CONDITION 17 SuDS VERIFICATION REPORT

Victoria Riverside, Dantzic Street

for

Far East Consortium



08/11/2024

COMPLEX CHALLENGES ...
MADE SIMPLE

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TITLE	NAME	SIGNATURE	DATE
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Approved By	PAUL WHITE		**20/05/2024**
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REVISION	DESCRIPTION	SIGNATURE	DATE
03	DRAWINGS UPDATED		**08/11/2024**

COMPLEX CHALLENGES ...
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COMPLEX CHALLENGES ...
MADE SIMPLE

PLANNING REFERENCE: 126944/FO/2020

Condition 17 - Prior to the first occupation of a phase hereby approved (save for the enabling works phase), details of the implementation, maintenance and management of the sustainable drainage scheme for that phase shall be submitted for approval in writing by the City Council, as Local Planning Authority.

For the avoidance of doubt the scheme shall include the following:

- Verification report providing photographic evidence of construction; and
- Management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.

The approved scheme shall then be implemented in accordance with the details and thereafter managed and maintained for as long as the development remains in use.

Reason - To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution pursuant to policies SP1, EN14 and DM1 of the Manchester Core Strategy (2012).

1.0 INTRODUCTION

This document has been prepared in support of a Condition Discharge application with respect to the above consented development, which is currently under construction, at Dantzic Street Manchester. It presents the management and maintenance requirements of the installed drainage system.

A management & maintenance company will ultimately be responsible for the maintenance of the site and should follow the guidelines set out below.

2.0 GENERAL

This document provides and overview of the operation and maintenance for the drainage features included within the drainage design and in relation to typical or bespoke details. Where proprietary products are specified, the manufacturer's instructions and recommendations are to be followed, unless specifically noted otherwise.

The recommended operations and frequencies are typical only and should be undertaken more regularly initially to ensure that there are no unforeseen issues with the drainage systems and then adjusted where necessary to suit site requirements.

The surface water drainage network has been designed to accommodate storm events up to and including the 1 in 100 year return period plus a 40% allowance for climate change. As the flows are being attenuated on site, there will be periods following these events where the network is still partially or fully surcharged whilst draining down. Should this surcharge continue to be present beyond 48 hours, further investigation and appropriate action may be required as noted within this document.

All works to the drainage network should be undertaken in accordance with the following legislation and regulations, all printed and published by the Health & Safety Executive:

- The Health & Safety at Work Act 1972
- The Management of Health and Safety at Work Regulations 1999
- The Manual Handling Operations Regulations 1992

3.0 COMPONENTS

The following components have been included within the drainage scheme for the development:

1. Inspection & Manhole Chambers
2. Gravity Pipework
3. Drainage Gullies, Channel Drains & Slot Drains
4. Geocellular Attenuation Tank
5. Rain Garden
6. Permeable Paving
7. Vortex Flow Control Device
8. Non-return flap valve
9. Orifice Control Devices
10. Hydrodynamic Separator

Run-off generated by roof areas will be collected by rainwater downpipes which connect into the below ground drainage network. Run-off from hard paved areas will be intercepted by linear drainage channels, road gullies and rain gardens.

Surface water discharge is to be restricted to 38.9 l/. As a result of this restriction, attenuation is required which is to be provided through two below ground geocellular tanks. One tank is configured in an ‘off-line’ arrangement in the basement of Podium A and the other ‘on-line’ in the car park beneath Podium B.

The maintenance of the above systems will be the responsibility of the onsite facilities team and an appointed management / maintenance company.

Appendix A provides the final construction / as built site wide drainage general arrangement.

4.0 GENERAL MAINTENANCE ARRANGEMENTS

Maintenance Frequency

Regular visual inspections of the sites drainage systems should be undertaken as often as is necessary to fulfil the required standard of maintenance. The necessary frequency can be divided into:

1. Regular Maintenance: Basic tasks completed on a frequent and predictable schedule.

2. Occasional Maintenance: Tasks that are likely to be required only periodically and much less frequently.

Maintenance Record

The site facilities management team and/or appointed management company will be provided with a 'Maintenance Record' so that they are aware of the function and maintenance requirements of the drainage system.

The record should include:

1. Location of the drainage system features within the site which are shown on RoC Final Construction drawings:

    - VRS-ROC-ZZ-XX-DR-C-DGA01 C9 Drainage GA Sheet 1
    - VRS-ROC-ZZ-XX-DR-C-DGA02 C9 Drainage GA Sheet 2
    - VRS-ROC-ZZ-XX-DR-C-DGA03 C9 Drainage GA Sheet 3
    - VRS-ROC-ZZ-XX-DR-C-DGA04 C5 Drainage GA Sheet 4
    - VRS-ROC-ZZ-XX-DR-C-DGA05 C4 Drainage GA Sheet 5

2. Drainage construction details as shown on RoC drawings:

    - VRS-ROC-ZZ-XX-DR-C-DCD01 C2 Drainage Details Sheet 1
    - VRS-ROC-ZZ-XX-DR-C-DCD02 C2 Drainage Details Sheet 2
    - VRS-ROC-ZZ-XX-DR-C-DCD03 C3 Drainage Details Sheet 3
    - VRS-ROC-ZZ-XX-DR-C-DCD04 C1 Drainage Details Sheet 4

3. Site Records showing any adjustments to the final construction information (i):

    - JRL-AB-VRA-PA-LB1-Drainage-001-AB00 Podium A Drainage
    - JRL-AB-VRA-PB-LB1-Drainage-001-AB00 Podium B Drainage

4. Maintenance Schedule

Regular Maintenance

Inspections of the drainage network should be conducted as per the maintenance schedules (Appendix C) and could be integrated with Landscape Management activities such as grass cutting, which may also be undertaken at similar intervals.

It is recommended that the frequency of inspections should be increased during the first year of operation so that inspections are also conducted after every significant storm event to ensure that the drainage systems are functioning correctly and, if necessary, implement improvement works to optimise performance.

Elements which should be inspected include:

- Inlets and outlets – ensure that inlets and outlets associated with the detention basins are clear and that flows are not impeded. Any obstruction or build-up of material must be removed as soon as possible.

- Structure – a visual inspection of the attenuation tanks, flow control devices, non-return valves, separator etc to check for any seepages or leaks. This inspection should also include a check for structural damage. Any defects should be remediated as soon as possible.

- Water Quality – is there evidence of poor water quality in the surface water storage systems e.g. algae, oils or odours, if so further inspection and remedial actions should be taken.

- Sediment build-up – a visual inspection of the attenuation tank, hydrodynamic separator, manholes / inspection chambers, gullies, channel drains, sumps, rain garden etc to determine whether there is evidence of silt build-up. Any evidence of silt build-up should be reported and inspected further to determine whether silt removal should be initiated.

- Evidence of Inefficiencies – is there any visual evidence of surface water building up in the system or on the surface which could indicate that the connections are blocked or damaged, if so, remedial action should be implemented.

Occasional Maintenance

To ensure the long-term effectiveness of the drainage scheme, accumulated sediment should be periodically removed. The frequency at which this is done will vary over the lifetime of the development. Accumulation will generally be most acute during and immediately following the construction period i.e. until such time as all hard and soft landscaping within the catchment is complete and well established and all construction work is finished. At this point, the amount of sediment entering the drainage system will be reduced.

Until all development is concluded, careful consideration should be given to sediment build up during the regular inspections outlined above. Following development completion, the frequency at which sediment removal will be required could be between 10 to 15 years. This could be extended if an appropriate maintenance regime is undertaken on the network upstream of the attenuation features.

Sediment removal should be undertaken in such a way as to prevent damage to the SuDS features, minimise the impact on ecological systems and maintain aesthetic appearance. The particular method of removal will depend upon the SuDS feature, access, wildlife concerns and sediment depth.

Pipework, Manholes, Inspection Chambers & General Maintenance

The following maintenance schedules are recommended.

- Local repair or local replacement of damaged pipes or other structures in order to maintain the functionality of the drainage system.
- Cleaning and removal of sediments, obstructions etc. to restore / maintain hydraulic capacity.
- Jetting / vacuum of sewers to be undertaken as often as necessary to remove silts and/or ordinary debris.
- In the event that any extraordinary issues are encountered during an inspection, further investigation in the form of a CCTV survey may be required.
- Maintenance to be undertaken on a six-monthly schedule.
- All manhole covers should be lifted and the manholes visually inspected for silt, debris and signs of blockages within the drainage system. Check manhole covers and frames for damage and ensure correctly bolted together. This should be undertaken on a six monthly basis.

- Should any debris or blockages be detected, the manholes should be cleaned along with associated pipe runs using high pressure jetting equipment. On completion a CCTV survey should be undertaken to verify / identify that no further remedial works are required.

- To avoid damaging the pipe, PSI pressures should be verified before jetting of any plastic twin wall drainage. Cleaning of drainage systems may require the temporary sealing of the system and careful collection of the effluent for disposal off site.

Control Manhole Maintenance

The proposed drainage system incorporates the use of various flow controls to restrict pass forward flows from areas of the main site drainage systems. These take the form of Hydrobrake Vortex devices and Orifice Plates, the location of which are identified on the drainage general arrangement drawings in Appendix A and B.

The controls do not have any moving parts and therefore require very little in the way of maintenance other than an inspection for debris / blockage. In particular, the orifice control devices used across the permeable pavement systems are potentially prone to blockage due to the orifice size being less than 75mm in places.

The typical maintenance schedule is provided in Appendix C.

Attenuation Tank Maintenance

Regular inspection and maintenance are required to ensure the effective long-term operation of below-ground attenuation systems. The attenuation tanks will be maintained in accordance with advice provided by the manufacturer, while the responsibility for this maintenance will be placed with the sites facilities management team and/or appointed maintenance company.

The maintenance tasks of the attenuation tanks generally include the inspection of the inlets, outlets, air vents and overflows to identify silt build-up and/or structural damage to determine if remedial actions are required. If allowed to develop, these issues can severely reduce the effectiveness of the tank.

The typical maintenance schedule is provided in Appendix C.

Permeable Paving Maintenance

Permeable pavements provide a pavement suitable for pedestrian and/or vehicular traffic, while allowing rainwater to infiltrate through the surface and into the underlying layers. In this instance, the water is temporarily stored before passed forward to the site wide drainage system.

Regular inspection and maintenance are important for the effective operation of permeable pavements. They should be inspected for clogging, litter, weeds and water ponding and all failures should be rectified. Inspections should be undertaken regularly, preferably after heavy rainfall to check effective operation and to identify any areas of ponding.

Permeable surfaces need to be regularly cleaned of silt and other sediments to preserve their infiltration capability.

The area of permeable paving is provided with number of permavoid geocellular units which serve as outlets. These help with the onward transmission of surface water flows to the wider drainage system. Both the upstream and downstream access chambers should be inspected for siltation and cleaned as necessary.

The typical maintenance schedule is provided in Appendix C.

Rain Garden Maintenance

Rain Gardens act as infiltration points for roof water and other clean surface water. The system implemented in the scheme drainage receives a small area of roof drainage via a rainwater downpipe which is connected directly to the planter via a permavoid rainwater diffuser unit. The rain garden is to be planted with flowers and vegetation which will capture and absorb most of the run-off. Any excess is allowed to leave the planter via a further permavoid diffuser unit which is connected to the main site drainage system.

Maintenance of the rain garden should be co-ordinated with the site wide landscape maintenance and will generally include vegetation management, litter / trash removal and inspection of the downstream access chamber for any blockages / siltation.

The typical maintenance schedule is provided in Appendix C.

5.0 DRAINAGE GULLIES, CHANNEL DRAINS AND SLOT DRAINS

Channels, slots and gullies should be inspected and cleaned in accordance with the manufacturer's details. Channel and slot units can be cleaned using a high-pressure hose; this can be fed into the system through access units placed along the channel run. The throat section of channel and slot units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel or slot and any debris within the throat should be removed.

Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers can move within their frame, this may cause damage to the frame or seating.

Sediment/material removal should be undertaken taking care to ensure that sediment does not enter further into the drainage system; especially where run-off is taken from potentially contaminated areas such as the car park.

The typical maintenance schedule is provided in Appendix C.

6.0 HYDRODYNAMIC BYPASS SEPARATOR

The bypass separator is a proprietary product and should be maintained in accordance with the manufacturer's recommendations. The unit has no moving parts and requires no power. It is specifically designed to remove suspended solids, hydrocarbons and floatable debris from stormwater run-off with settled sediment retained within the sump storage of the unit.

Periodic checks and removal of stored sediments, floatables and hydrocarbons is essential to the effective functioning of the separator. Failure to provide adequate regular maintenance may limit the performance of the unit.

First regular maintenance check is advised between 6-12 months after installation, serving as a preventative check and sets respective periods of maintenance accordingly. The frequency of maintenance will be established after the first few maintenance intervals due to the amount of sediment, floatables and hydrocarbons varying considerably from site to site.

The typical maintenance schedule is provided in Appendix C. A copy of the manufacturer's literature is provided in Appendix D.

APPENDIX A – FINAL CONSTRUCTION ISSUE DRAWINGS

DGA01
DGA02
DGA03 — PODIUM BC TOWERS B&C

DGA04
DGA05 — PODIUM A TOWER A

FOR COORDINATES TO FW & SW POP UPS REFER TO HBA DRAWINGS

GULLY & SLOT DRAIN TO CONNECT TO PERFORATED PIPE WITHIN OPEN GRADED SUB-BASE LAYER (350mm) BENEATH PLANTER

ACCESS RAMP TO DRAIN TO DRAINAGE CHANNEL

MH F1.22 FITTED WITH IN-LINE NON-RETURN VALVE ON OUTLET PIPE

CONTRACTOR PROPOSAL: POLYSTORM GEOCELLULAR ATTENUATION TANK. PLAN AREA 92m2, VOL$_{MAX}$: 110.4m3, STORAGE 104.88m3 IL: 28.00m, 1.2m DP, 1.5 LAYERS, WELDED GEOMEMBRANE. TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS INCLUDING VENT PIPE AND TOP OF VENT PIPE TO PROJECT ABOVE FLOOD LEVELS (APPROX 700mm ABOVE CAR PARK SLAB LEVEL.

DASHED L… ABOVE. A… PERMEAB…

- SITE BOUNDARY
- EXISTING COMBINED SEWER
- SEWER TO BE ABANDONED
- DIVERTED COMBINED SEWER
- EXTENT OF PODIUM ABOVE
- ABOVE GROUND POTABLE WATER STORAGE TANKS. REFER TO M&E INFORMATION
- EXTENT OF TOWER CRANE BASE
- RAIN GARDEN
- PERMEABLE PAVEMENT
- ATTENUATION TANK
- SURFACE WATER DRAIN
- SURFACE WATER MANHOLE/ INSPECTION CHAMBER
- RWP — RAINWATER PIPE & 150Ø CONNECTION
- RG — ROAD GULLY & 150Ø CONNECTION
- YG — YARD GULLY & 110Ø CONNECTION
- SU — AU — ACO 150D 10.0 BRICKSLOT TWINSLOT WITH SUMP UNIT (SU) & ACCESS UNIT (AU)
- SU — ACO HEXDRAIN BRICKSLOT WITH SUMP UNIT & CORNER UNIT
- 100Ø PERFORATED PIPE
- PERMAVOID DIFFUSER UNIT & 150Ø CONNECTION
- FOUL WATER DRAIN
- FOUL WATER MANHOLE/ INSPECTION CHAMBER
- FOUL WATER CONNECTION 150Ø
- FG — FLOOR GULLEY
- * DENOTES CHAMBER TO BE FITTED WITH EJCO (PETER SAVAGE) PRESSURE RATED PS754 COVER & FRAME CAST INTO SLAB. REFER TO TYPICAL DETAIL

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6. CLASS Z 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.
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13. ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER FOR FOUL AND 150mm FOR SURFACE WATER UNLESS NOTED OTHERWISE. ALL DRAINAGE PIPEWORK SHALL BE LAID SOFFIT TO SOFFIT UNLESS OTHERWISE STATED.
14. ALL UNDERSLAB DRAINAGE SHALL BE LAID AT GRADIENTS OF 1:80 MIN. FOR FOUL 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 FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE. ALL RAINWATER PIPES SHALL HAVE ABOVE GROUND RODDING 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 SURVEYED UPON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL. FREE OF EXCESS DEBRIS/SILT AND ALL IDENTIFIED FAULTS RECTIFIED.
20. SURFACE WATER DRAINAGE DESIGN HAS BEEN DEVELOPED ON THE BASIS OF THE PREVIOUSLY AGREED DISCHARGE RATES AND POINTS OF CONNECTION BETWEEN CIVIC ENGINEERS AND MCC LLFA.
21. ATTENUATION STORAGE CALCULATIONS INCLUDE CLIMATE CHANGE ALLOWANCE OF 40% IN ACCORDANCE WITH CURRENT ENVIRONMENT AGENCY GUIDELINES.

REV.	DATE	DETAILS	DRN.	CHK.
C10	08.11.24	UPDATED TO SUIT AS BUILT RECORDS	ARJ	PAW
C9	12.09.24	CHANGES AS CLOUDED	ARJ	PAW
C8	22.09.23	LEGEND UPDATED	PAW	ARJ
C7	19.04.22	TOWER C POP UPS ADJUSTED TO SUIT AOD	PAW	ARJ
C6	21.03.22	TOWER B LVL01 DRAINAGE ADDED/UPDATED. LVL00 CL's REFINED TO SUIT SSL.	PAW	ARJ
C5	09.03.22	POP UP POSITIONS AND BGD UPDATED	PAW	ARJ
C4	11.02.22	SUB-STRUCTURE PENETRATION LEVELS ADDED	ARJ	JAS
C3	08.02.22	UPDATED TO SUIT COORDINATED DRAWINGS FROM HAWKINS BROWN DATED 31.01.2022	WDC	PAW
C2	09.12.21	UPDATED TO SUIT TOWER CRANE BASES, FLOOD COMPENSATION LEVELS AND PLANT LEVELS. SLOT DRAINS ADDED AT DOOR THRESHOLDS ALONG BROMLEY ST	ARJ	JAS
C1	02.11.21	ISSUED FOR CONSTRUCTION	ARJ	JAS

DRAWING STATUS
CONSTRUCTION

RIBA STAGE
STAGE 5

RoC CONSULTING
Commercial Wharf
6 Commercial Street
Manchester M15 4PZ
T 0161 214 5390
W rocconsulting.com

DRAWN ARJ	DATE SEP 21	SCALES 1:100
CHECKED PAW	DATE SEP 21	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE --DO NOT SCALE--
APPRVD. JAS	DATE SEP 21	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
CRUK

PROJECT TITLE
VICTORIA RIVERSIDE

DRAWING TITLE
BELOW GROUND DRAINAGE GENERAL ARRANGEMENT
SHEET 1 of 5

DRAWING No.	REV.
VRS-ROC-ZZ-XX-DR-C-DGA01	C10

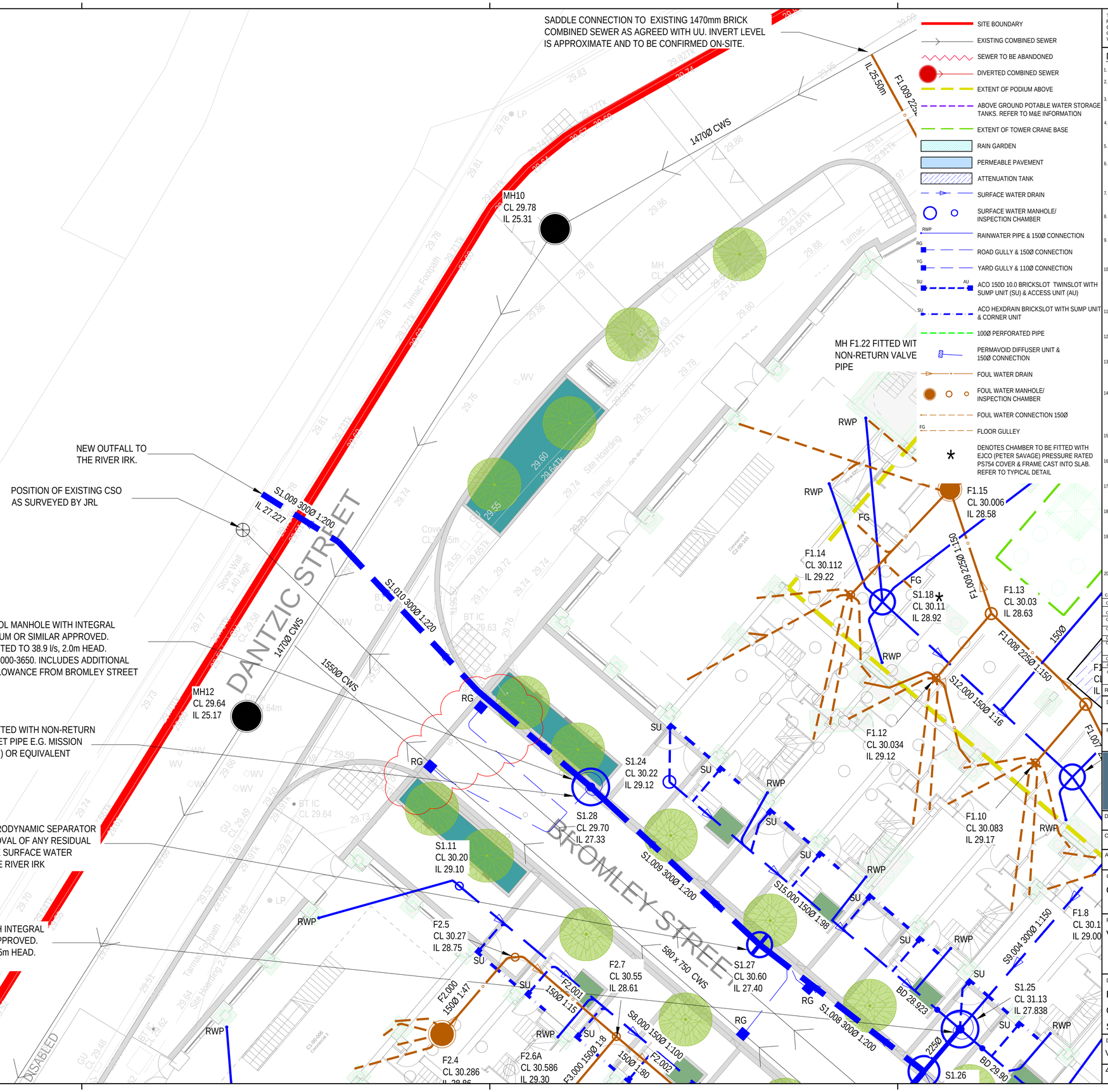
4212

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DGA01 PODIUM BC
DGA02 TOWERS B&C
DGA03

DGA04 PODIUM A
DGA05 TOWER A

FOR COORDINATES TO FW & SW POP UPS REFER TO HBA DRAWINGS



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C8	22.09.23	LEGEND UPDATED	PAW	ARJ
C7	14.06.23	UPDATED TO SUIT HBA AND BFL LAYOUTS FOR PODIUM A. S1.25 IL CORRECTED	PAW	ARJ
C6	19.04.22	UPDATED TO SUIT HBA AND BFL LAYOUTS FOR PODIUM A & MIDRISE A	PAW	ARJ
C5	08.04.22	TOWER A DRAINAGE UPDATED	PAW	ARJ
C4	21.03.22	TOWER B LVL01 DRAINAGE ADDED/UPDATED. LVL00 CL's REFINED TO SUIT SSL	PAW	ARJ
C3	09.03.22	POP UP POSITIONS AND BGD UPDATED	PAW	ARJ
C2	11.02.22	NON-RETURN VALVE SPEC ADDED	ARJ	PAW
C1	08.02.22	ISSUED FOR CONSTRUCTION REVISED SCALE FORMERLY ISSUED AS DGA01	WDC	PAW

DRAWING STATUS
CONSTRUCTION

RIBA STAGE
STAGE 5

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W rocconsulting.com

DRAWN	DATE	SCALES
ARJ	SEP 21	1:100
CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE --DO NOT SCALE--
PAW	SEP 21	
APPRVD.	DATE	EMAIL FOR DRAWINGS
JAS	SEP 21	info@rocconsulting.com

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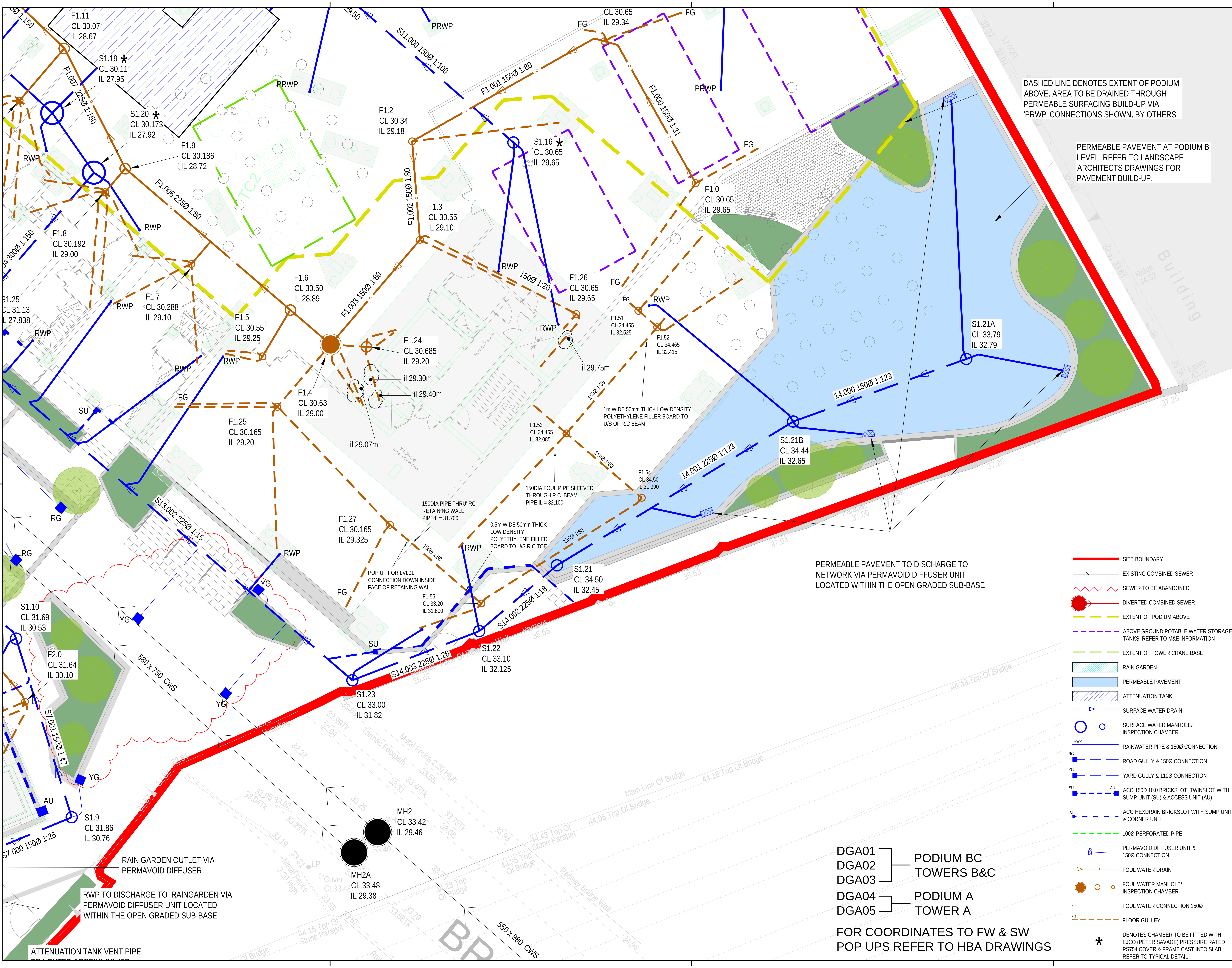
PROJECT TITLE
VICTORIA RIVERSIDE

DRAWING TITLE
BELOW GROUND DRAINAGE GENERAL ARRANGEMENT SHEET 2 of 5

DRAWING No.	REV.
VRS-ROC-ZZ-XX-DR-C-DGA02	C10

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21. ATTENUATION STORAGE CALCULATIONS INCLUDE CLIMATE CHANGE ALLOWANCE OF 40% IN ACCORDANCE WITH CURRENT ENVIRONMENT AGENCY GUIDELINES.

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C9	12.09.24	CHANGES AS CLOUDED	ARJ	PAW
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C6	08.04.22	TOWER A DRAINAGE UPDATED	PAW	ARJ
C5	01.04.22	TOWER B LVL01 FOUL DRAINAGE UPDATED TO SUIT SLAB DESIGN	PAW	ARJ
C4	21.03.22	TOWER B LVL01 DRAINAGE ADDED/UPDATED. LVL00 CL's REFINED TO SUIT SSL	PAW	ARJ
C3	09.03.22	POP UP POSITIONS AND BGD UPDATED	PAW	ARJ
C2	11.02.22	SUB-STRUCTURE PENETRATION LEVELS ADDED	ARJ	JAS
C1	08.02.22	ISSUED FOR CONSTRUCTION REVISED SCALE FORMERLY ISSUED AS DGA01	WDC	PAW

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APPRVD. JAS	DATE SEP 21	EMAIL FOR DRAWINGS info@rocconsulting.com

CLIENT
CRUK

PROJECT TITLE
VICTORIA RIVERSIDE

DRAWING TITLE
BELOW GROUND DRAINAGE
GENERAL ARRANGEMENT
SHEET 3 of 5

DRAWING No.
VRS-ROC-ZZ-XX-DR-C-DGA03

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(S1.12) FLOW CONTROL MANHOLE WITH INTEGRAL HYDROBRAKE OPTIMUM OR SIMILAR APPROVED. DISCHARGE RESTRICTED TO 12.5 l/s, 2.0m HEAD. REF: SHE-0146-1250-2000-1250

CONTRACTOR PROPOSAL: POLYSTORM GEOCELLULAR ATTENUATION TANK. PLAN AREA 74.5m2, VOL_{MAX}: 119.2m3, STORAGE 113.24m3, IL: 28.00m, 1.6m DP, 2.0 LAYERS, WELDED GEOMEMBRANE. TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS

DASHED LINE DENOTES EXTENT OF PODIUM ABOVE. AREA TO BE DRAINED THROUGH PERMEABLE SURFACING BUILD-UP VIA 'PRWP' CONNECTIONS SHOWN. DETAILS AND LOCATION OF PROPOSED OUTFALLS SUBJECT TO FURTHER DESIGN DEVELOPMENT

CWMH1 ADJUSTED TO AVOID CLASH WITH SUB-STRUCTURE AS AGREED WITH UU. COVER LEVEL TO BE SET TO SUIT PLANIT FINISHED SURFACE LEVELS

RAIN GARDEN OUTLET VIA PERMAVOID DIFFUSER

RWP TO DISCHARGE TO RAINGARDEN VIA PERMAVOID DIFFUSER UNIT LOCATED WITHIN THE OPEN GRADED SUB-BASE

ATTENUATION TANK VENT PIPE TO VENTED ACCESS COVER

- SITE BOUNDARY
- EXISTING COMBINED SEWER
- SEWER TO BE ABANDONED
- DIVERTED COMBINED SEWER
- EXTENT OF PODIUM ABOVE
- ABOVE GROUND POTABLE WATER STOR TANKS. REFER TO M&E INFORMATION
- EXTENT OF TOWER CRANE BASE
- RAIN GARDEN
- PERMEABLE PAVEMENT
- ATTENUATION TANK
- SURFACE WATER DRAIN
- SURFACE WATER MANHOLE/ INSPECTION CHAMBER
- RWP — RAINWATER PIPE & 150Ø CONNECTION
- RG — ROAD GULLY & 150Ø CONNECTION
- YG — YARD GULLY & 110Ø CONNECTION
- SU AU — ACO 150D 10.0 BRICKSLOT TWINSLOT W SUMP UNIT (SU) & ACCESS UNIT (AU)
- SU — ACO HEXDRAIN BRICKSLOT WITH SUMP & CORNER UNIT
- 100Ø PERFORATED PIPE
- PERMAVOID DIFFUSER UNIT & 150Ø CONNECTION
- FOUL WATER DRAIN
- FOUL WATER MANHOLE/ INSPECTION CHAMBER

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C6	08.11.24	UPDATED TO SUIT AS BUILT RECORDS	ARJ	PAW
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STAGE 5

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W rocconsulting.com

DRAWN	DATE	SCALES
PAW	APR 22	1:100
CHECKED	DATE	THE ABOVE SCALES APPLY WHEN PLOTTED AT A1 SIZE. --DO NOT SCALE--
ARJ	APR 22	
APPRVD.	DATE	EMAIL FOR DRAWINGS
JAS	APR 22	info@rocconsulting.com

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PROJECT TITLE
VICTORIA RIVERSIDE

DRAWING TITLE
BELOW GROUND DRAINAGE GENERAL ARRANGEMENT SHEET 4 of 5

DRAWING No.	REV.
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DGA01
DGA02
DGA03
— PODIUM BC TOWERS B&C

DGA04
DGA05
— PODIUM A TOWER A

FOR COORDINATES TO FW & SW POP UPS REFER TO HBA DRAWINGS

PRE-FABRICATED POLYPIPE RIDGISTORM CONTROL CHAMBER (OR SIMILAR APPROVED) WITH INTEGRATED PENSTOCK VALVE. TO BE CLOSED MANUALLY WHEN FLOOD WARNING RECEIVED TO PREVENT ANY FLOOD WATER ENTERING THE BELOW DRAINAGE SYSTEM

NEW CONNECTION INTO EXISTING COMBINED SEWER MANHOLE. INVERT LEVEL IS APPROXIMATE AND TO BE CONFIRMED ON-SITE. ALL SUBJECT TO S106 APPLICATION TO UNITED UTILITIES

MH F2.20 FITTED WITH IN-LINE NON-RETURN VALVE ON OUTLET PIPE

MANHOLE TO BE ADJUSTED TO SUIT NEW COVER LEVEL OF 30.65m (APPROX).

MANHOLE TO BE ADJUSTED TO SUIT NEW COVER LEVEL OF 30.85m (APPROX).

'AS BUILT' ALIGNMENT OF DIVERTED COMBINED SEWER

MH9
CL 29.77
IL 26.39

MH8
CL 31.17
IL 26.66

S1.0
CL 29.95
IL 28.940

S1.0A
CL 29.92
IL 28.870

S1.1
CL 31.23
IL 30.26

S1.2
CL 30.60
IL 29.20

S1.2A
CL 30.75
IL 29.090

S1.3
CL 30.11
IL 28.77

F2.10
CL 29.99
IL 28.40

F2.12
CL 29.99
IL 28.10

F2.13
CL 29.99
IL 27.90

F2.14
CL 29.58
IL 28.55

F2.14A
CL 29.58
IL 28.475

F2.15
CL 29.99
IL 27.960

F2.16
CL 30.83
IL 27.83

F2.16B
CL 30.83
IL 29.33

F2.17
CL 30.83
IL 27.75

F2.17A
CL 30.83
IL 29.33

F2.18
CL 29.89
IL 28.64

F2.18A
CL 29.89
IL 28.59

F2.18B
CL 29.89
IL 28.50

F2.19
CL 29.89
IL 28.45

F2.20
CL 30.25
IL 27.50

F2.20A
CL 30.15
IL 27.65

CWMH3
CL 30.05
IL26.80

CWMH2
CL 30.26
IL 26.83

F1.010 225Ø 1:24
F1.009 225Ø 1:150
F1.009 225Ø 1:150
F1.008 225Ø 1:150
F1.007 225Ø 1:150
F7.000 150Ø 1:80
F7.001 150Ø 1:19
S1.000 300Ø 1:60
S1.001 300Ø 1:172
2.002 150Ø 1:60
S2.001 150Ø 1:61
S2.000 150Ø 1:18
F5.000 150Ø 1:80
1.000 150Ø 1:10
750Ø 1:89
300Ø 1:76

880Ø CWS
750Ø CWS
150Ø CWS

SITE BOUNDARY
EXISTING COMBINED SEWER
SEWER TO BE ABANDONED
DIVERTED COMBINED SEWER
EXTENT OF PODIUM ABOVE
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PERMEABLE PAVEMENT
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SURFACE WATER MANHOLE/ INSPECTION CHAMBER
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BELOW GROUND DRAINAGE GENERAL ARRANGEMENT SHEET 5 of 5

DRAWING No. VRS-ROC-ZZ-XX-DR-C-DGA05
REV. C5

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APPENDIX B – SITE RECORDS

Notes:

1. DO NOT SCALE FROM THIS DRAWING, WORK ONLY TO DIMENSIONS SHOWN.
2. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

Rev	By	Chkd	Apprvd	Date	Description
AB00	AS	AS	SG	13.10.2023	AS-BUILT ISSUED FOR INFORMATION

Client

CR Construction (U.K.) Company Limited
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TEL: 0161 236 5705
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JRL GROUP

Project

VICTORIA
RIVERSIDE

Drawing

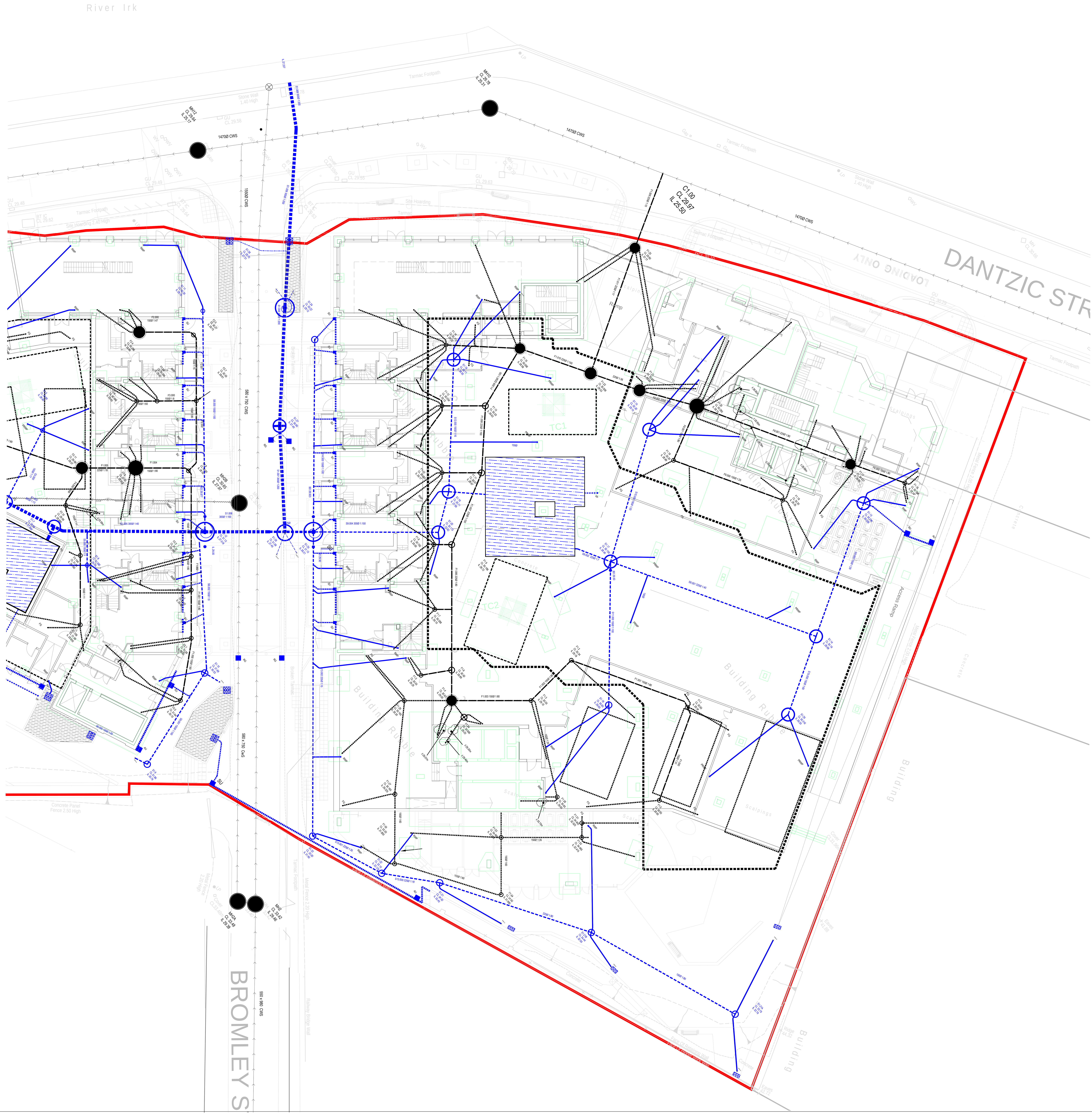
PODIUM A BASEMENT DRAINAGE

Suitability: FOR INFORMATION

Drawn by:	AS	Date:	13.10.23
Checked by:	AS	Date:	13.10.23
Approved by:	SG	Date:	13.10.23
Drawing Scale:	1NTS		

Drawing No. JRL-AB-VRS-PA-LB1-DRAINAGE-001

Revision AB00



Notes:

1. DO NOT SCALE FROM THIS DRAWING, WORK ONLY TO DIMENSIONS SHOWN.
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VICTORIA RIVERSIDE

Drawing

PODIUM B BASEMENT DRAINAGE

Suitability:

FOR INFORMATION

Drawn by:	AS	Date:	13.10.23
Checked by:	AS	Date:	13.10.23
Approved by:	SG	Date:	13.10.23
Drawing Scale:	1NTS		

Drawing No.	Revision
JRL-AB-VRS-PB-LB1-DRAIANGE-001	AB00

APPENDIX C – MAINTENANCE SCHEDULE

COMPLEX CHALLENGES ...
MADE SIMPLE

Pipework, Access and General Maintenance

Inspection Date:

Pipework and Manhole Access Maintenance	Frequency	Details	Action required	Date completed
Inspection of inlets and outlets. Ensure they are clear and flows are not impeded.	Bi-annually			
Inspection of manholes, gullies, sumps, and channel drains for debris and signs of blockages.	Bi-annually			
Inspection of manhole covers and frames for damage and ensure correctly bolted together.	Bi-annually			
Inspection of water quality. Ensure water quality is free of algae, oils, or odours.	Bi-annually			
Visual inspection for inefficiencies - such as surface water building up at the inlet.	Bi-annually			
Remove litter and debris from gully and channel drain surface.	Bi-annually			
Remove or control tree roots where they are encroaching the sides of the gully	Bi-annually			
Inspection of gully and channel drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.	Bi-annually			

COMPLEX CHALLENGES ...
MADE SIMPLE

Control Chamber Maintenance

Inspection Date:

Control Chamber Maintenance	Frequency	Details	Action required	Date completed
Inspection of the Vortex Flow Control device to ensure that the outlet is clear and unit is undamaged	Monthly for 6 months after installation then Bi-annually			
Inspection of the Vortex Flow Control By-Pass Penstock to ensure it is operational	Monthly for 6 months after installation then Bi-annually			
Inspection of Orifice Control to ensure hole is clear and undamaged	Monthly for 6 months after installation then Bi-annually			
Inspection of incoming and outgoing pipework for blockages and clear if required.	Monthly for 6 months after installation then Bi-annually			
Remove sediment and debris from control chamber sump	Monthly for 6 months after installation then Bi-annually			

COMPLEX CHALLENGES ...
MADE SIMPLE

Rain Garden Maintenance

Inspection Date:

Detention Basin Maintenance	Frequency	Details	Action required	Date completed
Manage other vegetation including removal of dead growth and nuisance plants	As required			
Re-plant areas of poor vegetation growth	Annually or as required			
Repair of erosion or other damage by re-planting	As required			
Re-level uneven surfaces and reinstate design levels	As required			
Inspect downstream inspection chamber for blockages and clear if required	Monthly/ after large storm events			

COMPLEX CHALLENGES ...
MADE SIMPLE

Attenuation Tank Maintenance

Inspection Date:

Attenuation Tank Maintenance	Frequency	Details	Action required	Date completed
Inspect and identify any areas that are not operating correctly. IF required, take remedial action	Monthly for 3 months then annually			
Remove debris from the catchment surface (where it has the potential to cause risks to performance)	Monthly			
Remove sediment from upstream/ downstream catchpits/ access points	Annually or as required			
Inspect all inlets, outlets, vents and overflows to ensure they are not blocked/ damaged and are operating as designed	Annually			
Survey inside of tank for sediment build-up and remove as necessary	Every 5 years or as required			

COMPLEX CHALLENGES ...
MADE SIMPLE

Permeable Paving Maintenance

Inspection Date:

Permeable Paving Maintenance	Frequency	Details	Action required	Date completed
Brushing and vacuuming (standard cosmetic sweep across whole surface)	3 times annually or as required			
Inspect for evidence of poor operation and/ or weed growth. If required take remedial action.	3 monthly			
Inspect filter/ under drain via upstream/ downstream inspection chambers & flow control. Remove silt as required	Annually			
Stabilise and mow adjacent landscaped areas.	As required			
Remove weeds or management using proprietary weed killer applied directly	As required			
Remedial works to any depressions, rutting and cracked or broken blocks.	As required			
Replace lost jointing materials	As required			
Rehabilitation of surface and upper sub-structure if performance is significantly reduced.	As required			

APPENDIX D – MANUFACTURER LITERATURE

TO VIEW ALL THE INFORMATION AND BENEFITS OF OUR STORMCLEANSER™ SCAN THE QR CODE

STORMCLEANSER ™

Operation and Maintenance Manual

wrc approved™
PT/480/0121




fpmccann
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INTRODUCTION

This document serves as a comprehensive insight in to the operation as well as a guide to efficient maintenance of the StormCleanser™ Hydrodynamic Vortex Separator, once installed on site. The details and instructions provided are to be followed as mentioned, any deviation could potentially affect the performance of the StormCleanser™. The maintenance guide reflects the frequency based on nominal rainfall conditions and may alter based on regional differences or anomalous rainfall events.

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Operation	6
Maintenance	7
StormCleanser™ Installation Record	10
StormCleanser™ Maintenance Record Sheet	11

PLEASE, CONTACT LOCAL YOUR FP MCCANN SPECIALIST ENGINEER OR OUR HEAD OFFICE ON 028 7964 2558 IN CASE OF ANY DOUBT OR OPERATION & MAINTENANCE RELATED ISSUES.

STORMCLEANSER™

Operation and Maintenance Manual

PRODUCT DESCRIPTION

StormCleanser™ provides a cost-effective solution for designers, engineers and contractors involved in the provision of Sustainable Drainage Systems (SuDS). This unit has no moving parts, requires no power, and is constructed within standard precast concrete chambers.
The units come factory fitted in precast chambers and could also be installed on-site as required. The modular stainless steel built assembly is designed to provide installation simplicity. The separator internal assembly is fabricated out of stainless steel (304L/316L), per BSI BS EN 10088-2-2014. Stainless Steel material grade and composition, provides exceptional longevity due to high corrosion resistance. The lifespan of the internal assembly outlasts the lifespan of a typical precast concrete structure (100+ years).



Figure 1 - StormCleanser™ Assembly and Exploded View

WORKING PRINCIPLE

The StormCleanser™ is specifically designed to remove suspended solids, hydrocarbons, and floatable debris from the stormwater run-off.

Water and pollutants enter the system via the inlet pipe, where the internal geometry enables low energy forced vortex flow patterns. This allows the floatables to gather and solids to settle to the bottom of the treatment chamber for subsequent removal.

Settled sediment is retained within the sump storage of the unit, allowing easy access for suction cleaning. Re-suspension of the solids is minimised by the provision of a baffle plate (Catch Skirt), positioned above the sediment storage sump. A central core allows for convenient suction hose entry down to the sump for cleaning and maintenance. If there is a stormwater surge in excess of maximum treatment flow rate, it overflows a weir, bypasses the treatment zone and directly discharges through the outlet pipe. This helps to minimize the effects of scour within the treatment region and prevents wash out of retained sediment downstream.

STORMCLEANSER™

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The generic configuration of the StormCleanser™ consists of the following main components:

- Inlet Sub-Assembly
- Core Sub-Assembly
- Catch Skirt
- Sump Unit

INLET SUB-ASSEMBLY:

The internal assembly comprises of the main components diverting the flow tangentially, at an angular velocity designed to be most conducive to separation of sediment particles. The inlet assembly also enables the StormCleanser™ to be configured for different inlet angles with respect to the outlet pipe, ranging from 90° – 270°. Moreover, multiple inlet sub-assemblies could also be stacked to form a multiple inlet configuration of StormCleanser™.

CORE SUB-ASSEMBLY:

The sub-assembly consists of a circular core that provides annular separation zone as well as an outlet channel that discharges the cleaner water out of the system. It also consists of the structural mounting surfaces to enable steadfast and safe installation.

CATCH SKIRT:

The Catch Skirt, also known as sump tray or baffle plate, minimizes the resuspension as well as escape of the captured sediment. The Catch Skirt also hydrodynamically directs the flow vortices towards the sump region.

SUMP UNIT:

The sump or catchment zone is the solids or denser sediment storage region. The separated particles are retained in the sump until cleaned during the maintenance process.

The combination of the discharge rate from surface runoff and the target pollutant load are the key variables governing the diameter of the separator and the height of the base unit respectively. These two values are determined by the designer as per the individual site requirements.

MODELS

The table below provides the maximum treatment flow rates and sediment/oil storage capacities for standard StormCleanser™ units.

Table 1 - StormCleanser™ Performance Table

MODEL	TANK DIAMETER	MAX TREATMENT FLOW RATE	MIN. SEDIMENT STORAGE CAPACITY	MIN. OIL STORAGE CAPACITY	MAX. HEAD LOSS AT TREATMENT FLOW RATE
	(mm)	(L/s)	(m^3)	(L)	(mm)
PRE-SC1200	1200	43	0.50	320	240
PRE-SC1500	1500	67	0.82	630	300
PRE-SC1800	1800	96	1.23	1085	360
PRE-SC2100	2100	131	1.75	1725	420
PRE-SC2400	2400	172	2.38	2575	480
PRE-SC2700	2700	217	3.13	3670	540
PRE-SC3000	3000	268	4.01	5035	600
PRE-SC3600	3600	387	6.20	8703	720
PRE-SC4000	4000	477	8.00	11938	800

Notes: Sediment storage capacity could be extended as required, per the desired maintenance frequency

OPERATION

StormCleanser™ operates without any external power or moving parts, hence seamless and effective operation is a function of hydrodynamics as well as the material and structure. The inlet flow openings are designed to permit passage of large floatable objects, which gather in the region above the main separation zone. The hydraulic losses are minimized by smooth channelling of flow through the annular region, at the specific design velocity. A StormCleanser™ unit consisting of multiple inlets, uniquely, provides flow direction selection to allow the longer unencumbered flow path to be taken and thus avoid any clogging of floatables.

Figure 2 demonstrates the two different separation mechanisms during normal operation. The hydrocarbons and floatables gather at the top by virtue of lower density, and could be accessed and removed first. The solid suspended sediment undergoes vortex separation phenomena and is captured in the sump region, to be extracted conveniently through the central cylindrical opening.

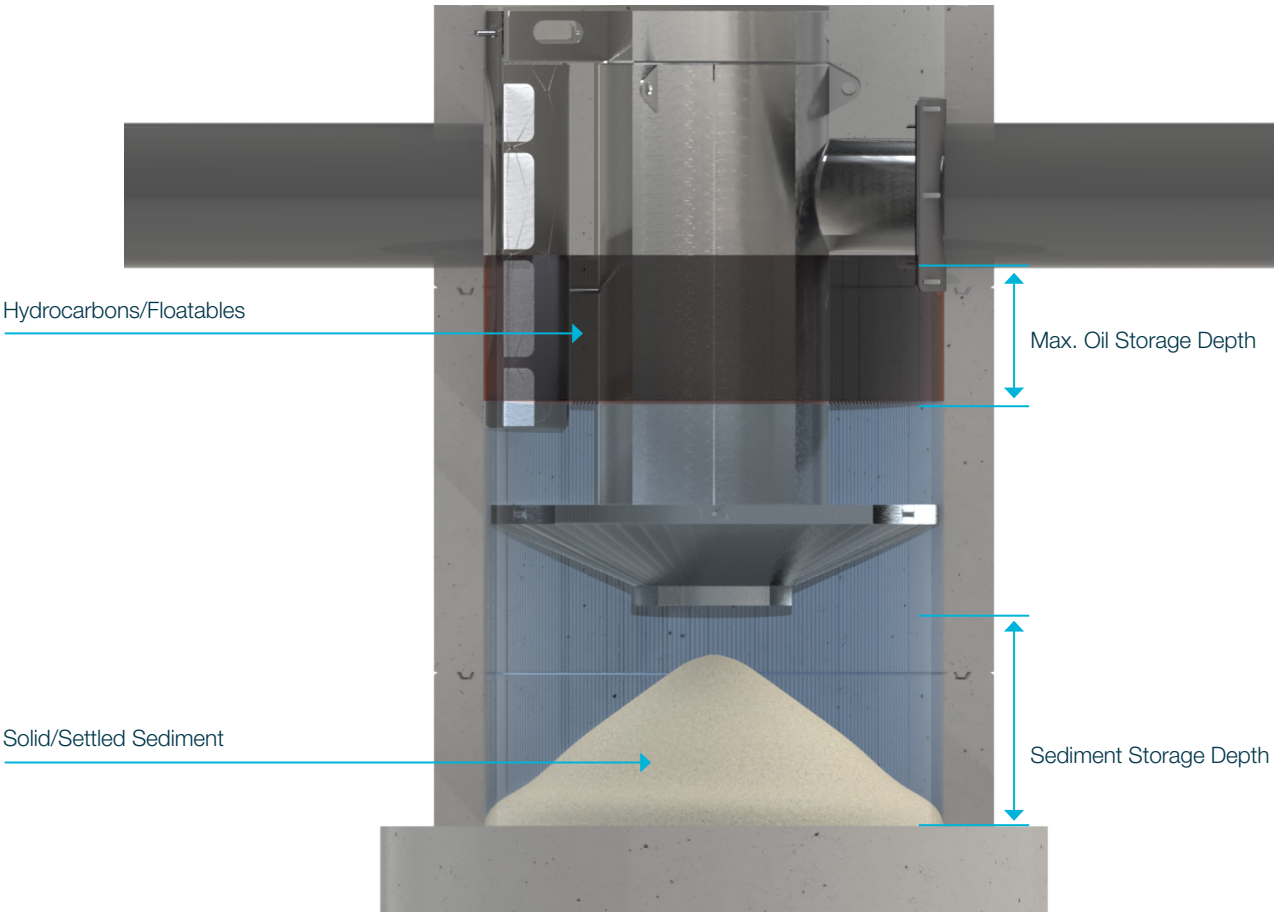


Figure 2 - StormCleanser™ sediment categorization during operation

MAINTENANCE

Periodic checks and removal of stored sediments, floatables, and hydrocarbons is essential to the effective functioning of the StormCleanser™. Failure to provide adequate regular maintenance may limit the performance of the installed unit.

**** Maintenance does not require removal or re-installation of any part in the existing StormCleanser™ assembly. If a part appears damaged, please contact regional FP McCann office.**

MAINTENANCE FREQUENCY

- During installation, the sump unit should be cleaned for any existing mud and debris, collected during storage/pre-installation period
- At the time of installation, the unit should be checked against the installation sheet and information should be logged
- First regular maintenance check is advised between 6-12 months after installation, serving as a preventive check and sets respective periods of maintenance accordingly
- The amount of sediment, floatables, and hydrocarbons for each site is highly variable and could be gauged upon first few maintenance intervals

REQUIRED EQUIPMENT

- There is no confined space entry necessary for inspection or maintenance
- Access slab/lid hardware and tooling
- Vacuum truck with suction hose and tanker for foul water removal
- Pressure wash or cleaning equipment (if required)

**** Safe and environmentally responsible disposal of pollutants is the responsibility of the maintenance contractor**

MAINTENANCE INSTRUCTIONS

1. Lower down the suction hose and extract floatables and hydrocarbons via the annulus region of the separator tank

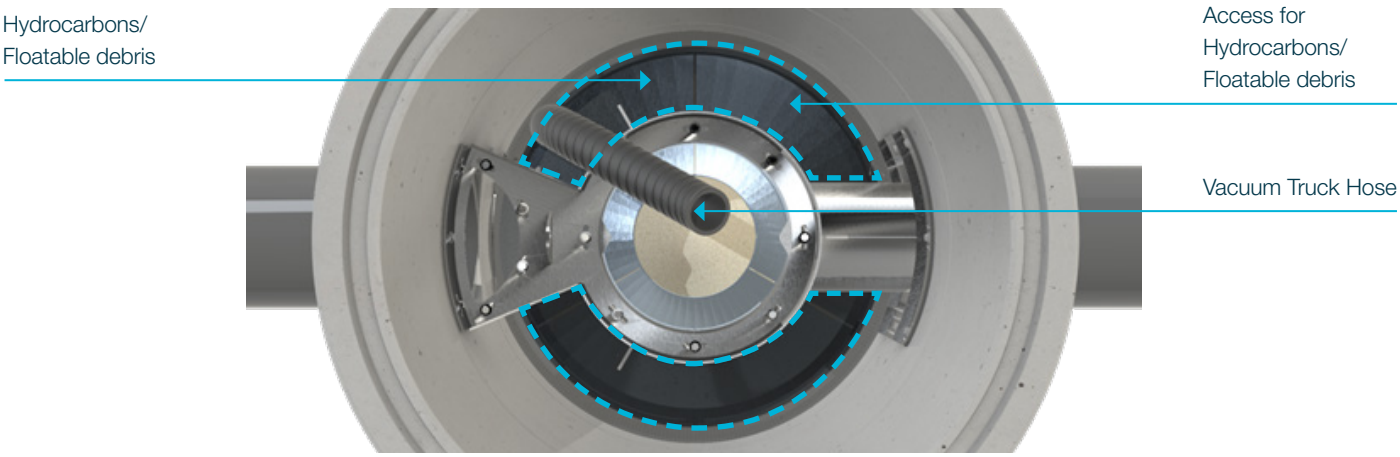


Figure 3 - Vacuum truck access region and cleaning of hydrocarbons and floatable debris

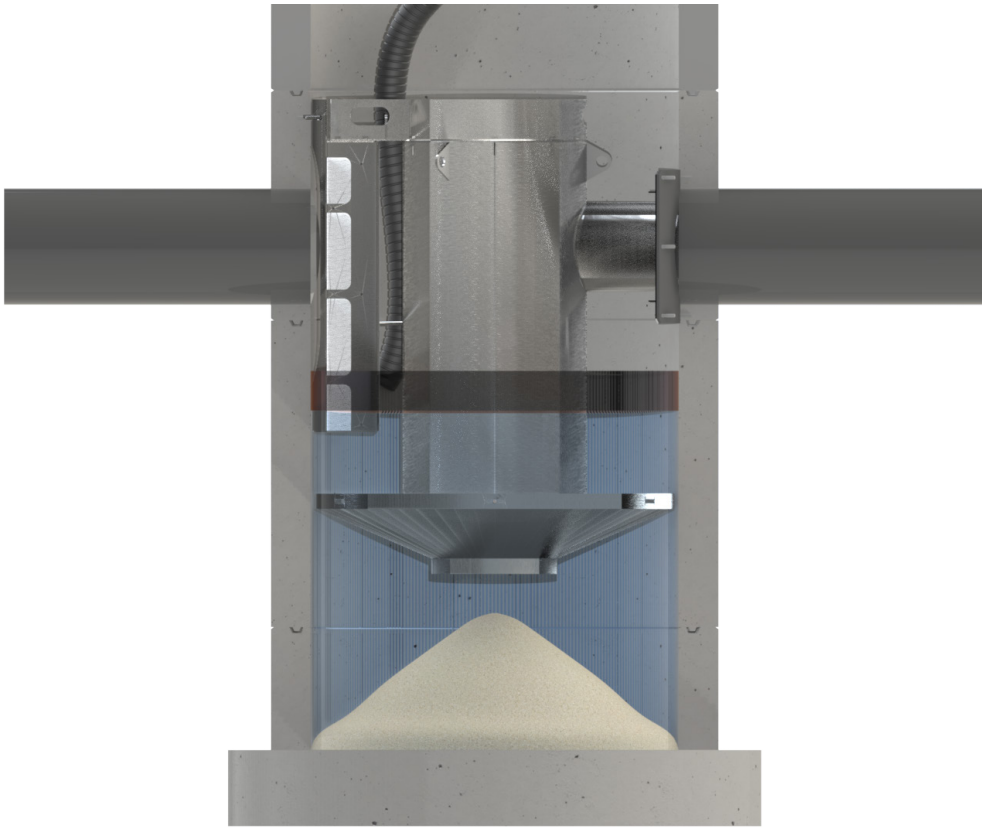


Figure 4 - Section view of vacuum suction hose, during hydrocarbons and floatable debris cleaning (Internal Assembly rendered transparent for visualization)

2. Suction hose should be placed beside the closed end of the inlet assembly to adequately capture all floatable debris and hydrocarbons
3. Once water level reduced down to the Catch Skirt level then lower the suction hose down to the sump region to suck the solid sediment out of the system
4. Continue lowering down the hose as it sucks the sediment until it hits the base of the sump

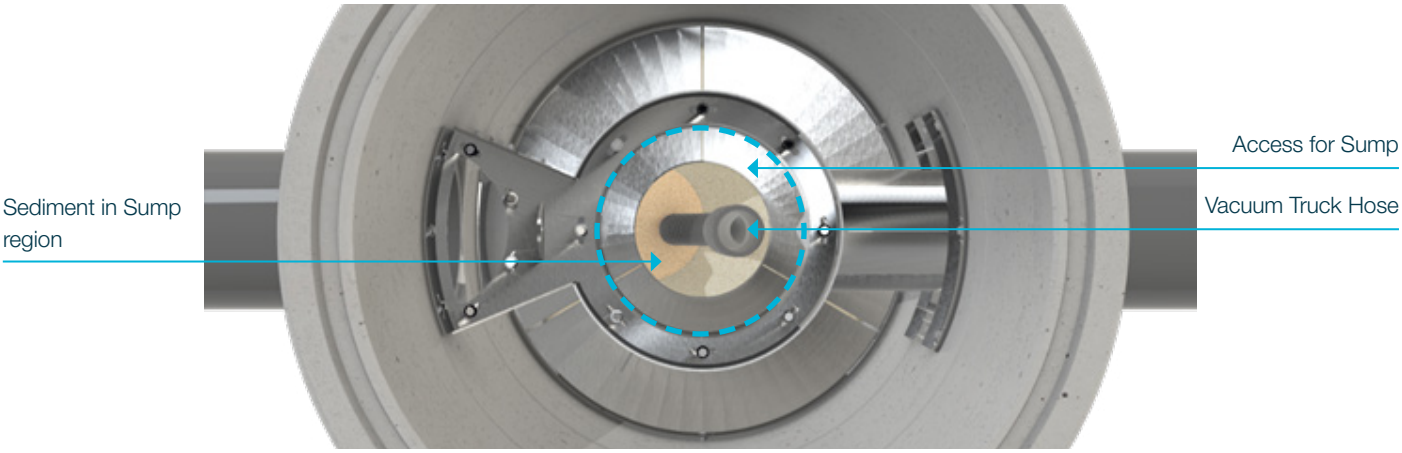


Figure 5 - Vacuum truck access region and cleaning of sediment stored in sump unit

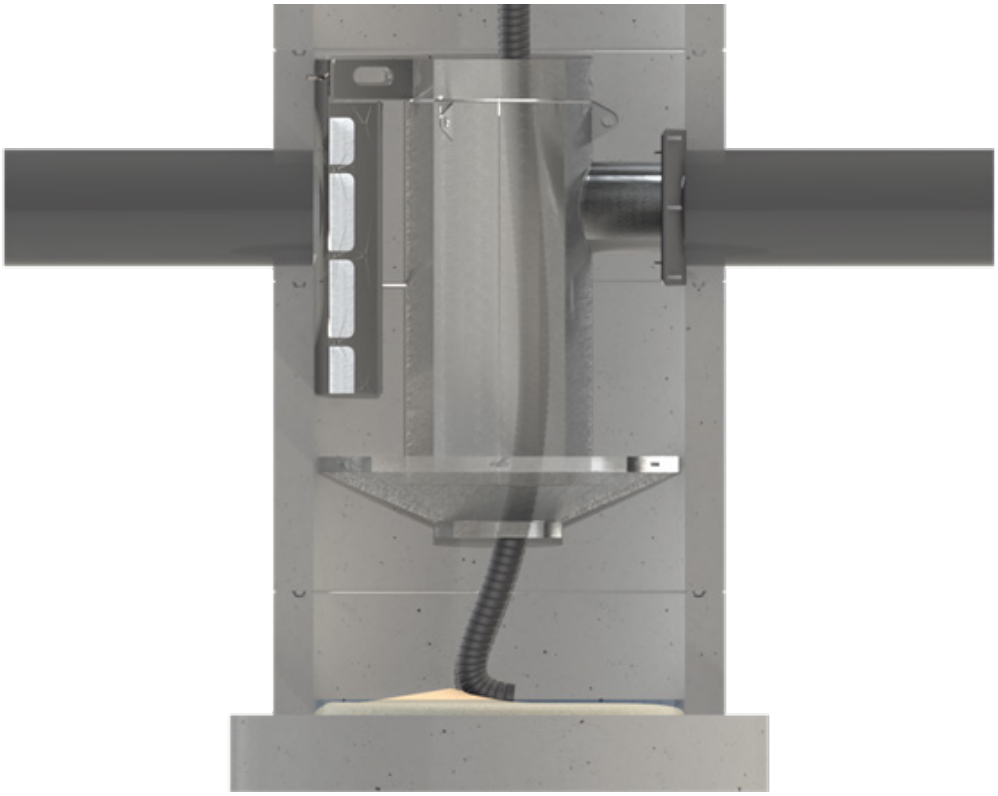


Figure 6 - Vacuum Truck hose in the settled sediment sump region (Internal Assembly rendered transparent for visualization)

5. The sump region would ideally need frequent rotational repositioning of the suction hose against the base, to access the far ends
6. Retrieve the suction hose and check for any anomalies
7. Lastly, securely close the lid of the tank

It is recommended that the units are regularly checked after any unexpected stormwater run-off surges or chemically hazardous spills.

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STORMCLEANSER™
Operation and Maintenance Manual

STORMCLEANSER™ INSTALLATION RECORD

Model Ref#	
Installation Date	
Project Ref	
Installation Site	
Location	

Model	Check
PRE-SC1200	☐
PRE-SC1500	☐
PRE-SC1800	☐
PRE-SC2100	☐
PRE-SC2400	☐
PRE-SC2700	☐
PRE-SC3000	☐
PRE-SC3600	☐
PRE-SC4000	☐

CLIENT DETAILS

Company Name	
Contact Person	
Address	
Telephone	
Fax	

CONTRACTOR DETAILS

Company Name	
Contact Person	
Address	
Telephone	
Fax	

**Above record sheet is a only a reference template and not a controlled FP McCann document*

STORMCLEANSER™ MAINTENANCE RECORD SHEET

MODEL REF#		INSTALLATION DATE		LOCATION	
DATE	NAME	COMPANY	SEDIMENT MASS (KG)	COMMENTS/REMARKS	

**Above record sheet is a only a reference template and not a controlled FP McCann document*

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AGRICULTURE
Lydney 01594 847500 Grantham 01476 562277

ARCHITECTURAL PRECAST
London 020 3905 7640

BOX CULVERTS
Weston Underwood 01335 361269

BUILDING PRODUCTS
Cadeby 01455 290780

DOCK LEVELLER PITS
Weston Underwood 01335 361269

DRAINAGE
Ellistown 01530 240000 (England/Wales) Magherafelt 028 7954 9026 (Scotland/NI)

FENCING
Cadeby 01455 290780

FILTER BED SYSTEMS
Littleport 01353 861416

FLOORING
Weston Underwood 01335 361269 Uddingston 01698 803300 Magherafelt 028 7954 9026 (NI)

POWER & INFRASTRUCTURE
Littleport 01353 861416

RAIL
Littleport 01353 861416

SPECIALIST PRECAST
Littleport 01353 861416

STRUCTURAL PRECAST
Byley 01606 843500 Grantham 01476 562277

STORMTANK™ - TANKS & CHAMBERS
Weston Underwood 01335 361269

TUNNELS & SHAFTS
Cadeby 01455 290780

WALLING
Grantham 01476 562277 Lydney 01594 847500
Uddingston 01698 803 300 (Scotland) Magherafelt 028 7954 9026 (NI)

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