

Pi Hotels Manchester Airport

Planning Condition 18 Sustainable Drainage

Contents

SUDs Management and Maintenance Plan.

Drawings

AP-BHE--XX-DR-C-96-4000 Surface water layout

AP1-BHE--XX-DR-C-96-3100 Details

AP1-BHE--XX-DR-C-96-3101 Details

AP1-BHE--XX-DR-C-96-3102 Details

AP1-BHE--XX-DR-C-92-2100 Buildups

AP!-UGR-00-DR-L-90-0001 Landscape GA

AP1-JRL-XX-XX-DR-X-52-0001 Attenuation tank details.

AP1-JRL-XX-XX-DR-X-52-0002 Attenuation tank details.

Drainage calcs

Photos of tank installation.

Airport City P1

SuDS Management and Maintenance Plan

AP1-BHE-XX-XX-RP-C-0002

0041946

28 January 2022

Revision P01

Revision	Description	Issued by	Date	Checked
P01	For Information	LA	28.01.22	AH

O:\0041946 Site P1 Airport City, Manchester _ Infra\F8 Civils - Infrastructure\03 Reports\SuDS Management and Maintenance Plan.docx

Report Disclaimer

This Report was prepared by Buro Happold Limited ("BH") for the sole benefit, use and information of BCEGI for Purpose of Report. BH assumes no liability or responsibility for any reliance placed on this Report by any third party for any actions taken by any third party in reliance of the information contained herein. BH's responsibility regarding the contents of the Report shall be limited to the purpose for which the Report was produced and shall be subject to the express contract terms with BCEGI. The Report shall not be construed as investment or financial advice. The findings of this Report are based on the available information as set out in this Report.

author **Lucy Allen**

date **28.01.22**

approved **Allan Hoodless**

signature



date **28.01.22**

Contents

1 Introduction 5

2 SuDS Layout and Design 6

3 SuDS Management & Maintenance 7

3.1 SuDS maintenance specification 7

3.1.1 General requirements 7

3.1.2 Pervious pavements 7

3.1.3 Filter drains 8

3.1.4 Inlets, outlets, controls and inspection chambers 9

3.1.5 Spillage – emergency action 9

Table of Tables

No table of tables entries found

Table of Figures

No table of figures entries found.

1 Introduction

This document sets out the principles for the long-term management and maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) installed at the development at Airport City Plot P1.

The activities listed are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required. Specific maintenance needs of the SuDS elements should be monitored, and maintenance schedules adjusted to suit requirements.

All those responsible for maintenance should follow relevant health and safety legislation for all activities listed within this report (including lone working, if relevant) and risk assessments should always be undertaken.

This report is to read in conjunction with drawing AP1-BHE-00-XX-DR-C-96-4000 for the location of all SuDS systems on this site. See also AP1-BHE-00-XX-DR-C-96-3100 to 3103 for drainage details.

SuDS are an environmentally friendly approach to managing rainfall that uses landscape features to deal with surface water. SuDS aim to:

- control the flow, volume and frequency of water leaving a development area
- prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- provide attractive surroundings for the community
- create opportunities for wildlife.

There are three categories of maintenance activities referred to in this report:

- **Regular maintenance** (including inspections and monitoring). Consists of basic tasks done on a frequent and predictable schedule, including vegetation management, litter and debris removal, and inspections.
- **Occasional maintenance** Comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example).
- **Remedial maintenance** Comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.

2 SuDS Layout and Design

The main SuDS components with the surface water drainage strategy are:

- Pervious pavements
- Attenuation tanks
- Filter drains
- Vortex flow controls

The surface drainage layout can be seen in drawing AP1-BHE-00-XX-DR-C-96-4000.

3 SuDS Management & Maintenance

The SuDS at Airport City Plot P1 have been designed for easy maintenance to comprise of the following maintenance activities.

3.1 SuDS maintenance specification

3.1.1 General requirements

General requirements	
Regular maintenance	Frequency
Generally Litter Collect all litter or other debris and remove it from site at each site visit	Monthly
Occasional tasks	Frequency
General inspection and flushing of drainage network	As required

- **Avoid** use of weed-killers and pesticides to prevent chemical pollution.
- **Avoid** de-icing agents wherever possible to allow bioremediation of pollutants in permeable surfaces.
- **Protect** all permeable, porous and infiltration surfaces from silt, sand, mulch and other fine particles.

Exclusions

- Maintenance of rainwater harvesting chambers, pumps etc.

3.1.2 Pervious pavements

- **Pervious pavements** include permeable block paving, porous asphalt, gravel or free-draining soils that allow rain to percolate through the surface into underlying drainage layers. They should be protected from silt, sand, compost, mulch etc. Permeable block paving and porous asphalt can be cleaned by brushing using a wide, soft broom, rubber-tined rake or a mechanical garden vacuum cleaner.

Pervious pavements	
Regular maintenance	Frequency
Cleaning Brush regularly using a wide soft broom and remove sweepings from all hard surfaces	Monthly or as required
Occasional tasks	Frequency
Permeable pavements: Brush and vacuum surface once a year to prevent silt blockage and enhance design life	Annually
Remedial Work	Frequency
Monitor effectiveness of permeable pavement, and when water does not infiltrate immediately advise the client of possible need for reinstatement of top layers or specialist cleaning. Recent experience suggests that jet washing and suction cleaning will substantially reinstate pavement to 90% efficiency.	As required

3.1.3 Attenuation tanks

- Attenuation tanks consist of crates with a perforated pipe running through them, surrounded by an impermeable membrane..
- The attenuation tanks sit under pervious pavements and act as storage to control discharge rates in storm events.

Attenuation tanks	
Regular maintenance	Frequency
Follow maintenance advice from supplier	As required
Occasional tasks	Frequency
Annual inspection of the catch pits either end of the tank should be carried out and silt removed when necessary. The distribution pipework can be jetted out if required.	Annually
Follow maintenance advice from supplier	As required
Remedial work	Frequency
Follow maintenance advice from supplier	As required

3.1.4 Filter drains

- Filter drains are stone filled trenches, sometimes with a perforated pipe in the bottom, that collect, clean and store runoff before conveying the water to another SuDS feature or allowing it to soak into the ground.
- Treatment trenches are enlarged filter drains designed to treat a known volume of dirty water or increase soakage into the ground. They may also be used to intercept overland flows, when they are referred to as cut off drains.

Filter drains and infiltration trenches	
Regular maintenance	Frequency
Grass edges Mow 1 m min. wide grass surround to drain at 100 mm and 150 mm maximum to filter runoff and protect drain from silt	Monthly or as required
Occasional tasks	Frequency
Weeds Hand pull or spot treat individual weed growth, only if necessary, ensuring that weed-killer does not enter the filter drain. Weed growth usually dies in dry weather.	As required
Perforated pipe Carry out rodding and/or flushing out of perforated pipe	As required
Remedial work	Frequency
Siltation at surface Where there is no protective geotextile, remove all stone and perforated pipe replacing as original spec. and include separating geotextile as below. Where there is a separating geotextile (see spec.) then remove surface stone layer and separating geotextile that protects the stone drain below. Replace geotextile and top stone layer.	As required

3.1.5 Inlets, outlets, controls and inspection chambers

- Inlet and outlet structures may be surface structures or conveyance pipes with guards or headwalls. They should be kept free from obstruction at all times.
- SuDS flow control structures can be protected orifices, slots, weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- Inspection chambers and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

Inlets, outlets, controls and inspection chambers	
Regular maintenance	Frequency
Inlets, outlets and surface control structures Inspect surface structures, removing obstructions and silt as necessary. Check there is no physical damage. Trim vegetation 1 m min. surround to structures and keep hard aprons free from silt and debris.	Monthly Monthly
Inspection chambers and below-ground control chambers Remove cover and inspect, ensuring that water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in autumn	Annually
Occasional maintenance	Frequency
Check topsoil levels are 20 mm above edges of baskets and chambers to avoid mower damage.	As necessary
Inspect flow control before any predicted major storm event, performing any repair/maintenance required to ensure functionality.	As required
Remedial work	Frequency
Unpack stone in basket features and unblock or repair and repack stone as design detail as necessary.	As required
Repair physical damage if necessary.	As required

3.1.6 Spillage – emergency action

Most spillages on development sites are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore, small spillages of oil, milk or other known organic substances should be mitigated where possible using soak mats as recommended by the Environment Agency to ensure any residual spillage does enter the drainage system in a controlled manner, allowing it to bioremediate.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or closely woven fabric.)

Contact the Environment Agency immediately in the event of a spillage.

Lucy Allen
Buro Happold Limited
Camden Mill
Lower Bristol Road
Bath
BA2 3DQ
UK

T: +44 (0)1225 320 600

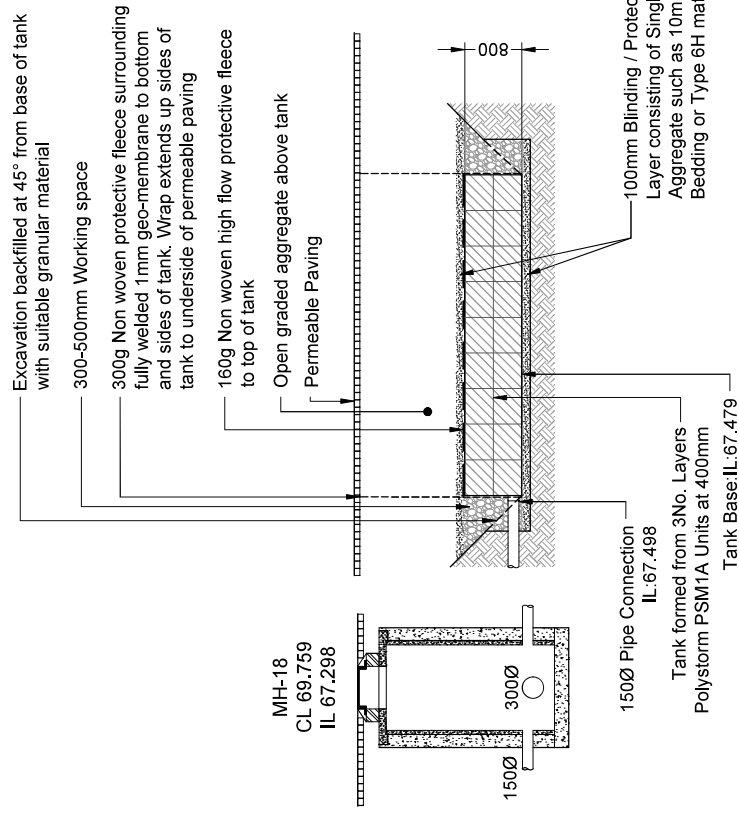
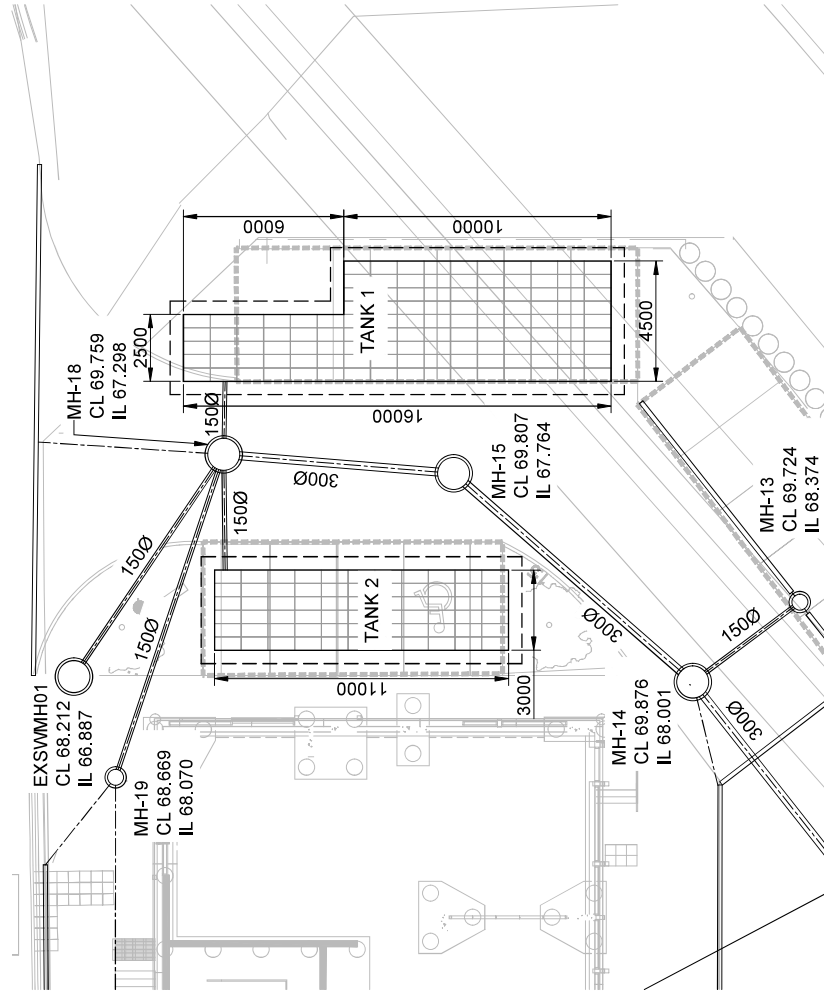
F: +44 (0)870 787 4148

Email: Lucy.Allen@burohappold.com

NOTES

1. Proposed Hydro WMS layout.
2. All dimensions are in millimetres, all elevations in metres unless otherwise stated.
3. All temporary and enabling works by others.
4. All dimensions of fabricated items are nominal and may vary within manufacturing tolerances.

6.0 x 2.5 x 0.8m deep
10.0 x 4.5 x 0.8 deep
Total Vol = 48.0m³
Net Vol = 45.6m³
At 95% min Void Ratio
240 PSM1A units



Proposed Plan
(Scale 1:200)

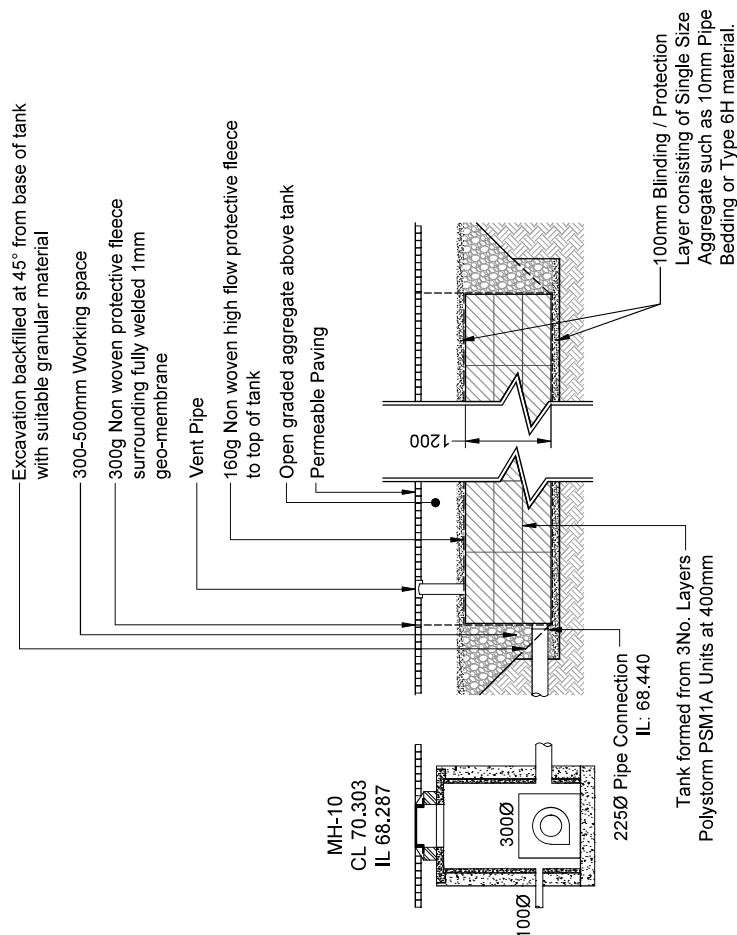
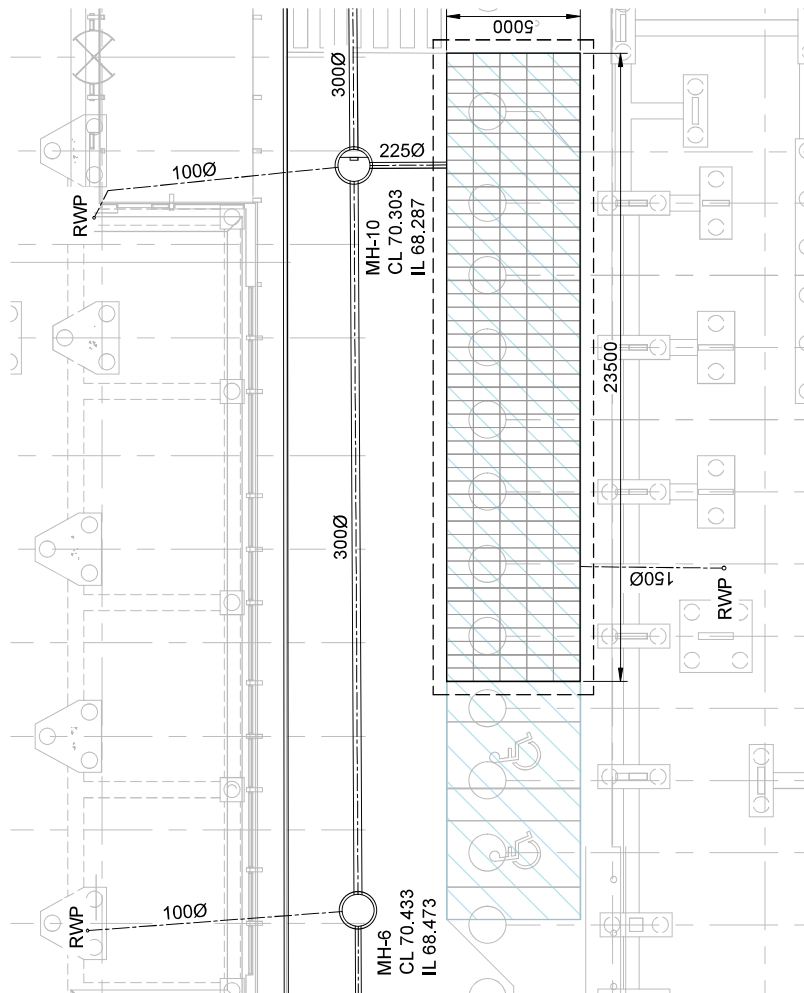
Proposed Section
(Scale 1:75)

A		DRAINAGE LAYOUT UPDATED, TANK SIZE REVISED		03/07/20	
REV	AMENDMENT	DATE	DRAWN	CHECKED	DATE
		25/06/20			
FOR APPROVAL			PROJECT No.		
DRAWING TITLE			SCALE		
Proposed Attenuation Tank1 Details			1:200@ A3		
CLIENT			DRAWING No.		
HYDRO WMS LTD RANDOLPH HOUSE 3 7-41 LONGSHUT LANE WEST STOCKPORT SK2 6RX Tel/Fax: 0161 4563476 brian.byrne@hydro-wms.co.uk www.hydro-wms.co.uk			001		
JOB TITLE			REV.		
Airport City, Manchester Site			A		

NOTES

1. Proposed Hydro VMS layout.
2. All dimensions are in millimetres, all elevations in metres unless otherwise stated.
3. All temporary and enabling works by others.
4. All dimensions of fabricated items are nominal and may vary within manufacturing tolerances.

23.5 x 5.0 x 1.2m deep
Total Vol = 141.0m³
Net Vol ≈ 133.95m³
At 95% min Void Ratio
705 PSM1A units

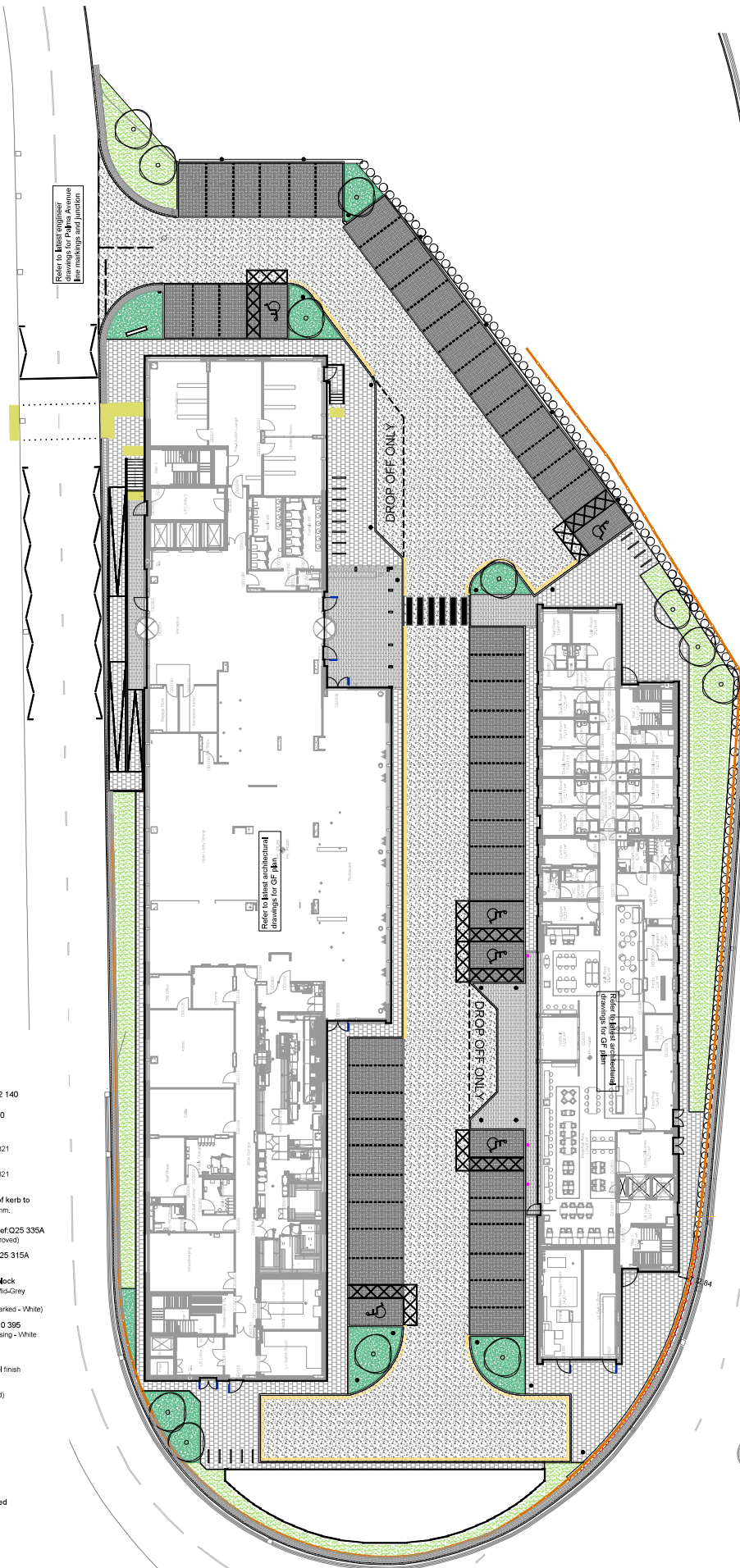
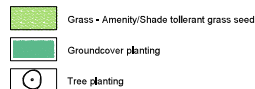


Proposed Plan
(Scale 1:200)

Proposed Section
(Scale 1:75)

 Complete Water Management Solutions HYDRO WMS LTD RANDOLPH HOUSE 3 7-41 LONGSHUT LANE WEST STOCKPORT SK2 6RX Tel/Fax: 0161 4563476 brian.byrne@hydro-wms.co.uk www.hydro-wms.co.uk	CUSTOMER	-	STATUS		FOR APPROVAL		AMENDMENT		REV		DATE
	JOB TITLE	P1 Airport City - Manchester Site		DRAWING TITLE				DATE	07/09/2020	DRAWN	CHECKED
							SCALE	1:200@ A3	PROJECT No.		
							DRAWING No.	002	REV.	-	

Responsibility for the reproduction of this drawing in paper form, or issued in electronic format lies with the recipient to check that all information has been replicated in full and is correct where compared to the original.



C10	24/01/22	LAYOUT UPDATED	SA	ME
C09	13/01/22	LAYOUT UPDATED	SA	ME
C08	05/10/21	LAYOUT UPDATED	RS	SA
C07	23/09/21	LAYOUT UPDATED	SA	ME
C06	09/08/21	LAYOUT UPDATED	SA	ME
REV.	DATE	DESCRIPTION	DRAWN	CHECK



Date: 20/02/20

Revision:

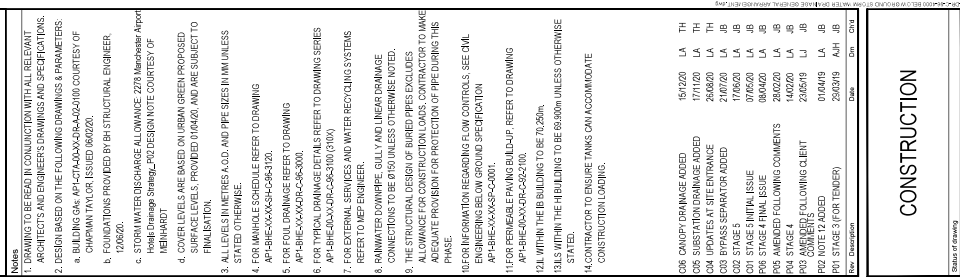
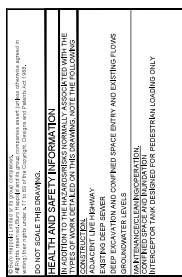
C10



A: Ground Floor, The Tower,
Deva City Office Park, Trinity Way,
Manchester M3 7BF

T: +44 (0) 161 312 3131

weareurban.green.co.uk

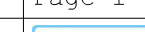


BURO HAPPOLD ENGINEERING

Calculation Cover Sheet

Project:	Airport City Site P1		
Project No:	0041946		
Document No:	AP1-BHE-00-XX-CA-C-4000	Rev No:	P01

Prepared by	Date	Description	Pages	Level of Check A, B or C	Date	Checked by
LA	26/02/20	Microdrainage Surface Water Model and outputs (printed 25/11/21)	82	A	28/02/20	TH

BuroHappold Ltd		Page 1
Camden Mill Lower Bristol Road Bath		
Date 25/11/2021 14:33 File 0041946_SURFACE WATER D...	Designed by lallen Checked by	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Pipe Sizes STANDARD Manhole Sizes STANDARD

Designed with Level Soffits

« - Indicates pipe capacity < flow

Network Results Table

BuroHappold Ltd											Page 2	
Camden Mill Lower Bristol Road Bath						Designed by lallen Checked by						
Date 25/11/2021 14:33 File 0041946_SURFACE WATER D...												
Innovyze						Network 2020.1.3						
Network Design Table for Storm												
PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section	Type	Auto Design
S1.003	27.860	0.186	149.8	0.032	0.00	0.0	0.600	o	300	Pipe/Conduit		
S5.000	5.808	0.182	31.9	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit		
S5.001	6.840	0.137	49.9	0.092	0.00	0.0	0.600	o	150	Pipe/Conduit		
S1.004	22.907	0.191	120.0	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit		
S6.000	4.374	0.095	46.0	0.032	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.005	9.479	0.095	100.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S7.000	7.177	0.060	119.6	0.049	5.00	0.0	0.600	o	150	Pipe/Conduit		
S1.006	11.858	0.237	50.0	0.049	0.00	0.0	0.600	o	300	Pipe/Conduit		
S1.007	8.602	0.126	68.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit		
S8.000	12.744	0.358	35.6	0.019	5.00	0.0	0.600	o	150	Pipe/Conduit		
S9.000	3.739	0.088	42.5	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit		
S10.000	4.051	0.088	46.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit		
Network Results Table												
PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)		
S1.003	55.67	5.91	68.473	0.214		0.0	0.0	0.0	1.28	90.6	43.0	
S5.000	59.46	5.05	69.260	0.000		0.0	0.0	0.0	1.79	31.6	0.0	
S5.001	59.08	5.13	69.078	0.092		0.0	0.0	0.0	1.43	25.2	19.6	
S1.004	54.60	6.17	68.287	0.360		0.0	0.0	0.0	1.43	101.4	70.9	
S6.000	59.48	5.05	68.680	0.032		0.0	0.0	0.0	1.49	26.3	6.9	
S1.005	54.21	6.27	68.096	0.392		0.0	0.0	0.0	1.57	111.1	76.7	
S7.000	59.09	5.13	68.374	0.049		0.0	0.0	0.0	0.92	16.2	10.4	
S1.006	53.87	6.36	68.001	0.490		0.0	0.0	0.0	2.23	157.5	95.2	
S1.007	53.58	6.44	67.764	0.490		0.0	0.0	0.0	1.91	134.7	95.2	
S8.000	59.12	5.13	68.070	0.019		0.0	0.0	0.0	1.69	29.9	4.0	
S9.000	59.53	5.04	67.500	0.000		0.0	0.0	0.0	1.55	27.4	0.0	
S10.000	59.50	5.05	67.500	0.000		0.0	0.0	0.0	1.49	26.3	0.0	
©1982-2020 Innovyze												

BuroHappold Ltd		Page 4
Camden Mill Lower Bristol Road Bath		
Date 25/11/2021 14:33 File 0041946_SURFACE WATER D...	Designed by lallen Checked by	
Innovyze	Network 2020.1.3	
<		

BuroHappold Ltd		Page 5
Camden Mill Lower Bristol Road Bath		
Date 25/11/2021 14:33 File 0041946_SURFACE WATER D...	Designed by lallen Checked by	
Innovyze Network 2020.1.3		

Summary Wizard of 15 minute 1 year Summer I+0% for Storm

Simulation Criteria

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

Number of Input Hydrographs	0	Number of Storage Structures	4
Number of Online Controls	3	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.360
Region England and Wales Cv (Summer)	0.750		
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm Rank	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	40	69.150	-0.109	0.000	0.17		4.4	OK
S2.000	S2	30	70.053	-0.097	0.000	0.26		7.3	OK
S1.001	S3	48	69.014	0.012	0.000	0.29		11.7	SURCHARGED
S3.000	S4	33	69.291	-0.125	0.000	0.07		1.5	OK
S4.000	SST1	66	68.857	-0.096	0.000	0.14		1.6	OK
S1.002	S5	48	69.001	0.079	0.000	0.06		2.4	SURCHARGED
S1.003	S6	60	68.762	-0.011	0.000	0.06		4.8	OK
S5.000	S9	26	69.260	-0.150	0.000	0.00		0.0	OK
S5.001	SST2	60	69.106	-0.122	0.000	0.08		1.7	OK
S1.004	S10	60	68.759	0.172	0.000	0.05		4.7	SURCHARGED
S6.000	S11	20	68.724	-0.106	0.000	0.19		3.7	OK
S1.005	S12	42	68.158	-0.238	0.000	0.09		7.2	OK
S7.000	S13	20	68.440	-0.084	0.000	0.40		5.6	OK
S1.006	S14	28	68.077	-0.225	0.000	0.14		17.3	OK
S1.007	S15	31	67.854	-0.210	0.000	0.19		17.3	OK
S8.000	S19	23	68.098	-0.122	0.000	0.08		2.2	OK
S9.000	S19	50	67.528	-0.122	0.000	0.07		1.3	OK
S10.000	S20	49	67.546	-0.104	0.000	0.12		2.2	OK
S1.008	S18	40	67.667	0.219	0.000	0.30		9.5	SURCHARGED

©1982-2020 Innovyze