	2.879		8.5	SURCHARGED
5.002	1.02	15 minute 30 year Summer I+35%	70.260	69.489	0.200	0.000	1.22	0.234	9.744		20.9	SURCHARGED
5.003	1.03	120 minute 30 year Winter I+35%	70.060	69.018	0.079	0.000	0.36	0.595	31.836		11.1	SURCHARGED
6.000	1.04	15 minute 30 year Summer I+35%	70.260	69.202	-0.108	0.000	0.17	0.006	2.437		5.6	OK
5.004	J1	60 minute 30 year Winter I+35%	70.200	68.892	0.000	0.000	0.51	0.639	31.098		21.4	SURCHARGED*
5.005	1.05	120 minute 30 year Winter I+35%	70.200	69.014	0.265	0.000	0.25	1.379	38.629		12.0	SURCHARGED
7.000	1.06	15 minute 30 year Summer I+35%	70.280	69.502	0.120	0.000	1.30	0.042	9.522		21.5	SURCHARGED
7.001	1.07	120 minute 30 year Winter I+35%	70.260	69.012	-0.194	0.000	0.03	2.427	63.303		21.1	OK
5.006	1.08	120 minute 30 year Winter I+35%	70.026	69.012	0.436	0.000	0.20	24.895	93.046		21.2	SURCHARGED
4.001	EXTN-SWMH-11	120 minute 30 year Winter I+35%	70.179	69.019	0.515	0.000	1.05	112.884	60.058	109	82.7	SURCHARGED
1.004	EXTN-SWMH-12	120 minute 30 year Winter I+35%	70.231	69.245	0.767	0.000	0.63	11.052	261.591		52.9	SURCHARGED
1.005	1.09	120 minute 30 year Winter I+35%	70.000	69.413	1.063	0.000	0.39	5.618	257.944		20.0	SURCHARGED
1.006	1.10	360 minute 30 year Winter I+35%	70.046	68.173	-0.168	0.000	0.40	0.174	473.232		20.0	OK
1.007	EXTN-SWMH-14	120 minute 30 year Summer I+35%	70.046	68.148	-0.181	0.000	0.34	0.327	255.897		20.0	OK

Figure 2.5 – 30 Year+35% Return Period Critical Results Summary

100 year return period Critical Summary of Results by Maximum Level (Rank 1)

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	EXTN-SWMH-03	180 minute 100 year Winter I+45%	70.150	69.861	0.520	0.000	0.04	0.837	0.000		2.5	FLOOD RISK
1.001	EXTN-SWMH-04	180 minute 100 year Winter I+45%	70.163	69.861	0.713	0.000	0.21	1.586	29.894		10.6	SURCHARGED
1.002	EXTN-SWMH-05	180 minute 100 year Winter I+45%	70.291	69.859	0.893	0.000	0.09	1.980	55.063		15.3	SURCHARGED
2.000	EXTN-SWMH-06	180 minute 100 year Winter I+45%	70.273	69.863	0.472	0.000	0.16	0.697	21.144		6.1	SURCHARGED
2.001	EXTN-SWMH-07	180 minute 100 year Winter I+45%	70.110	69.860	1.041	0.000	0.15	3.755	56.692		14.5	FLOOD RISK
1.003	EXTN-SWMH-08	180 minute 100 year Winter I+45%	70.221	69.859	1.098	0.000	0.21	95.649	59.868		28.2	SURCHARGED
3.000	EXTN-SWMH-01	15 minute 100 year Summer I+45%	70.105	70.107	1.004	1.872	1.79	3.170	15.050		26.1	FLOOD
3.001	EXTN-SWMH-02	180 minute 100 year Winter I+45%	70.178	69.865	1.044	0.000	0.47	2.116	95.007		21.5	SURCHARGED
4.000	EXTN-SWMH-10	180 minute 100 year Winter I+45%	70.219	69.858	1.274	0.000	0.06	1.690	8.875		2.0	SURCHARGED
5.000	1.00	15 minute 100 year Summer I+45%	70.290	70.065	0.485	0.000	0.18	0.100	1.227		3.1	FLOOD RISK
5.001	1.01	15 minute 100 year Summer I+45%	70.190	70.053	0.681	0.000	0.56	0.592	3.991		8.7	FLOOD RISK
5.002	1.02	15 minute 100 year Summer I+45%	70.260	70.029	0.740	0.000	1.58	0.386	13.511		27.1	FLOOD RISK
5.003	1.03	180 minute 100 year Winter I+45%	70.060	69.869	0.930	0.000	0.35	1.903	50.134		10.8	FLOOD RISK
6.000	1.04	180 minute 100 year Winter I+45%	70.260	69.868	0.558	0.000	0.06	0.112	8.020		1.9	SURCHARGED
5.004	J1	15 minute 100 year Summer I+45%	70.200	68.892	0.000	0.000	1.14	0.802	25.397		48.1	SURCHARGED*
5.005	1.05	180 minute 100 year Winter I+45%	70.200	69.863	1.114	0.000	0.25	2.340	59.630		12.3	SURCHARGED
7.000	1.06	180 minute 100 year Winter I+45%	70.280	69.864	0.482	0.000	0.44	0.100	31.355		7.3	SURCHARGED
7.001	1.07	180 minute 100 year Winter I+45%	70.260	69.859	0.653	0.000	0.03	5.650	99.620		22.3	SURCHARGED
5.006	1.08	180 minute 100 year Winter I+45%	70.026	69.859	1.283	0.000	0.30	31.670	141.254		32.7	FLOOD RISK
4.001	EXTN-SWMH-11	180 minute 100 year Winter I+45%	70.179	69.857	1.353	0.000	1.06	193.213	80.141	169	83.7	SURCHARGED
1.004	EXTN-SWMH-12	180 minute 100 year Winter I+45%	70.231	69.855	1.377	0.000	0.63	12.604	386.612		52.8	SURCHARGED
1.005	1.09	180 minute 100 year Winter I+45%	70.000	69.843	1.493	0.000	0.39	6.713	381.724		20.0	FLOOD RISK
1.006	1.10	120 minute 100 year Winter I+45%	70.046	68.173	-0.167	0.000	0.40	0.175	251.123		20.0	OK
1.007	EXTN-SWMH-14	120 minute 100 year Summer I+45%	70.046	68.148	-0.181	0.000	0.34	0.327	249.836		20.0	OK

Figure 2.6 – 100 Year +45% Return Period Critical Results Summary

The results demonstrate that the surface water drainage system is able to operate satisfactorily with only 1.87m³ of flooding in the 15 minute 100 year plus climate change return period in pipe number 3.000 (SWMH-01). This is to the north of the H3 Plot.

The flooding only occurs in the extreme short duration event and represents a very small amount which would flow onto the access road where it would re-enter the network via the installed kerb drain.

It should be noted that the calculations submitted for the H3 Plot noted a total of 43m³ of flooding during the extreme rainfall event. However, with the addition of the H5 Plot drainage and additional storage provided in the network, this is reduced significantly.

A full copy of the microdrainage calculations is provided in Appendix F.

A plan showing indicative overland flow paths is provided in Appendix G.

2.5 Water Quality

Land use is the primary influencing factor in the quality of urban surface water run-off and is used to assess the pollution hazard posed by the development.

In accordance with CIRIA SuDS Manual 2015 guidance, and the requirements of the Lead Local Flood Authority, it is proposed that the Simple Index Approach is used to assess pollution risk based upon land use.

TABLE 26.1 Approaches to water quality risk management			
Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening ¹	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Figure 2.7 – CIRIA SuDS Manual Water Quality Risk Management

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As evident in Table 26.2 below, the risk of contamination from the commercial roof areas is considered to be Low. There are no car parks present, and only limited areas of road infrastructure within the overall H3/ H5 plot boundary. Vehicle numbers are therefore expected to be relatively minimal with the primary traffic comprising pedestrians only. Therefore, the risk of contamination associated with surrounding areas of hardstanding is also considered to be Low.

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Figure 2.8 – CIRIA SuDS Manual Pollution Hazard Indices

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The table below details the Total Pollution Hazard Indices for the site.

Land Use	Pollution/ Hazard Level	TSS	Metals	Hydrocarbons
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2	0.05
Low traffic roads, Non-residential car parking with infrequent change (e.g. schools, offices) i.e. <300 traffic movements/day	Low	0.5	0.4	0.4
TOTAL POLLUTION HAZARD INDICES		0.8	0.6	0.45

Taking the above into consideration, to deliver adequate treatment, the proposed drainage measures should have a total pollution mitigation index that equals or exceeds the total pollution hazard index (by contaminant type) where:

$$\text{Total SuDS mitigation index} = \text{mitigation index}_1 + 0.5 (\text{mitigation index}_2)$$

A factor of 0.5 is used to account for the reduced performance of any secondary or tertiary components associated with already reduced inflow concentrations.

The existing H3 Plot system incorporates a single by-pass separator, installed after the flow control device and prior to the outfall to the existing MAG network. This is to be removed and replaced with a new hydrodynamic separator unit, specified to suit the increased flow rate/ drained site area.

Treatment Component	TSS	Metals	Hydro.	Catchment	Comment
StormShark	0.8	0.6	0.96	Whole Site	SSK1200M Installed at S1.10
TOTAL	0.8	0.6	0.96		
Indices Balance	0.0	0.0	+0.51		

The StormShark proprietary pollution control device can be demonstrated to either meet or exceed the minimum requirement as defined by the simple index approach set out in the SuDS Manual.

The proposed drainage system therefore ensures that there are no adverse impacts on the downstream network.

A data sheet from the proposed hydrodynamic separator device is provided in Appendix H.

2.6 Surface Water Run-off Volume

The Non-Statutory Technical Standards for Sustainable Drainage Systems states that where reasonably practical the run-off volume from a development for the 1 in 100-year 6 hour rainfall event should not exceed the run-off volume prior to development or redevelopment.

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In the absence of a definitive existing drainage survey, the pre-development run-off volume has been calculated using the gross catchment area defined above (0.767ha) and an average rainfall intensity of 9.92 mm/hr which has been calculated using Microdrainage.

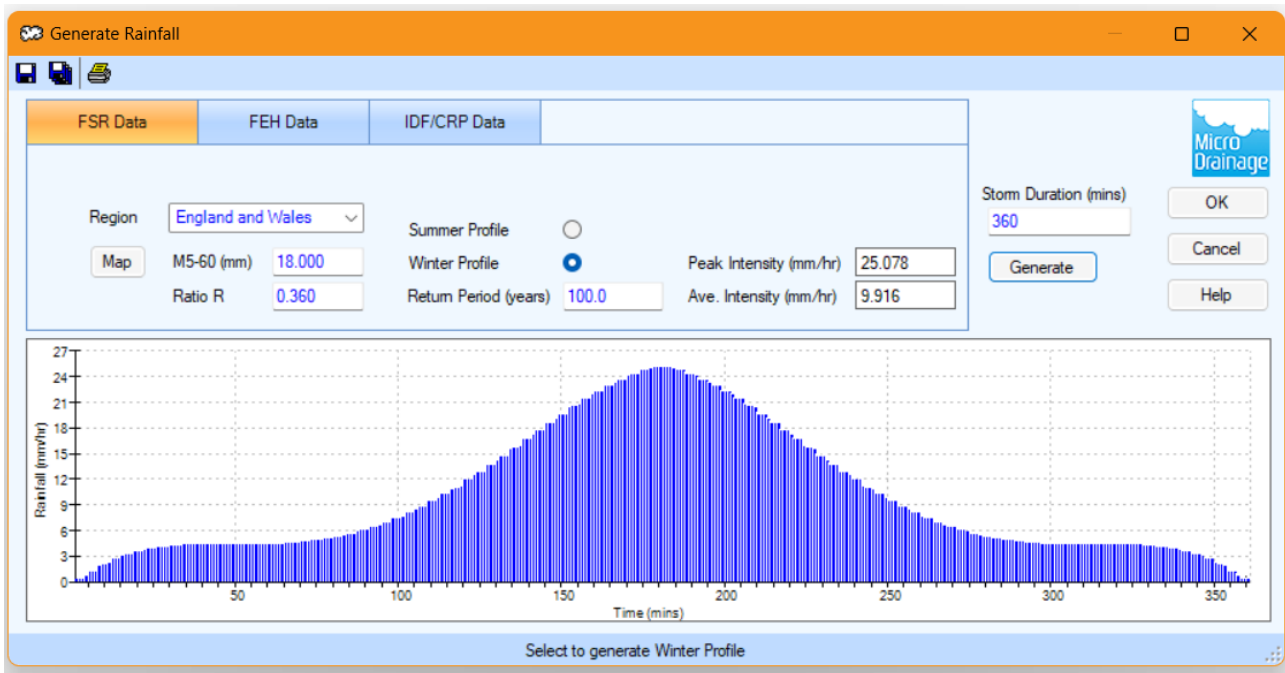


Figure 2.9 – 100 year, 6 hour rainfall profile

$$\text{Run-off Volume (V)} = \text{PR} \times \text{A} \times \text{i} \text{ (m}^3\text{)}$$

Where:

<i>PR</i> = Percentage Run-off (%)	[100]
<i>A</i> = Catchment Area (ha)	[0.767]
<i>i</i> = Rainfall Intensity (mm/hr)	[9.92]

This provides an estimated existing pre-development brownfield run-off volume of **761m³**.

The post-development run-off volume for the same event, including a 45% allowance for climate change is **662m³** which has been determined from the Microdrainage modelling that has been undertaken.

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Summary of Results for 360 minute 100 year Winter I+45%

Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Maximum Vol (m³)	Discharge Vol (m³)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	EXTN-SWMH-03	360 minute 100 year Winter I+45%	70.150	69.474	0.133	0.000	0.04	0.399	0.000		2.4	SURCHARGED
1.001	EXTN-SWMH-04	360 minute 100 year Winter I+45%	70.163	69.469	0.321	0.000	0.17	1.142	35.370		8.8	SURCHARGED
1.002	EXTN-SWMH-05	360 minute 100 year Winter I+45%	70.291	69.490	0.524	0.000	0.06	1.562	65.563		11.2	SURCHARGED
2.000	EXTN-SWMH-06	360 minute 100 year Winter I+45%	70.273	69.470	0.079	0.000	0.11	0.254	25.018		4.1	SURCHARGED
2.001	EXTN-SWMH-07	360 minute 100 year Winter I+45%	70.110	69.491	0.672	0.000	0.12	2.814	68.347		11.3	SURCHARGED
1.003	EXTN-SWMH-08	360 minute 100 year Winter I+45%	70.221	69.494	0.733	0.000	0.21	94.721	133.766	227	28.3	SURCHARGED
3.000	EXTN-SWMH-01	360 minute 100 year Winter I+45%	70.105	69.474	0.371	0.000	0.38	0.584	42.270		5.6	SURCHARGED
3.001	EXTN-SWMH-02	360 minute 100 year Winter I+45%	70.178	69.532	0.711	0.000	0.38	1.739	112.991		17.5	SURCHARGED
4.000	EXTN-SWMH-10	360 minute 100 year Winter I+45%	70.219	69.436	0.852	0.000	0.04	1.212	11.215		1.5	SURCHARGED
5.000	1.00	360 minute 100 year Winter I+45%	70.290	69.449	-0.131	0.000	0.02	0.002	3.451		0.4	OK
5.001	1.01	360 minute 100 year Winter I+45%	70.190	69.448	0.076	0.000	0.08	0.305	11.215		1.3	SURCHARGED
5.002	1.02	360 minute 100 year Winter I+45%	70.260	69.447	0.158	0.000	0.26	0.222	37.957		4.4	SURCHARGED
5.003	1.03	360 minute 100 year Winter I+45%	70.060	69.443	0.504	0.000	0.22	1.422	59.524		6.6	SURCHARGED
6.000	1.04	360 minute 100 year Winter I+45%	70.260	69.443	0.133	0.000	0.03	0.044	9.489		1.1	SURCHARGED
5.004	J1	360 minute 100 year Winter I+45%	70.200	68.892	0.000	0.000	0.19	1.208	72.464		7.9	SURCHARGED*
5.005	1.05	360 minute 100 year Winter I+45%	70.200	69.439	0.690	0.000	0.16	1.860	72.464		7.5	SURCHARGED
7.000	1.06	360 minute 100 year Winter I+45%	70.280	69.441	0.059	0.000	0.26	0.032	37.095		4.3	SURCHARGED
7.001	1.07	360 minute 100 year Winter I+45%	70.260	69.437	0.231	0.000	0.02	4.178	120.771		13.4	SURCHARGED
5.006	1.08	360 minute 100 year Winter I+45%	70.026	69.437	0.861	0.000	0.22	30.208	193.235		24.1	SURCHARGED
4.001	EXTN-SWMH-11	360 minute 100 year Winter I+45%	70.179	69.436	0.932	0.000	1.05	176.545	219.979	204	83.1	SURCHARGED
1.004	EXTN-SWMH-12	360 minute 100 year Winter I+45%	70.231	69.546	1.067	0.000	0.63	11.817	661.839		53.0	SURCHARGED
1.005	1.09	360 minute 100 year Winter I+45%	70.000	69.625	1.274	0.000	0.39	6.156	661.835		20.0	SURCHARGED
1.006	1.10	360 minute 100 year Winter I+45%	70.046	68.173	-0.168	0.000	0.40	0.175	661.835		20.0	OK
1.007	EXTN-SWMH-14	360 minute 100 year Winter I+45%	70.046	68.148	-0.181	0.000	0.34	0.327	661.835		20.0	OK

Figure 2.10 – 100 year +45%CC 360 minute Results

The table below summarises the pre and post development run-off volume figures which demonstrate there is approximately 13% reduction when compared to existing.

Run-off Volume Comparison		
Existing Volume (m³)	Proposed Volume (m³)	Difference (m³)
761	662	-99



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APPENDIX A – LANDSCAPE GA

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5. This drawing must be read with the relevant specification clauses and detail drawings.
6. Order of construction and setting out to be agreed on site.

WORKS BOUNDARIES

Premier Inn/BCEGI Landscape Works Boundary

LEVELS & DRAINAGE

FFL +70.3 Proposed Levels H5 Premier Inn

70370 Existing external level retained

70360 Proposed external level

70360 Proposed bin store level

70360 Proposed generator slab level

1.88 0 Proposed gradient or fall

Slot drain
Indicative location - refer to engineers details

Refer to ROC and TetraTech drawings for drainage information and details

P08	19/05/2025	Update to levels following coordination with architects.	JTN	GB
S2-P07	15/05/2025	Update to levels following coordination with architects.	JTN	GB
S2-P06	09/04/2025	Updated to Astle comments - additional levels added	MI	-
S2-P05	22/01/2025	Updated to planning comments	MI	GB
S2-P04	11/11/2024	Site Boundary updated	MI	GB

Revision	Date	Description	Drawn	Apprvd.
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Project Plot H5 Premier Inn

Drg Title Site Levels General Arrangement

Created on 04-09-2024 Created by MI Approved by GB

Scale 1:250 Size A1 Workstage Tender

Drg No. H5PI-PLA-EX-XX-DR-L-13000 Suitability S2 Revision P08

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WORKS BOUNDARIES

 Premier Inn/BCEGI Landscape Works Boundary

LEVELS & DRAINAGE

-  **Proposed Levels H5 Premier Inn**
-  **Existing external level retained**
-  **Proposed external level**
-  **Proposed bin store level**
-  **Proposed generator slab level**
-  **Proposed gradient or fall**
-  **Slot drain**
Indicative location - refer to engineers details

Refer to ROC and TetraTech drawings for drainage information and details

S2-P09	20/05/2025	Updated to show topo survey	MI	-
S2-P08	19/05/2025	Update to levels following coordination with architects.	JTN	GB
S2-P07	15/05/2025	Update to levels following coordination with architects.	JTN	GB
S2-P06	09/04/2025	Updated to Asite comments - additional levels added	MI	-
S2-P05	22/01/2025	Updated to planning comments	MI	GB

Revision	Date	Description	Drawn	Apprvd.
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Size A1
Workstage Tender

Drg No. H5PI-PLA-EX-XX-DR-L-13000
Suitability S2
Revision S2-P09



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APPENDIX B – H3 PLOT AS-BUILT DRAINAGE



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APPENDIX C – AECOM H3 PLOT CONDITION DISCHARGE REPORT

Airport City - H3 Hotel

Planning Condition no. 12 – Surface Water Drainage
Response

Airport City Limited Partnership

Project reference: Airport City, Manchester
Project number: 60489357
ACCBD-ACM-H3-XX-RP-C-00001 Rev P1

December 2020

Quality information

Prepared by



Joseph Watton
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Technical Director

Revision History

Revision	Revision date	Details
P1	04/12/2020	First Issue

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1. Introduction

- 1.1 A planning application (ref: 125848/FO/2020) for the erection of a nine-storey hotel at Manchester Airport was approved in April 2020. There were a number of Planning Conditions imposed on the application.
- 1.2 This report has been prepared in response to Planning Condition 12, which was worded as follows:

“No development shall take place until details of surface water drainage works have been submitted to and approved in writing by the Local Planning Authority, in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards. The drainage shall then be implemented and thereafter maintained in accordance with those approved details.”

Reason - To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution, pursuant to Policies EN08 and EN14 in the Core Strategy Development Plan Document and in light of national policies within the NPPF and NPPG.”
- 1.3 Further guidance as to what information would need to be provided to discharge the Condition was provided on page 8 of the Decision Notice.
- 1.4 The report will provide a direct response to each of the items listed on the Decision Notice and include the required evidence in support.

2. Response to Condition 12

1) Evidence that the designed drainage system for the H Masterplan performs for the H3 plot and links together to form an effective system during each phase of the entire H Masterplan as well as on final completion

Existing Site Run-off Rates

- 2.1 The site is currently in use as a car park with no apparent flow control measures in place to reduce surface water run-off rates. We have therefore used the CIRIA SuDS Manual Modified Rationale Method for calculating the existing run-off rate from the site.

$$Q = 2.78 \times C_v \times i \times A_i \quad (\text{Equation 24.5 – CIRIA SuDS Manual C753})$$

Q = design event peak rate of runoff(l/s)

C_v = volumetric runoff coefficient

i = rainfall intensity for the design return period (in mm/hr)

A_i = impervious area (hectares)

- 2.2 For the purpose of this calculation, the rainfall intensity, i , has been taken from MicroDrainage for the Manchester Airport area.
- 2.3 The volumetric runoff coefficient, C_v , has been taken as 1 due to the existing site being mostly hardstanding areas.
- 2.4 The total impervious site area, A_i , has been measured as 0.741Ha. The drainage catchment plan has been included with the drainage layout and details drawings in **Appendix A**.

The estimated existing run-off rates are as follows for the various storm events:

Storm Event	Rainfall intensity (mm/hr)	Existing Run-off Rate (l/s)
1 in 1yr	28.0	57.7
1 in 2yr	36.2	74.6
1 in 30yr	68.6	141.3
1 in 100yr + 40%CC	124.1	255.7

Table 1 – Existing Run-off Rates

- 2.5 The site currently drains into an existing private surface water sewer network within the car park. This sewer network is the responsibility of Manchester Airport.

Proposed Site Drainage Infrastructure and Discharge Rates

- 2.6 In accordance with Building Regulations Part H, all drainage design should consider the following disposal hierarchy:
- 1) Infiltration or soakaway on site;
 - 2) Discharge to a watercourse; and
 - 3) Discharge to a sewer.
- 2.7 Site investigations have demonstrated that the ground conditions beneath the site are not suitable for using infiltration as a means of discharging surfacing water.
- 2.8 As there are also no watercourses in close proximity to the site, in line with the preferred disposal in line with the preferred disposal hierarchy, it is proposed to connect to an existing surface water sewer adjacent to the site boundary.
- 2.9 It is proposed to provide a new surface water drainage networks to drain run-off from H3 and H5 hotel roof drainage and associated external areas. There will be a temporary and a permanent arrangement for this new drainage network. A brief description of each of these arrangements are as follows:
- Temporary Network – Pipe network to drain the H3 hotel and surrounding public realm and service road areas. This area can be seen by the orange hatch on the catchment plan in **Appendix A**. This will drain into a cellular storage attenuation tank, which has been sized to accommodate run-off from the future H5 hotel and external areas. A Hydrobrake will be used to control run-off rates from the new development prior to discharging, via an oil bypass separator, to the existing Manchester Airport sewer network. The temporary coach and taxi parking area to the south of the public realm area will utilise existing gully connections and below ground drains to discharge run-off to the existing sewer network.
 - Permanent Network – New pipe network to discharge into manhole S51 from the H3 hotel network to accommodate the run-off from the H5 hotel to the south. The flow control Hydrobrake in place for the temporary network will then need to be upsized to increase the flow rate for the additional catchment area.
- 2.10 The future H plots from the masterplan will then have its own independent surface water drainage network with associated attenuation and flow control devices discharging downstream of the proposed discharge location of the H3 and H5 hotels.
- 2.11 In accordance with the Manchester, Trafford and Salford SFRA, it is proposed to reduce the run-off rates to at least 50% of their current run-off for the equivalent storm. The total site area for the temporary arrangement is 0.485Ha and 0.741HA for the permanent arrangement.

Storm Event	Existing Run-off Rate (l/s)	Proposed Discharge Rate (l/s) (50% of Existing) – Temporary Network	Proposed Discharge Rate (l/s) (50% of Existing) – Permanent Network
1 in 1yr	57.7	18.9	28.8
1 in 2yr	74.6	24.4	37.3
1 in 30yr	141.3	46.2	70.6
1 in 100yr + 40%CC	255.7	83.7	127.9

Table 2 – Proposed Discharge Rates (Temporary & Permanent)

- 2.12 It proposed to provide flow control by using a Hydrobrake by Hydro International (or similar approved) restricted to 18.9l/s in the temporary arrangement and then upsized to accommodate a flow rate of 28.8l/s for the permanent arrangement. The outfall is to be into the existing surface water sewer where the site currently drains.

2) Runoff volume in the 1 in 100-year, 6 hours rainfall shall be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to re-development.

- 2.13 As the site was almost entirely impermeable area, it is not considered practical to limit the flow to equivalent Greenfield rates as this would require very large underground storage tanks on an already constrained site area.

- 2.14 The total run-off volume for a Greenfield site for this storm would be as follows:

Temporary – $5\text{l/s/ha} \times 0.485\text{ha} \times 3600 \times 6\text{hr} = 52\text{m}^3$

Permanent – $5\text{l/s/ha} \times 0.741\text{ha} \times 3600 \times 6\text{hr} = 80\text{m}^3$

- 2.15 However, the site was almost completely paved prior to development. The runoff volume prior to development based on the existing paved area for an average intensity of 15mm/hr (taken from Microdrainage), equates to the following:

Temporary – $4,850\text{m}^2 \times 0.015\text{mm/hr} \times 6\text{hr} = 436.5\text{m}^3$

Permanent – $7,410\text{m}^2 \times 0.015\text{mm/hr} \times 6\text{hr} = 666.9\text{m}^3$

- 2.16 Our proposed discharge volumes for a 1 in 100-year storm in a 6-hour period are as follows:

Temporary – $18.8\text{l/s} \times 3600 \times 6\text{hr} = 406,080\text{ l} = 406\text{m}^3$

Permanent – $28.7\text{l/s} \times 3600 \times 6\text{hr} = 619,920\text{ l} = 620\text{m}^3$

Total Volume = 848.8m³

- 2.17 This would mean there is a small reduction in discharge over a 6-hour period for a 1 in 100-year event. The Microdrainage results from this storm event can be seen in **Appendix B**.

3) Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100-year rainfall event with allowance for climate change in any part of a building.

- 2.18 As mentioned previously, the surface water drainage design has been designed as a temporary network for just H3 and a permanent network for H5. Both networks were modelled in Microdrainage to demonstrate that no flooding will occur during a 1 in 100-year rainfall event with allowance for climate a change. The results from the critical rainfall event can be seen in **Appendix C**.

Critical Summary of Results by Maximum Level (Rank 1)											
Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000 1		15 minute 100 year Winter I+40%	70.100	68.913	0.013	0.000	0.53		0.149	19.6	SURCHARGED
1.001 2		15 minute 100 year Winter I+40%	70.100	68.858	0.108	0.000	0.56		1.385	36.5	SURCHARGED
1.002 3		15 minute 100 year Winter I+40%	70.300	68.773	0.198	0.000	1.08		3.561	66.4	SURCHARGED
1.003 4		60 minute 100 year Winter I+40%	70.300	68.758	0.233	0.000	0.79		1.011	74.0	SURCHARGED
2.000 21		15 minute 100 year Winter I+40%	70.300	68.808	0.283	0.000	0.24		0.569	11.6	SURCHARGED
3.000 31		15 minute 100 year Winter I+40%	70.200	69.188	0.573	0.000	1.19		0.897	90.4	SURCHARGED
2.001 22		15 minute 100 year Winter I+40%	70.300	68.784	0.459	0.000	2.26		1.581	100.8	SURCHARGED
4.000 41		60 minute 100 year Winter I+40%	69.660	68.714	-0.046	0.000	0.09		0.197	4.7	OK
5.000 51		60 minute 100 year Winter I+40%	70.240	68.711	0.341	0.000	0.00		0.720	0.1	SURCHARGED
1.004 5		60 minute 100 year Winter I+40%	70.300	68.711	0.336	0.000	0.25		134.944	30.2	SURCHARGED
1.005 6		60 minute 100 year Winter I+40%	70.000	68.727	0.527	0.000	0.30		3.942	25.8	SURCHARGED
1.006 7		60 minute 100 year Winter I+40%	70.000	67.909	-0.171	0.000	0.38		0.241	25.7	OK
1.007 8		60 minute 100 year Winter I+40%	69.870	67.846	-0.154	0.000	0.48		0.475	25.7	OK

Figure 1 – Temporary Network Critical Rainfall Event Summary

Critical Summary of Results by Maximum Level (Rank 1)											
Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000 1		60 minute 100 year Winter I+40%	70.100	69.408	0.508	0.000	0.29		0.463	10.8	SURCHARGED
1.001 2		60 minute 100 year Winter I+40%	70.100	69.403	0.653	0.000	0.30		2.022	19.4	SURCHARGED
1.002 3		60 minute 100 year Winter I+40%	70.300	69.398	0.823	0.000	0.52		4.276	32.1	SURCHARGED
1.003 4		60 minute 100 year Winter I+40%	70.300	69.394	0.869	0.000	0.72		1.731	66.9	SURCHARGED
2.000 21		60 minute 100 year Winter I+40%	70.300	69.385	0.860	0.000	0.12		1.222	5.8	SURCHARGED
3.000 31		60 minute 100 year Winter I+40%	70.200	69.389	0.774	0.000	0.63		1.124	47.6	SURCHARGED
2.001 22		60 minute 100 year Winter I+40%	70.300	69.382	1.057	0.000	1.17		2.258	52.3	SURCHARGED
4.000 41		60 minute 100 year Winter I+40%	69.660	69.380	0.620	0.000	0.08		0.951	4.7	FLOOD RISK
5.000 51		60 minute 100 year Winter I+40%	70.240	69.398	1.028	0.000	1.31		1.496	72.2	SURCHARGED
1.004 5		60 minute 100 year Winter I+40%	70.300	69.378	1.003	0.000	0.50		186.687	60.8	SURCHARGED
1.005 6		60 minute 100 year Winter I+40%	70.000	69.281	1.081	0.000	0.57		5.351	49.8	SURCHARGED
1.006 7		60 minute 100 year Winter I+40%	70.000	67.976	-0.104	0.000	0.75		0.446	49.9	OK
1.007 8		60 minute 100 year Winter I+40%	69.870	67.926	-0.074	0.000	0.92		0.883	49.7	OK

Figure 2 – Permanent Network Critical Rainfall Event Summary

4) Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. The flood water should be routed away from the buildings and towards the less vulnerable areas i.e. open spaces, car parks and roads. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.

- 2.19 Below are the outputs from the design software for the simulation of a 1 in 1000-year rainfall event for the two drainage systems. These results have also been included in **Appendix D**.

Critical Summary of Results by Maximum Level (Rank 1)											
Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000 1		15 minute 1000 year Winter I+0%	70.100	69.081	0.181	0.000	0.60		0.255	22.1	SURCHARGED
1.001 2		15 minute 1000 year Winter I+0%	70.100	69.012	0.262	0.000	0.67		1.580	43.7	SURCHARGED
1.002 3		60 minute 1000 year Winter I+0%	70.300	68.954	0.379	0.000	0.64		3.774	39.6	SURCHARGED
1.003 4		60 minute 1000 year Winter I+0%	70.300	68.943	0.418	0.000	0.88		1.220	82.0	SURCHARGED
2.000 21		15 minute 1000 year Winter I+0%	70.300	69.014	0.489	0.000	0.28		0.801	13.1	SURCHARGED
3.000 31		15 minute 1000 year Winter I+0%	70.200	69.524	0.909	0.000	1.37		1.277	103.6	SURCHARGED
2.001 22		15 minute 1000 year Winter I+0%	70.300	68.986	0.661	0.000	2.57		1.810	114.5	SURCHARGED
4.000 41		60 minute 1000 year Winter I+0%	69.660	68.897	0.137	0.000	0.10		0.404	5.7	SURCHARGED
5.000 51		60 minute 1000 year Winter I+0%	70.240	68.895	0.525	0.000	0.00		0.927	0.2	SURCHARGED
1.004 5		60 minute 1000 year Winter I+0%	70.300	68.895	0.520	0.000	0.34		167.267	41.7	SURCHARGED
1.005 6		60 minute 1000 year Winter I+0%	70.000	68.910	0.710	0.000	0.33		4.405	28.4	SURCHARGED
1.006 7		60 minute 1000 year Winter I+0%	70.000	67.916	-0.164	0.000	0.43		0.262	28.4	OK
1.007 8		60 minute 1000 year Winter I+0%	69.870	67.855	-0.145	0.000	0.53		0.521	28.3	OK

Figure 3 – Temporary Network Forced Flood Event (1 in 1000-yr Storm)

Critical Summary of Results by Maximum Level (Rank 1)											
Pipe Number	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Maximum Vol (m³)	Pipe Flow (l/s)	Status
1.000 1		60 minute 1000 year Winter I+0%	70.100	70.103	1.203	2.820	0.56		3.639	20.6	FLOOD
1.001 2		60 minute 1000 year Winter I+0%	70.100	70.104	1.354	3.695	0.35		6.377	22.7	FLOOD
1.002 3		60 minute 1000 year Winter I+0%	70.300	70.153	1.578	0.000	0.67		5.130	41.2	FLOOD RISK
1.003 4		60 minute 1000 year Winter I+0%	70.300	70.152	1.627	0.000	0.91		2.588	84.4	FLOOD RISK
2.000 21		60 minute 1000 year Winter I+0%	70.300	70.200	1.675	0.000	0.15		2.143	7.0	FLOOD RISK
3.000 31		60 minute 1000 year Winter I+0%	70.200	70.202	1.587	1.805	0.75		3.840	57.2	FLOOD
2.001 22		60 minute 1000 year Winter I+0%	70.300	70.189	1.864	0.000	1.41		3.170	62.8	FLOOD RISK
4.000 41		60 minute 1000 year Winter I+0%	69.660	69.694	0.934	34.457	0.83		35.632	45.9	FLOOD
5.000 51		60 minute 1000 year Winter I+0%	70.240	70.182	1.812	0.000	1.57		2.383	86.5	FLOOD RISK
1.004 5		60 minute 1000 year Winter I+0%	70.300	70.107	1.732	0.000	0.69		188.337	84.5	FLOOD RISK
1.005 6		60 minute 1000 year Winter I+0%	70.000	70.000	1.800	0.310	0.70		7.454	60.7	FLOOD
1.006 7		60 minute 1000 year Winter I+0%	70.000	68.104	0.024	0.000	0.90		0.830	60.4	SURCHARGED
1.007 8		60 minute 1000 year Winter I+0%	69.870	68.013	0.013	0.000	1.11		1.286	59.9	SURCHARGED

Figure 4 – Permanent Network Forced Flood Event (1 in 1000-yr Storm)

- 2.20 The modelling undertaken to demonstrate flood flow routes for extreme events showed flooding would take place at the following manholes. No flooding was observed for the temporary network which is expected as the attenuation tank will be significantly larger than required for the temporary scenario.

Manhole Ref	Flood Volume (m³)
1	2.820
2	3.695
6	1.805
31	34.457
41	0.310

Table 3 – Permanent Network Extreme Event Flood Volumes

- 2.21 Indicative overland flow routes from these manholes have been shown on the drawing included in **Appendix E**. it is clear from the proposed levels that the flood water would be conveyed away from the buildings as the low spots are located within the access road, the car park area adjacent to the hotels, and the taxi arrival/departure area which is around lower than the paved areas directly adjacent to the buildings. The majority of the flooding would occur in the sunken landscaped area where there are a number of slot drains and soft landscaped areas that will eventually allow the area to drain. Though the flood volume is fairly significant, it will not pose a risk to flooding the adjacent buildings and will be contained in the landscape area.

5) Hydraulic calculation of the existing and proposed drainage system.

Existing Drainage Network

- 2.22 All information regarding the existing surface water drainage is taken from Manchester Airport Group (MAG) record drawings and the Infracore model prepared by Montgomery Watson in 1996 and subsequently updated by Mott MacDonald in 2000, 2004 and 2013 to reflect developments within the airport. Manchester Airport Group have recently undertaken some more detailed drainage modelling of the whole airport surface water network (by Jacobs). Details of that drainage modelling can be obtained directly from Manchester Airport Group. The drainage system within the proposed site of the hotel is currently localised car park drainage which ties into the wider Manchester Airport drainage network.

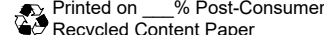
Proposed Drainage Network

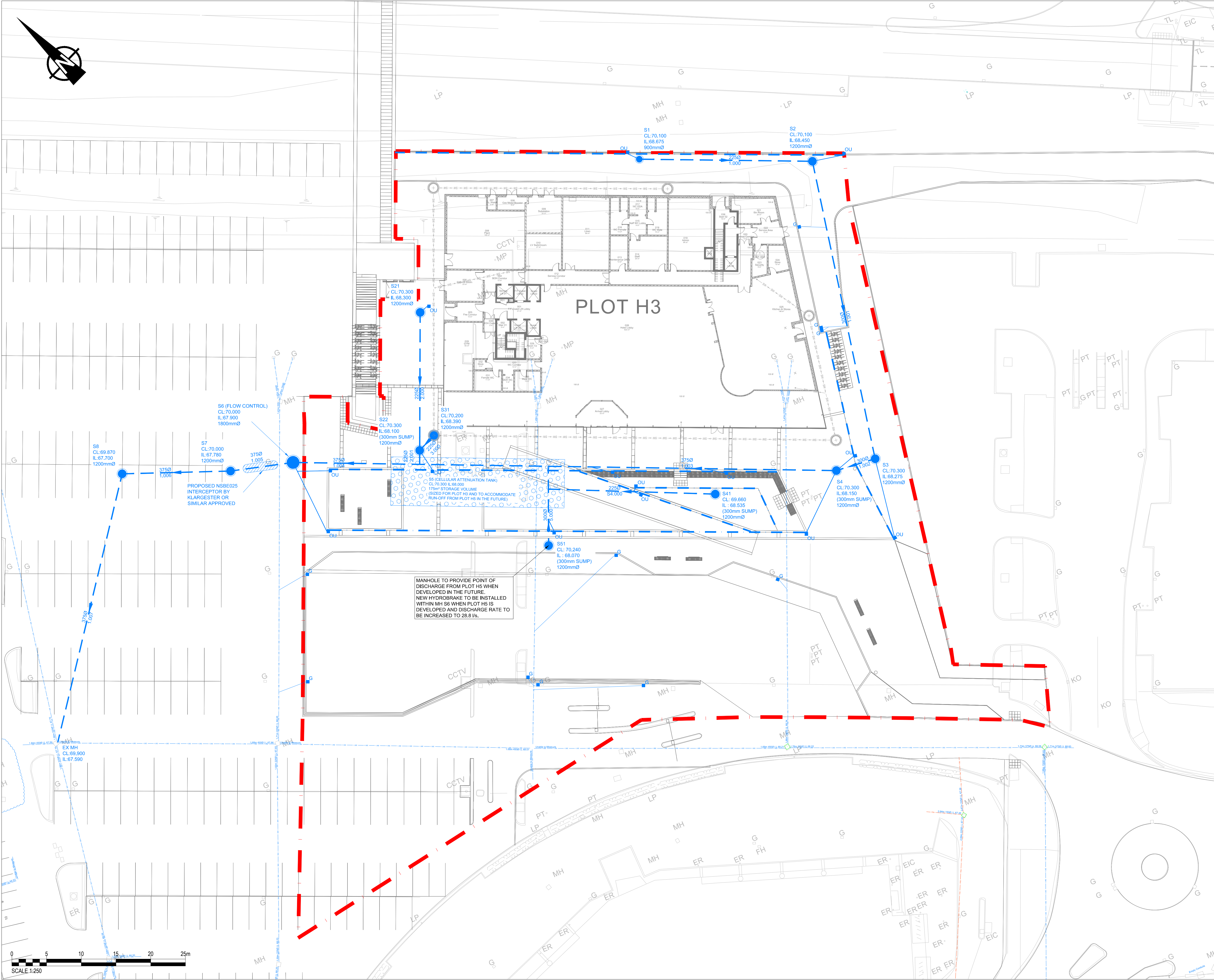
- 2.23 The details of the two proposed drainage networks can be found in **Appendix F**. The modelling results for the critical storm event for these networks is shown in **Appendix C**.

6) Construction details of flow control and SuDS elements.

- 2.24 Typical construction details for the Hydrobrake manhole, oil interceptor and below ground cellular storage tank have been provided in **Appendix A**.

Appendix A – Drainage Catchment, Layout & Details Drawings





KEY	
	SITE BOUNDARY
	EXISTING SURFACE WATER SEWER
	EXISTING FOUL SEWER
	PROPOSED HOTEL SURFACE WATER DRAINAGE (DESIGN BY OTHERS)
	PROPOSED SURFACE WATER SEWER
	PROPOSED KERB/SLOT DRAIN
	PROPOSED CELLULAR ATTENUATION TANK
	PROPOSED PETROL INTERCEPTOR
	PROPOSED ROAD GULLY
	PROPOSED KERB/SLOT DRAIN OUTLET UNIT

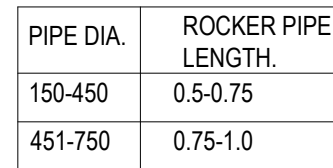
ISSUE/REVISION		
P1	04/12/20	FIRST ISSUE
I/R	DATE	DESCRIPTION

PROJECT NUMBER	
60489357	
SHEET TITLE	
H3 PLANNING CONDITIONS PROPOSED SURFACE WATER LAYOUT PLAN	
SHEET NUMBER	
ACCBD-ACM-H3-XX-DR-C-25001 P1	



- SITE BOUNDARY
- EXISTING SURFACE WATER SEWER
- EXISTING FOUL SEWER
- PROPOSED SURFACE WATER NETWORK
- PROPOSED CATCHMENT 1
- EXTERNAL AREAS (AREA = 0.313Ha)
- PROPOSED CATCHMENT 2
- ROOF AREA (AREA = 0.172Ha)
- PROPOSED CATCHMENT 3
- FUTURE PLOT H5 AREA (AREA = 0.256Ha)

P1	04/12/20	FIRST ISSUE
I/R	DATE	DESCRIPTION



DETAILED DESIGN TO BE PREPARED BY SPECIALIST DESIGNER (NTS)



P1	27/11/20	FIRST ISSUE
I/R	DATE	DESCRIPTION

60489357

H3 PLANNING CONDITIONS TYPICAL DETAILS

ACCBD-ACM-H3-XX-DR-C-25003 P1

Appendix B – 1 in 100yr 6 Hour Storm Event Results

AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 01/12/2020 14:19 File H3-DN01 - Permanent.MDX		
Designed by joseph.watton Checked by		
Innovyze		Network 2019.1

Summary Wizard of 360 minute 100 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.397
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	18.300	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	15	68.709	-0.191	0.000	0.06		2.1	OK
S1.001	S2	15	68.500	-0.250	0.000	0.07		4.3	OK
S1.002	S3	14	68.349	-0.226	0.000	0.13		7.8	OK
S1.003	S4	14	68.342	-0.183	0.000	0.17		15.5	OK
S2.000	S21	14	68.339	-0.186	0.000	0.03		1.4	OK
S3.000	S31	15	68.444	-0.171	0.000	0.13		9.8	OK
S2.001	S22	14	68.335	0.010	0.000	0.25		11.0	SURCHARGED
S4.000	S41	15	68.553	-0.207	0.000	0.02		0.9	OK
S5.000	S51	14	68.355	-0.015	0.000	0.26		14.4	OK
S1.004	S5	14	68.332	-0.043	0.000	0.24		29.1	OK
S1.005	S6	14	68.273	0.073	0.000	0.33		28.7	SURCHARGED
S1.006	S7	14	67.917	-0.163	0.000	0.43		28.7	OK
S1.007	S8	14	67.856	-0.144	0.000	0.53		28.7	OK

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AECOM		Page 1
Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 01/12/2020 14:43 File H3-DN01 - Temporary.MDX		
Designed by joseph.watton Checked by		
Innovyze		Network 2019.1

Summary Wizard of 360 minute 100 year Winter I+0% for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.397
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	18.300	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	OFF

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	100
Climate Change (%)	0

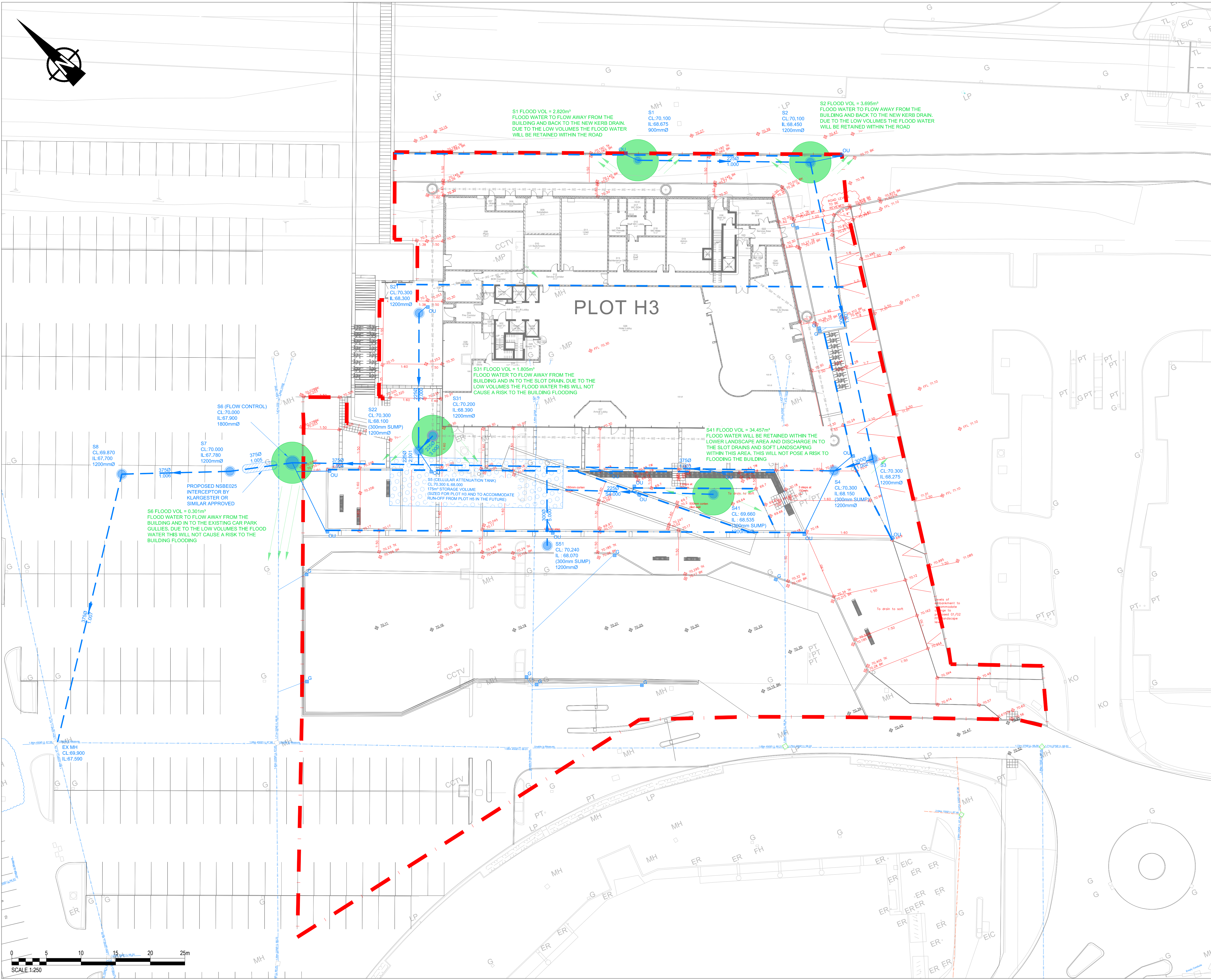
PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
S1.000	S1	15	68.709	-0.191	0.000	0.06		2.1	OK
S1.001	S2	15	68.500	-0.250	0.000	0.07		4.3	OK
S1.002	S3	15	68.346	-0.229	0.000	0.13		7.8	OK
S1.003	S4	14	68.264	-0.261	0.000	0.17		15.6	OK
S2.000	S21	15	68.325	-0.200	0.000	0.03		1.4	OK
S3.000	S31	15	68.444	-0.171	0.000	0.13		9.8	OK
S2.001	S22	14	68.233	-0.092	0.000	0.25		11.2	OK
S4.000	S41	15	68.553	-0.207	0.000	0.02		0.9	OK
S5.000	S51	14	68.230	-0.140	0.000	0.00		0.1	OK
S1.004	S5	14	68.230	-0.145	0.000	0.16		19.1	OK
S1.005	S6	14	68.213	0.013	0.000	0.22		18.8	SURCHARGED
S1.006	S7	13	67.888	-0.192	0.000	0.28		18.8	OK
S1.007	S8	13	67.822	-0.178	0.000	0.35		18.8	OK

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Appendix C – Critical Storm Event Results

Appendix D – 1 in 1000yr Extreme Event Results

Appendix E – Overland Flood Flow Drawing



- SITE BOUNDARY
- EXISTING SURFACE WATER SEWER
- EXISTING FOUL SEWER
- PROPOSED HOTEL SURFACE WATER DRAINAGE (DESIGN BY OTHERS)
- PROPOSED SURFACE WATER SEWER
- PROPOSED KERB/SLOT DRAIN
- PROPOSED CELLULAR ATTENUATION TANK
- PROPOSED PETROL INTERCEPTOR
- PROPOSED ROAD GULLY
- PROPOSED KERB/SLOT DRAIN OUTLET UNIT
- MANHOLE SUBJECT TO FLOODING IN A 1 IN 1000 YEAR EXTREME EVENT
- INDICATIVE FLOOD FLOW DIRECTION
- INDICATIVE PROPOSED SITE LEVELS
- EXISTING SITE LEVELS

ISSUE/REVISION	DATE	DESCRIPTION
P1	04/12/20	FIRST ISSUE
I/R	DATE	DESCRIPTION

Appendix F – Proposed Drainage Network Model

AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 01/12/2020 14:17	Designed by joseph.watton	
File H3-DN01 - Permanent.MDX	Checked by	
Innovyze		Network 2019.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	70.100	1.425	Open Manhole	900	S1.000	68.675	225				
S2	70.100	1.650	Open Manhole	1200	S1.001	68.450	300	S1.000	68.525	225	
S3	70.300	2.025	Open Manhole	1200	S1.002	68.275	300	S1.001	68.275	300	
S4	70.300	2.150	Open Manhole	1200	S1.003	68.150	375	S1.002	68.225	300	
S21	70.300	2.000	Open Manhole	1200	S2.000	68.300	225				
S31	70.200	1.810	Open Manhole	1200	S3.000	68.390	225				
S22	70.300	2.200	Open Manhole	1200	S2.001	68.100	225	S2.000	68.100	225	
								S3.000	68.100	225	
S41	69.660	1.125	Open Manhole	1200	S4.000	68.535	225				
S51	70.240	2.170	Open Manhole	1200	S5.000	68.070	300				
S5	70.300	2.300	Open Manhole	1200	S1.004	68.000	375	S1.003	68.000	375	
								S2.001	68.000	225	
								S4.000	68.000	225	
								S5.000	68.000	300	
S6	70.000	2.100	Open Manhole	1800	S1.005	67.900	300	S1.004	67.900	375	
S7	70.000	2.220	Open Manhole	1200	S1.006	67.780	300	S1.005	67.780	300	
S8	69.870	2.170	Open Manhole	1200	S1.007	67.700	300	S1.006	67.700	300	
S	69.900	2.310	Open Manhole	0		OUTFALL		S1.007	67.590	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	381896.872	385611.385	381896.872	385611.385	Required	
S2	381919.707	385601.364	381919.707	385601.364	Required	
S3	381911.281	385558.372	381911.281	385558.372	Required	
S4	381905.449	385558.968	381905.449	385558.968	Required	
S21	381859.188	385603.400	381859.188	385603.400	Required	
S31	381854.083	385586.310	381854.083	385586.310	Required	

AECOM		Page 4																				
Midpoint Alencon Link Basingstoke, RG21 7PP																						
Date 01/12/2020 14:17 File H3-DN01 - Permanent.MDX	Designed by joseph.watton Checked by																					
Innovyze	Network 2019.1																					
<div>Simulation Criteria for Storm</div> <table><tr><td>Rainfall Model</td><td>FSR</td><td>Profile Type</td><td>Summer</td></tr><tr><td>Return Period (years)</td><td>1</td><td>Cv (Summer)</td><td>0.750</td></tr><tr><td>Region</td><td>England and Wales</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>M5-60 (mm)</td><td>18.200</td><td>Storm Duration (mins)</td><td>30</td></tr><tr><td>Ratio R</td><td>0.396</td><td></td><td></td></tr></table>			Rainfall Model	FSR	Profile Type	Summer	Return Period (years)	1	Cv (Summer)	0.750	Region	England and Wales	Cv (Winter)	0.840	M5-60 (mm)	18.200	Storm Duration (mins)	30	Ratio R	0.396		
Rainfall Model	FSR	Profile Type	Summer																			
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M5-60 (mm)	18.200	Storm Duration (mins)	30																			
Ratio R	0.396																					
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AECOM		Page 2
Midpoint Alencon Link Basingstoke, RG21 7PP		
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Innovyze Network 2019.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	70.100	1.425	Open Manhole	900	S1.000	68.675	225				
S2	70.100	1.650	Open Manhole	1200	S1.001	68.450	300	S1.000	68.525	225	
S3	70.300	2.025	Open Manhole	1200	S1.002	68.275	300	S1.001	68.275	300	
S4	70.300	2.150	Open Manhole	1200	S1.003	68.150	375	S1.002	68.225	300	
S21	70.300	2.000	Open Manhole	1200	S2.000	68.300	225				
S31	70.200	1.810	Open Manhole	1200	S3.000	68.390	225				
S22	70.300	2.200	Open Manhole	1200	S2.001	68.100	225	S2.000	68.100	225	
								S3.000	68.100	225	
S41	69.660	1.125	Open Manhole	1200	S4.000	68.535	225				
S51	70.240	2.170	Open Manhole	1200	S5.000	68.070	300				
S5	70.300	2.300	Open Manhole	1200	S1.004	68.000	375	S1.003	68.000	375	
								S2.001	68.000	225	
								S4.000	68.000	225	
								S5.000	68.000	300	
S6	70.000	2.100	Open Manhole	1800	S1.005	67.900	300	S1.004	67.900	375	
S7	70.000	2.220	Open Manhole	1200	S1.006	67.780	300	S1.005	67.780	300	
S8	69.870	2.170	Open Manhole	1200	S1.007	67.700	300	S1.006	67.700	300	
S	69.900	2.310	Open Manhole	0		OUTFALL		S1.007	67.590	300	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	381896.872	385611.385	381896.872	385611.385	Required	
S2	381919.707	385601.364	381919.707	385601.364	Required	
S3	381911.281	385558.372	381911.281	385558.372	Required	
S4	381905.449	385558.968	381905.449	385558.968	Required	
S21	381859.188	385603.400	381859.188	385603.400	Required	
S31	381854.083	385586.310	381854.083	385586.310	Required	

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Midpoint Alencon Link Basingstoke, RG21 7PP		
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: S6, DS/PN: S1.005, Volume (m³): 7.2

Unit Reference	MD-SHE-0201-1890-0400-1890
Design Head (m)	0.400
Design Flow (l/s)	18.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	201
Invert Level (m)	67.900
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.400	18.9	Kick-Flo®	0.366	18.1
Flush-Flo™	0.268	18.9	Mean Flow over Head Range	-	13.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.9	1.200	31.9	3.000	49.7	7.000	75.1
0.200	18.4	1.400	34.4	3.500	53.6	7.500	77.8
0.300	18.8	1.600	36.7	4.000	57.2	8.000	80.4
0.400	18.9	1.800	38.8	4.500	60.0	8.500	82.9
0.500	21.0	2.000	40.9	5.000	63.3	9.000	85.3
0.600	22.9	2.200	42.8	5.500	66.5	9.500	87.7
0.800	26.3	2.400	44.6	6.000	69.5		
1.000	29.3	2.600	46.4	6.500	72.3		

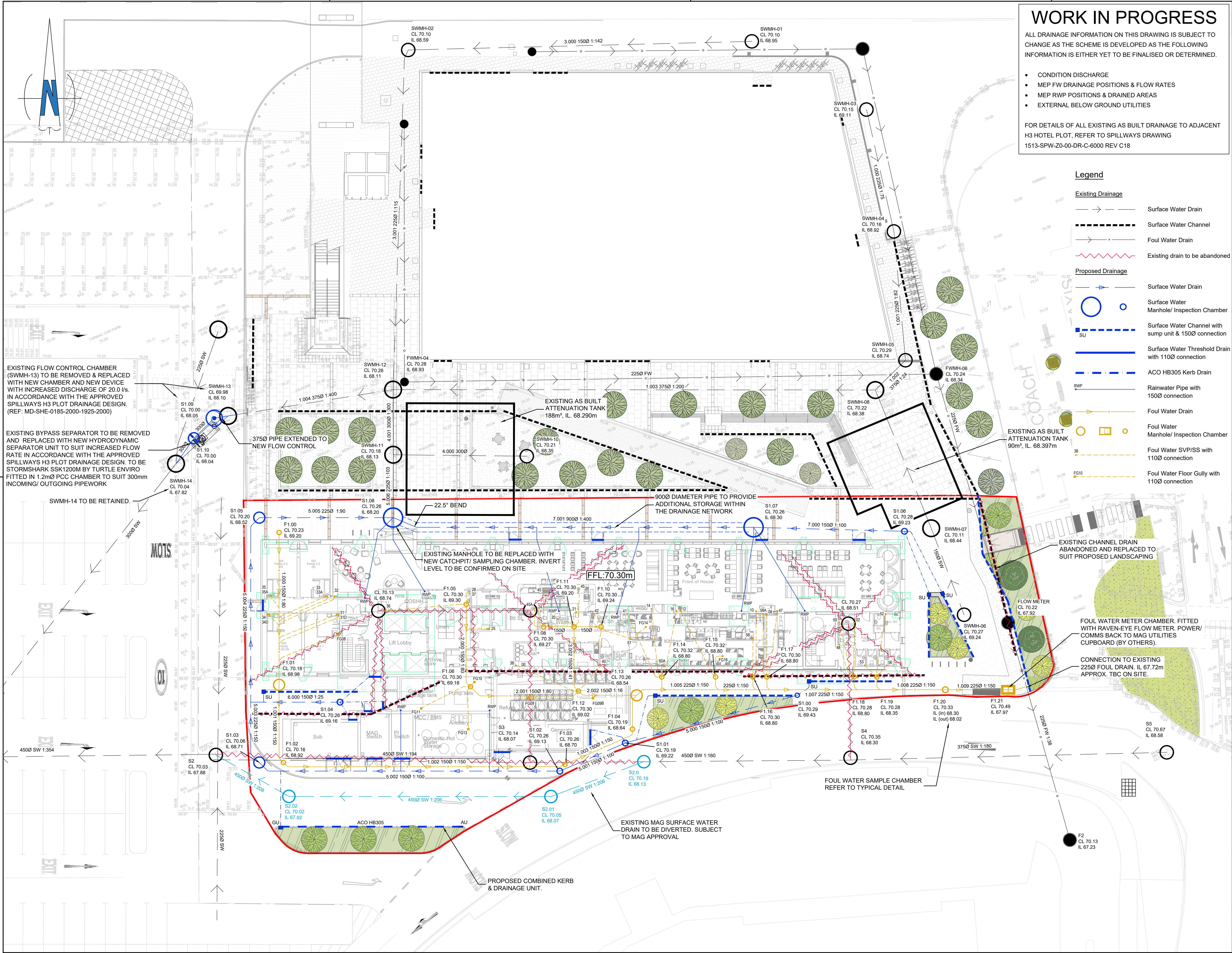
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Midpoint Alencon Link Basingstoke, RG21 7PP		
Date 01/12/2020 14:41 File H3-DN01 - Temporary.MDX	Designed by joseph.watton Checked by	
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COMPLEX CHALLENGES ...
MADE SIMPLE

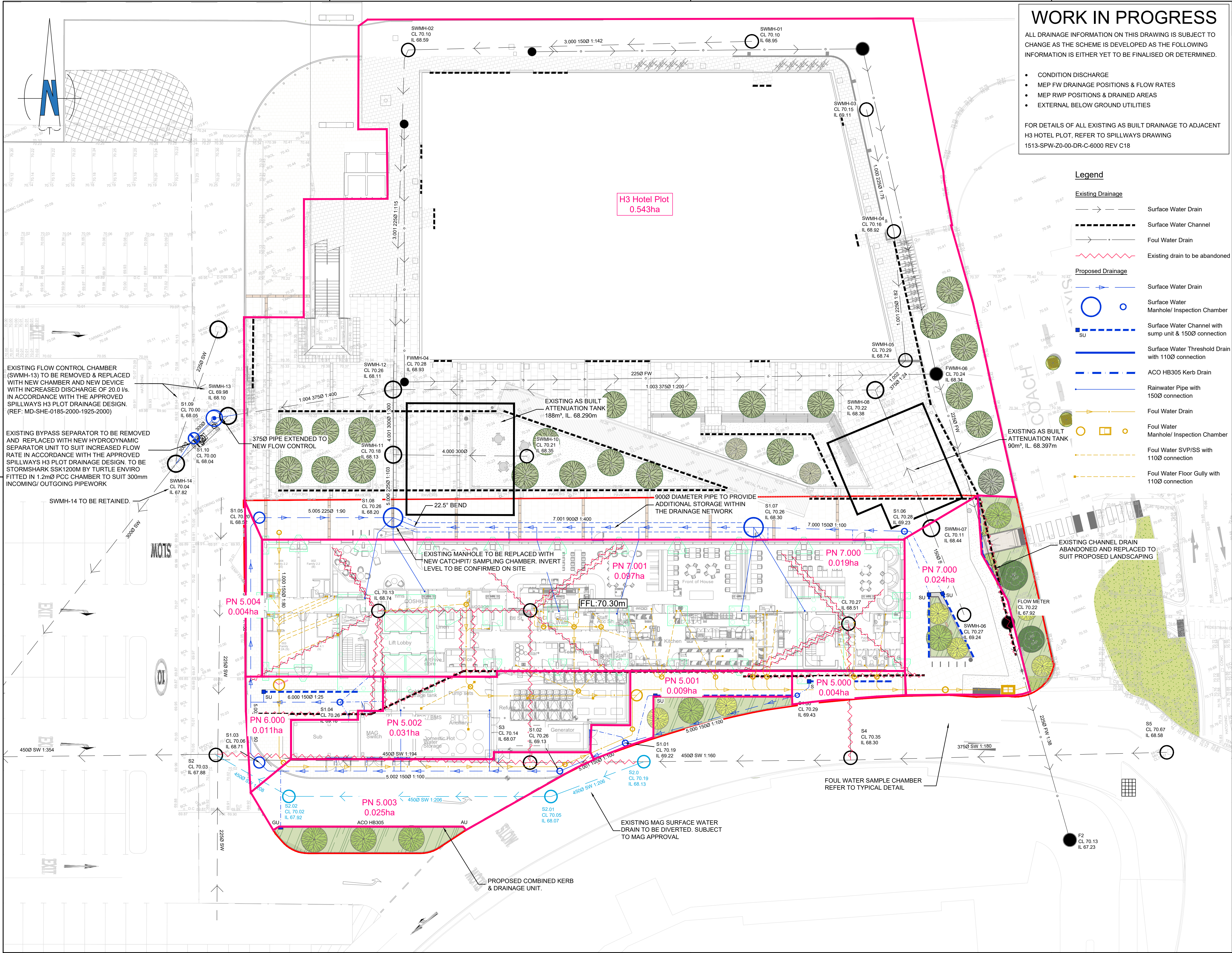
APPENDIX D – H5 PLOT DRAINAGE GENERAL ARRANGEMENT





COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX E – H3 / H5 PLOT CATCHMENT AREAS



WORK IN PROGRESS

ALL DRAINAGE INFORMATION ON THIS DRAWING IS SUBJECT TO CHANGE AS THE SCHEME IS DEVELOPED AS THE FOLLOWING INFORMATION IS EITHER YET TO BE FINALISED OR DETERMINED.

- CONDITION DISCHARGE
- MEP FW DRAINAGE POSITIONS & FLOW RATES
- MEP RWP POSITIONS & DRAINED AREAS
- EXTERNAL BELOW GROUND UTILITIES

FOR DETAILS OF ALL EXISTING AS BUILT DRAINAGE TO ADJACENT H3 HOTEL PLOT, REFER TO SPILLWAYS DRAWING 1513-SPW-Z0-00-DR-C-6000 REV C18

Legend

Existing Drainage

- Surface Water Drain
- Surface Water Channel
- Foul Water Drain
- Existing drain to be abandoned

Proposed Drainage

- Surface Water Drain
- Surface Water Manhole/ Inspection Chamber
- Surface Water Channel with sump unit & 1500 connection
- Surface Water Threshold Drain with 1100 connection
- ACO HB305 Kerb Drain
- Rainwater Pipe with 1500 connection
- Foul Water Drain
- Foul Water Manhole/ Inspection Chamber
- Foul Water SVP/SS with 1100 connection
- Foul Water Floor Gully with 1100 connection

NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
4. BEFORE STARTING ANY WORKS, CONTRACTOR TO CHECK INVERT LEVELS AND POSITIONS OF EXISTING DRAINS, SEWERS, INSPECTIONS CHAMBERS AND MANHOLES AGAINST INFORMATION SHOWN ON THIS DRAWING.
5. ROCKER PIPES ARE TO BE PROVIDED AT ALL CONCRETE CASED INTERFACES.
6. CLASS 2 CONCRETE SURROUND TO BE PROVIDED FOR PIPES WITH COVER LESS THAN 1.2m ABOVE THE CROWN OF THE PIPE FOR ROADS AND 0.6m FOR SOFT AND PEDESTRIAN AREAS ONLY AND UNDER ALL FOUNDATIONS AND WHERE PIPES LAID WITHIN 1m OF FOUNDATIONS.
7. CONNECTIONS TO EXISTING PUBLIC SEWERS IN ACCORDANCE WITH UNITED UTILITIES REQUIREMENTS, TO BE APPROVED / AGREED WITH THE WATER AUTHORITY.
8. PROPOSED COVER LEVELS ARE APPROXIMATE AND SHALL BE CHECKED BY THE CONTRACTOR ON SITE TO SUIT THE EXACT FINISHED LEVEL AND GRADIENT.
9. ALL DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY AND IN CONJUNCTION WITH ALL RELEVANT BRITISH STANDARDS, CODES OF PRACTICE AND SEWERS FOR ADOPTION 7th EDITION.
10. ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS SPECIFIED AND TO BS EN 124 AND KITEMARKED OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH FACTA ASSOCIATION EQUIVALENT. ALLOW FOR RECESS MANHOLE COVERS TO ACCEPT LANDSCAPE ARCHITECT FINISHES TO ALL NON-ASPHALT EXTERNAL AREAS.
11. THE PROPOSED BUILDING LAYOUTS SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.
12. FOR SETTING OUT DIMENSIONS OF SSS, SVPS, RWPS, FLOOR GULLYS & OTHER DRAINAGE POP UP LOCATIONS, REFER TO ARCHITECTS OR MECHANICAL & ELECTRICAL ENGINEERS DRAWINGS.
13. ALL DRAINAGE PIPEWORK SHOWN SHALL BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
14. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FLOOR PIPEWORK AND 1:100 MIN. FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE. USE OF SHORT/LONG RADIUS BENDS IS ACCEPTABLE PROVIDED THEY ARE KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.
15. AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FLOOR RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND ROODING ACCESS.
16. ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF UPVC TO BS EN 1401-1, UNLESS NOTED OTHERWISE.
17. CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.
18. WHERE NEW DRAINAGE IS SITUATED WITHIN 5 METRES OF NEW OR EXISTING TREES THE PIPEWORK SHALL BE ENCASED IN CONCRETE TO REDUCE THE RISK OF ROOT INGRESS.
19. ALL NEW DRAINAGE INSTALLATIONS TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE JETTED AND CCTV SURVEILLED UPON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL, FREE OF EXCESS DEBRIS/SILT AND ALL IDENTIFIED FAULTS RECTIFIED.

P01	09.10.25	PLANNING ISSUE	ARJ	MN
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
PRELIMINARY

RIBA STAGE
STAGE 4



Fourways House
Roc Consulting
3rd Floor, 57 Hilton Street
Manchester M1 2EJ
T 0161 214 5390
W rocconsulting.com

DRAWN	ARJ	DATE	SEP 24	SCALES	1:200
CHECKED	MN	DATE	SEP 24	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-	
APPRVD.	MN	DATE	SEP 24	EMAIL FOR DRAWINGS info@rocconsulting.com	

CLIENT
MANCHESTER AIRPORT GROUP

PROJECT TITLE
**PLOT H5 PREMIER INN
AIRPORT CITY**

DRAWING TITLE
**SURFACE WATER DRAINAGE
CATCHMENT AREAS**

DRAWING No.	REV.
H5PI/ROC/PI/XX/DR/C/0508	P01



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX F – MICRODRAINAGE CALCULATIONS

ROC Consulting		Page 0
Commercial wharf 6 Commercial Street Manchester M15 4PZ	4700 Premier Inn Plot H5 Manchester Airport	
Date 08/10/2025	Designed by Andy James	
File SW-FW Network S4 P01.MDX	Checked by Mike Newman	
XP Solutions	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Full SW Net

Pipe Sizes Circular Manhole Sizes Adoptable

FSR Rainfall Model - England and Wales			
Return Period (years)	30	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	0
Ratio R	0.400	Minimum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	0.000
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.900
Foul Sewage (l/s/ha)	0.000	Min vel for Auto Design only (m/s)	1.00
volumetric Runoff Coeff.	1.000	Min Slope for Optimisation (1:X)	1000

Designed with Level Soffits

Time Area Diagram for Full SW Net

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.386	4-8	0.380	8-12	0.000

Total Area Contributing (ha) = 0.767

Total Pipe Volume (m³) = 50.584

Network Design Table for Full SW Net

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	14.549	0.193	75.4	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	15.058	0.182	82.7	0.041	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	4.937	0.205	24.1	0.035	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.000	10.773	0.572	18.8	0.029	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	17.361	0.058	299.3	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.003	56.180	0.282	199.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	40.038	0.282	142.0	0.049	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	39.586	0.342	115.7	0.082	0.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	15.552	0.080	194.4	0.013	5.00	0.0	0.600	o	225	Pipe/Conduit	
5.000	20.793	0.208	100.0	0.004	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	8.298	0.083	100.0	0.009	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.002	35.020	0.350	100.1	0.031	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.003	7.100	0.047	151.1	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
6.000	10.400	0.418	24.9	0.011	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.16	69.116	0.000	0.0	0.0	0.0	1.51	60.0	0.0
1.001	50.00	5.34	68.923	0.041	0.0	0.0	0.0	1.44	57.2	7.4
1.002	50.00	5.36	68.591	0.076	0.0	0.0	0.0	3.71	409.3	13.7
2.000	50.00	5.08	69.241	0.029	0.0	0.0	0.0	2.33	41.2	5.2
2.001	50.00	5.35	68.444	0.079	0.0	0.0	0.0	1.04	115.1	14.3
1.003	50.00	6.09	68.386	0.155	0.0	0.0	0.0	1.28	141.4	28.0
3.000	50.00	5.79	68.953	0.049	0.0	0.0	0.0	0.84	14.9	8.8
3.001	50.00	6.34	68.596	0.131	0.0	0.0	0.0	1.21	48.3	23.7
4.000	50.00	5.28	68.359	0.013	0.0	0.0	0.0	0.93	37.1	2.3
5.000	50.00	5.34	69.430	0.004	0.0	0.0	0.0	1.01	17.8	0.7
5.001	50.00	5.48	69.222	0.013	0.0	0.0	0.0	1.00	17.8	2.3
5.002	50.00	6.06	69.139	0.044	0.0	0.0	0.0	1.00	17.8	7.9
5.003	50.00	6.17	68.714	0.069	0.0	0.0	0.0	1.06	42.2	12.5
6.000	50.00	5.09	69.160	0.011	0.0	0.0	0.0	2.03	35.8	2.0

Network Design Table for Full SW Net

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
5.004	21.504	0.143	150.4	0.004	0.00	0.0	0.600	o	225	Pipe/Conduit	
5.005	15.582	0.173	90.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
7.000	17.582	0.176	99.9	0.043	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	42.011	0.105	400.1	0.097	0.00	0.0	0.600	o	900	Pipe/Conduit	
5.006	7.321	0.071	103.1	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
4.001	7.588	0.025	300.0	0.018	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.004	21.380	0.053	400.0	0.226	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	2.979	0.010	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	3.633	0.012	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	43.338	0.144	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
5.004	50.00	6.51	68.667	0.084	0.0	0.0	0.0	1.06	42.3	15.2
5.005	50.00	6.70	68.524	0.084	0.0	0.0	0.0	1.38	54.8	15.2
7.000	50.00	5.29	69.232	0.043	0.0	0.0	0.0	1.01	17.8	7.8
7.001	50.00	5.74	68.306	0.140	0.0	0.0	0.0	1.56	992.6	25.3
5.006	50.00	6.77	68.201	0.224	0.0	0.0	0.0	1.78	197.1	40.4
4.001	50.00	6.89	68.129	0.255	0.0	0.0	0.0	1.04	115.0	46.0
1.004	50.00	5.40	68.104	0.000	90.0	0.0	0.0	0.90	99.4	90.0
1.005	50.00	5.06	68.050	0.000	20.0	0.0	0.0	0.90	63.8	20.0
1.006	50.00	5.12	68.040	0.000	20.0	0.0	0.0	0.90	63.8	20.0
1.007	50.00	5.92	68.028	0.000	20.0	0.0	0.0	0.90	63.8	20.0

Manhole schedules for Full SW Net											
MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
EXTN-SWMH-03	70.150	1.034	Open Manhole	1200	1.000	69.116	225				
EXTN-SWMH-04	70.163	1.240	Open Manhole	1200	1.001	68.923	225	1.000	68.923	225	
EXTN-SWMH-05	70.291	1.700	Open Manhole	1200	1.002	68.591	375	1.001	68.741	225	
EXTN-SWMH-06	70.273	1.032	Open Manhole	1200	2.000	69.241	150				
EXTN-SWMH-07	70.110	1.666	Open Manhole	1800	2.001	68.444	375	2.000	68.669	150	
EXTN-SWMH-08	70.221	1.835	Open Manhole	1800	1.003	68.386	375	1.002	68.386	375	
								2.001	68.386	375	
EXTN-SWMH-01	70.105	1.152	Open Manhole	1200	3.000	68.953	150				
EXTN-SWMH-02	70.178	1.582	Open Manhole	1200	3.001	68.596	225	3.000	68.671	150	
EXTN-SWMH-10	70.219	1.860	Open Manhole	1200	4.000	68.359	225				
1.00	70.290	0.860	Open Manhole	450	5.000	69.430	150				
1.01	70.190	0.968	Open Manhole	600	5.001	69.222	150	5.000	69.222	150	
1.02	70.260	1.121	Open Manhole	600	5.002	69.139	150	5.001	69.139	150	
1.03	70.060	1.346	Open Manhole	1200	5.003	68.714	225	5.002	68.789	150	
1.04	70.260	1.100	Open Manhole	450	6.000	69.160	150				
11	70.200	1.533	Junction		5.004	68.667	225	5.003	68.667	225	
								6.000	68.742	150	
1.05	70.200	1.676	Open Manhole	1200	5.005	68.524	225	5.004	68.524	225	
1.06	70.280	1.048	Open Manhole	450	7.000	69.232	150				
1.07	70.260	1.954	Open Manhole	2100	7.001	68.306	900	7.000	69.056	150	
1.08	70.026	1.825	Open Manhole	2100	5.006	68.201	375	5.005	68.351	225	
								7.001	68.201	900	
EXTN-SWMH-11	70.179	2.050	Open Manhole	1800	4.001	68.129	375	4.000	68.279	225	
								5.006	68.130	375	
EXTN-SWMH-12	70.231	2.127	Open Manhole	1800	1.004	68.104	375	1.003	68.104	375	
								3.001	68.254	225	
								4.001	68.104	375	
1.09	70.000	1.950	Open Manhole	1800	1.005	68.050	300	1.004	68.050	375	
1.10	70.046	2.006	Open Manhole	1200	1.006	68.040	300	1.005	68.040	300	
EXTN-SWMH-14	70.046	2.018	Open Manhole	1800	1.007	68.028	300	1.006	68.028	300	
S1	69.888	2.004	Open Manhole	1200		OUTFALL		1.007	67.884	300	

MH Name

Manhole Easting (m)

Manhole Northing (m)

Intersection Easting (m)

Intersection Northing (m)

Manhole Access

Layout (North)

EXTN-SWMH-03

381915.012

385593.291

381915.012

385593.291

Required

EXTN-SWMH-04

381912.329

385578.992

381912.329

385578.992

Required

EXTN-SWMH-05

381907.629

385564.686

381907.629

385564.686

Required

EXTN-SWMH-06

381902.160

385534.765

381902.160

385534.765

Required

EXTN-SWMH-07

381902.638

385545.527

381902.638

385545.527

Required

EXTN-SWMH-08

381903.033

385562.884

381903.033

385562.884

Required

EXTN-SWMH-01

381905.897

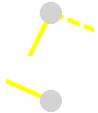
385605.869

381905.897

385605.869

Required

Manhole Schedules for Full SW Net

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
EXTN-SWMH-02	381868.746	385620.797	381868.746	385620.797	Required	
EXTN-SWMH-10	381862.691	385571.895	381862.691	385571.895	Required	
1.00	381880.607	385533.855	381880.607	385533.855	Required	
1.01	381860.006	385536.675	381860.006	385536.675	Required	
1.02	381851.708	385536.696	381851.708	385536.696	Required	
1.03	381819.960	385551.476	381819.960	385551.476	Required	
1.04	381831.375	385554.208	381831.375	385554.208	Required	
J1	381821.825	385558.326			No Entry	
1.05	381831.249	385577.655	381831.249	385577.655	Required	
1.06	381899.633	385546.440	381899.633	385546.440	Required	
1.07	381883.675	385553.822	381883.675	385553.822	Required	
1.08	381845.561	385571.492	381845.561	385571.492	Required	
EXTN-SWMH-11	381848.478	385578.207	381848.478	385578.207	Required	
EXTN-SWMH-12	381851.467	385585.181	381851.467	385585.181	Required	
1.09	381830.695	385590.244	381830.695	385590.244	Required	
1.10	381827.917	385589.167	381827.917	385589.167	Required	
EXTN-SWMH-14	381824.820	385587.268	381824.820	385587.268	Required	
S1	381786.816	385566.438			No Entry	

Area Summary for Full SW Net

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.000	0.000	0.000
1.001	-	-	100	0.041	0.041	0.041
1.002	-	-	100	0.035	0.035	0.035
2.000	-	-	100	0.029	0.029	0.029
2.001	-	-	100	0.050	0.050	0.050
1.003	-	-	100	0.000	0.000	0.000
3.000	-	-	100	0.049	0.049	0.049
3.001	-	-	100	0.082	0.082	0.082
4.000	-	-	100	0.013	0.013	0.013
5.000	-	-	100	0.004	0.004	0.004
5.001	-	-	100	0.009	0.009	0.009
5.002	-	-	100	0.031	0.031	0.031
5.003	-	-	100	0.025	0.025	0.025
6.000	-	-	100	0.011	0.011	0.011
5.004	-	-	100	0.004	0.004	0.004
5.005	-	-	100	0.000	0.000	0.000
7.000	-	-	100	0.043	0.043	0.043
7.001	-	-	100	0.097	0.097	0.097
5.006	-	-	100	0.000	0.000	0.000
4.001	-	-	100	0.018	0.018	0.018
1.004	-	-	100	0.226	0.226	0.226
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
1.007	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.767	0.767	0.767

Simulation Criteria for Full SW Net

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	2
		Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.400		

Online Controls for Full SW Net

Hydro-Brake® Optimum Manhole: 1.09, DS/PN: 1.005, Volume (m³): 7.1

Unit Reference	MD-SHE-0185-2000-1925-2000
Design Head (m)	1.925
Design Flow (l/s)	20.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	185
Invert Level (m)	68.050
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.925	20.0	Kick-Flo®	1.199	16.0
Flush-Flo™	0.564	20.0	Mean Flow over Head Range	-	17.4

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.5	0.800	19.6	2.000	20.4	4.000	28.4	7.000	37.1
0.200	16.8	1.000	18.5	2.200	21.3	4.500	30.0	7.500	38.4
0.300	18.7	1.200	16.0	2.400	22.2	5.000	31.6	8.000	39.6
0.400	19.6	1.400	17.2	2.600	23.1	5.500	33.1	8.500	40.8
0.500	19.9	1.600	18.3	3.000	24.7	6.000	34.5	9.000	41.9
0.600	20.0	1.800	19.4	3.500	26.6	6.500	35.8	9.500	43.0

Storage Structures for Full SW Net

Cellular Storage Manhole: EXTN-SWMH-08, DS/PN: 1.003

Invert Level (m) 68.397 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	126.0	0.0	0.750	126.0	0.0	0.751	0.0	0.0

Cellular Storage Manhole: EXTN-SWMH-11, DS/PN: 4.001

Invert Level (m) 68.290 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	158.0	0.0	1.250	158.0	0.0	1.251	0.0	0.0

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Commercial wharf 6 Commercial Street Manchester M15 4PZ	4700 Premier Inn Plot H5 Manchester Airport	
Date 08/10/2025	Designed by Andy James	
File SW-FW Network S4 P01.MDX	Checked by Mike Newman	
XP Solutions	Network 2020.1.3	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

Simulation Criteria			
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	2
		Number of Real Time Controls	0

Synthetic Rainfall Details			
Rainfall Model	FSR M5-60 (mm)	Cv (Summer)	1.000
Region England and Wales	Ratio R	Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5 Second	Increment (Extended)	
DTS Status			OFF
DVD Status			OFF
Inertia Status			OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	EXTN-SWMH-03	15 Summer	1	+0%	100/60 Summer				69.116	-0.225
1.001	EXTN-SWMH-04	15 Summer	1	+0%	100/60 Summer				68.972	-0.176
1.002	EXTN-SWMH-05	15 Summer	1	+0%	30/120 Summer				68.648	-0.318
2.000	EXTN-SWMH-06	15 Summer	1	+0%	100/60 Summer				69.275	-0.116
2.001	EXTN-SWMH-07	15 Summer	1	+0%	30/30 Summer				68.529	-0.290
1.003	EXTN-SWMH-08	30 Summer	1	+0%	30/30 Summer				68.465	-0.296
3.000	EXTN-SWMH-01	15 Summer	1	+0%	30/15 Summer	100/15 summer			69.030	-0.073
3.001	EXTN-SWMH-02	15 Summer	1	+0%	30/15 Summer				68.694	-0.127
4.000	EXTN-SWMH-10	60 Summer	1	+0%	30/15 Summer				68.446	-0.138
5.000	1.00	15 Summer	1	+0%	100/15 Summer				69.449	-0.131
5.001	1.01	15 Summer	1	+0%	30/15 Summer				69.256	-0.116
5.002	1.02	15 Summer	1	+0%	30/15 Summer				69.199	-0.090
5.003	1.03	15 Summer	1	+0%	30/15 Summer				68.797	-0.142
6.000	1.04	15 Summer	1	+0%	100/60 Summer				69.182	-0.128
5.004	1.05	15 Summer	1	+0%	30/15 Summer				68.745	-0.147
5.005	1.06	15 Summer	1	+0%	30/15 Summer				68.597	-0.152
7.000	1.07	15 Summer	1	+0%	30/15 Summer				69.298	-0.084
7.001	1.08	60 Summer	1	+0%	100/60 Summer				68.448	-0.758
5.006	1.09	60 Summer	1	+0%	30/15 Summer				68.447	-0.129
4.001	EXTN-SWMH-11	60 Summer	1	+0%	30/15 Summer				68.446	-0.058
1.004	EXTN-SWMH-12	30 Summer	1	+0%	2/15 Summer				68.450	-0.029
1.005	1.10	30 Summer	1	+0%	1/15 Summer				68.438	0.088
1.006	1.11	30 Summer	1	+0%					68.166	-0.175
1.007	EXTN-SWMH-14	30 Summer	1	+0%					68.141	-0.187

PN	US/MH Name	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	EXTN-SWMH-03	0.000	0.00		0.0	OK	
1.001	EXTN-SWMH-04	0.000	0.11		5.3	OK	
1.002	EXTN-SWMH-05	0.000	0.06		9.8	OK	
2.000	EXTN-SWMH-06	0.000	0.11		4.4	OK	
2.001	EXTN-SWMH-07	0.000	0.11		10.8	OK	
1.003	EXTN-SWMH-08	0.000	0.06	23	7.8	OK	
3.000	EXTN-SWMH-01	0.000	0.50		7.3	OK	3
3.001	EXTN-SWMH-02	0.000	0.38		17.5	OK	
4.000	EXTN-SWMH-10	0.000	0.04		1.4	OK	
5.000	1.00	0.000	0.04		0.6	OK	
5.001	1.01	0.000	0.11		1.8	OK	
5.002	1.02	0.000	0.34		5.8	OK	
5.003	1.03	0.000	0.29		8.9	OK	
6.000	1.04	0.000	0.05		1.7	OK	
5.004	1.05	0.000	0.23		11.1	OK*	
5.005	1.06	0.000	0.39		11.0	OK	
7.000	1.07	0.000	0.02		6.5	OK	
7.001	1.08	0.000	0.02		13.9	OK	
5.006	1.09	0.000	0.17		18.1	OK	
4.001	EXTN-SWMH-11	0.000	0.15	34	12.2	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

PN	US/MH Name	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	EXTN-SWMH-12	0.000	0.25		20.7	OK	
1.005	1.09	0.000	0.35		18.2	SURCHARGED	
1.006	1.10	0.000	0.37		18.2	OK	
1.007	EXTN-SWMH-14	0.000	0.30		18.1	OK	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	2	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR M5-60 (mm)	18.000	Cv (Summer)	1.000	
Region	England and Wales	Ratio R	0.360	Cv (Winter)	1.000

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	OFF
Inertia Status	OFF

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years)	1, 2, 30, 100
Climate Change (%)	0, 0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)
1.000	EXTN-SWMH-03	15 Summer	2	+0%	100/60 Summer				69.116	-0.225
1.001	EXTN-SWMH-04	15 Summer	2	+0%	100/60 Summer				68.978	-0.170
1.002	EXTN-SWMH-05	15 Summer	2	+0%	30/120 Summer				68.657	-0.309
2.000	EXTN-SWMH-06	15 Summer	2	+0%	100/60 Summer				69.279	-0.112
2.001	EXTN-SWMH-07	15 Summer	2	+0%	30/30 Summer				68.541	-0.278
1.003	EXTN-SWMH-08	60 Summer	2	+0%	30/30 Summer				68.504	-0.257
3.000	EXTN-SWMH-01	15 Summer	2	+0%	30/15 Summer	100/15 summer			69.043	-0.060
3.001	EXTN-SWMH-02	15 Summer	2	+0%	30/15 Summer				68.709	-0.112
4.000	EXTN-SWMH-10	60 Summer	2	+0%	30/15 Summer				68.503	-0.081
5.000	1.00	15 Summer	2	+0%	100/15 Summer				69.451	-0.129
5.001	1.01	15 Summer	2	+0%	30/15 Summer				69.261	-0.111
5.002	1.02	15 Summer	2	+0%	30/15 Summer				69.209	-0.080
5.003	1.03	15 Summer	2	+0%	30/15 Summer				68.810	-0.129
6.000	1.04	15 Summer	2	+0%	100/60 Summer				69.186	-0.124
5.004	1.05	15 Summer	2	+0%	30/15 Summer				68.758	-0.134
5.005	1.06	15 Summer	2	+0%	30/15 Summer				68.607	-0.142
7.000	1.07	15 Summer	2	+0%	30/15 Summer				69.309	-0.073
7.001	1.08	60 Summer	2	+0%	100/60 Summer				68.504	-0.702
5.006	1.09	60 Summer	2	+0%	30/15 Summer				68.504	-0.072
4.001	EXTN-SWMH-11	60 Summer	2	+0%	30/15 Summer				68.502	-0.002
1.004	EXTN-SWMH-12	60 Summer	2	+0%	2/15 Summer				68.500	0.022
1.005	1.10	60 Summer	2	+0%	1/15 Summer				68.489	0.138
1.006	1.11	60 Summer	2	+0%					68.168	-0.172
1.007	EXTN-SWMH-14	60 Summer	2	+0%					68.144	-0.185

PN	US/MH Name	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	EXTN-SWMH-03	0.000	0.00		0.0	OK	
1.001	EXTN-SWMH-04	0.000	0.14		6.9	OK	
1.002	EXTN-SWMH-05	0.000	0.07		12.7	OK	
2.000	EXTN-SWMH-06	0.000	0.15		5.7	OK	
2.001	EXTN-SWMH-07	0.000	0.15		13.9	OK	
1.003	EXTN-SWMH-08	0.000	0.05	34	6.5	OK	
3.000	EXTN-SWMH-01	0.000	0.65		9.5	OK	3
3.001	EXTN-SWMH-02	0.000	0.49		22.6	OK	
4.000	EXTN-SWMH-10	0.000	0.05		1.7	OK	
5.000	1.00	0.000	0.05		0.8	OK	
5.001	1.01	0.000	0.15		2.3	OK	
5.002	1.02	0.000	0.43		7.4	OK	
5.003	1.03	0.000	0.38		11.5	OK	
6.000	1.04	0.000	0.07		2.2	OK	
5.004	1.05	0.000	0.34		14.3	OK*	
5.005	1.06	0.000	0.30		14.3	OK	
7.000	1.07	0.000	0.51		8.5	OK	
7.001	1.08	0.000	0.02		17.5	OK	
5.006	1.09	0.000	0.21		22.3	OK	
4.001	EXTN-SWMH-11	0.000	0.15	44	12.1	OK	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

PN	US/MH Name	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	EXTN-SWMH-12	0.000	0.25		20.8	SURCHARGED	
1.005	1.09	0.000	0.37		18.9	SURCHARGED	
1.006	1.10	0.000	0.38		18.9	OK	
1.007	EXTN-SWMH-14	0.000	0.32		18.9	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.360 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 35, 45

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	EXTN-SWMH-03	15 Summer	30	+35%	100/60	Summer			69.116
1.001	EXTN-SWMH-04	15 Summer	30	+35%	100/60	Summer			69.031
1.002	EXTN-SWMH-05	120 winter	30	+35%	30/120	Summer			68.999
2.000	EXTN-SWMH-06	15 Summer	30	+35%	100/60	Summer			69.305
2.001	EXTN-SWMH-07	120 winter	30	+35%	30/30	Summer			69.000
1.003	EXTN-SWMH-08	120 winter	30	+35%	30/30	Summer			68.999
3.000	EXTN-SWMH-01	15 Summer	30	+35%	30/15	Summer	100/15 Summer		69.746
3.001	EXTN-SWMH-02	15 Summer	30	+35%	30/15	Summer			69.199
4.000	EXTN-SWMH-10	120 winter	30	+35%	30/15	Summer			69.019
5.000	1.00	15 Summer	30	+35%	100/15	Summer			69.513
5.001	1.01	15 Summer	30	+35%	30/15	Summer			69.504
5.002	1.02	15 Summer	30	+35%	30/15	Summer			69.489
5.003	1.03	120 winter	30	+35%	30/15	Summer			69.018
6.000	1.04	15 Summer	30	+35%	100/60	Summer			69.202
5.004	J1	60 winter	30	+35%					68.892
5.005	1.05	120 winter	30	+35%	30/15	Summer			69.014
7.000	1.06	15 Summer	30	+35%	30/15	Summer			69.502
7.001	1.07	120 winter	30	+35%	100/60	Summer			69.012
5.006	1.08	120 winter	30	+35%	30/15	Summer			69.012
4.001	EXTN-SWMH-11	120 winter	30	+35%	30/15	Summer			69.019
1.004	EXTN-SWMH-12	120 winter	30	+35%	2/15	Summer			69.245
1.005	1.09	120 winter	30	+35%	1/15	Summer			69.413
1.006	1.10	360 winter	30	+35%					68.173
1.007	EXTN-SWMH-14	120 Summer	30	+35%					68.148

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	EXTN-SWMH-03	-0.225	0.000	0.00			0.0	OK	
1.001	EXTN-SWMH-04	-0.117	0.000	0.46			23.3	OK	
1.002	EXTN-SWMH-05	0.033	0.000	0.07			12.1	SURCHARGED	
2.000	EXTN-SWMH-06	-0.086	0.000	0.38			14.7	OK	
2.001	EXTN-SWMH-07	0.181	0.000	0.12			11.8	SURCHARGED	
1.003	EXTN-SWMH-08	0.238	0.000	0.21		96	27.2	SURCHARGED	
3.000	EXTN-SWMH-01	0.643	0.000	1.45			21.2	SURCHARGED	3
3.001	EXTN-SWMH-02	0.378	0.000	1.24			56.6	SURCHARGED	
4.000	EXTN-SWMH-10	0.435	0.000	0.05			1.7	SURCHARGED	
5.000	1.00	-0.067	0.000	0.12			1.9	OK	
5.001	1.01	0.132	0.000	0.55			8.5	SURCHARGED	
5.002	1.02	0.200	0.000	1.22			20.9	SURCHARGED	
5.003	1.03	0.079	0.000	0.36			11.1	SURCHARGED	
6.000	1.04	-0.108	0.000	0.17			5.6	OK	
5.004	J1	0.000	0.000	0.51			21.4	SURCHARGED*	
5.005	1.05	0.265	0.000	0.25			12.0	SURCHARGED	
7.000	1.06	0.120	0.000	1.30			21.5	SURCHARGED	
7.001	1.07	-0.194	0.000	0.03			21.1	OK	
5.006	1.08	0.436	0.000	0.20			21.2	SURCHARGED	
4.001	EXTN-SWMH-11	0.515	0.000	1.05		109	82.7	SURCHARGED	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	EXTN-SWMH-12	0.767	0.000	0.63			52.9	SURCHARGED	
1.005	1.09	1.063	0.000	0.39			20.0	SURCHARGED	
1.006	1.10	-0.168	0.000	0.40			20.0	OK	
1.007	EXTN-SWMH-14	-0.181	0.000	0.34			20.0	OK	

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Date 08/10/2025	Designed by Andy James	
File SW-FW Network S4 P01.MDX	Checked by Mike Newman	
XP Solutions	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

Simulation Criteria			
Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		
Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	1	Number of Time/Area Diagrams	0
		Number of Storage Structures	2
		Number of Real Time Controls	0
Synthetic Rainfall Details			
Rainfall Model	FSR M5-60 (mm)	Cv (Summer)	1.000
Region	England and Wales	Ratio R	0.360
		Cv (Winter)	1.000
Margin for Flood Risk Warning (mm)			300.0
Analysis Timestep	2.5 Second	Increment (Extended)	
DTS Status			OFF
DVD Status			OFF
Inertia Status			OFF
Profile(s)		Summer and Winter	
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320		
Return Period(s) (years)		1, 2, 30, 100	
Climate Change (%)		0, 0, 35, 45	

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	EXTN-SWMH-03	180 winter	100	+45%	100/60	Summer			69.861
1.001	EXTN-SWMH-04	180 winter	100	+45%	100/60	Summer			69.861
1.002	EXTN-SWMH-05	180 winter	100	+45%	30/120	Summer			69.859
2.000	EXTN-SWMH-06	180 winter	100	+45%	100/60	Summer			69.863
2.001	EXTN-SWMH-07	180 winter	100	+45%	30/30	Summer			69.860
1.003	EXTN-SWMH-08	180 winter	100	+45%	30/30	Summer			69.859
3.000	EXTN-SWMH-01	15 Summer	100	+45%	30/15	Summer	100/15 Summer		70.107
3.001	EXTN-SWMH-02	180 winter	100	+45%	30/15	Summer			69.865
4.000	EXTN-SWMH-10	180 winter	100	+45%	30/15	Summer			69.858
5.000	1.00	15 Summer	100	+45%	100/15	Summer			70.065
5.001	1.01	15 Summer	100	+45%	30/15	Summer			70.053
5.002	1.02	15 Summer	100	+45%	30/15	Summer			70.029
5.003	1.03	180 winter	100	+45%	30/15	Summer			69.869
6.000	1.04	180 winter	100	+45%	100/60	Summer			69.868
5.004	1.05	15 Summer	100	+45%					68.892
5.005	1.06	180 winter	100	+45%	30/15	Summer			69.863
7.000	1.07	180 winter	100	+45%	30/15	Summer			69.864
7.001	1.08	180 winter	100	+45%	100/60	Summer			69.859
5.006	1.09	180 winter	100	+45%	30/15	Summer			69.859
4.001	EXTN-SWMH-11	180 winter	100	+45%	30/15	Summer			69.857
1.004	EXTN-SWMH-12	180 winter	100	+45%	2/15	Summer			69.855
1.005	1.10	180 winter	100	+45%	1/15	Summer			69.843
1.006		120 winter	100	+45%					68.173
1.007	EXTN-SWMH-14	120 Summer	100	+45%					68.148

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	EXTN-SWMH-03	0.520	0.000	0.04			2.5	FLOOD RISK	
1.001	EXTN-SWMH-04	0.713	0.000	0.21			10.6	SURCHARGED	
1.002	EXTN-SWMH-05	0.893	0.000	0.09			15.3	SURCHARGED	
2.000	EXTN-SWMH-06	0.472	0.000	0.16			6.1	SURCHARGED	
2.001	EXTN-SWMH-07	1.041	0.000	0.15			14.5	FLOOD RISK	
1.003	EXTN-SWMH-08	1.098	0.000	0.21			28.2	SURCHARGED	
3.000	EXTN-SWMH-01	1.004	1.872	1.79			26.1	FLOOD	3
3.001	EXTN-SWMH-02	1.044	0.000	0.47			21.5	SURCHARGED	
4.000	EXTN-SWMH-10	1.274	0.000	0.06			2.0	SURCHARGED	
5.000	1.00	0.485	0.000	0.18			3.1	FLOOD RISK	
5.001	1.01	0.681	0.000	0.56			8.7	FLOOD RISK	
5.002	1.02	0.740	0.000	1.58			27.1	FLOOD RISK	
5.003	1.03	0.930	0.000	0.35			10.8	FLOOD RISK	
6.000	1.04	0.558	0.000	0.06			1.9	SURCHARGED	
5.004	1.05	0.000	0.000	1.14			48.1	SURCHARGED*	
5.005	1.06	1.114	0.000	0.25			12.3	SURCHARGED	
7.000	1.07	0.482	0.000	0.44			7.3	SURCHARGED	
7.001	1.08	0.653	0.000	0.03			22.3	SURCHARGED	
5.006	1.09	1.283	0.000	0.30			32.7	FLOOD RISK	
4.001	EXTN-SWMH-11	1.353	0.000	1.06		169	83.7	SURCHARGED	

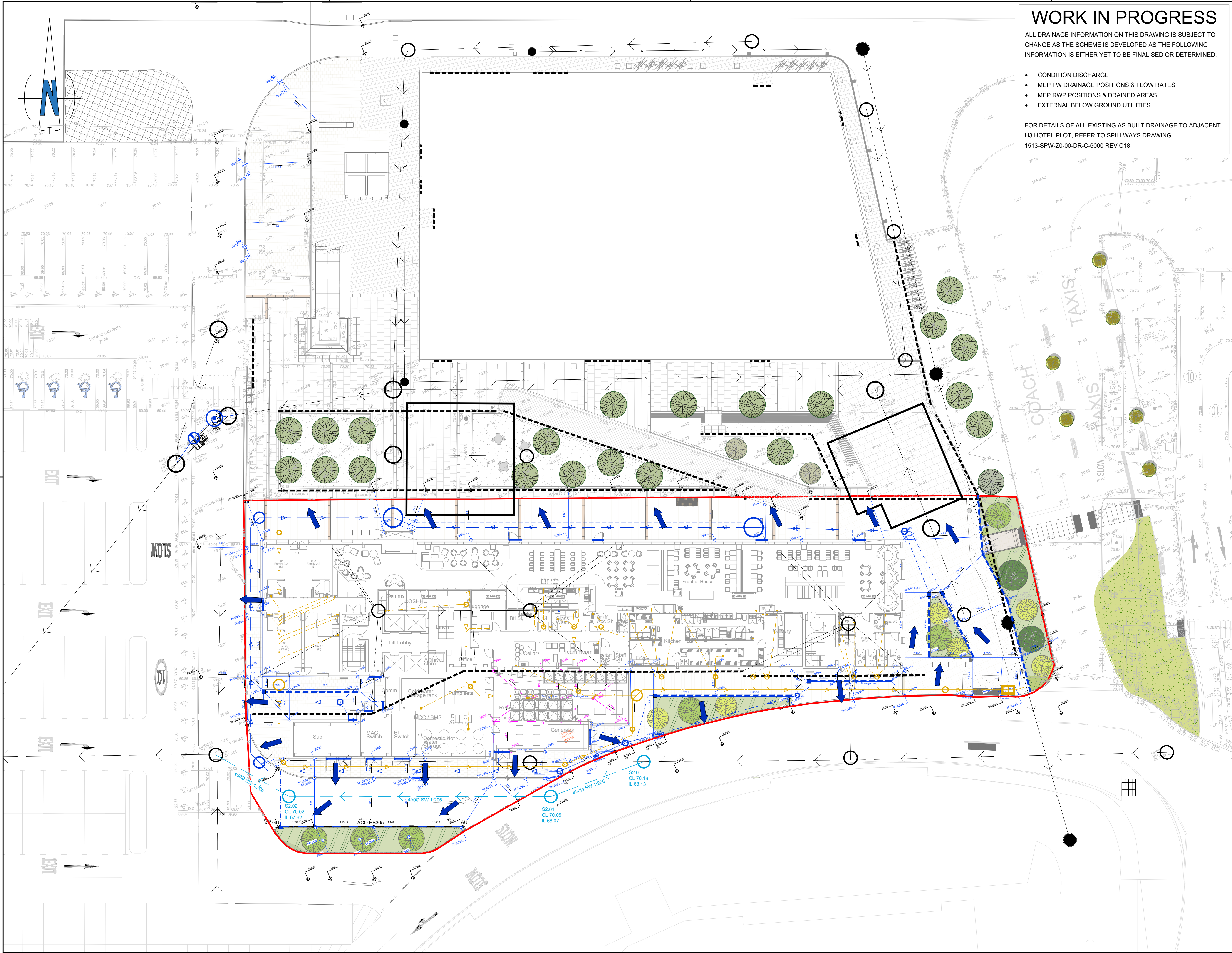
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Full SW Net

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
1.004	EXTN-SWMH-12	1.377	0.000	0.63			52.8	SURCHARGED	
1.005	1.09	1.493	0.000	0.39			20.0	FLOOD RISK	
1.006	1.10	-0.167	0.000	0.40			20.0	OK	
1.007	EXTN-SWMH-14	-0.181	0.000	0.34			20.0	OK	



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX G – EXCEEDANCE FLOW PATHS



WORK IN PROGRESS

ALL DRAINAGE INFORMATION ON THIS DRAWING IS SUBJECT TO CHANGE AS THE SCHEME IS DEVELOPED AS THE FOLLOWING INFORMATION IS EITHER YET TO BE FINALISED OR DETERMINED.

- CONDITION DISCHARGE
- MEP FW DRAINAGE POSITIONS & FLOW RATES
- MEP RWP POSITIONS & DRAINED AREAS
- EXTERNAL BELOW GROUND UTILITIES

FOR DETAILS OF ALL EXISTING AS BUILT DRAINAGE TO ADJACENT H3 HOTEL PLOT, REFER TO SPILLWAYS DRAWING 1513-SPW-Z0-00-DR-C-6000 REV C18

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NOTES

1. ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS, ENGINEERS AND SPECIALIST DRAWINGS AND SPECIFICATIONS.
3. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ENGINEER IMMEDIATELY SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.

P01	09.10.25	PLANNING ISSUE	ARJ	MN
REV	DATE	DETAILS	DRN	CHK
DRAWING STATUS PRELIMINARY				
RIBA STAGE STAGE 4				
		Fourways House RoC Consulting 3rd Floor, 57 Hilton Street Manchester M1 2EJ T 0161 214 5390 W roccoconsulting.com		
DRAWN ARJ	DATE SEP 24	SCALES 1:200		
CHECKED MN	DATE SEP 24	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE-		
APPRVD. MN	DATE SEP 24	EMAIL FOR DRAWINGS info@roccoconsulting.com		
CLIENT MANCHESTER AIRPORT GROUP				
PROJECT TITLE PLOT H5 PREMIER INN AIRPORT CITY				
DRAWING TITLE SURFACE WATER DRAINAGE EXCEEDANCE FLOW PATHS				
DRAWING No. H5PI/ROC/PI/XX/DR/C/0509		REV. P01		
4700				



COMPLEX CHALLENGES ...
MADE SIMPLE

APPENDIX H – STORMSHARK DATA SHEET

Model: SSK1500M

INTRODUCTION

The STORMSHARK is a cutting-edge hydrodynamic vortex separator that sets the standard in the industry with its unique patented design and exceptional performance. Engineered specifically for Sustainable Drainage Systems (SuDS) treatment trains, the STORMSHARK delivers outstanding water quality treatment while significantly enhancing amenity and bio diversity downstream. It serves as a powerful guardian, effectively protecting controlled waters from harmful sediment-bound pollutants.

Manufactured in Germany for the global stormwater management market, every model in the STORMSHARK range not only meets but exceeds the most stringent German Stormwater Treatment standards, including DWA M153 D24 and D25. Furthermore, the STORMSHARK has undergone rigorous testing in the United States, fully complying with the guidelines established by the New Jersey Department of Environmental Protection (NJDEP).

The STORMSHARK's remarkable flexibility allows it to operate both online and offline, seamlessly integrating with or without an external bypass unit. This adaptability positions it as the definitive solution for a wide range of multi-treatment water purification processes.

DESIGN CERTIFICATION & TESTING

- NJDEP 2021
- NRW Trennerlass (Independent German Lab & field test)
- DiBt

PERFORMANCE

The STORMSHARK removes sediment bound contaminants. Available in differing sizes to suit site flows and conditions. The STORMSHARK removes over 50% of fine TSS (0-200 microns, median size 75 microns) at design flows and up to 99% of TDS 0.1 to 0.4mm (coarse).

MITIGATION	TSS Total Suspended Solids	TOTAL METALS	TOTAL HYDROCARBONS
TSS Coarse	0.99	0.75	0.79
NJDEP*1	0.5	0	0
Turtle Enviro*2	0.5	0.4	0.45
British Water Code of Practice*3	0.8	0.6	0.96*3

*1 NJDEP protocol

*2 "Best advice" (in part as NJDEP only covers TSS)

*3 The British Water Code of Practice (Assessment of Manufactured Treatment Devices. Designed to Treat Surface Water Runoff) using DiBt and EN858 data.

PLASTICS

NRW Tested	Polyethylene	Polystyrene
% Retained	0.6224	0.7541

The STORMSHARK hydraulic flow rates have larger pipe connection sizes, ideal for sites where higher peak flows are anticipated or required. The STORMSHARK also affords ease of connection to twinwall and other structural wall drainage pipes commonly used in the UK storm water drainage market.

*** Adjustable feet are fitted to this model, so the levels can be adjusted, if fitted into pre cast concrete chamber.**

INSTALLATION:

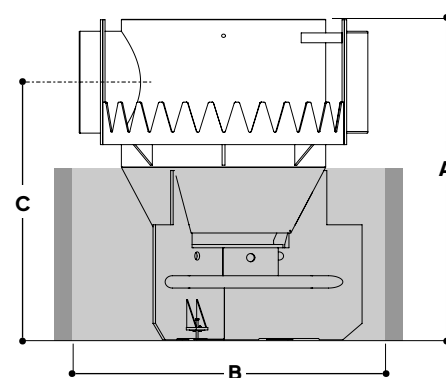
The installation design should consider traffic loadings, ground conditions and variable ground water elevations. If in any doubt consult your schemes' Designer/Engineer. A suitably qualified professional is required to sign off the installation.

***To view installation instructions click here.**



FEATURES

- Single piece unit
- Easily installed in PCC chambers
- Patented design that has been tested
- No head loss; the level inverts remain stable
- Cannot become air locked
- Inlet deflector plate creates a vortex
- Retains floatable materials and liquids
- Prevents re-suspension of settled solids
- Upward flow provides a uniform flow pathway, even at high design flows
- Shark toothed weir ensures balanced, optimised flow
- Simple maintenance required
- 25 year warranty



SPECIFICATION

Overall Height A:	1950mm
Minimum Ø chamber required B:	1500mm
Height to Inlet centre C:	1580mm
Standard Pipework Connection:	450mm
Sediment Storage Capacity:	0.96m ³
Oil/Debris Storage Capacity:	420 litres
Machine Weight:	95kg

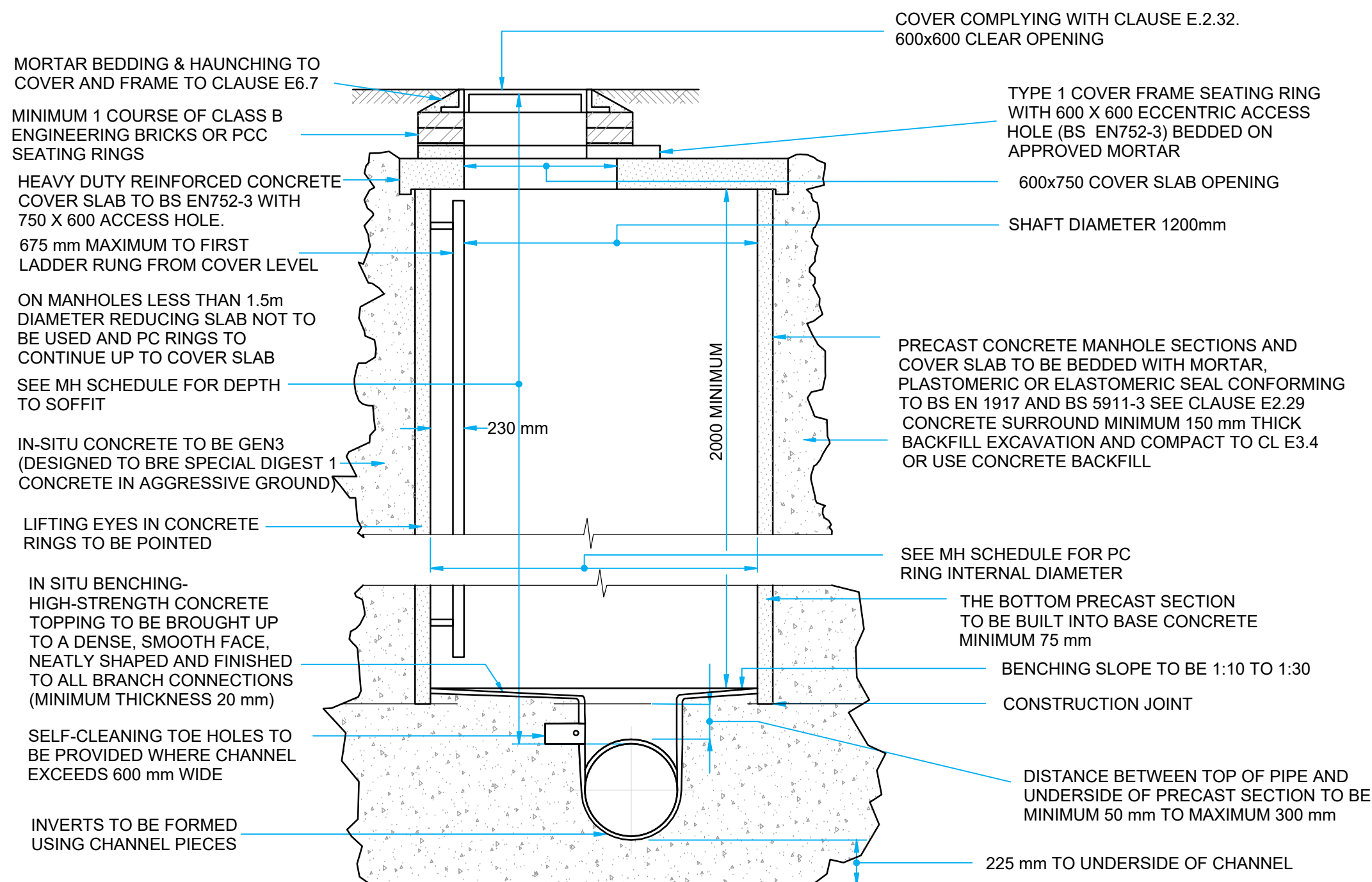
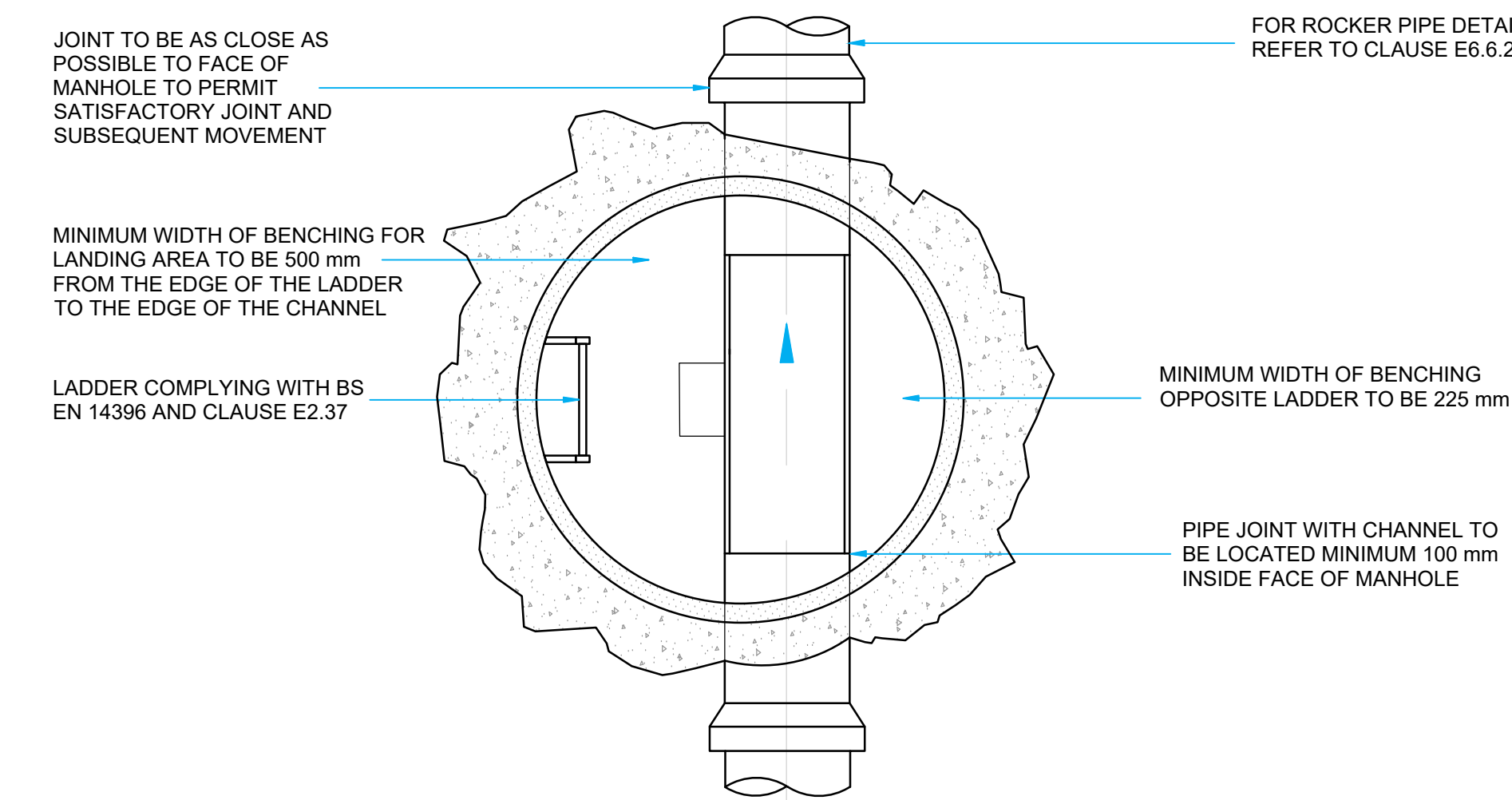


COMPLEX CHALLENGES ...
MADE SIMPLE

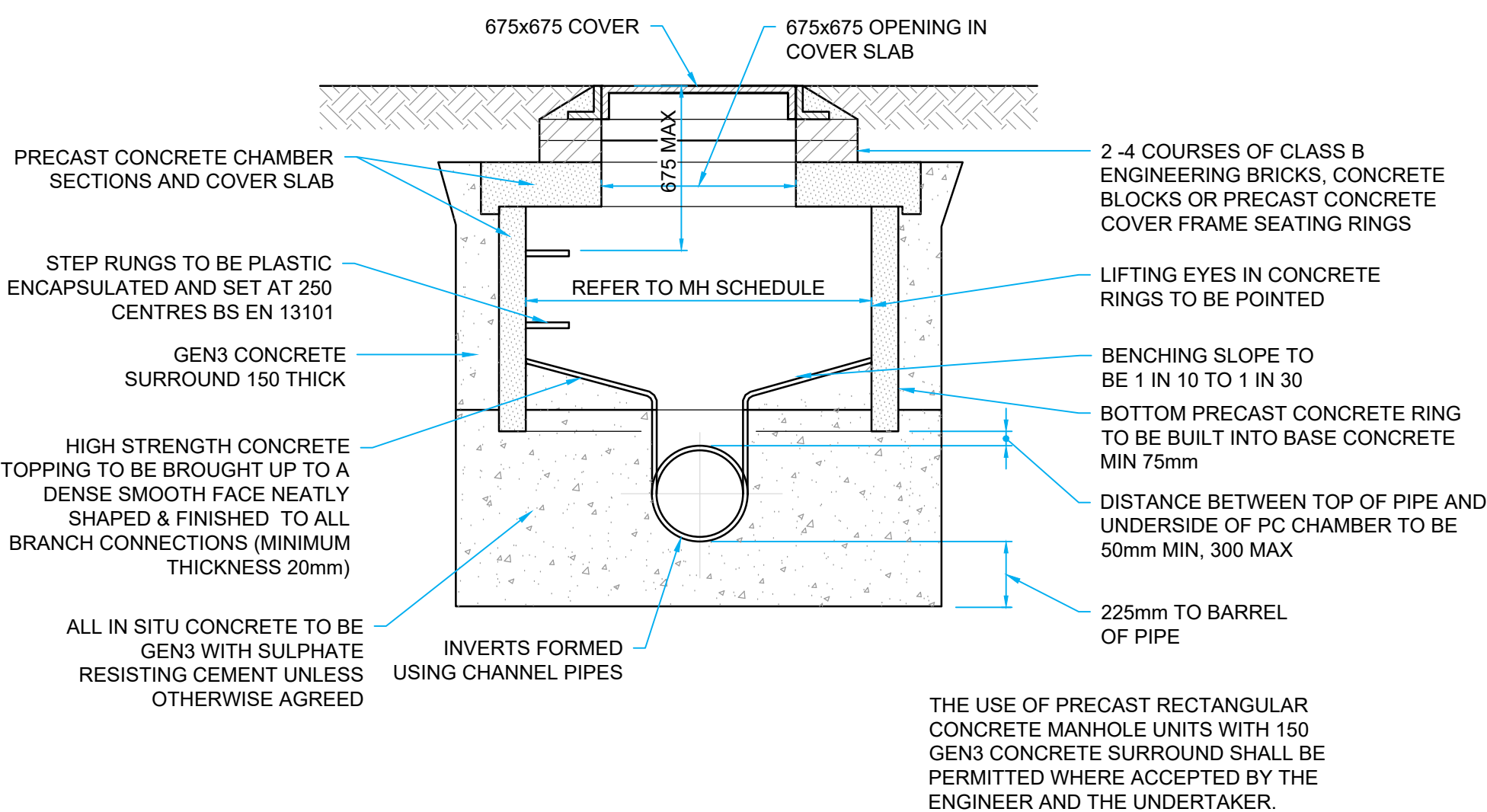
APPENDIX J – DRAINAGE DETAILS

NOTES

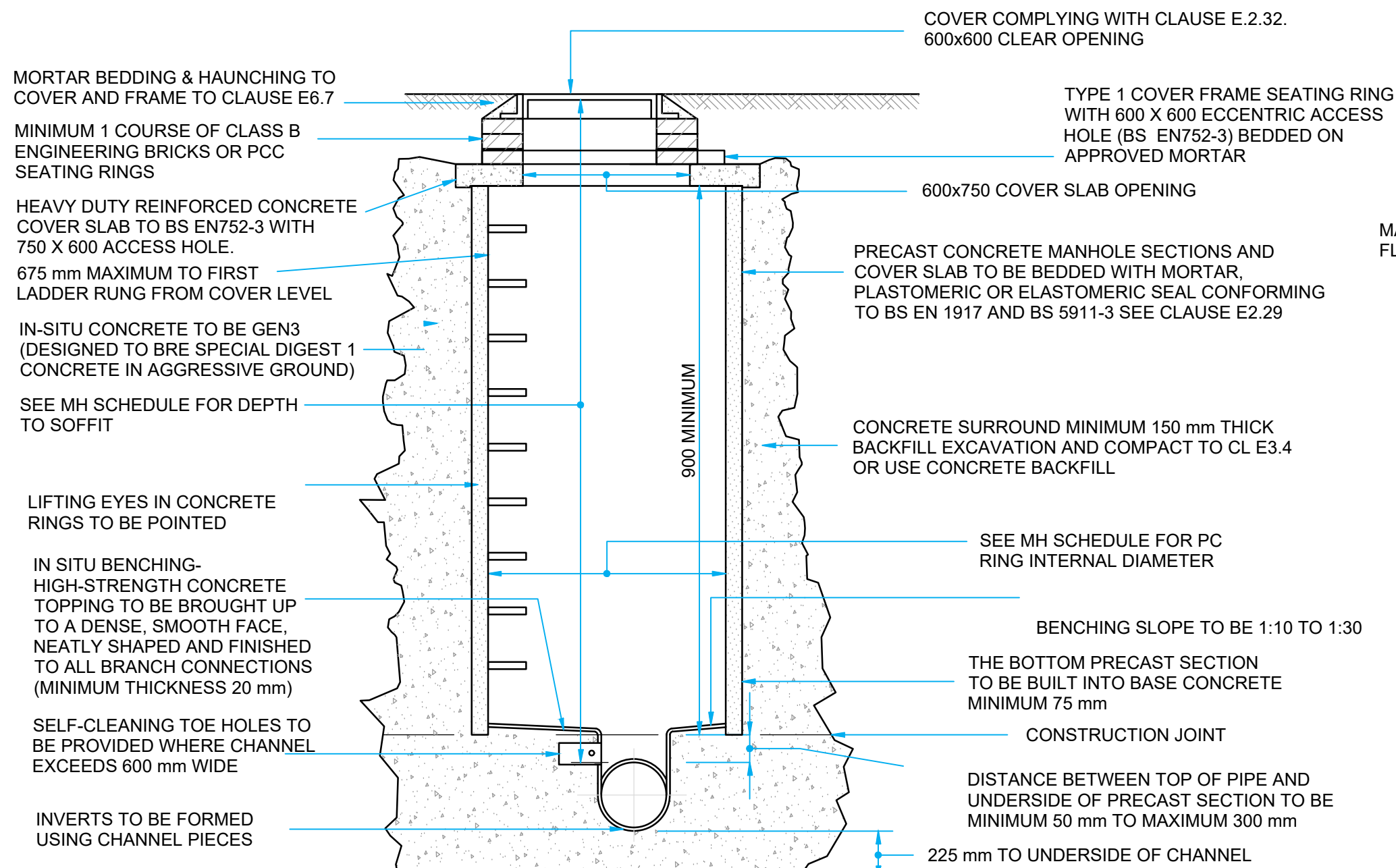
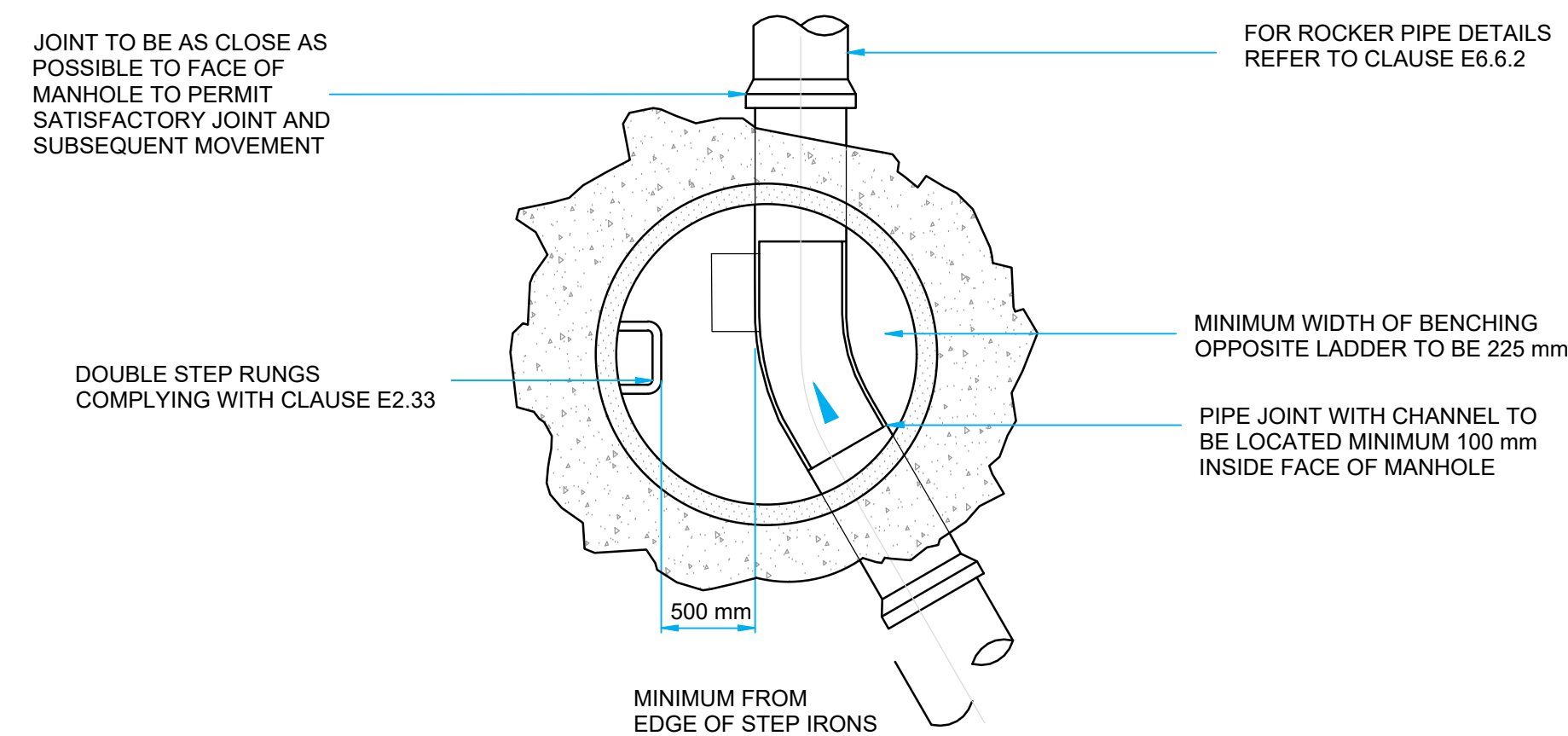
- DO NOT SCALE.
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- ALL DIMENSIONS SHOWN ARE IN METRES UNLESS NOTED OTHERWISE.



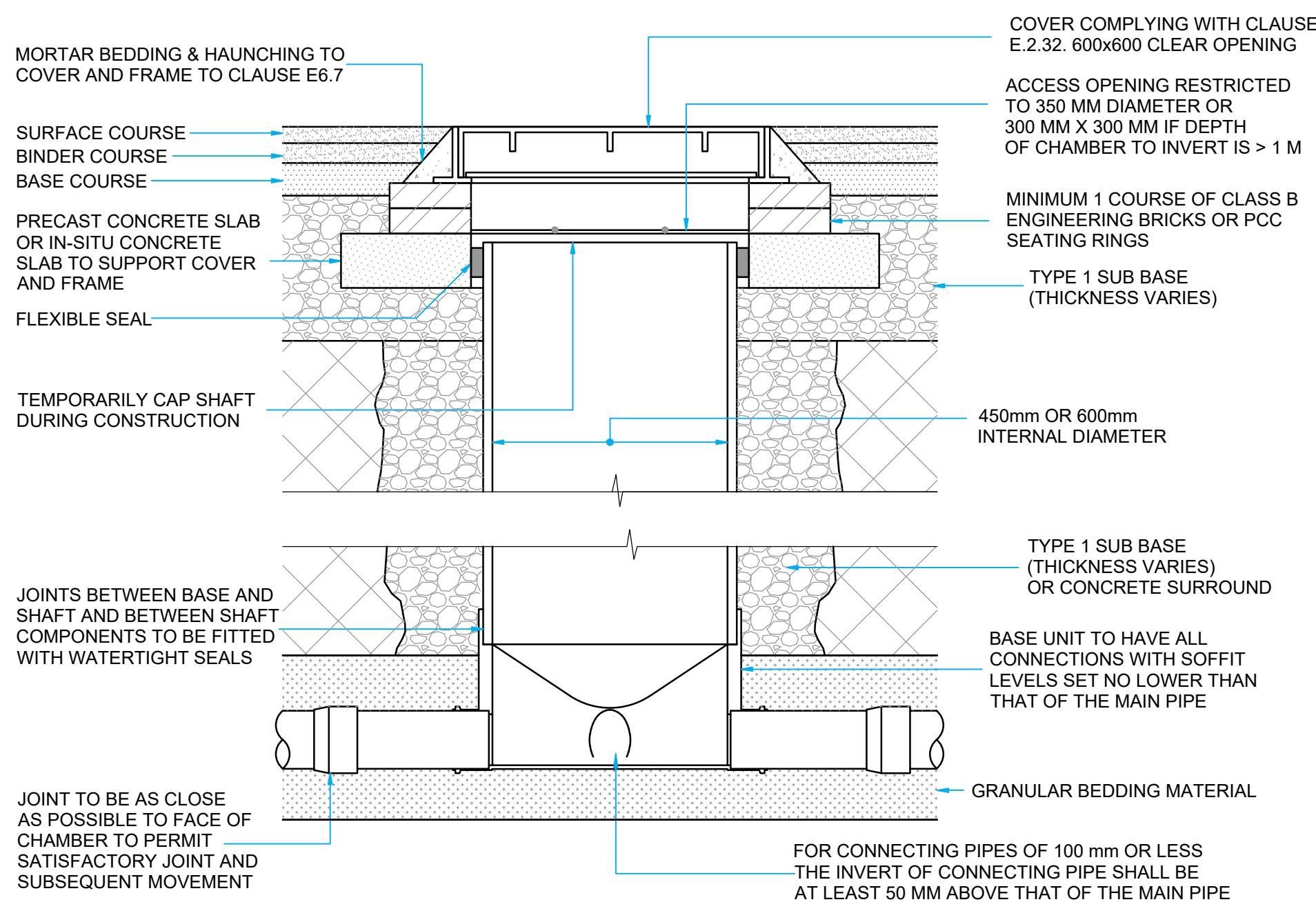
TYPICAL MANHOLE DETAIL - TYPE A
(DEPTH TO SOFFIT 3m - 6m)
SCALE - NTS



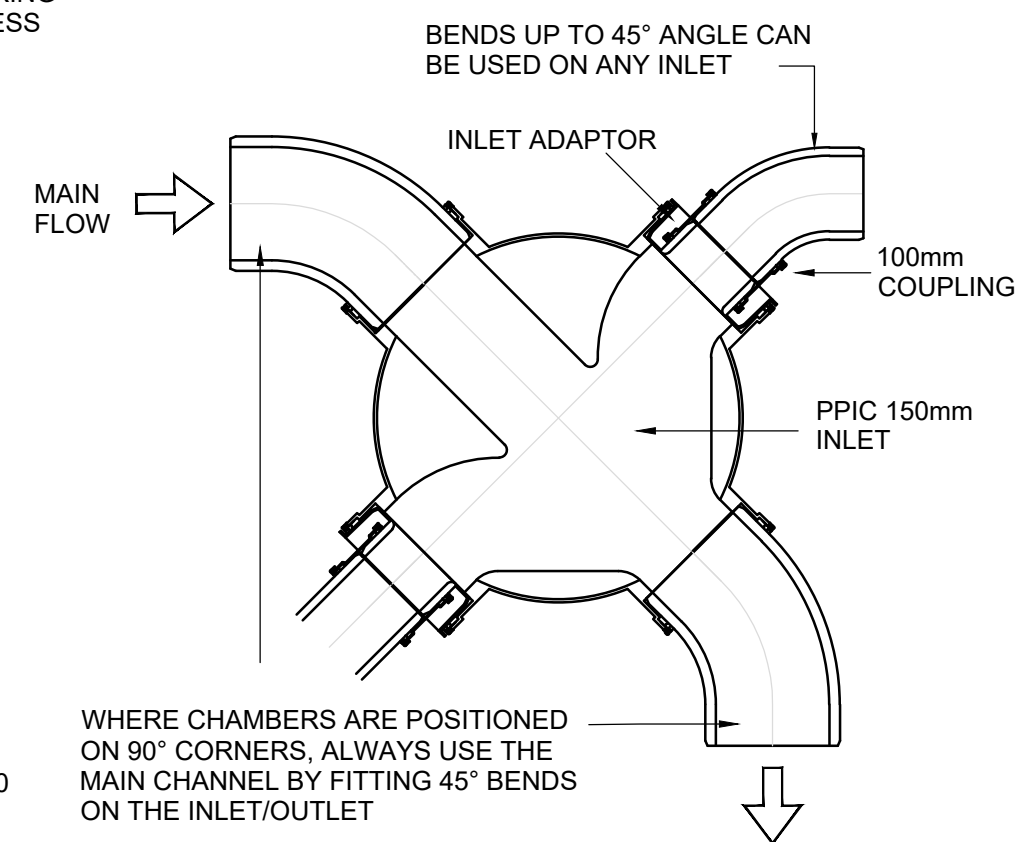
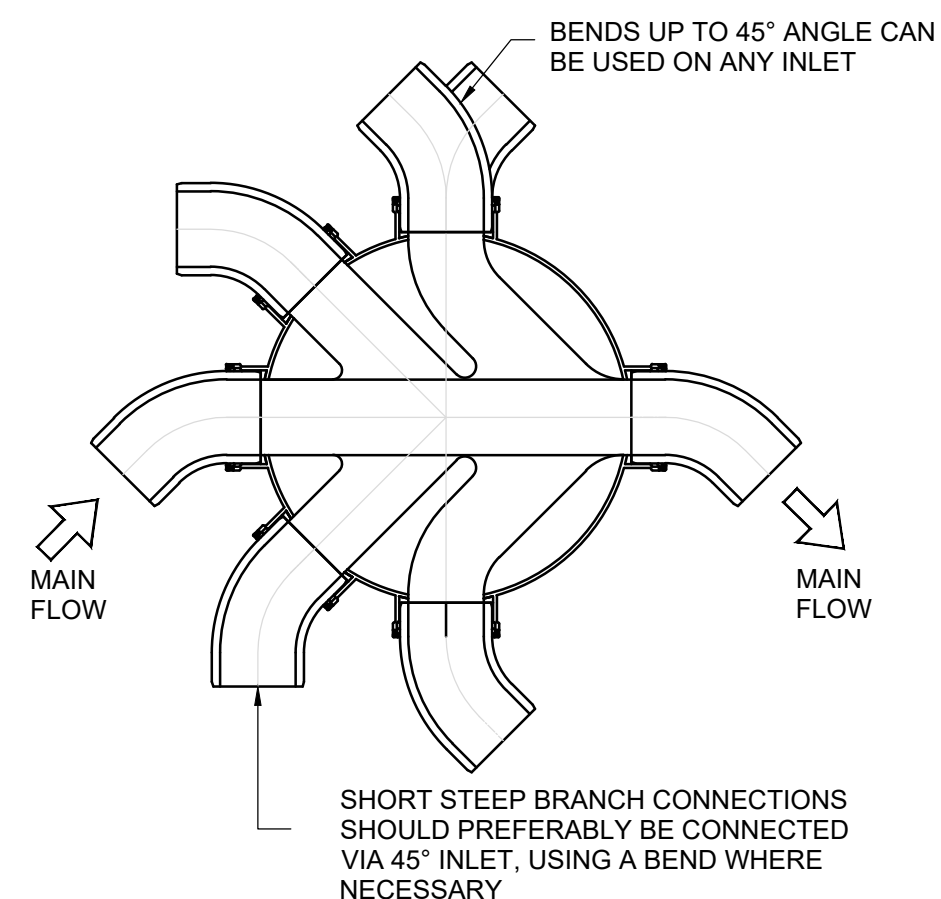
MANHOLE DETAIL - TYPE C
(DEPTH TO SOFFIT 1.0m - 1.5m)
SCALE - NTS



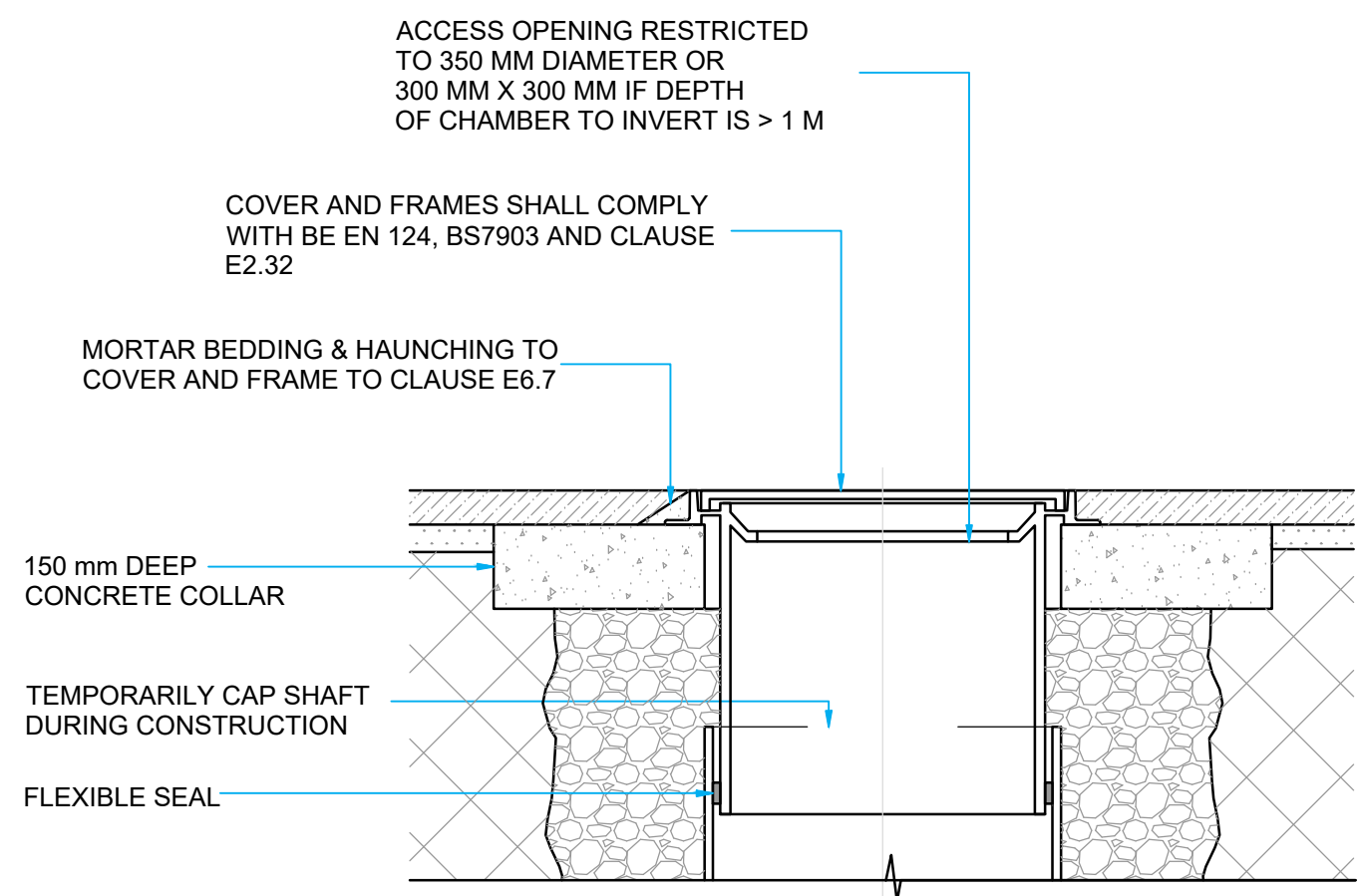
TYPICAL MANHOLE DETAIL - TYPE B
(DEPTH TO SOFFIT 1.5 - 3m)
SCALE - NTS



INSPECTION CHAMBER DETAIL - TYPE D
4500 & 6000 (DEPTH TO SOFFIT 3m)
D400 COVER
SCALE - NTS



**PPIC
BASE DETAIL**
SCALE - NTS



INSPECTION CHAMBER DETAIL - TYPE D
B125 COVER
SCALE - NTS

P02	16.06.25	DRAFT STAGE 4 ISSUE	ARJ	PAW
P01	27.09.24	FIRST ISSUE	ARJ	PAW
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
PRELIMINARY

RIBA STAGE

STAGE 4



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RoC Consulting
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Manchester M1 2EJ
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W roccoconsulting.com

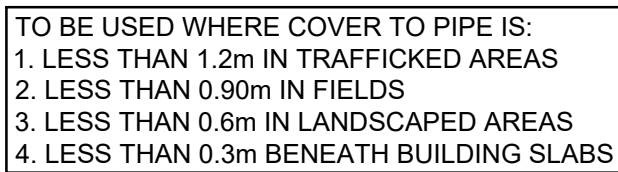
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CHECKED MN	DATE SEPT 24	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE -DO NOT SCALE--
APPRVD. MN	DATE SEPT 24	EMAIL FOR DRAWINGS info@roccoconsulting.com

CLIENT
MANCHESTER AIRPORT GROUP

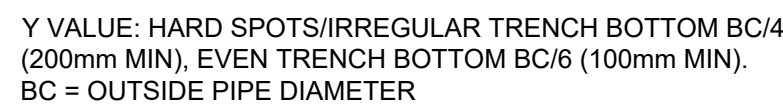
PROJECT TITLE
**PLOT H5 PREMIER INN
AIRPORT CITY**

DRAWING TITLE
**DRAINAGE DETAILS
SHEET 1**

DRAWING No. H5PI/ROC/PI/XX/DR/C/0501	REV. P02
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Y VALUE: HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4
(200mm MIN), EVEN TRENCH BOTTOM BC/6 (100mm MIN)
BC = OUTSIDE PIPE DIAMETER



STANDARD TUMBLING BAY JUNCTION

150

PRECAST CONCRETE MANHOLE SECTION

SPLASH GUARD/PIPE STOPPER IN RODDING EYE IF REQUESTED BY THE UNDERTAKER/COUNCIL

INVERT OF RODDING EYE TO BE NOT GREATER THAN 1.5m ABOVE TOP OF BENCHING

225mm MIN GEN3/ST4 INSITU CONCRETE SURROUND (DESIGNED TO BRE SPECIAL DIGEST 1 CONCRETE IN AGGRESSIVE GROUND)

SHORT RADIUS 90 DEGREE BEND

CONSTRUCTION JOINT

CONCRETE SURROUND TO BACKDROP TO BE CAST INTEGRAL WITH MH SURROUND

BACKDROP PIPE SET VERTICAL

CARE TO BE TAKEN TO MAINTAIN FLEXIBILITY OF JOINTS

150

ADDITIONAL ROCKER PIPES MAY BE NECESSARY FOR TRANSITION OF PIPE GRADIENT TO VERTICAL DOWNPIPE.

NOTE : WHERE THE DROP IS NOT EXCESSIVE A 45° DROP PIPE MAY BE USED

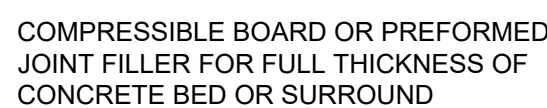
THE CONNECTION AT THE BOTTOM OF THE BACKDROP IS TO BE MADE AT SOFFIT LEVEL IN MANHOLES MAX. PIPE SIZE 825mm AND AT SPRINGING LEVEL IN MANHOLES PIPE SIZE 900 TO 1500mm

VERTICAL RODDING EYE MAY BE REQUIRED IN SITUATIONS WHERE BLOCKAGES ARE HIGH RISK. THE TUMBLING BAY SHALL BE BUILT INTO THE MANHOLE CHAMBER BELOW ANY REUCING SLAB

VERTICAL RODDING EYE MAY BE REQUIRED IN SITUATIONS WHERE BLOCKAGES ARE HIGH RISK. THE TUMBLING BAY SHALL BE BUILT INTO THE MANHOLE CHAMBER BELOW ANY REUCING SLAB

BS EN 13242, COARSE AGGREGATE (CLAUSE 4.3.2)		
CATEGORY FOR GENERAL GRADING REQUIREMENTS	Gc80-20	
CATEGORY FOR TOLERANCES AT MID-SIZE SIEVES	GTnr (NO REQUIREMENTS)	
CATEGORY PF MAXIMUM VALUES OF FINES CONTENTS	GRAVEL - F1.5 CRUSHED ROCK, RECYCLED AGGREGATE - F4	
NOMINAL PIPE DIAMETER, mm	AGGREGATE SIZE, mm	
	GRADED	SINGLE SIZED
NOT EXCEEDING 140	-	4/10
EXCEEDING 140 BUT NOT EXCEEDING 400	2/14 or 4/20	4/10, 6/14 or 10/20
EXCEEDING 400	2/14, 4/20 or 4/40	4/10, 6/14, 10/20 or 20/40

FOR RIGID PIPES THE BEDDING SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAX SIZE OF 10mm FOR 100mm PIPES; 14mm FOR 150mm PIPES; 20mm FOR 225mm TO 600mm PIPES; 40mm FOR OVER 600mm PIPES



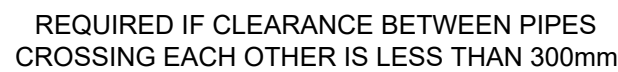
A cross-sectional diagram of a flexible pipe joint. The diagram shows a central joint component, likely a bellows or a similar flexible material, connecting two sections of a pipe. The pipe sections are shown with a textured, granular interior, possibly representing a composite or reinforced material. A blue arrow points to the joint area, and the text "FLEXIBLE PIPE JOINT" is written next to it.

(BITUMEN IMPREGNATED INSULATING BOARD TO BS EN 622-1 AND BS EN 622-4)

(AT EACH PIPE JOINT)



NOTE: COVER SET AT SSL. ARCHITECT TO DETAIL INTERFACE WITH PROPOSED FLOOR FINISH



COVER AND FRAMES SHALL COMPLY WITH BS EN 124, BS7903 AND CLAUSE E2.32. 600x600 / 450x450 CLEAR OPENING

ACCESS OPENING RESTRICTED TO 350 MM DIAMETER OR 300 MM X 300 MM IF DEPTH OF CHAMBER TO INVERT IS > 1 M

MINIMUM 1 COURSE OF CLASS B ENGINEERING BRICKS OR PCC SEATING RINGS

TYPE 1 SUB BASE (THICKNESS VARIES)

INSITU PIPE CONNECTOR WAVIN NE950/ NE960

450mm OR 600mm INTERNAL DIAMETER

COMPACTED GRANULAR BEDDING MATERIAL FOR LOAD CLASS B125 OR GEN3/S14 CONCRETE SURROUND FOR LOAD CLASS D400 (VARIES 150mm MIN)

BASE UNIT TO HAVE ALL CONNECTIONS WITH SOFFIT LEVELS SET NO LOWER THAN THAT OF THE MAIN PIPE

MORTAR BEDDING & HAUNCHING TO COVER AND FRAME TO CLAUSE E6.7

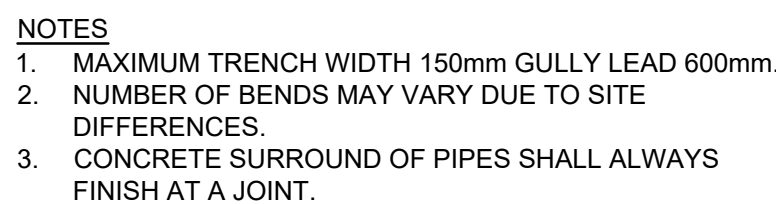
SURFACE COURSE

BINDER COURSE

BASE COURSE

PRECAST CONCRETE SLAB OR IN-SITU CONCRETE SLAB TO SUPPORT COVER AND FRAME

SCALE - NTS



TYPICAL ROAD GULLY DETAIL

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P03	31.07.25	ROAD GULLY DETAIL UPDATED	ARJ	PAT
P02	16.06.25	DRAFT STAGE 4 ISSUE	ARJ	PAT
P01	27.09.24	FIRST ISSUE	ARJ	PAT
REV.	DATE	DETAILS	DRN.	CH

RIBA STAGE

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PROJECT TITLE

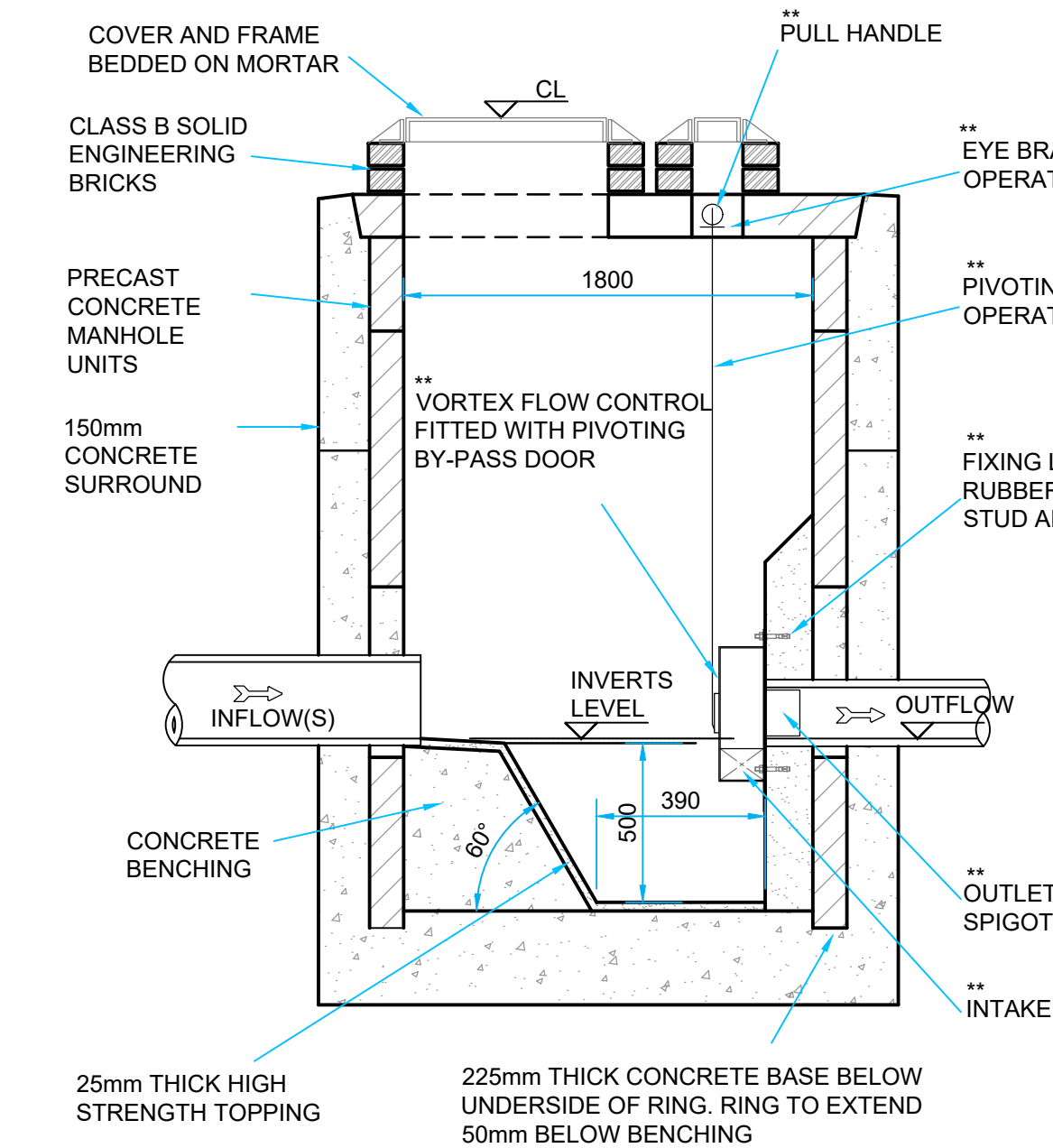
PLOT H5 PREMIER INN
AIRPORT CITY

DRAWING TITLE

DRAINAGE DETAILS
SHEET 2

DRAWING No.	REV.
H5PI/ROC/PI/XX/DR/C/0502	P03

4700



VORTEX FLOW CONTROL MANHOLE

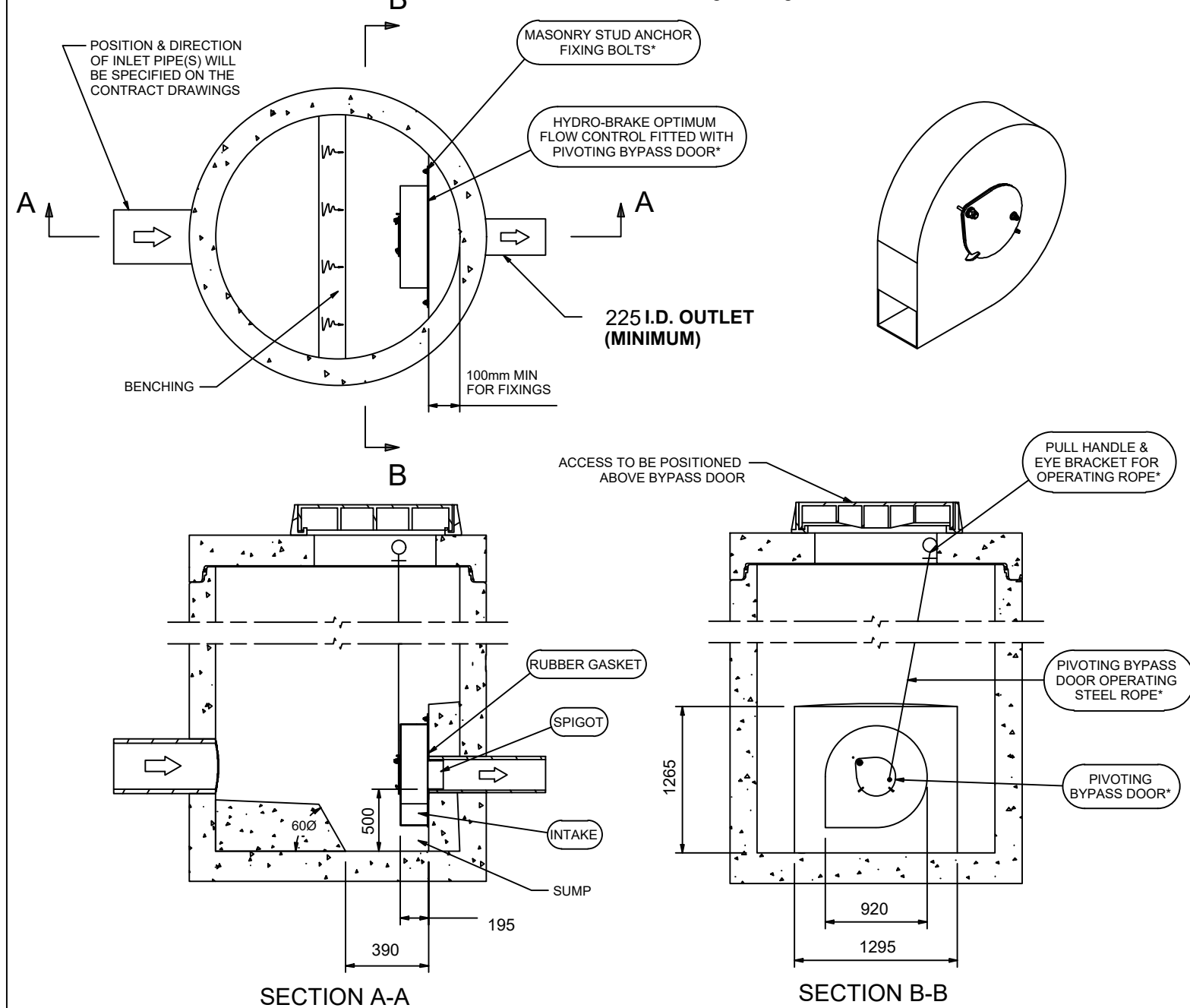
NOT TO SCALE
FOR LOCATION OF VORTEX FLOW CONTROL MANHOLES REFER
TO ROC DRAINAGE GENERAL ARRANGEMENT DRAWINGS

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.925	20.000
Flush-Fl	0.564	19.987
Kick-Fl	1.199	15.960
Mean Flow		17.407

Hydro-Brake Optimum Flow Control including:

- 5 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Media blasted for corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Variable flow rate post installation via adjustable inlet
- Indicative weight: 80kg



IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
WHERE SUPPLIED
HYDRO-BRAKE FLOW CONTROL & HYDRO-BRAKE OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW
CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

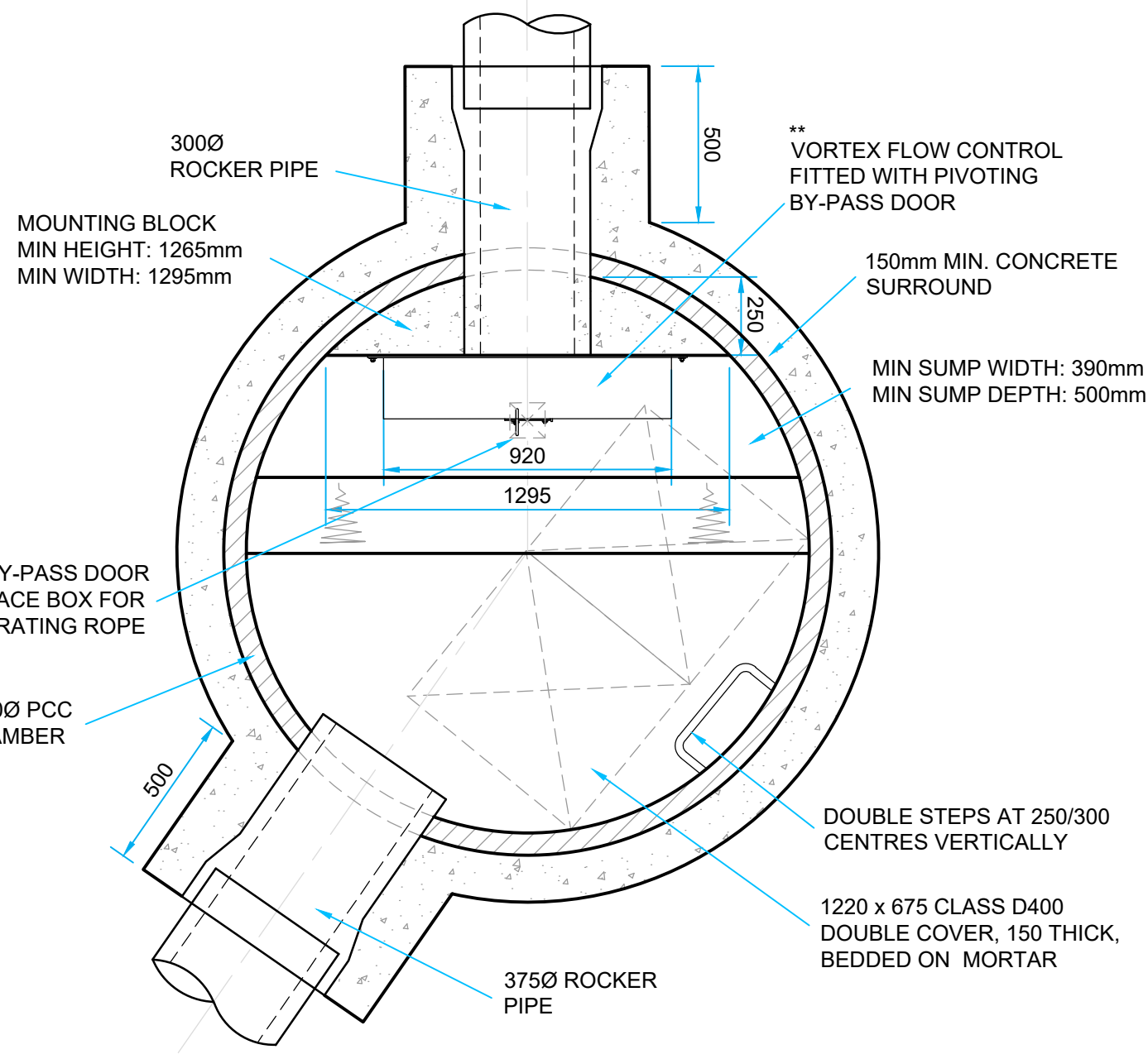
THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN
ADVICE
The head/flow characteristics of this SHE-0185-2000-1925-2000
Hydro-Brake Optimum Flow Control are unique. Dynamic hydraulic modelling
evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data
and could constitute a flood risk.

DATE	
SITE	Premier Inn, Manchester Airport
DESIGNER	Andy James
REF	4700

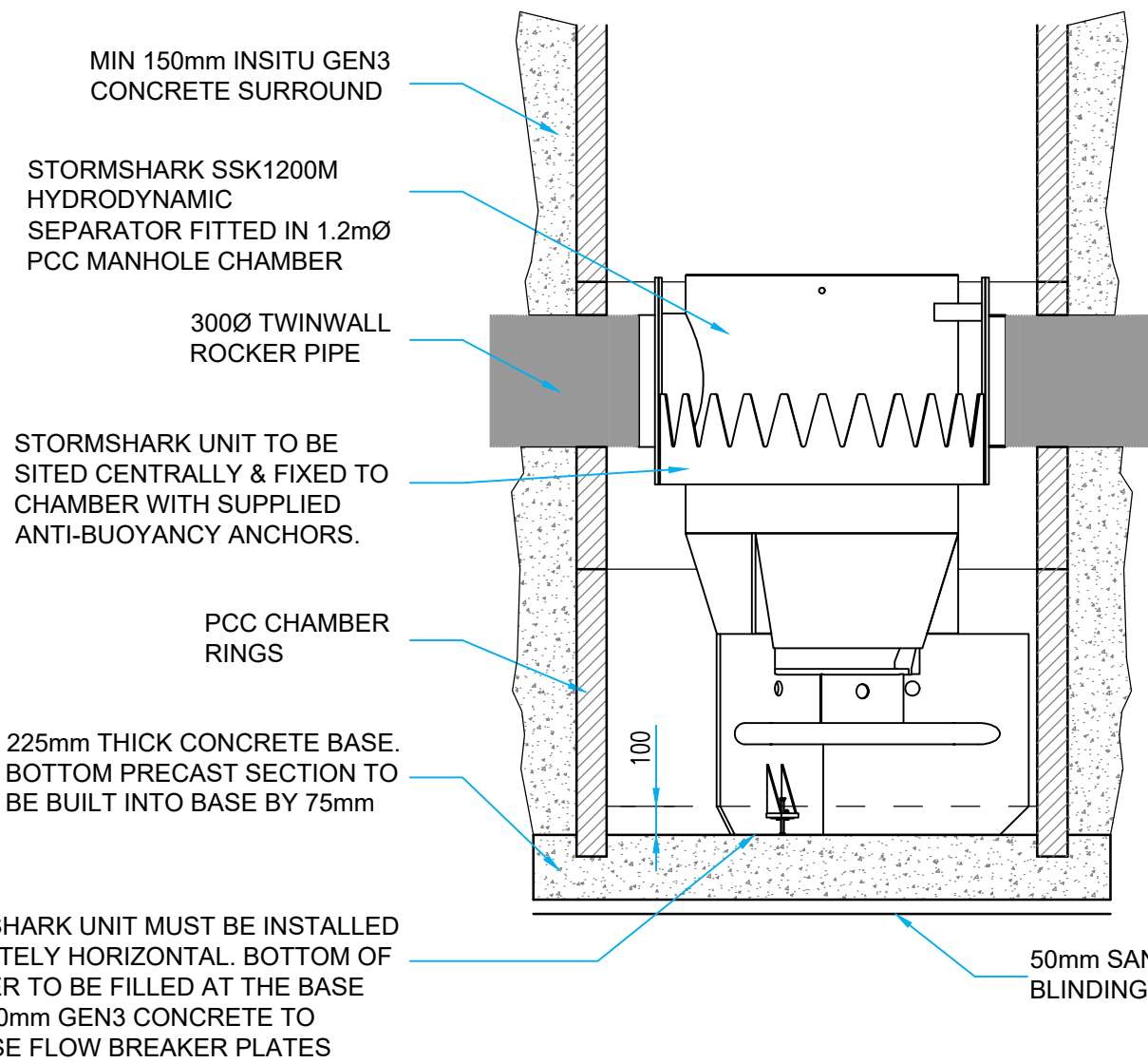
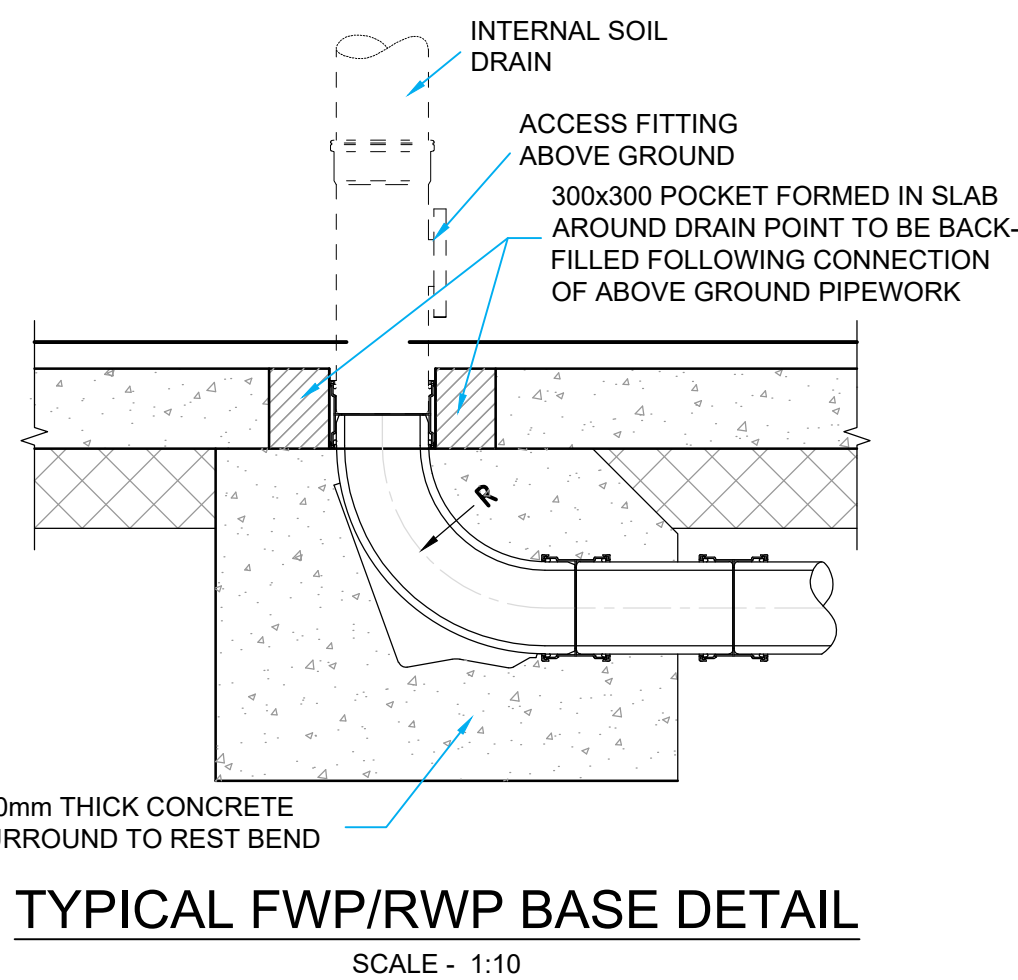
SHE-0185-2000-1925-2000
Hydro-Brake Optimum

© 2025 Hydro International Ltd. Unit 2, Rivermead Court, Kenn Business Park, Windmill Road, Kenn, Cleveland BS21 6FT. Tel: 01275 878371 Web: www.hydro-int.com Email: enquiries@hydro-int.com



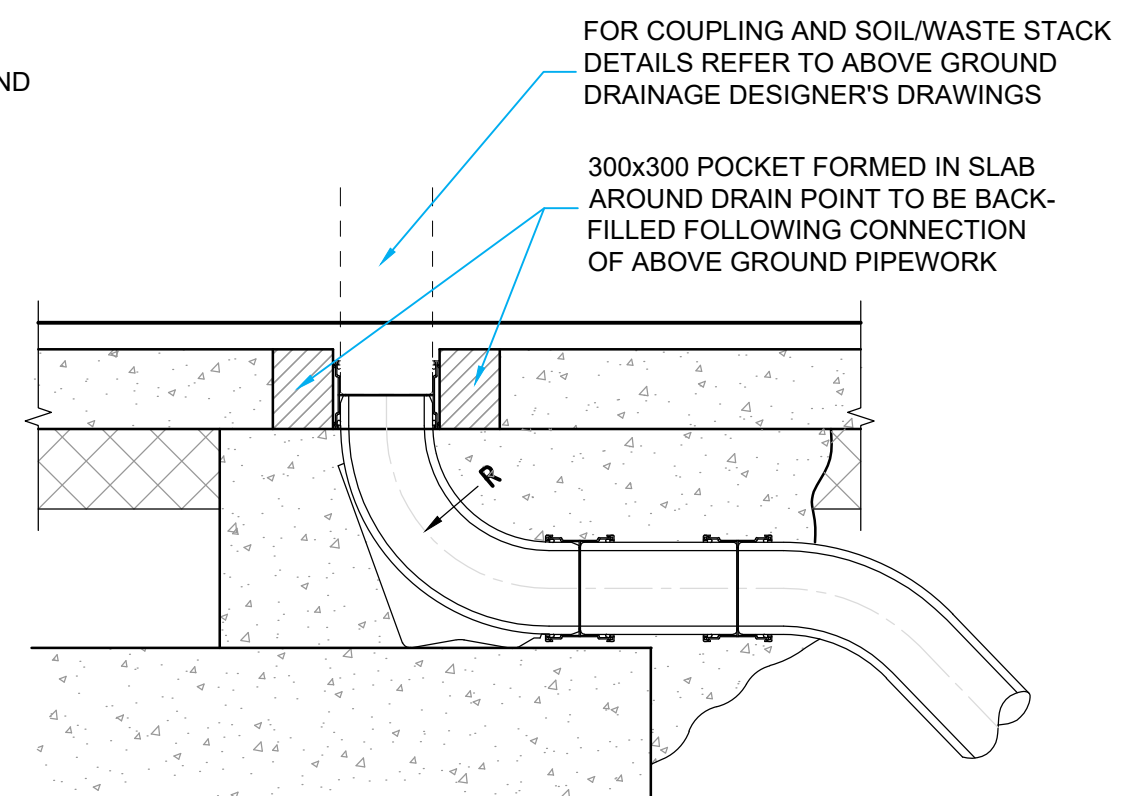
STORMSHARK INSTALLATION DETAIL

SCALE 1:25



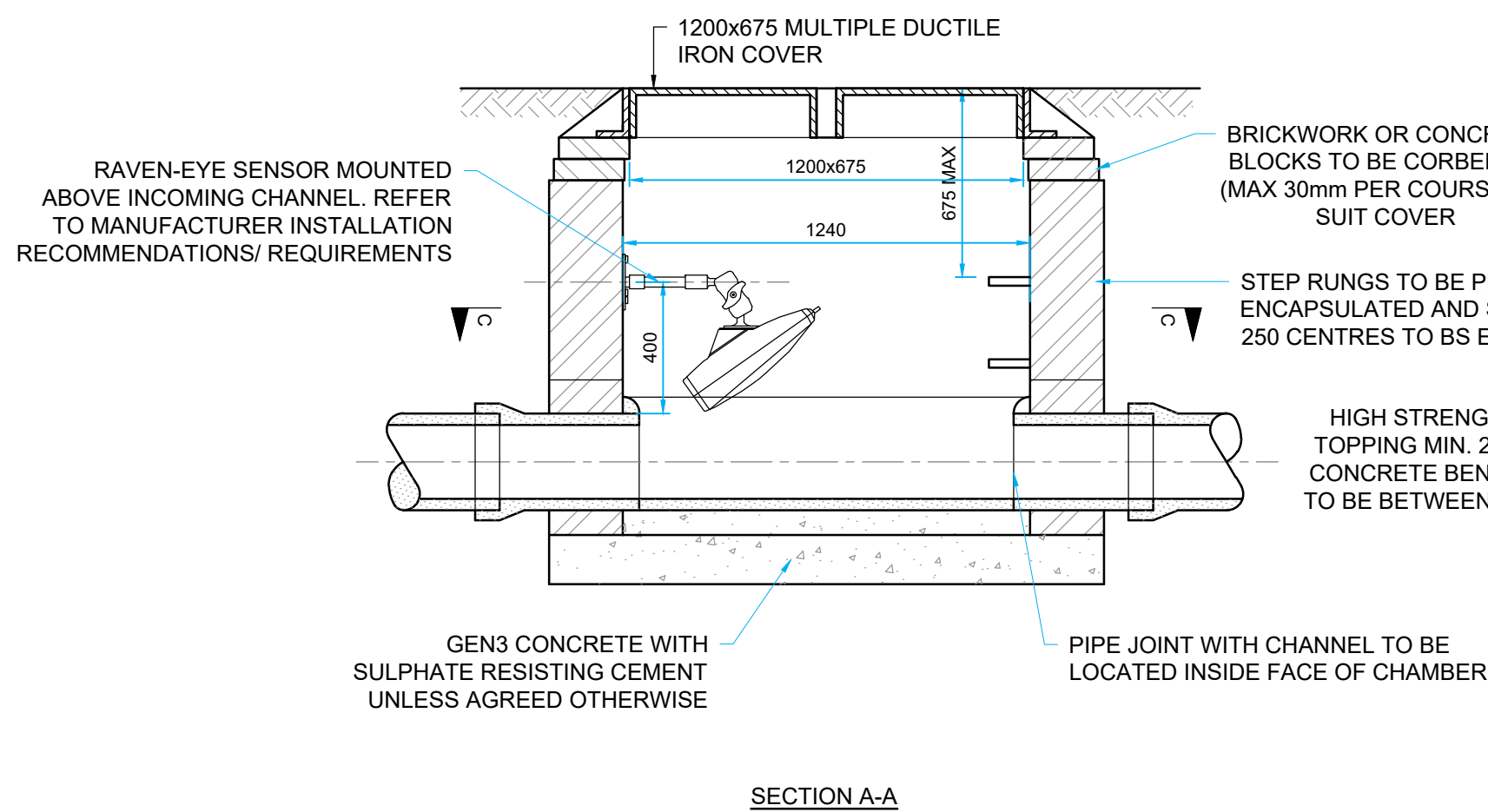
TYPICAL FWP/RWP BASE DETAIL

SCALE - 1:10



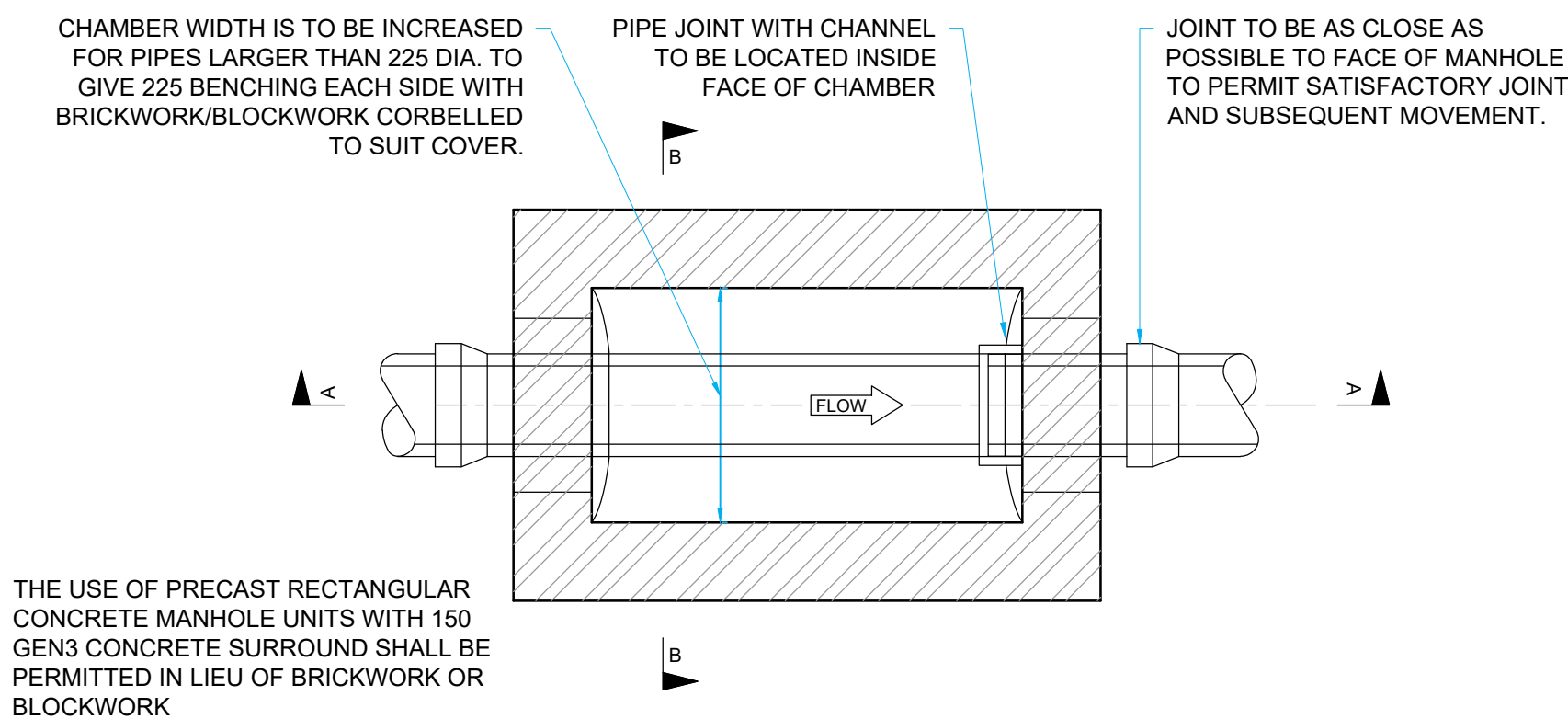
TYPICAL FWP/RWP BASE DETAIL (ABOVE FOUNDATION)

SCALE - 1:10



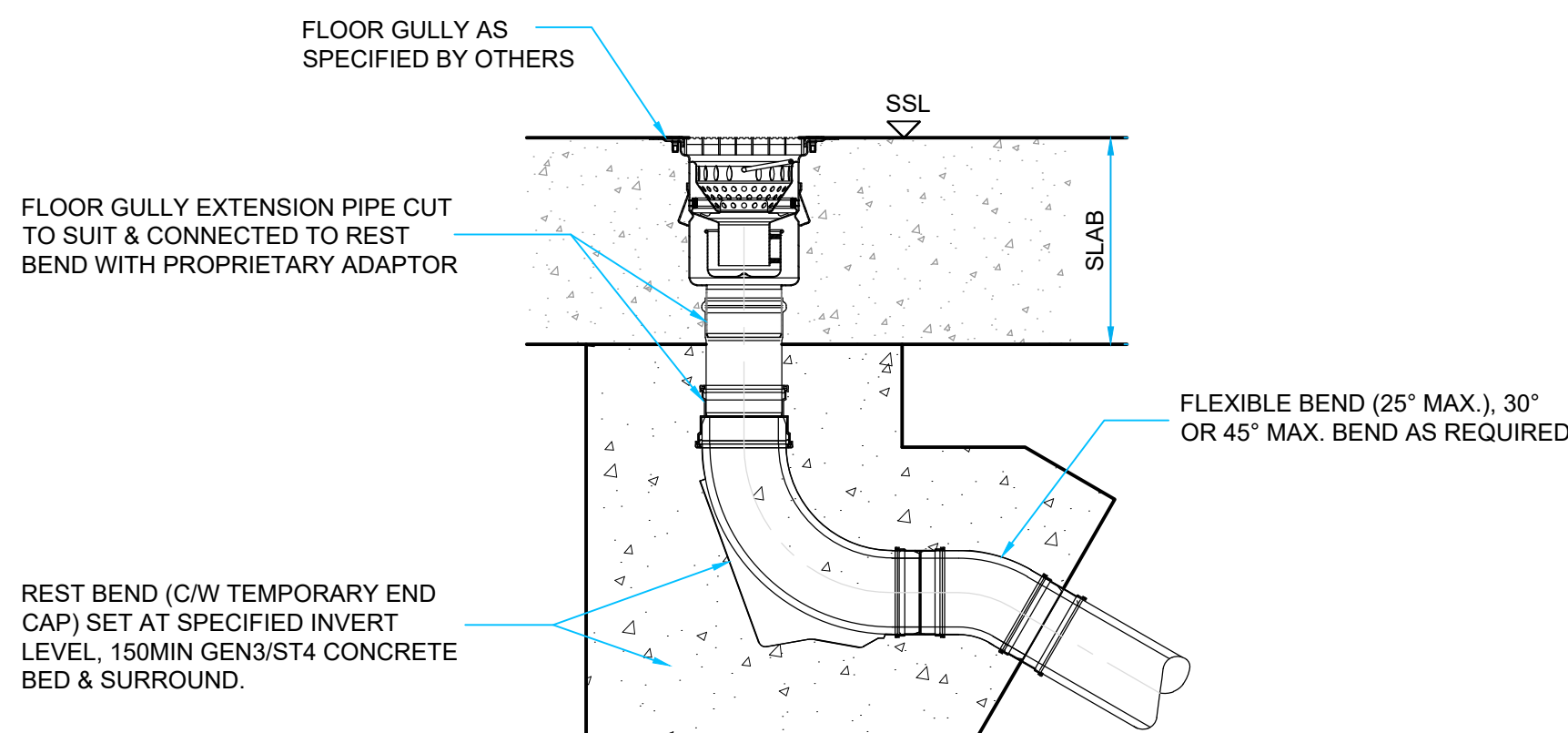
SECTION A-A

SECTION B-B



MANHOLE DETAIL TYPE E (FOUL FLOW METER)

SCALE - 1:20



TRAPPED INTERNAL FLOOR GULLY DETAIL

NOT TO SCALE

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OTHERWISE.

P01	16.06.25	DRAFT STAGE 4 ISSUE	ARJ	PAW
REV	DATE	DETAILS	DRN	CHK

DRAWING STATUS
PRELIMINARY

RIBA STAGE
STAGE 4

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APPRVD. MN	DATE SEPT 24	EMAIL FOR DRAWINGS info@roccoconsulting.com

CLIENT
MANCHESTER AIRPORT GROUP

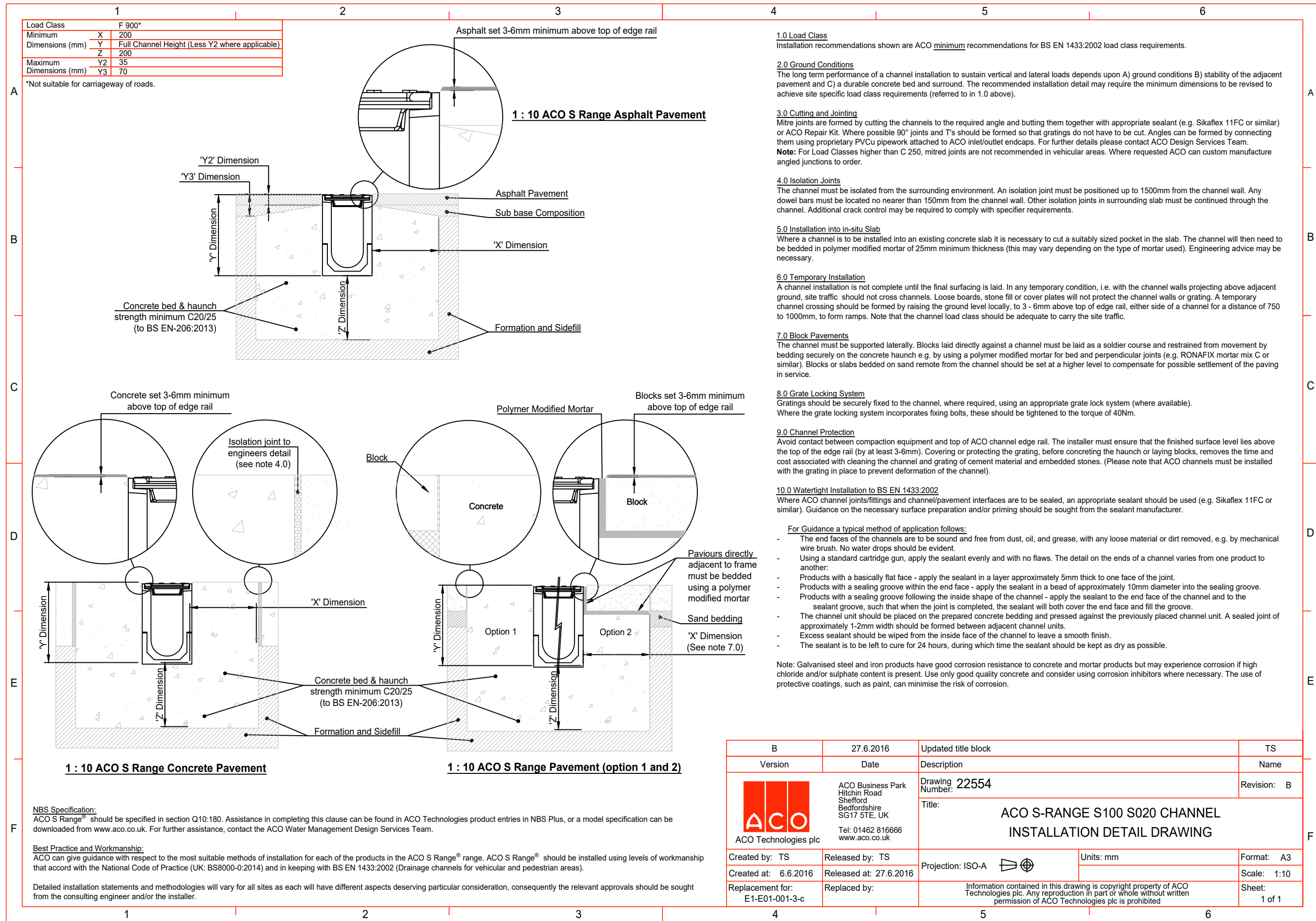
PROJECT TITLE
**PLOT H5 PREMIER INN
AIRPORT CITY**

DRAWING TITLE
**DRAINAGE DETAILS
SHEET 3**

DRAWING No. H5PI/ROC/PI/XX/DR/C/0503	REV. P01
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4700

RgCp Ltd.





STRATEGIC LAND



EARTH SCIENCES



CIVIL ENGINEERING



STRUCTURAL ENGINEERING



SPECIAL PROJECTS



COMPLIANCE MONITORING

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