



Drainage Strategy Report

Prepared for Bowlers Yard, Manchester

23/03/2023

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1. INTRODUCTION

1.1. *General*

1.1.1. This report has been prepared on instruction received from ForViva DevCo Limited and relates to the new residential eleven storey building situated on Bowler Yard, Manchester.

1.1.2. The report outlines the initial drainage design philosophy in relation to the proposed development.

1.1.3. This report is prepared solely for the benefit of the Client. This report may not be assigned without prior written permission from Clancy Consulting.

1.1.4. This report is for Planning Application purposes only and does not constitute a construction-ready design.

1.2. *Report Structure*

1.2.1. The report has been structured to follow the general principles set out by Manchester City Council Local Flood Risk Management Strategy.

1.2.2. The drainage strategy will provide justification of the discharge method considering the following (in order of preference);

1. Discharge by Infiltration
2. Discharge to Watercourse
3. Discharge to Surface Water Sewer
4. Discharge to Combined Sewer

1.2.3. The drainage strategy will discuss proposed SUDs techniques and comply with the 'Non-Statutory Technical Standards for Sustainable Drainage Systems'

1.2.4. Sources of information:

- Manchester City Council Local Flood Risk Management Strategy.
- United Utilities Public Sewer Records
- Non-statutory technical standards for sustainable drainage systems.
- Architectural drawings provided by Carey Jones Chapman Tolcher
- Maps by Google and Streetmap
- Historical Maps by National Library of Scotland
- Lead local Flood Authority Critical Drainage Area Maps
- GHD Livgunn Limited on drawing 12502913-GHD-DR-C-5601 and 5602

2. LOCAL POLICY

LLFA SURFACE WATER MANAGEMENT GUIDANCE FOR PLANNING APPLICATIONS

Full details are found in the LLFA's surface water management guidance report and supporting information. In summary this indicates:

Consideration of the site area should be made together with EA flood maps to determine the flood zone and whether a Flood Risk Assessment is required.

Drainage Strategy should follow SUDS hierarchy – i.e. in preferential order – Use on Site*, Infiltration, Watercourse, Surface Water Sewer, Combined Sewer. Infiltration tests are required to demonstrate whether a soakaway is feasible. It should be noted that Utilities companies also apply this strictly and detailed consideration of the hierarchy will need to be demonstrated in supporting documentation.

Appropriate discharge rates should be calculated for the 2, 30 and 100 year flood events for use in drainage design. In line with NPPF this should be attenuated to greenfield rates for greenfield sites/ site area and as close as possible to greenfield rates for brownfield areas (50% betterment on existing). Climate change should be considered appropriately.

A conceptual drainage layout should be prepared indicating runoff areas and calculations provided including attenuation. Interceptors/ filtration may also be deemed appropriate in accordance with SUDS hierarchy/ guidance.

Calculations should show no flooding during the 1 in 2 year and 1 in 30 year storm events and flooding in the 1 in 100 year storm event (plus climate change) is held on the development and without being detrimental to property.

3. SITE CHARACTERISTICS

3.1. *Location*

3.1.1. The site is located as detailed as below:

OS X (Eastings)	385607
OS Y (Northings)	398326
Nat Grid	SJ856983 / SJ8560798326
Nearest Post Code	M4 7AY
Lat (WGS84)	N53:28:53 (53.48145520380666)
Long (WGS84)	W2:13:06 (-2.218349897743377)

Table 1 - Site Characteristics (Streetmap)

3.2. *Site Description*



Figure 1 - Site Location (Google Maps)

3.2.1. The new proposed dwelling is located on Pollard Street (boundary highlighted in Figure 1) and represents approximately 0.088 hectares in area.

3.2.2. The current site is a derelict piece of land, areas of overgrown vegetation with a large area of hard standing.

3.2.3. The development is bounded along the Northern boundary by a above ground train line. Munday Street forms the Southwest boundary, and Pollard Street forms the Southeast boundary.

3.2.4. A basic topographical plan was provided by GHD Livgunn Limited. This indicated that the site was sloped, falling east to west from 52.38m AOD to 51.88m AOD.

3.2.5. A review of historic maps indicates that the current site was developed in 1956.

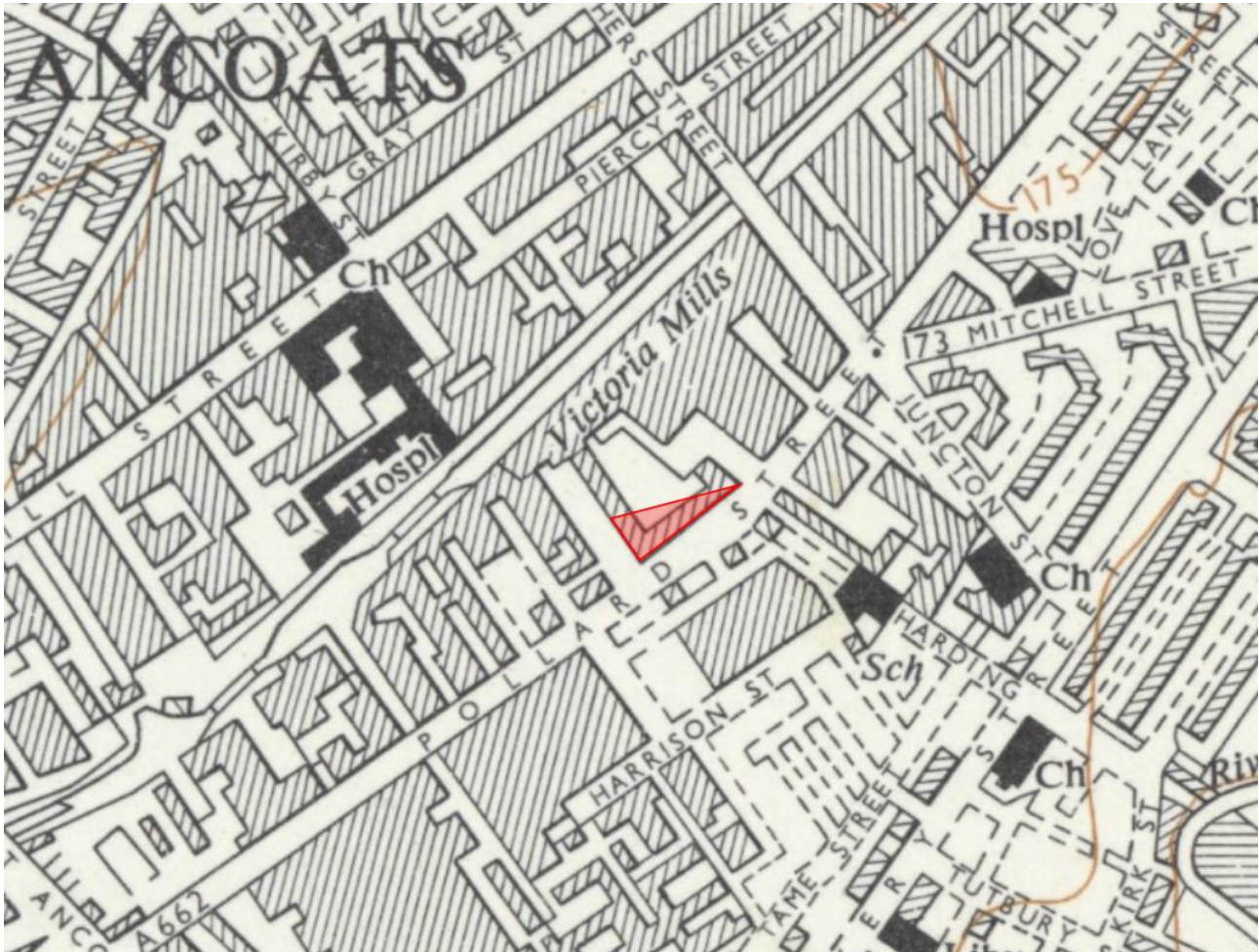


Figure 2 - Historic Map from 1956 (National Library of Scotland)

3.2.6. The development is approximately 90m from Ashton Canal. 305m from River Medlock.

3.2.7. Following review of Flood Maps, the development is within Flood Zone 1 and considered as low probability of flooding.

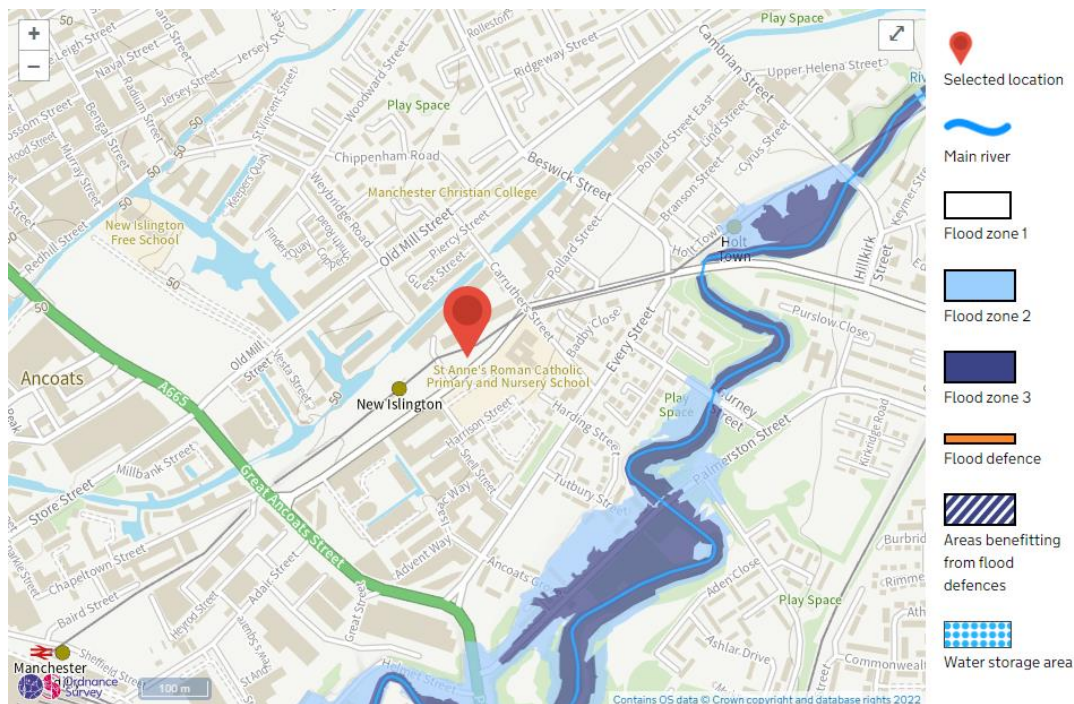


Figure 3 - Flood Risk Mapping (GOV.uk)

3.3. Development Proposals

3.3.1. The current site will host a 11-storey building to form 62 residential apartments with associated landscaping, access and parking.

3.3.2. A private drive will access ground floor parking area from Munday Street.

3.3.3. An area comparison pre and post development is shown below:

Site Region	Pre-Development (m2)	Post Development (m2)
Building	0	619
Hardstand/ Car Parking	881	262
Soft Landscaping/ Garden	0	0
Impermeable	881	881
Permeable	0	0

Table 2- Pre and Post Development Detailed Figures

3.4. Existing Drainage

3.4.1. Following review of existing UU record drawings, there is a combined water drain running north below Pollard Street.

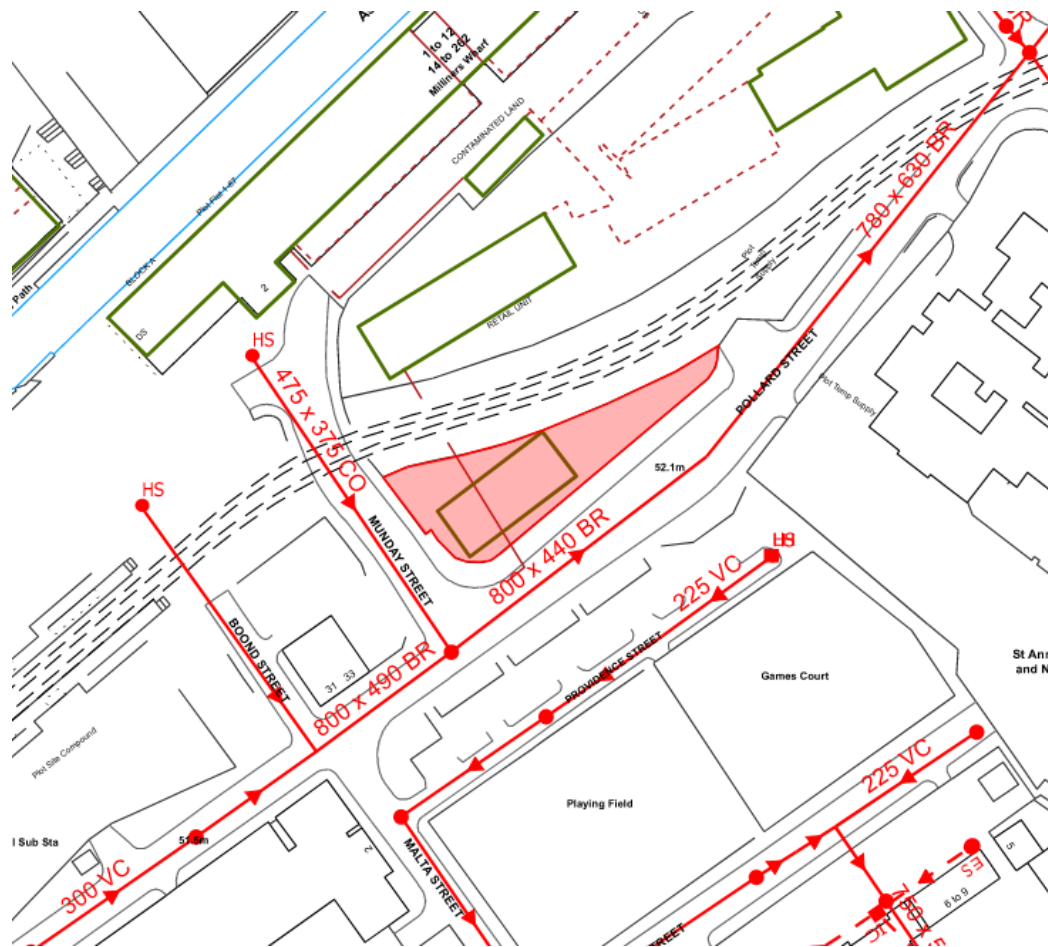


Figure 4 - Existing Infrastructure (United Utilities)

3.4.2. Details regarding the depths, sizes and fall of the public manholes or pipes identified on the above plan have been provided by GHD Livgunn Limited on drawing 12502913-GHD-DR-C-5601 Rev P02. The plans indicate the combined sewer below Munday Street has an invert level of 48.750m AOD at the point of proposed connection. This then backdrops into the main combined sewer run below Pollard Street which has an invert level of 47.100m AOD.

3.4.3. All of the assumed existing drainage will need to be investigated prior to connection – depth, gradients, flow rates etc.

4. SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS)

Any new drainage for the development should be designed in accordance with the non-statutory technical guidance for the design of sustainable drainage systems.

4.1. *Surface Water Disposal Hierarchy*

4.1.1. The disposal of surface water should be considered in the following order of priority;

1. Discharge to be used on site.
2. Infiltration into the subsoil via soakaways or permeable paving.
3. Discharge to a water course or the sea.
4. Discharge to a surface water sewer.
5. Discharge to a combined sewer.

4.1.2. If it is not possible to use discharge on site or discharge to a soakaway, then surface water should be controlled with the use of Sustainable Drainage Systems (SuDS) and considered using the SuDS Hierarchy.

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
	Living roofs	✓	✓	✓
	Basins and ponds - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✓	✓	✓
	Filter strips and swales	✓	✓	✓
	Infiltration devices - soakaways - infiltration trenches and basins	✓	✓	✓
	Permeable surfaces and filter drains - gravelled areas - solid paving blocks - porous paviers	✓	✓	
	Tanked systems - over-sized pipes/tanks - storms cells	✓		
Least Sustainable				

Table 3 - SuDS Hierarchy (Environment Agency)

4.2. *Disposal Strategy*

4.2.1. Use on Site

Under the new Design and Construction Guidance document introduced at the end of May 2021, Use of Surface Water generated on site is now the preferred first option in the SUDS hierarchy.

This may well be a feasible option during detailed design as further guidance will be required from the Services Consultant as to how extraction is achievable (and cost effective) using greywater to flush toilets is.

The position of any greywater tanks for water extraction for irrigation need to be positioned to avoid a site covered with other services (electric. drainage, telecommunications and as proposed for use on this site – piping for ground sourced heating).

At this stage, and given the site size, layout and use, this would have to be used in conjunction with other options on the SUDS hierarchy as opposed to being the sole option and may only offer a small overall reduction into the existing infrastructure.

4.2.2. Infiltration

There is no potential room for a permeable attenuation tank to be located within the landscaped areas while still maintaining a minimum 5m away from foundations or the site boundary and avoiding tree root protection areas.

Investigations concluded the site did not fall within a groundwater source protection zone.

4.2.3. Discharge to a Water Course

The nearest watercourse/body of water is Ashton Canal however, accessing this would entail crossing third party land.

Existing drainage survey carried out by GHD did not identify any existing drains that currently discharge into this watercourse.

4.2.4. Discharge to a Surface Water Sewer

There is no evidence of surface water sewers adjacent to the development.

4.2.5. Combined Sewer

Discharging into the combined sewer at a controlled rate is currently the most feasible option to be considered. A combined sewer passes below Munday Street.

A CCTV drainage survey will also be required to establish if there are existing live connections up stream which may result in a localised diversion when a new connection is made.

4.3. **SuDS Strategy**

4.3.1. Living Roof

A significant area of the site receiving surface water is roof area. A sustainable solution to control run-off at its source is to provide green or brown roof areas. These roof areas retain part of the rainwater, slow down the speed of run-off and also help to reduce water pollution whilst providing a habitat for nature.

Any green or brown roof system would impose additional weight onto the roof structure which would need to be designed accordingly to accommodate the additional weight.

4.3.2. Ponds/Basins and Swales

There is no area within the development that would be suitable to accommodate a feature like this.

4.3.3. Infiltration/ Permeable Surfaces

All soakaways must be situated at least 5m away from the building footprint and boundary line as per building regulations. This makes soakaways an unfeasible option for this development. Site Investigations have been carried out and identify the ground to be clay which is no suitable for infiltration.

Areas of hard landscaping have the potential to be utilised as subbase reservoirs with either full or partial filtration options to consider subject to testing or use purely as attenuation.

4.3.4. Landscaped Areas

The most sustainable solution to control run-off at its source would be to utilise areas of landscaping (grass and planting). There is an opportunity to make the external areas around the buildings heavily landscaped with tree pits, areas of feature planting to assist with this option. This may need to be used in conjunction with a primary means of surface water discharge.

4.3.5. Tanked System

Typically, a tanked system would be considered as a means to provide additional attenuation storage to control rainfall up to 1 in 100 year change events with an allowance for climate change for existing sites undergoing complete redevelopment.

In this instance, an attenuation tank with a flow control downstream may be the primary SUDS option to be utilised.

4.3.6. Pollution

The development does not contain 50 spaces or an area for parking greater than 800m² therefore a petrol interceptor is not required.

5. DRAINAGE STRATEGY

5.1. *Surface Water Drainage*

- 5.1.1. In accordance with LLFA requirements, the development will be treated as a greenfield site as it has been derelict in excess of 12 months.
- 5.1.2. This has limited the flow to 5l/s and will be maintained using flow control systems such as a Hydro-Brake.
- 5.1.3. The peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 2 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.
- 5.1.4. Site investigations have determined the geology of the soil to be clay with unfeasible infiltration rates.
- 5.1.5. Following preliminary assessment by calculation using initial layouts and assumed rainwater pipe locations, the development will require an approximate total of 33 cubic metres of storage, 28m³ of which is the attenuation tank with the remainder provided by the manholes and pipes. Storage is provided for storm events up to and including 1 in 100 year plus climate change.
- 5.1.6. This is currently a theoretical design based on the information we have been provided to date and will require confirmation of assumptions made (including invert level of the outfall of the existing sewer) – which will be undertaken during detailed design.
- 5.1.7. Outline proposals are shown on the Drainage Strategy drawing located in Appendix A.
- 5.1.8. Preliminary calculations have been included in the Appendix B.

5.2. *Development Foul Water Drainage*

- 5.2.1. Foul water will be collected in a separate system to surface water. This will be collected via pipes & inspection chambers.
- 5.2.2. All proposed below ground foul water drainage will comply with Building Regulations Part H:2010, BS EN 12056-2:2000 and BS EN 752:2008.
- 5.2.3. Based upon the above, the peak foul flow rate from site is estimated to be 16.6l/s.
- 5.2.4. The proposed foul sewer system has been designed to handle this flow rate.
- 5.2.5. United Utilities approval for the flow rate entering the public sewer will be required to proceed with detailed design.

SUMMARY	Discharge Unit	Totals	Total DU
<i>Shower</i>	0.6	42	25.2
<i>Bath</i>	1.3	62	80.6
<i>Washbasin</i>	0.6	104	62.4
<i>WCs (4l-9l cistern)</i>	2.5	104	260
<i>Kitchen Sink</i>	1.3	62	80.6
<i>Dishwasher</i>	0.8	62	49.6
<i>Floor Drain</i>	2	1	2
			560.4
<i>Peak Flow Discharge</i>	16.6/s		

Table 4 - Foul Flow Discharge Rate Estimation

5.3. Flood Risk within the Development

- 5.3.1. As per Environment Agency Flood Maps, the development is currently in Flood Zone One with a low probability of flooding.
- 5.3.2. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 2 or 1 in 30 year rainfall event.
- 5.3.3. The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
- 5.3.4. The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
- 5.3.5. Initial levels have been designed to be sympathetic to the existing levels with no vast areas of landscaping resulting in significant or abrupt level changes.
- 5.3.6. Levels will be designed such that in the event of a more extreme rainfall event water will discharge away from buildings.

6. **MAINTENANCE & CONSTRUCTION**

6.1. ***Maintenance Considerations***

- 6.1.1. This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details.
- 6.1.2. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 6.1.3. The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the development.
- 6.1.4. As the flows are generally being attenuated on site, there will be a period after storm events where the network is still partially or fully surcharged and is draining down.
- 6.1.5. Where this surcharging is still present after 48hrs appropriate action should be taken.
- 6.1.6. A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 6.1.7. No large shrubs should be planted over any geocellular tanks within 3m in all directions and 6m from small/medium specimen tree planting. Larger trees should not be planted within 20m of the tanks.
- 6.1.8. It is advisable that above ground signage is installed detailing size and depth of any below ground structures to make any future works manageable.
- 6.1.9. It is assumed that the maintenance of the drainage network will be the responsibility of an on-site facilities management team.
- 6.1.10. A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual.
- 6.1.11. It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.
- 6.1.12. Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.
- 6.1.13. Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.
- 6.1.14. During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter.

6.1.15. Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

6.1.16. Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.

6.2. Construction

6.2.1. Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.

6.2.2. Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.

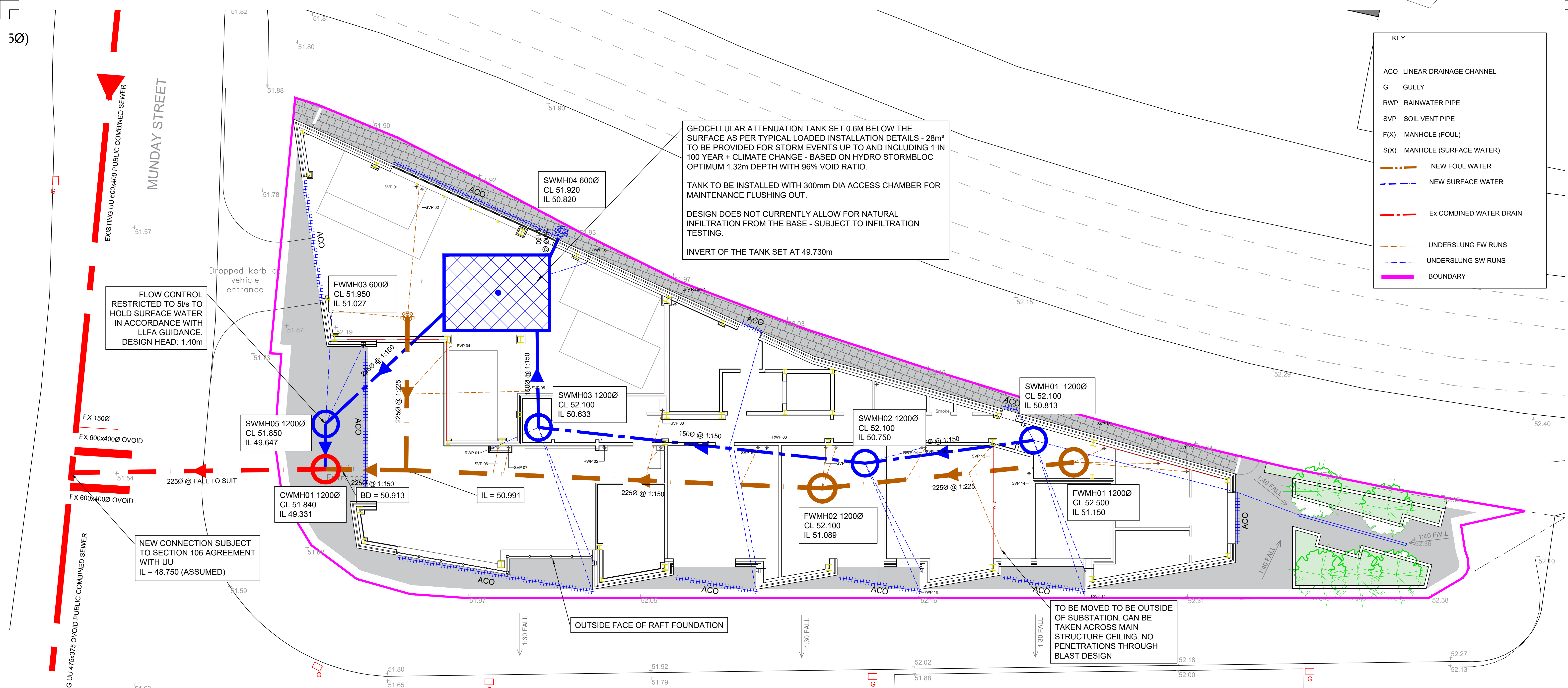
6.2.3. The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer, must be of a suitable nature and quality for their intended use.

6.2.4. The detailed design of the system and product selection for the storage and pipe solution will be made at the detailed design stage when all the site constraints can be considered. There are numerous products available for storage of water below ground and care will be needed to ensure that the right product is chosen for the final loading conditions.

7. **CONCLUSIONS AND RECOMMENDATIONS**

- 7.1. This report gives details of the Drainage Strategy which has been undertaken in relation to the proposed development on Pollard, Manchester.
- 7.2. The development will be situated on the derelict site to provide an eleven storey building with 62 one and two bedroom apartments.
- 7.3. Separate foul and surface water systems will be provided on the development, only connecting at the final manhole on the development before discharge to the public combined sewer.
- 7.4. The development has been considered to be greenfield as it has the site has been derelict for in excess of 12 months. Therefore, a 5l/s discharge rate for the surface water is agreed as in accordance with the LLFA requirements.
- 7.5. The proposed development provides an opportunity to reduce local area flood risk by controlling surface water on site. Following the SuDS and water disposal hierarchy it has been determined the most viable solution will be to control surface water using flow controls and stored on site before being discharged to the public combined sewer.
- 7.6. The proposed system will be designed to control surface water run-off for all storms up to and including the 100 year plus climate change event. Water will be stored on site below ground before being discharged at the agreed flow rate. Final run-off rates will be dependent on approval by United Utilities
- 7.7. A total of 33 cubic metres of storage is required for the for the entire development provided through the use of an attenuation tank (28m³) the pipes and manhole chambers providing the remainder.
- 7.8. New connections will be required from the development into the existing combined sewer with preliminary details shown on the Drainage Strategy drawing. These may require temporary sewer diversions and road closures to form the connection safely.
- 7.9. A Wastewater Pre-Development Enquiry has been submitted to United Utilities for comment on the proposed drainage strategy presented within this report. At the time of writing, no response has been received.
- 7.10. The proposed system will be designed to meet the Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems, March 2015.

APPENDIX A***Drainage Strategy Drawing***



KEY	
ACO	LINEAR DRAINAGE CHANNEL
G	GULLY
RWP	RAINWATER PIPE
SVP	SOIL VENT PIPE
F(X)	MANHOLE (FOUL)
S(X)	MANHOLE (SURFACE WATER)
---	NEW FOUL WATER
---	NEW SURFACE WATER
---	Ex COMBINED WATER DRAIN
---	UNDERSLUNG FW RUNS
---	UNDERSLUNG SW RUNS
---	BOUNDARY

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER ENGINEER'S AND ARCHITECT'S DRAWINGS, DETAILS AND SPECIFICATIONS.
- OWNERSHIP OF PIPE NETWORKS ARE TO BE CONFIRMED PRIOR TO ANY DIVERSION WORKS.
- THIS DRAWING INDICATES DRAINAGE PRINCIPLES AND STRATEGY ONLY AND FURTHER DETAIL DESIGN IS REQUIRED FOLLOWING CONFIRMATION OF BUILDING SET OUT, PROPOSED LEVELS, PROPOSED INTERNAL POP UPS AND FURTHER DISCUSSIONS WITH ALL RELEVANT PARTIES REGARDING ALLOWABLE DISCHARGE.
- THE DEVELOPMENT HAS BEEN CONSIDERED AS GREENFIELD IN ACCORDANCE WITH LLFA GUIDANCE.
- DURING THE DETAILED DESIGN PHASE, ALL STORM EVENT DURATIONS UP TO AND INCLUDING 6 HOURS WILL BE MODELED TO DETERMINE THE FINAL STORAGE REQUIREMENT FOR THE DEVELOPMENT.
- ALL PROPOSED RESTRICTED FLOW RATES AND CONNECTION POINTS WILL BE SUBJECT TO UNITED UTILITIES AGREEMENT AND APPROVAL.
- FOUL WATER FLOW RATES ARE ESTIMATED IN ACCORDANCE WITH BS EN 752:2008 AND DESIGNED FOR PEAK FLOW RATES.
- UNITED UTILITIES CONFIRMATION OF APPROVAL FOR THE FLOW RATE ENTERING THE PUBLIC SEWER WILL BE REQUIRED TO PROCEED WITH THE DETAILED DESIGN.
- ALL EXISTING ON-SITE DRAINAGE (ABANDONED OR LIVE) TO BE IDENTIFIED AND TERMINATED AT SITE BOUNDARY UNO.

SW DISPOSAL HIERARCHY STATEMENT

- USE ON SITE** - SUBJECT TO DETAILED DESIGN AND INPUT FROM M&E CONSULTANTS. POSITIONING OF GREYWATER TANKS MAY PROVE DIFFICULT. MAY PROVE TO BE ONLY USED IN CONJUNCTION WITH OTHER OPTIONS.
- INFILTRATION** - LIMITATIONS OF LOCATION DUE TO CLEARANCE REQUIREMENTS FROM FOUNDATIONS AND BOUNDARY LINES. INFILTRATION TESTS TO BE CARRIED OUT TO DETERMINE FEASIBILITY.
- DISCHARGE TO WATERCOURSE** - DISTANCE TO NEAREST WATERCOURSE WOULD ENTAIL CROSSING THIRD PARTY LAND.
- DISCHARGE TO SURFACE WATER SEWERS** - NO SURFACE WATER SEWER WITHIN PROXIMITY OF THE DEVELOPMENT.
- DISCHARGE TO COMBINED SEWER** - THIS IS CURRENTLY THE FEASIBLE OPTION WITH A COMBINED SEWER BELOW MUNDAY STREET.

SURFACE WATER STRATEGY:

THE DEVELOPMENT HAS BEEN CLASSIFIED BY MANCHESTER CITY COUNCIL AS GREENFIELD AND THE MAXIMUM SURFACE WATER DISCHARGE FROM THE SITE IS TO BE 5l/s. DISCHARGE IS TO CONNECT TO THE FOUL AT A DEMARCATION CHAMBER LOCATED WITHIN THE SITE BOUNDARY BEFORE DISCHARGING INTO THE PUBLIC SEWER BELOW MUNDAY STREET.

BASED ON AREAS SUPPORTED, MAXIMUM TOTAL STORAGE VOLUME OF 33m³ IS REQUIRED FOR THE SYSTEM FOR ALL STORM EVENTS UP TO AND INCLUDING THE 1:100 YEAR STORM + 40% CLIMATE CHANGE TO BE CONTAINED BELOW GROUND. 28m³ OF THIS IS PROVIDED BY THE ATTENUATION TANK, THE REMAINDER PROVIDED BY THE NETWORK OF MANHOLES AND PIPES.

THIS IS A THEORETICAL PRELIMINARY DESIGN AS ASSUMPTIONS MADE MUST BE CONFIRMED (I.E. LEVELS, AREAS SUPPORTED). CONSTRUCTION STAGE DESIGN IS SUBJECT TO DETAILED DESIGN. DO NOT CONSTRUCT FROM THIS DRAWING.

FOUL WATER STRATEGY:

THIS WILL BE COLLECTED ON SITE THROUGH A SEPERATE FOUL DRAINAGE SYSTEM WHICH COMBINES WITH THE SURFACE WATER AT THE BOUNDARY OF THE SITE - DOWNSTREAM OF THE FLOW CONTROL CHAMBERS. THE ESTIMATED PEAK FOUL FLOW IS SUBJECT TO CONFIRMATION OF NUMBERS AND LAYOUTS OF ROOMS.

THE INDICATIVE DRAINAGE ARRANGEMENTS SHOWN ON EACH PLOT IS SUBJECT TO COORDINATION WITH THE ARCHITECT AND LANDSCAPE ARCHITECT FOR LEVELS, M&E CONSULTANT FOR POP-UPS.

THIS DRAWING IS FOR INFORMATION ONLY AND IS SUBJECT TO FURTHER DISCUSSIONS WITH THE RELEVANT AUTHORITIES AND SUBSEQUENT FURTHER DETAILED DESIGN - DO NOT CONSTRUCT FROM THIS DRAWING.

IT IS PROPOSED TO FORM A CONNECTION TO THE LIVE SEWER OUTSIDE THE DEVELOPMENT AS SHOWN SUBJECT TO FURTHER CCTV INVESTIGATIONS.

SHOULD THE RESULTS OF THIS CONCLUDE THAT THE CONNECTION IS NOT VIABLE, A NEW CONNECTION AND MANHOLE WILL BE REQUIRED RESULTING IN POTENTIAL ROAD CLOSURES.

DETAILS SHOWN ARE SUBJECT TO CONFIRMATION OF LAYOUTS, ABOVE GROUND DRAINAGE, CONFIRMATION OF EXISTING DRAINAGE INFRASTRUCTURE DETAILS AND AGREEMENTS FROM ALL REGULATORY BODIES.

THE STRATEGY SHOWN IS SUBJECT TO CONFIRMATION OF THE EXISTING DRAINAGE INFRASTRUCTURE (LEVELS, FALLS, PIPE DIAMETERS, ETC).

THE STRATEGY ASSUMES DUE TO LEVELS, PUMPING WILL NOT BE REQUIRED.

PUMPING WOULD REQUIRE AN ALARM SYSTEM, A STANDBY PUMP AND 24 HOUR STORAGE AS MINIMUM REQUIREMENTS.

ALL MANHOLES ARE REQUIRED TO BE INSTALLED WITH A 300mm DEEP SUMP TO ACT AS A SEDIMENT TRAP.

04	22.05.23	UPDATED KEY	OB	MD	BRH
03	24.03.23	FINALISED FLOOR PLANS	OB	MD	BRH
02	24.01.23	COUNCIL COMMENTS	OB	MD	BRH
01	11.11.22	ISSUED FOR INFORMATION	OB	MD	BRH
Rev	Date	Description	By	Check	App.

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Client
FORVIVA DEVCO LIMITED

Project
BOWLERS YARD
LIVERPOOL

Office
LIVERPOOL

Discipline
CIVIL

Title
DRAINAGE STRATEGY

Scale @ A1
1-100

Status
INFORMATION



www.clancy.co.uk

Job Number	Originator	Building/Zone	Level
4/8578	CCL	ALL	DRN
Type	Discipline	Drawing No.	Revision
GA	C	050	04

DO NOT PRICE OR CONSTRUCT FROM THIS DRAWING

APPENDIX B***Initial Drainage Model Calculations***

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	30	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	19.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
2	0.018	5.00	52.100	1200	52.181	73.009	1.350
3	0.028	5.00	52.100	1200	34.701	74.516	1.467
4	0.023	5.00	51.850	1200	23.511	74.904	1.903
5			51.840	1200	23.477	72.491	1.909
6			51.540	1200	10.045	72.322	1.699
tank	0.015	5.00	51.950		34.506	80.850	1.920
1	0.018	5.00	52.100	1200	61.623	73.643	1.287

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	2	3	17.545	0.600	50.750	50.633	0.117	150.0	150	5.55	50.0
1.002	3	tank	6.337	0.600	50.633	50.591	0.042	150.0	150	5.68	50.0
1.004	4	5	2.413	0.600	49.947	49.931	0.016	150.0	225	5.91	50.0
1.005	5	6	13.433	0.600	49.931	49.841	0.090	150.0	225	6.12	50.0
1.003	tank	4	12.500	0.600	50.030	49.947	0.083	150.0	225	5.88	50.0
1.000	1	2	9.463	0.600	50.813	50.750	0.063	150.0	150	5.19	50.0

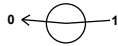
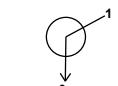
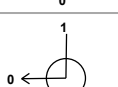
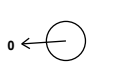
Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.001	0.818	14.5	4.9	1.200	1.317	0.036	0.0	60	0.739
1.002	0.818	14.5	8.7	1.317	1.209	0.064	0.0	83	0.853
1.004	1.065	42.3	13.8	1.678	1.684	0.102	0.0	88	0.955
1.005	1.065	42.3	13.8	1.684	1.474	0.102	0.0	88	0.955
1.003	1.065	42.3	10.7	1.695	1.678	0.079	0.0	77	0.891
1.000	0.818	14.5	2.4	1.137	1.200	0.018	0.0	42	0.611

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.001	17.545	150.0	150	Circular	52.100	50.750	1.200	52.100	50.633	1.317
1.002	6.337	150.0	150	Circular	52.100	50.633	1.317	51.950	50.591	1.209
1.004	2.413	150.0	225	Circular	51.850	49.947	1.678	51.840	49.931	1.684
1.005	13.433	150.0	225	Circular	51.840	49.931	1.684	51.540	49.841	1.474
1.003	12.500	150.0	225	Circular	51.950	50.030	1.695	51.850	49.947	1.678
1.000	9.463	150.0	150	Circular	52.100	50.813	1.137	52.100	50.750	1.200

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.001	2	1200	Manhole	Adoptable	3	1200	Manhole	Adoptable
1.002	3	1200	Manhole	Adoptable	tank		Junction	
1.004	4	1200	Manhole	Adoptable	5	1200	Manhole	Adoptable
1.005	5	1200	Manhole	Adoptable	6	1200	Manhole	Adoptable
1.003	tank		Junction		4	1200	Manhole	Adoptable
1.000	1	1200	Manhole	Adoptable	2	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
2	52.181	73.009	52.100	1.350	1200		1.000	50.750	150
3	34.701	74.516	52.100	1.467	1200		1.001	50.633	150
4	23.511	74.904	51.850	1.903	1200		1.002	50.633	150
5	23.477	72.491	51.840	1.909	1200		1.003	49.947	225
6	10.045	72.322	51.540	1.699	1200		1.004	49.947	225
tank	34.506	80.850	51.950	1.920			1.004	49.931	225
1	61.623	73.643	52.100	1.287	1200		1.005	49.841	225
							1.002	50.591	150
							1.003	50.030	225
							1.000	50.813	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	19.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	0	0	0
100	40	0	0

Node 4 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	49.947	Product Number	CTL-SHE-0112-5000-0500-5000
Design Depth (m)	0.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node tank Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	50.030
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.96	Time to half empty (mins)	51

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	16.0	0.0	1.320	16.0	0.0	1.321	0.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	10	50.817	0.067	6.1	0.0936	0.0000	OK
15 minute winter	3	11	50.734	0.101	10.8	0.1522	0.0000	OK
30 minute winter	4	25	50.283	0.336	7.4	0.4619	0.0000	SURCHARGED
15 minute summer	5	22	49.985	0.054	5.0	0.0608	0.0000	OK
30 minute summer	6	34	49.893	0.052	5.0	0.0000	0.0000	OK
30 minute winter	tank	25	50.283	0.253	10.5	3.9320	0.0000	SURCHARGED
15 minute winter	1	10	50.860	0.047	3.1	0.0658	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	2	1.001	3	6.0	0.597	0.413	0.1766	
15 minute winter	3	1.002	tank	10.7	0.876	0.740	0.0773	
30 minute winter	4	Hydro-Brake®	5	5.0				
15 minute summer	5	1.005	6	5.0	0.707	0.118	0.0949	7.2
30 minute winter	tank	1.003	4	4.8	0.238	0.113	0.4971	
15 minute winter	1	1.000	2	3.0	0.498	0.211	0.0580	

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

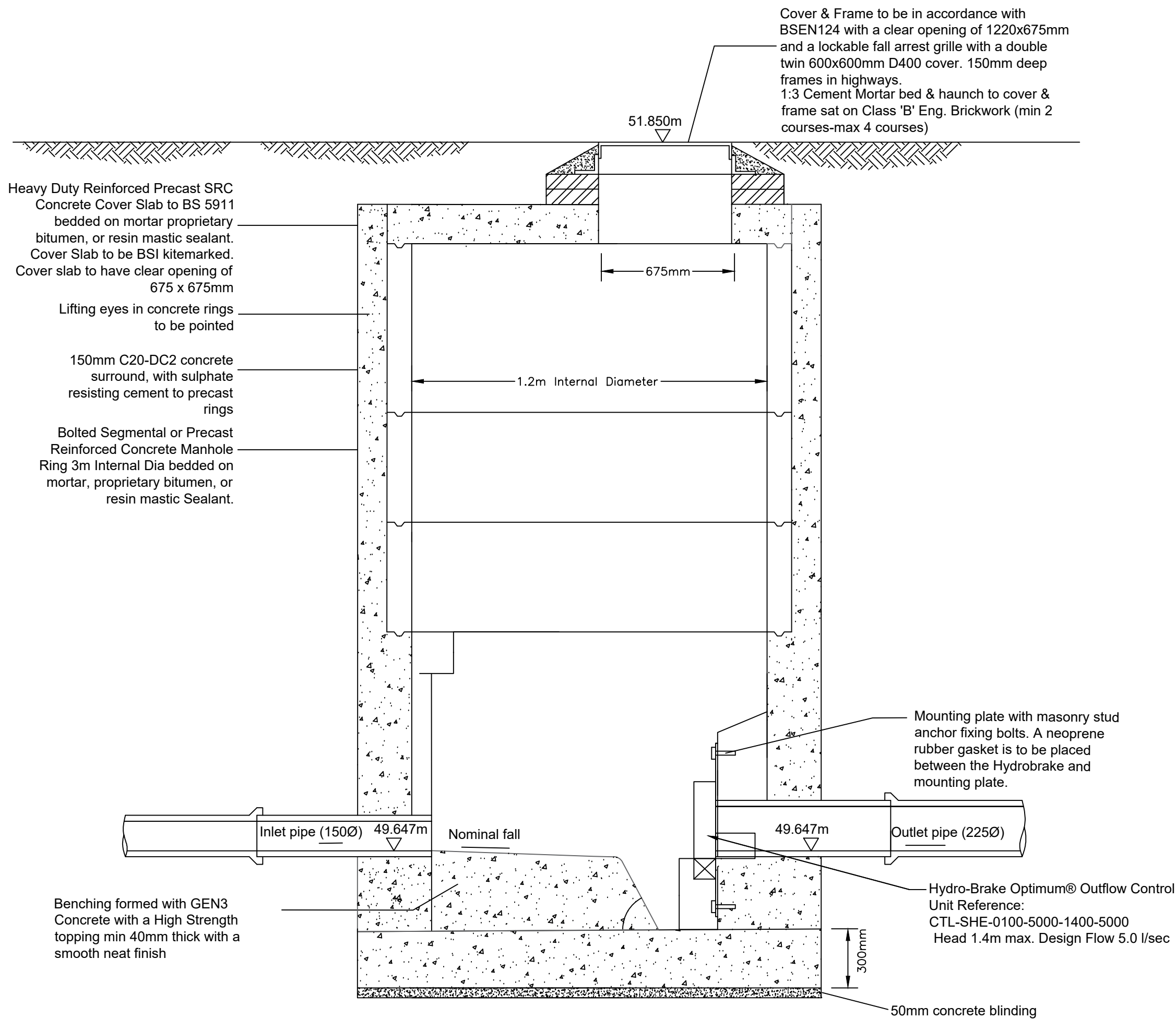
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	2	11	50.879	0.129	11.7	0.1808	0.0000	OK
15 minute winter	3	11	50.814	0.181	19.6	0.2736	0.0000	SURCHARGED
30 minute winter	4	27	50.719	0.772	7.6	1.0596	0.0000	SURCHARGED
30 minute winter	5	27	49.990	0.059	6.0	0.0666	0.0000	OK
30 minute winter	6	27	49.898	0.057	6.0	0.0000	0.0000	OK
30 minute winter	tank	27	50.720	0.690	19.8	10.7079	0.0000	SURCHARGED
15 minute winter	1	11	50.887	0.074	5.9	0.1041	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	2	1.001	3	11.1	0.656	0.767	0.2961	
15 minute winter	3	1.002	tank	19.5	1.115	1.349	0.1065	
30 minute winter	4	Hydro-Brake®	5	6.0				
30 minute winter	5	1.005	6	6.0	0.742	0.141	0.1078	20.1
30 minute winter	tank	1.003	4	5.3	0.248	0.126	0.4971	
15 minute winter	1	1.000	2	5.8	0.566	0.402	0.1172	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

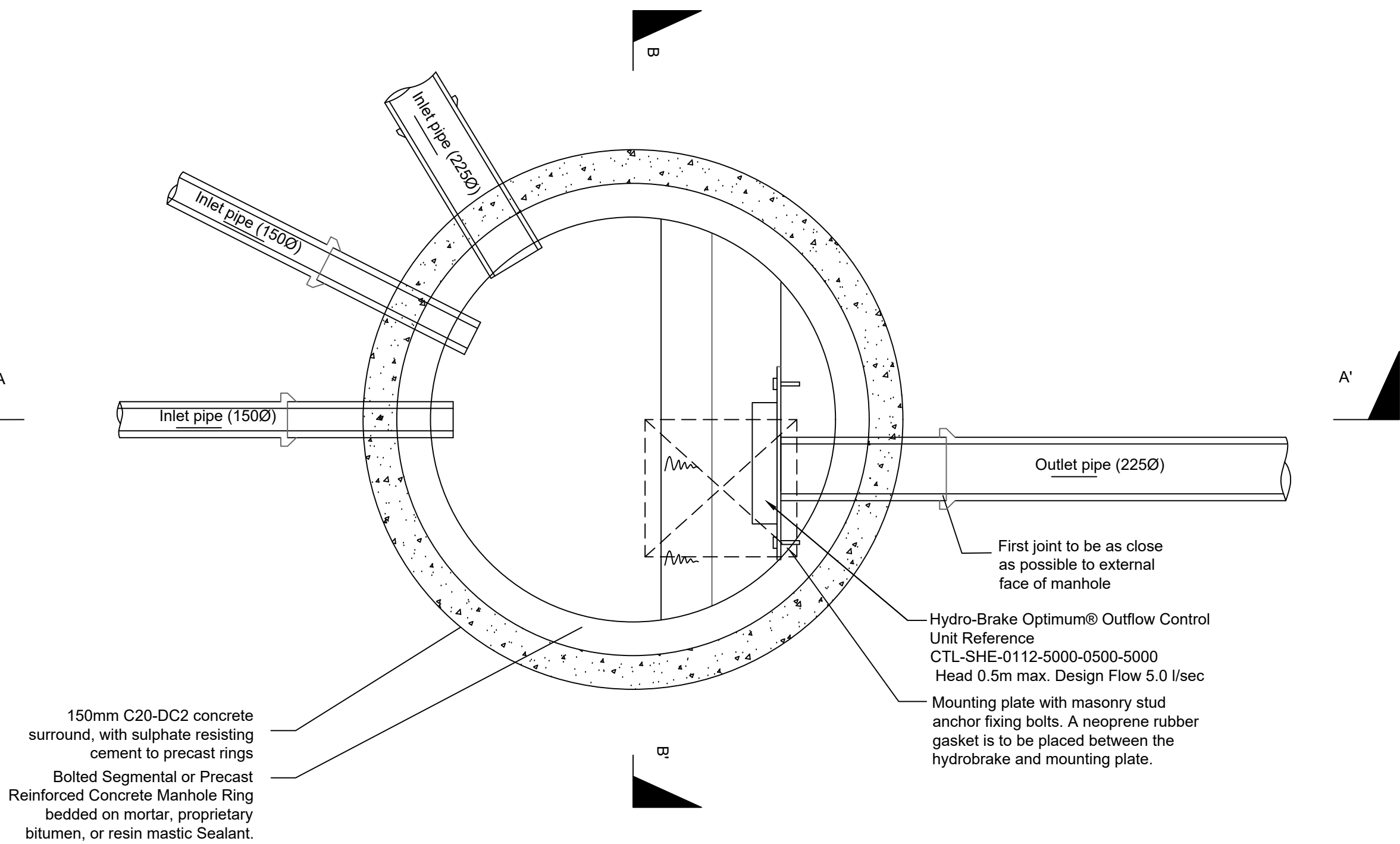
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	2	47	51.508	0.758	10.8	1.0591	0.0000	SURCHARGED
60 minute winter	3	47	51.502	0.869	18.5	1.3148	0.0000	SURCHARGED
60 minute winter	4	47	51.493	1.546	9.4	2.1224	0.0000	SURCHARGED
60 minute winter	5	47	50.001	0.070	8.3	0.0796	0.0000	OK
60 minute winter	6	48	49.908	0.067	8.3	0.0000	0.0000	OK
60 minute winter	tank	47	51.495	1.465	22.2	20.5115	0.0000	SURCHARGED
60 minute winter	1	48	51.508	0.695	5.5	0.9813	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	2	1.001	3	10.0	0.647	0.693	0.3089	
60 minute winter	3	1.002	tank	17.8	1.030	1.232	0.1116	
60 minute winter	4	Hydro-Brake®	5	8.3				
60 minute winter	5	1.005	6	8.3	0.813	0.197	0.1377	46.0
60 minute winter	tank	1.003	4	7.2	0.251	0.169	0.4971	
60 minute winter	1	1.000	2	5.4	0.555	0.372	0.1666	

APPENDIX C***Hydro Brake Manhole Detail Drawing***



SECTION A-A' THROUGH FLOW CONTROL MANHOLE
Scale 1:20



SECTION B-B' THROUGH FLOW CONTROL MANHOLE
Scale 1:20

- GENERAL NOTES**
- ALL CLANCY CONSULTING DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS. SHOULD THERE BE ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, CLANCY CONSULTING SHOULD BE INFORMED PRIOR TO CONSTRUCTION.
 - DO NOT SCALE FROM ANY CLANCY DRAWING, IN EITHER PAPER OR DIGITAL FORM. USE WRITTEN DIMENSIONS ONLY. ALL DIMENSIONS AND LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
 - UNTIL TECHNICAL APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT AUTHORITIES, IT SHALL BE UNDERSTOOD THAT ALL DRAWINGS ISSUED ARE PRELIMINARY AND NOT FOR CONSTRUCTION.
 - ALL LEVELS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION, FOLLOWING FULL TOPOGRAPHICAL SURVEY, DRAINAGE LEVEL SURVEY, INFORMATION AND CURRENT EXISTING SERVICES PLANS AND MAPS.
 - ANY DISCREPANCIES MUST BE REPORTED TO CLANCY CONSULTING PRIOR TO THE COMMENCEMENT OR CONTINUANCE OF ANY FURTHER WORKS.
- CONSTRUCTION DESIGN & MANAGEMENT NOTES**
- CCL are project 'designers' as defined in the CDM regulations.
 - The contractor shall plan and implement his temporary support and building methodology so as to ensure the permanent works are built as designed and detailed.
 - CCL have assumed a competent and experienced contractor will be employed.
 - Party wall awards to be submitted by the contract administrator to the relevant adjoining properties, the contractor is to comply with the party wall award requirements.
 - The contractor is responsible for verifying all site levels and setting out dimensions, including 'as built' positions of temporary works, before commencing the works. The contractor must carry out an exact site survey to confirm all final levels and setting out. any discrepancies that may exist between drawings and any other related document should be notified to the contract administrator immediately.
 - All work to be carried out to the satisfaction of the contract administrator.
 - The contractor is advised to visit the site to satisfy himself regarding the practicability of the works.
- DRAINAGE NOTES**
- All adoptable sewer works and material to be in accordance with "Sewers for Adoption" 6th Edition. The relevant British/European and Electrical Specification and Kitemarked.
 - Manhole covers shall/must have a clear opening of 600mm and shall be Class D400 BS EN 124 with 150mm deep frames in highway.
 - Filled ground must be filled and consolidated.
 - Cover slabs must carry the BSI Kitemark. Where the clear opening of the Kitemarked product is different to that of the cover and frame, a loading bearing slab should be fitted above the cover slab to bring the size down to 600x600mm. Please refer to Concrete Pipe Systems Association (CPSA) 'Technical Bulletin' issued Autumn 2004 for Kitemarked cover slab opening sizes.
 - Sewers should be a minimum of 1m and manholes 0.5m from kerb faces and service margins.
 - Sewers must have 5 metres clearance from trees and hedges. (Also refer to Figure 2.3 on page 33 in "Sewers for Adoption" 6th Edition for restrictions on tree planting adjacent to Sewers).
 - Sewers should be laid in Class "S" bedding (150mm granular bed and surround). Where depth of cover to top of the sewer is less than 1.2m in highways and verges (or less than 900mm in none vehicular access areas) then a concrete slab should be provided above the granular bed and surround.
 - Sewer pipes to be laid in maximum 3 metre lengths unless there is a specific operational need to lay longer lengths.
 - Plastic channel sections in manholes are not acceptable and clayware is preferable. Plastic channels are difficult to set in concrete and a satisfactory finish cannot be obtained on the benching.
 - The chamber size of manholes with more than one connection in them may need to be increased an increment to accommodate the connections and bends.
 - Manholes shall be Type "B" with 1200mm dia or 1500mm dia. rings, with the opening sited over the channel where depth of cover to pipe soffit is 1-1.5m shall be used.
 - Surface water and foul rising mains to be provided with marker tape above the rising mains.
 - If plastic pipes are to be used then the following should apply:-
 - All adoptable sewers to be BSI Kitemark (certified to WIS 4-35-01 and BS EN 13476).
 - Bedding and backfill material to conform to the requirements of Water Industry Specification 4-08-02 (Table A2)
 - Where plastic pipes are proposed, structural calculations for the plastic pipes and a site investigation report to prove that the ground condition is suitable for the plastic pipes are to be produced.
 - Where a B125 cover and frame has been approved, this must not be coated in plastic and must have lifting eyes suitable sized to accommodate standard lifting keys. Screw down covers are not acceptable.
 - Demarcation chambers to be a min. 450mmØ chamber for 100mmØ foul & 150mmØ surface water pipes up to 1.2m deep. For depths greater than 1.2m, restricted access opening to 350mm is required for safety reasons.
 - Maximum depth of demarcation chamber to be 2m, where depth exceeds 2m, manhole to be constructed as type B manhole.
 - Sulphate resistant cement (C20-DC2) and precast concrete products must be used or a laboratory report provided that such precautions are not necessary.
 - Strength of vitrified clay pipes (if used) to be 40kN/m for 100Ø, 40kN/m for 150Ø, 45kN/m for 225Ø and 72kN/m for 300Ø. All concrete pipes to be Class 120 concrete to BS EN 1216.
 - The contractor must allow for any fee's required for road and sewer opening permits, sewer connections and make the appropriate applications.
 - The first manhole(s) upstream from the connection to the (existing) public sewer should, when constructed, be fitted with a screen in order to prevent debris entering the public sewer. The sewer should not be removed until immediately prior to the occupation of premises to be served by the sewer.

Rev	Date	Description	By	Check	BRH
01	22.05.23	UPDATED KEY			

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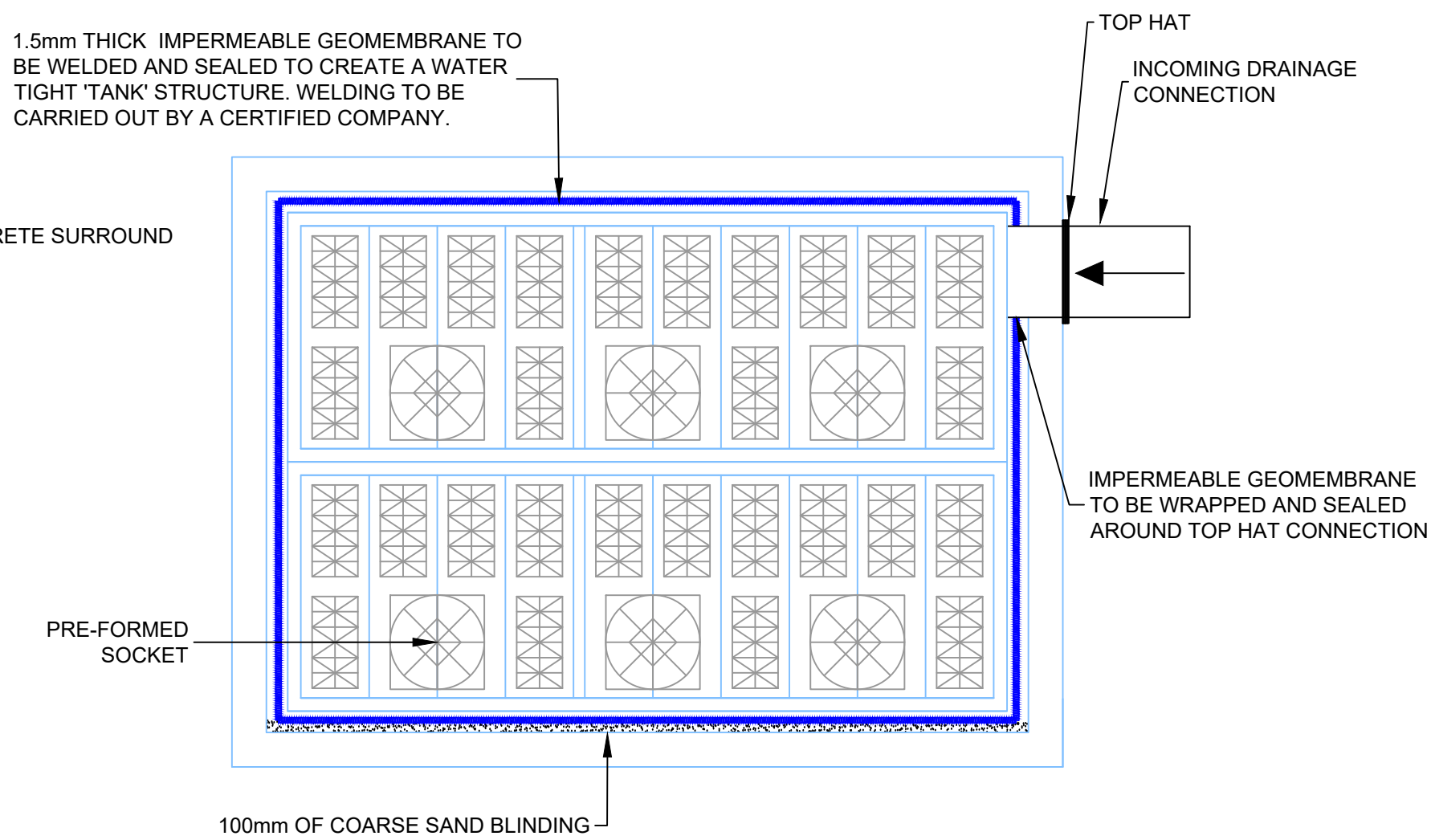
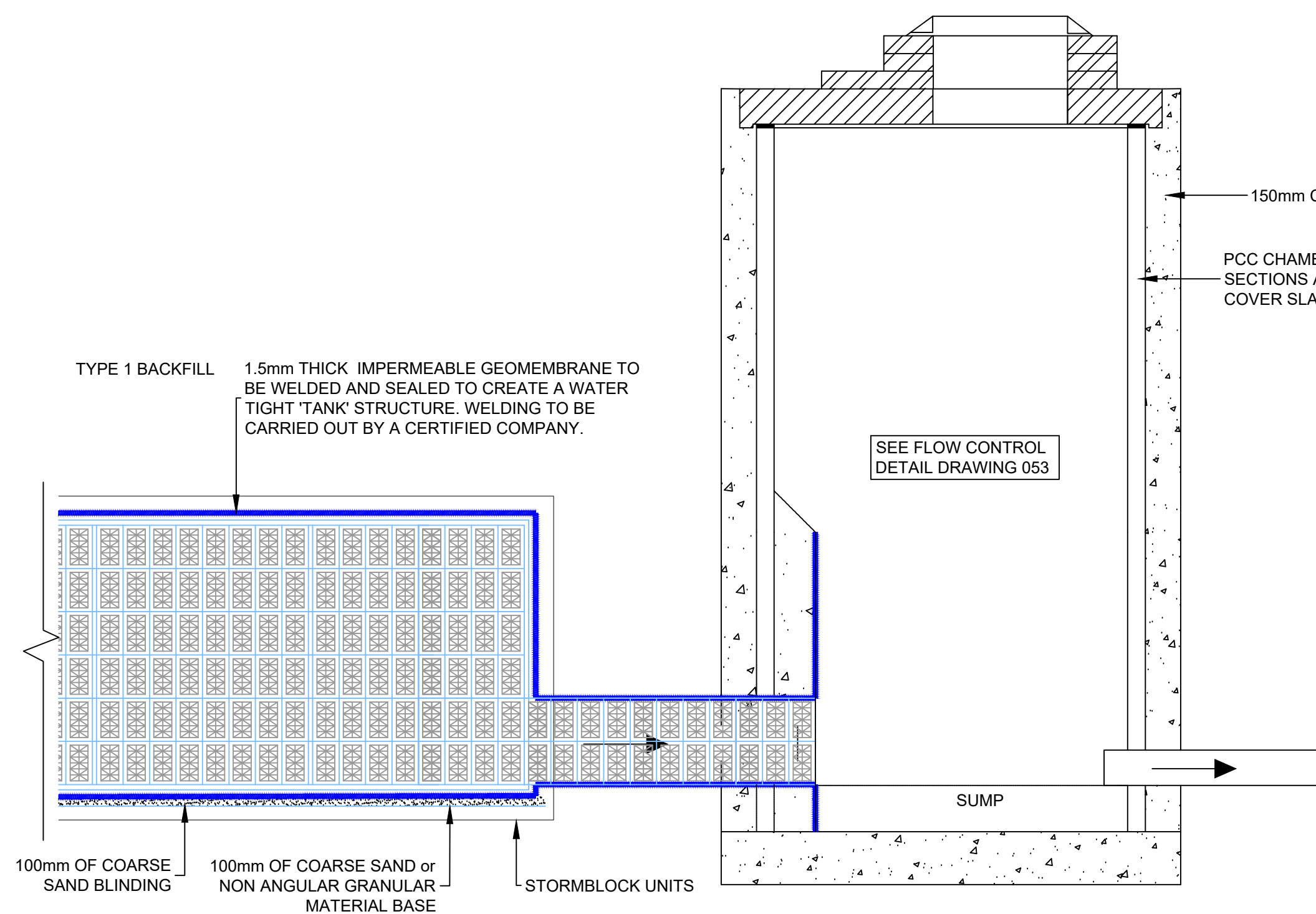
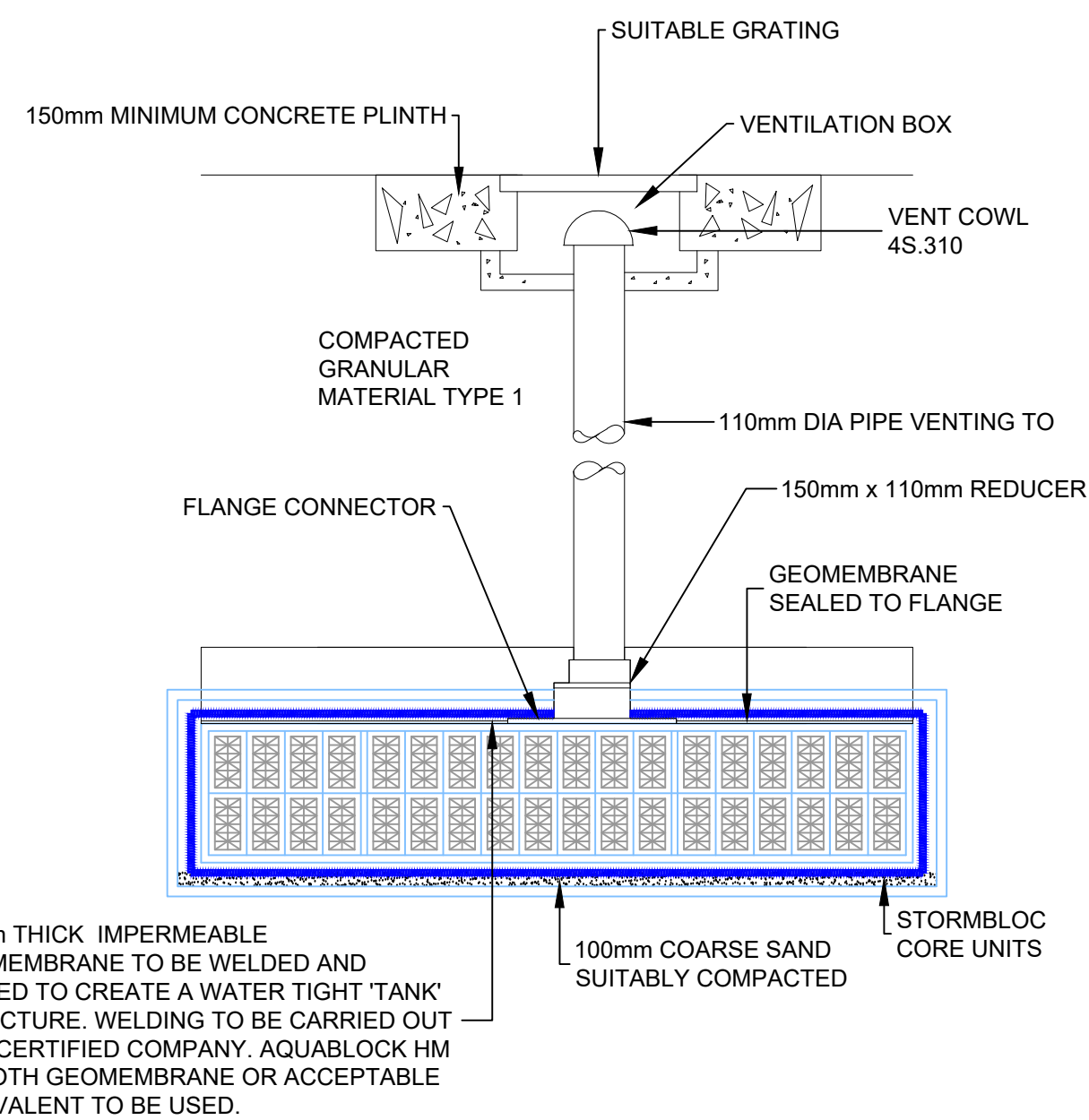
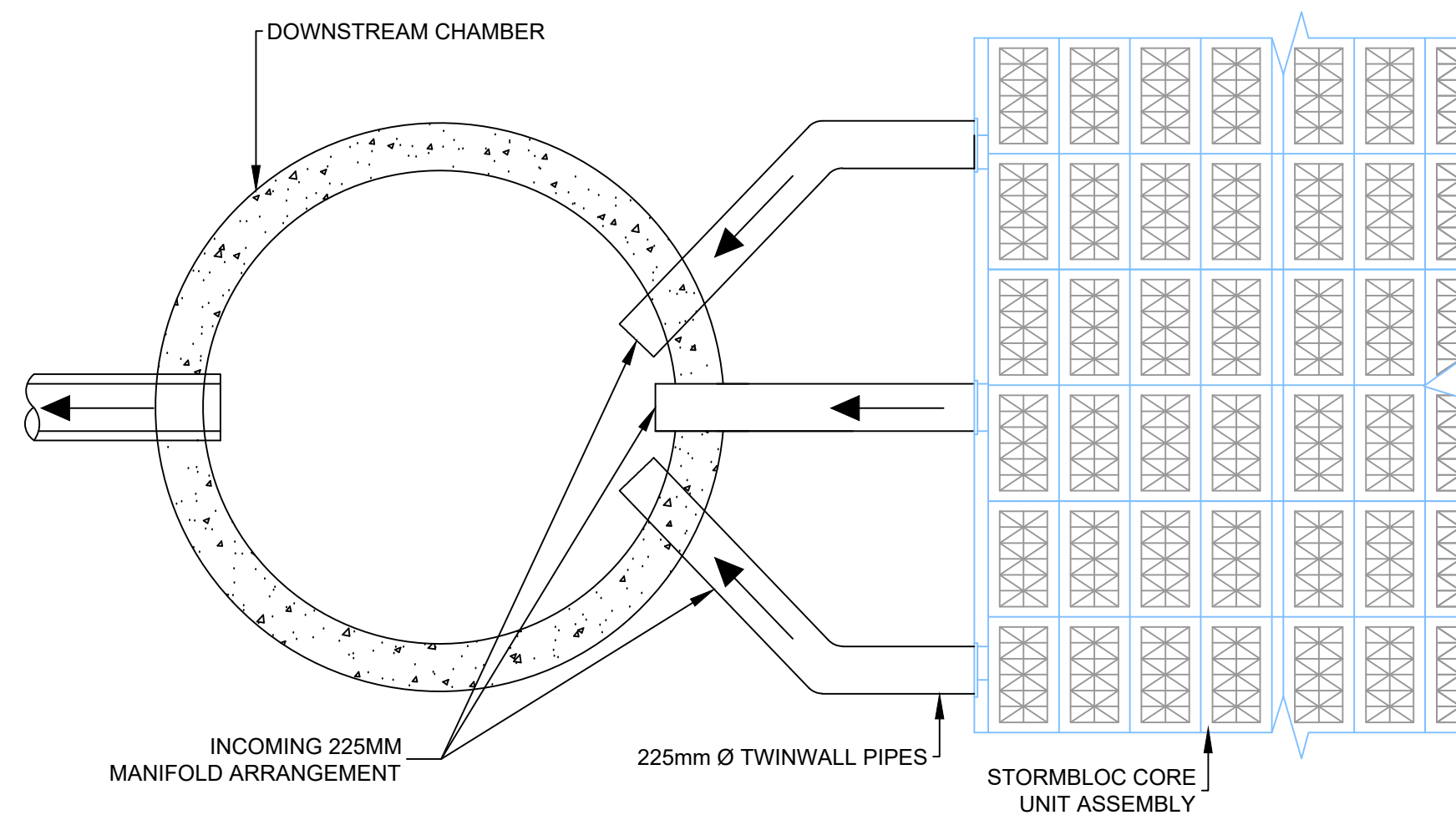
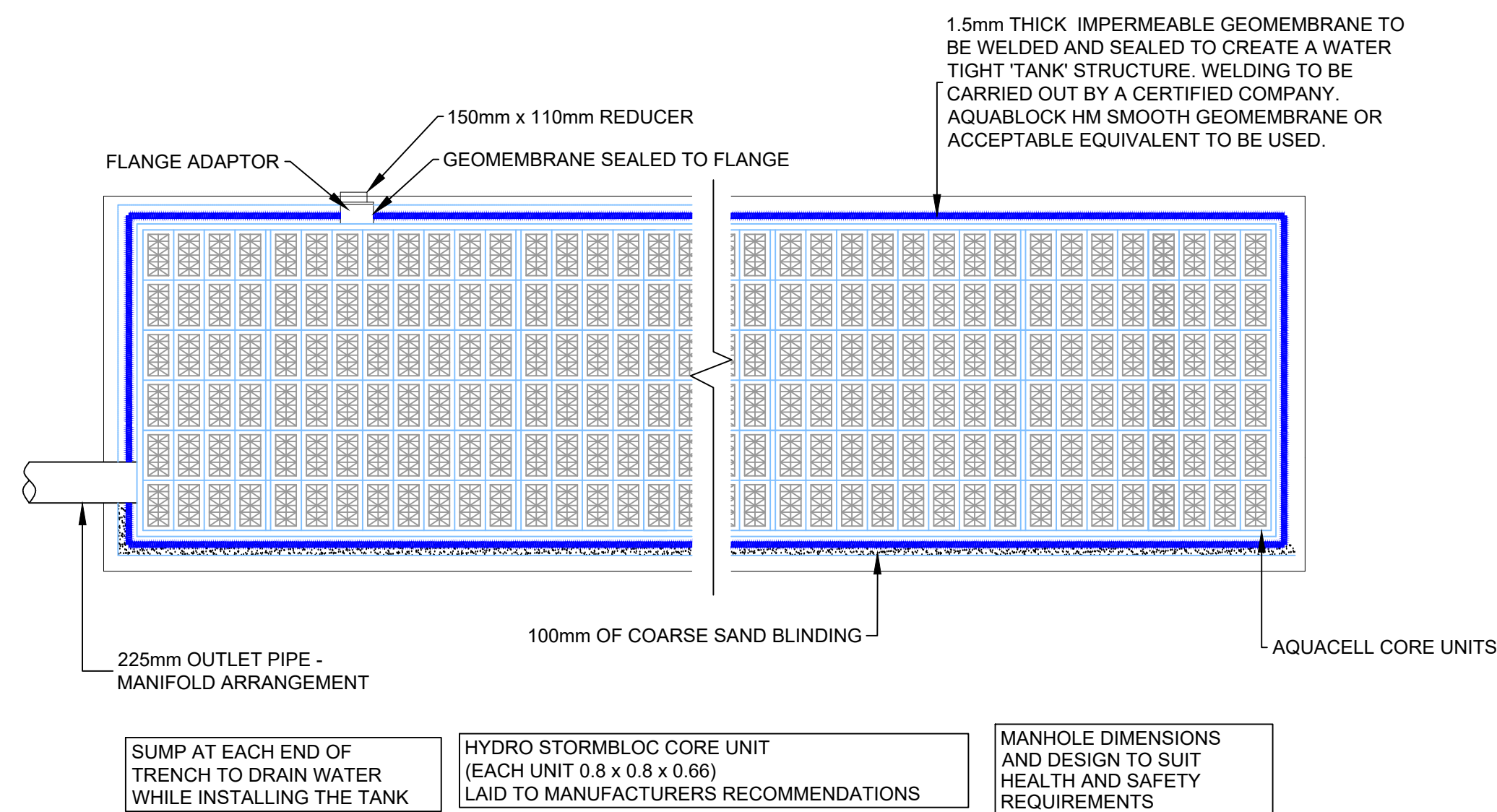
Client	FORVIVA DEVCO LIMITED				
Project	BOWLERS YARD LIVERPOOL				
Office	LIVERPOOL				
Discipline	CIVIL				
Title	HYDROBRAKE MANHOLE DETAILS				
Scale @ A1	AS SHOWN	Status	INFORMATION		



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Job Number	Originator	Building/Zone	Level
4/8578	CCL	ALL	DRN
Type	Discipline	Drawing No.	Revision
DET	C	053	01

APPENDIX D***Attenuation Tank Detail Drawing***



NOTE: IT IS RECOMMENDED THAT ONE VENT PIPE, 110mm IN DIAMETER, IS PROVIDED PER 7,500 SQUARE METERS OF IMPERMEABLE CATCHMENT AREA ON A SITE

NOTE: VENT TO BE POSITIONED OUT OF THE WAY OF CHILDREN. TO BE CONCEALED WITHIN NEARBY PLANTING.

STORMBLOC NOTES
TYPE 1 OR TYPE 2 SUB-BASE BACKFILL TO THE SIDES AND OVER THE CELLS ONLY. MATERIAL TO BE COMPACTED IN ACCORDANCE WITH TABLE 6/1 OR 8/1 OF THE SPECIFICATION FOR HIGHWAY WORKS AND TAKING INTO ACCOUNT MAXIMUM ROLLER WEIGHTS AS ADVISED BY MANUFACTURER.

CONSTRUCTION PLANT **NOT** TO TRAFFIC NEAR OR OVER TANK LOCATIONS UNLESS SPECIFICALLY AUTHORISED BY THE ENGINEER.

TYPICAL AIR VENT INSTALLATION DETAILS
Scale: NTS

FOR TRAFFICKED AREAS - WITH STORAGE WRAPPING

PIPEWORK SHOWN INDICATIVELY ONLY. SEE GENERAL ARRANGEMENT FOR LOCATIONS AND LEVELS OF PIPEWORK.

HYDRO STORMBLOC UNIT (FOR TRAFFICKED AREAS)
(EACH UNIT 0.8 x 0.8 x 0.66)
LAID TO MANUFACTURERS RECOMMENDATIONS

NOTES

TYPE 1 OR TYPE 2 SUB-BASE BACKFILL TO THE SIDES AND OVER THE CELLS ONLY. MATERIAL TO BE COMPACTED IN ACCORDANCE WITH TABLE 6/1 OR 8/1 OF THE SPECIFICATION FOR HIGHWAY WORKS AND TAKING INTO ACCOUNT MAXIMUM ROLLER WEIGHTS AS ADVISED BY WAVIN.

CONSTRUCTION PLANT **NOT** TO TRAFFIC NEAR OR OVER TANK LOCATIONS UNLESS SPECIFICALLY
AUTHORISED BY THE ENGINEER.

UNITS TO BE WRAPPED IN A GEOMEMBRANE AS RECOMMENDED AND SPECIFIED BY THE MANUFACTURER UNITS TO BE PLACED ON 100MM DEEP OF SHARP SAND.
PIPE ENTRY POINTS AND GEOTEXTILE TO BE SEALED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, INCLUDING WELDED DOUBLE SEAMS.
HYDRO STORMBLOC UNITS TO BE USED UNLESS SPECIFIC AGREEMENT GIVEN BY CLIENT FOR ALTERNATIVE APPROVED PRODUCT.

- GENERAL NOTES**
1. ALL CLANCY CONSULTING DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS. SHOULD ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, CLANCY CONSULTING SHOULD BE INFORMED PRIOR TO CONSTRUCTION.
 2. DO NOT SCALE FROM ANY CLANCY DRAWING, IN EITHER PAPER OR DIGITAL FORM. ANY USE OF THE DRAWING FOR DIMENSIONS AND LEVELS ARE IN METRES UNLESS OTHERWISE STATED.
 3. UNTIL TECHNICAL APPROVAL HAS BEEN OBTAINED FROM THE RELEVANT AUTHORITIES, IT SHALL BE UNDERSTOOD THAT ALL DRAWINGS ISSUED BY CLANCY CONSULTING ARE FOR INFORMATION ONLY.
 4. ALL LEVELS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION. FOLLOWING FULL TOPOGRAPHICAL SURVEY, DRAINAGE LEVEL SURVEY INFORMATION AND CURRENT EXISTING SERVICES PLANS AND MAPS.
 5. ANY DISCREPANCIES MUST BE REPORTED TO CLANCY CONSULTING PRIOR TO THE COMMENCEMENT OR CONTINUANCE OF ANY FURTHER WORKS.

- | CONSTRUCTION DESIGN & MANAGEMENT NOTES | |
|--|---|
| 1. | CCL are project 'designers' as defined in the CDM regulations. |
| 2. | The contractor shall plan and implement his temporary support and building methodology so as to ensure that permanent works are built as designed and detailed CCL have assumed a complete responsibility for the design which will be employed. |
| 3. | Party wall awards to be submitted by the contract administrator to the relevant adjacent properties, the contractor is to comply with the party wall award requirements. |
| 4. | The contractor is responsible for verifying all site levels and setting out dimensions, including 'half positions' and 'half widths' before commencing works. If necessary, the contractor must carry out an extensive site survey to confirm all final levels and setting out any discrepancies that may exist between drawings and any other related document should be notified to the contract administrator immediately. |
| 5. | The contractor is to be advised to the satisfaction of the contract administrator. |
| 6. | All work to be carried out to the satisfaction of the contract administrator. |
| 7. | The contractor is advised to visit the site to satisfy himself regarding the practicability of the works. |

- ## 20 DRAINAGE NOTES
1. All adoptable sewer works and material to be installed in accordance with "Sewers for Adoption" 6th Edition, The relevant British/European and Electrical Specifications and Kitemarked.
 2. Manhole covers shall must have a minimum clearance of 600mm and shall be fitted with BS EN 124 Class 2 or 3 cast iron frames in ground.
 3. Filled ground must be filled and consolidated.
 4. Cover slabs must carry the BS1 Kitemark. Where the clear opening of the Kitemarked product is different to that of the cover and frame, a minimum of 100mm shall be fitted above the cover slab to bring the size down to 600mm/600mm. Please refer to Concrete Pipe Systems Association (CPSA), Technical Bulletin 1 issued Autumn 2004 for further details on cover slab opening requirements.
 5. Sewers should be a minimum 1m and manholes 0.5m from kerb faces and service margins.
 6. Sewers must have 5 metres clearance from trees and hedgerows. (Also refer to BS EN 12953 on page 33 in "Sewers for Adoption" 6th Edition for restrictions on tree planting adjacent to Sewers).
 7. Sewers should be laid in Class "S" bedding (150mm granular bed and surround). Where depth of cover to top of the sewer is less than 1.2m in urban areas, the bedding or top of the sewer should be placed in concrete areas) then a concrete slab should be provided above the granular bed and surround).
 8. Sewers to be laid in maximum 3 metre lengths unless there is a specific operational need to lay longer lengths.
 9. Plastic channel sections in manholes are not acceptable and clayware is preferable. Plastic manholes are difficult to set in concrete and a concrete trench can be used to support the manhole.
 10. The chamber size of manholes with more than one connection in them may need to be increased an estimate to accommodate the additional connections and bends.
 11. Manholes shall be Type "B" with 1200mm dia. or 1500mm dia. rings, with the opening sized over the channel where depth of cover to pipe silt is 1-1.5m shall be used.
 12. Sewers with a depth of foul rising mains to be provided with marker tape above the rising mains.
 13. If plastic pipes are to be used then the following should apply:-
a) All adoptable sewers to be BS1 Kitemarked (certified to WIS 4-35-01 and BS EN 14776).
 14. b) Bedding and backfill material to conform to the requirements of Water Industry Specification 4-68-02 (Table A2)
 15. c) Where plastic pipes are proposed, standard calculations for the plastic pipes and a site investigation report to prove that the ground condition is suitable for the plastic pipes are to be produced.
 16. Where a B125 cover and frame has been approved, this must not be used in the ground and the manhole must be constructed to accommodate standard fitting keys. Screw down covers are not acceptable
 17. Manhole chambers to be a min. 450x500mm chamber for 100mm/150mm foul & 150mm/250mm surface water pipes up to 1.2m depth. For depths greater than 1.2m, restricted access opening to 350mm is required for safety reasons.
 18. Manhole depth of demarcation chamber to be 2m, where depth exceeds 2m, manhole to be constructed as type B manhole.
 19. Sulphate resistant cement (C20-C22) and precast concrete products must be used for a laboratory report provided that such precautions are not necessary.
 20. Strength of drilled clay pipes (if used) to be 40kN/m for 1000, 40kN/m for 1500, 45kN/m for 2250 and 72kN/m for 3000. All concrete pipes to be tested to concrete to BS EN 12756.
 21. The contractor must allow for any fee's required for road and sewer opening permits, sewer connections and make the appropriate applications.
 22. Where a manhole(s) upstream from the connection to the (existing) public sewer is required, when constructed, be fitted with a screen in order to prevent debris entering the public sewer. The sewer should not be opened immediately prior to the occupation of premises to be served by the sewer.

Rev	Date	Description	By	Check	App.
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APPENDIX E***United Utilities Service Record Drawing***

Extract from Map of Public Sewers

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.

The actual positions may be different from those shown on the plan and private pipes, sewers or drains may not be recorded.

United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

LEGEND

Foul	Surface	Combined	Overflow	
				MainSewer, Public
				MainSewer, Private
				MainSewer, S104
				Rising Main, Public
				Rising Main, Private
				Rising Main, S104
				Highway Drain, Private

ABANDONED SEWER

	MainSewer
	Rising Main
	Highway Drain

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