

Drainage Planning Conditions

Subject: Embassy Village

Reference: 077442-CUR-XX-XX-RP-C-001_V03

Date: 25/04/2024

The Planning Permission Ref: 129923/FO/2021
Conditions 13, 14 and 16 relates to Pre-Commencement drainage proposals for the development.
(Note Condition 15 information is not included and is Pre-Occupation).

Proposed Drainage:

The proposed drainage system consists of a separate foul and surface water network.
Reference should be made to the following drainage design documents:

- 077442-CUR-XX-XX-DR-C-92560_P02 Proposed Overland Flow Routes
- 077442-CUR-XX-XX-DR-C-92570_P01 Existing Impermeable Areas
- 077442-CUR-XX-XX-DR-C-92580_P02 Proposed Permeable Areas
- 077442-CUR-XX-XX-DR-C-92500_P03 Drainage Layout
- 077442-CUR-XX-XX-DR-C-92501_P03 Drainage Layout
- 077442-CUR-XX-XX-CA-C-92500_P02 Drainage Calculations

With specific reference to the conditioned points:

Condition 13

No development shall take place until surface water drainage works, designed in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards, have been submitted to and approved in writing by the City Council as Local Planning Authority. In order to discharge this condition, the following additional information shall be provided:

- a. A Flood Risk Assessment (FRA) which shall include:
An overlay of the proposed masterplan on Flood Zone 2 & 3 extents.
Sequential test should demonstrate sequential masterplanning of the proposal.
Exception test to be applied.
Proposed mitigation in line with NPPF / Standing Advice requirements.

The FRA should demonstrate that sufficient consideration has been given to the potential vulnerability of residents housed in the proposed development, regarding flood risk, evacuation, access and egress during any such event.

Modelled 2D flood levels for the onsite flood extents shall be obtained from the Environment Agency and considered in FFL design. The FRA shall include modelled flood levels upon which FFLs are proposed.

- b. A finalised drainage layout showing all components, inlets, outfalls, levels and connectivity.
c. Maximised integration of green SuDS components (utilising infiltration or attenuation);
d. An existing and proposed impermeable areas drawing to accompany all discharge rate calculations.
e. Runoff volume in the 1 in 100-year, 6 hours rainfall shall be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment.
f. Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100-year rainfall event with allowance for 40% climate change in any part of a building.

- g. Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.
- h. Hydraulic calculation of the proposed drainage system.
- i. Construction details of flow control and SuDS elements.

a. A Flood Risk Assessment (FRA) which shall include:
An overlay of the proposed masterplan on Flood Zone 2 & 3 extents.
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Exception test to be applied.
Proposed mitigation in line with NPPF / Standing Advice requirements.

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Modelled 2D flood levels for the onsite flood extents shall be obtained from the Environment Agency and considered in FFL design. The FRA shall include modelled flood levels upon which FFLs are proposed.

A Flood Risk Assessment (FRA) was submitted with the planning application. Reference should be made to this report: 077442-CUR-XX-XX-RP-C-92000-V04 FRADS_Final.

The following information has been extracted from the FRA:

Information record as part of the topographic survey shows that the Hulme Lock Canal has a typical water level of 25.2m while the River Medlock has a water level below 23.42m which is the noted bank level.

As the Medlock is the define source of flooding, the site is set some 2.6m above the bank of the Medlock.

The flood level information from the Environment Agency confirms that the flood levels at the nearest node point to the site are:

- 23.65m for the 1 in 100 year +35% event.
- 23.73m for the 1 in 100 year +70% event.
- 24.04m for the 1 in 1000-year event.

When comparing this defined flood level with the topographic survey levels of typically +26.0m within that area the site is in excess of 1.8m above the noted 1:1000yr event. This would suggest that the site is no longer located within either Flood Zone 2 or 3. Ground levels in the proposed development scenario are generally at 26.00m or above, there is a localised area along the southern edge of the site which is between 25.87 and 26m however this would also be above the Flood Zone 2 and 3 extents.

As part of our review of the provided data we have also considered the potential inundation of water from the south of the site. At this location the flood levels at the nearest node point to the site are:

- 25.67m for the 1 in 100 year +35% event.
- 25.82m for the 1 in 100 year +70% event.
- 25.94m for the 1 in 1000-year event.

When comparing this defined flood level with the topographic survey levels of typically +26.0m within that area the site this would also suggest that the site is no longer located within either Flood Zone 2 or 3. However, ground levels in the proposed development scenario are generally at 26.00m or above, there is a localised area along the southern edge of the site which is between 25.87 and 26m and would encroach the Flood Zone 2 extents only. This is illustrated in the following extract:

Extract 1: Proposed Extent of Flood Zone 2 (25.94m – up to 0.07m depth)



The FRA initially provided a recommendation to set FFLs at 26.600, however Environment Agency Standing advice recommends that:

The estimated flood level is the depth of flooding anticipated on your development site in a river flood with a 1 in 100 annual probability plus an allowance for climate change and that finished floor levels should be a minimum of whichever is higher of 300mm above the:

- average ground level of the site
- adjacent road level to the building
- estimated river or sea flood level

As there is a significant level change across the site, the average ground level is difficult to define. The adjacent road level is also at a significantly higher elevation. The 1 in 100-year flood level with an allowance of 70% for climate change is 25.82m, therefore floor levels are set in excess of 300mm above this level. Reference should be made to the Landscape Architects levels drawing 2596-PLA-XX-XX-DR-L-3000-P02 Levels Plan, enclosed with this report.

There is a clear evacuation route from the accommodation area to the site entrance that will remain dry in all events up to the modelled water level of 25.94m in the 1 in 1000-year event. As discussed above the majority for the site sits above the extreme water level therefore a safe evacuation route can be achieved as demonstrated in the following extract:

Extract 2: Access and Egress Routes within Flood Zone 1.



As the site is considered Flood Zone 1, the sequential and exception test is not applicable.

b. *A finalised drainage layout showing all components, inlets, outfalls, levels and connectivity.*

The Proposed Drainage Layouts are enclosed with this report:

- 077442-CUR-XX-XX-DR-C-92500_P03 Drainage Layout
- 077442-CUR-XX-XX-DR-C-92501_P03 Drainage Layout

c. *Maximised integration of green SuDS components (utilising infiltration or attenuation);*

Sustainable drainage component options are limited on site, there are various constraints with the existing arches and arch 3m offsets that need to be minimally impacted/limited excavation within these zones. Proposed Landscaping areas and areas of permeable construction have been proposed for sports facility areas.

d. *An existing and proposed impermeable areas drawing to accompany all discharge rate calculations.*

The existing and proposed impermeable areas drawings are enclosed with this report:

- 077442-CUR-XX-XX-DR-C-92570_P01 Existing Impermeable Areas
- 077442-CUR-XX-XX-DR-C-92580_P02 Proposed Permeable Areas

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

There is evidence that the existing site at least partially drained to the River Medlock, although the existing network is in poor condition and relatively shallow for proposed use.

We have however estimated pre-development volumes equivalent to greenfield and post development volumes:

Pre-Development as Greenfield is 54m³ (based on areas excluding below overhang)

Pre-development discharge

Site Makeup	Greenfield	OK
Greenfield Method	FSR/FEH	
Positively Drained Area (ha)	0.200	Cancel
Soil Index	4	
SPR	0.47	Calc
Catchment Wetness Index	124.698	
Return Period (years)	100	
Climate Change (%)	0	
Storm Duration (mins)	360	
Betterment (%)	0	
	Calc	
PR	0.498	
Runoff Volume (m ³)	54	

Post-Development is 123.8m³

100 year +45% CC 360 minute winter Results for 100 year +45% CC 360 minute winter, 600 minute analysis at 8 minute timestep.

US Node ID	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status	Link ID	DS Node ID	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
S1A	184	25.979	0.029	1.6	0.0235	0.0000	OK	1.000	S1B	1.6	0.516	0.081	0.0758	
S1B	184	25.691	0.041	2.4	0.0232	0.0000	OK	1.001	S1	2.4	0.682	0.150	0.0437	
S1	184	25.585	0.035	2.4	0.0100	0.0000	OK	1.002	S3	2.4	0.771	0.115	0.0424	
S2	176	25.563	0.013	0.4	0.0057	0.0000	OK	2.000	S3	0.4	0.482	0.016	0.0107	
S3	184	25.358	0.068	7.2	0.1147	0.0000	OK	1.003	S5	7.2	0.695	0.183	0.1445	
S4	176	25.513	0.013	0.4	0.0055	0.0000	OK	3.000	S5	0.4	0.494	0.015	0.0120	
S5	184	25.280	0.070	7.6	0.0199	0.0000	OK	1.004	S6	7.6	0.777	0.194	0.0857	
S6	184	25.222	0.062	7.6	0.0176	0.0000	OK	1.005	S8	7.6	0.764	0.080	0.0482	
S7	184	25.462	0.022	1.2	0.0159	0.0000	OK	4.000	S8	1.2	0.738	0.046	0.0205	
S8	184	25.159	0.109	8.8	0.1228	0.0000	OK	1.006	S10	8.8	0.279	0.125	0.4708	
S9	184	25.635	0.015	0.4	0.0062	0.0000	OK	5.000	S10	0.4	0.377	0.008	0.0126	
S10	184	25.156	0.166	13.2	0.3965	0.0000	OK	1.007	S12	13.1	0.360	0.178	0.6477	
S11	176	25.736	0.016	0.4	0.0068	0.0000	OK	6.000	S12	0.4	0.402	0.023	0.0106	
S12	184	25.153	0.223	13.5	0.2525	0.0000	OK	1.008	S14	13.5	0.222	0.183	0.5444	
S13	184	25.677	0.027	1.2	0.0235	0.0000	OK	7.000	S14	1.2	0.561	0.069	0.0221	
S14	184	25.151	0.261	14.7	0.2956	0.0000	OK	1.009	OUTFALL	14.7	0.220	0.152	0.1744	123.8
OUTFALL	8	25.150	0.280	14.7	0.0000	0.0000	OK							

There is a marginal increase in volume as a result, however as the outfall will be consistently surcharged to a balanced canal level of 25.2m, and restricted flows requiring attenuation would be surcharge dup to 25.2m and any attenuation would be required a surface level only which is not possible to achieve with the existing constraints on site.

f. Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100-year rainfall event with allowance for 40% climate change in any part of a building.

The drainage system has been designed to accommodate the 1 in 100 year +40%cc design event with an allowance for a surcharge outfall at the standing canal water level of 25.200m.

The drainage calculations are enclosed with this report:

- 077442-CUR-XX-XX-CA-C-92500_P02 Drainage Calculations

g. Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.

The Overland Flows drawing is enclosed with this report:

- 077442-CUR-XX-XX-DR-C-92560_P02 Proposed Overland Flow Routes

h. Hydraulic calculation of the proposed drainage system.

The drainage calculations are enclosed with this report:

- 077442-CUR-XX-XX-CA-C-92500_P02 Drainage Calculations

i. Construction details of flow control and SuDS elements.

Flow controls and SuDs features not applicable.

Condition 14

No drainage systems for the infiltration of surface water to the ground are permitted other than with the written consent of the local planning authority. Any proposals for such systems must be supported by an assessment of the risks to controlled waters. The development shall be carried out in accordance with the approved details.

Reason - To ensure that the development does not contribute to, is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution caused by mobilised contaminants, pursuant to paragraph 170 of the National Planning Policy Framework. To protect the underlying Principle and Secondary A Aquifers and adjacent surface watercourses.

The proposed surface water drainage is proposed to be collected and discharged to the piped drainage network. There are no proposals for infiltration on site.

Condition 16

Foul and surface water shall be drained on separate systems.

Foul and Surface Water are proposed to be drained via separate systems. The foul drainage is proposed to be pumped via a newly installed rising main to the public sewer in Water Street. The surface water drainage is proposed to be discharged into the canal basin via a new outfall.

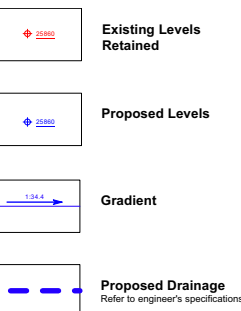
Refer to the drainage drawings enclosed within this report.

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NOTES:

- . Do not scale from this drawing.
- . Always work to noted dimensions.
- . All dimensions are in millimetres unless otherwise stated.
- . All setting out, levels and dimensions to be agreed on site.
- . The dimensions of all materials must be checked on site before being laid out.
- . This drawing must be read with the relevant specification clauses and detail drawings.
- . Order of construction and setting out to be agreed on site.

KEY

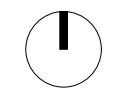


1-P07	14-02-24	Update to Levels	EKH	KR
1-P06	12-01-24	Update to Levels	EKH	KR
1-P05	04-08-23	Stage 4 Draft Issue	EKH	KR
1-P04	23-02-23	Stage 3	EKH	KR
1-P03	13-02-23	Stage 3	EKH	KR
1-P02	22-03-21	Updated arrangement as part of water safety strategy	CS	GB
1-P01	08-02-21	First Issue	CS	GB

Division	Date	Description	Drawn	Apprvd.
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Embassy

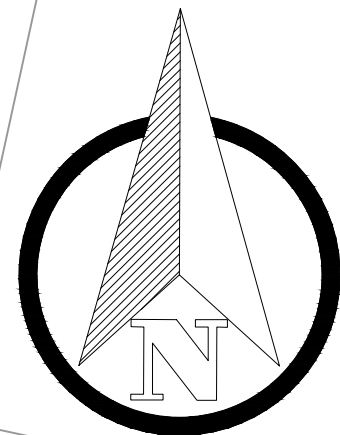
Project Embassy Village

rg Title Levels Plan

Created on	Created by	Approved by
8/02/2021	CS	GB

Scale	Size	Workstage
1:250	A1	Stage 4

Org No.	Suitability	Revision
596-PLA-XX-XX-DR-L-3000	S1	P07



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5. REFER TO NOTES DRAWING 077442-CUR-XX-XX-D-C-92510.

KEY:

- INDICATES THE FLOW ROUTE BASED ON FULL INLET CAPACITY OF COMPONENTS. i.e FALLS AT SURFACE
- INDICATES THE GENERAL GROUND LEVEL FALLS TO THE DRAINAGE SYSTEM
- SITE BOUNDARY
- GROUND LEVELS TO FALL AWAY FROM THE PROPOSED BUILDING

P02	STAGE 4 DRAFT - UPDATED TO LATEST LANDSCAPE LEVELS	01/03/24	CG	CG
P01	STAGE 4 DRAFT - ISSUED FOR PLANNING CONDITION DISCHARGE	31/01/24	CS	CG
Rev:	Description:	Date:	By:	Chkd:

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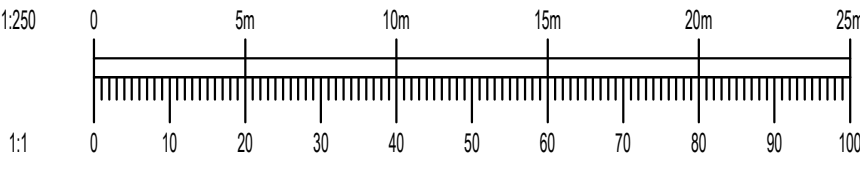
Status: **SUITABLE FOR INFORMATION** **S2**

Project: **EMBASSY VILLAGE**

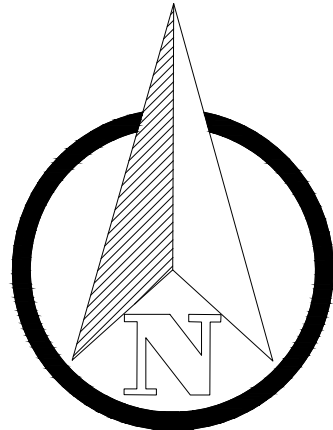
Orig Title: **PROPOSED OVERLAND FLOW ROUTES**

Drawn By	Designed By	Checked By
JC	CS	CG
Project No	Date	Scales @ A1
077442	03/01/2024	1:250
Project Code - Originator - Function - Spatial - Form - Discipline - Number		
Revision		

077442 - CUR-XX-XX- D - C - 92560 P02



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5. REFER TO NOTES DRAWING 077442-CUR-XX-XX-D-C-92510.

KEY:
EXISTING IMPERMEABLE
AREA: 0.56HA
SITE BOUNDARY

EXISTING IMPERMEABLE AREA: 0.56HA
NOT ALL EXISTING IMPERMEABLE AREA
DRAINS AS THEY ARE LOCATED UNDER
THE EXISTING BRIDGE STRUCTURE

P01	STAGE 4 DRAFT - ISSUED FOR PLANNING CONDITION DISCHARGE	31/01/24	JC	CG
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Rev:	Description:	Date:	By:	Chkd:
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Status: **SUITABLE FOR AUTHORIZATION** **S4**

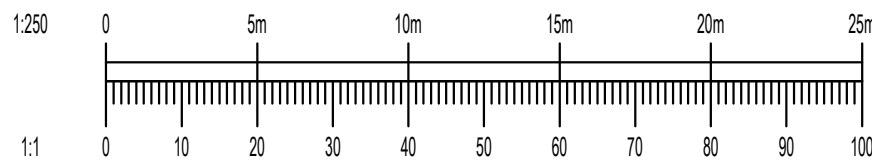
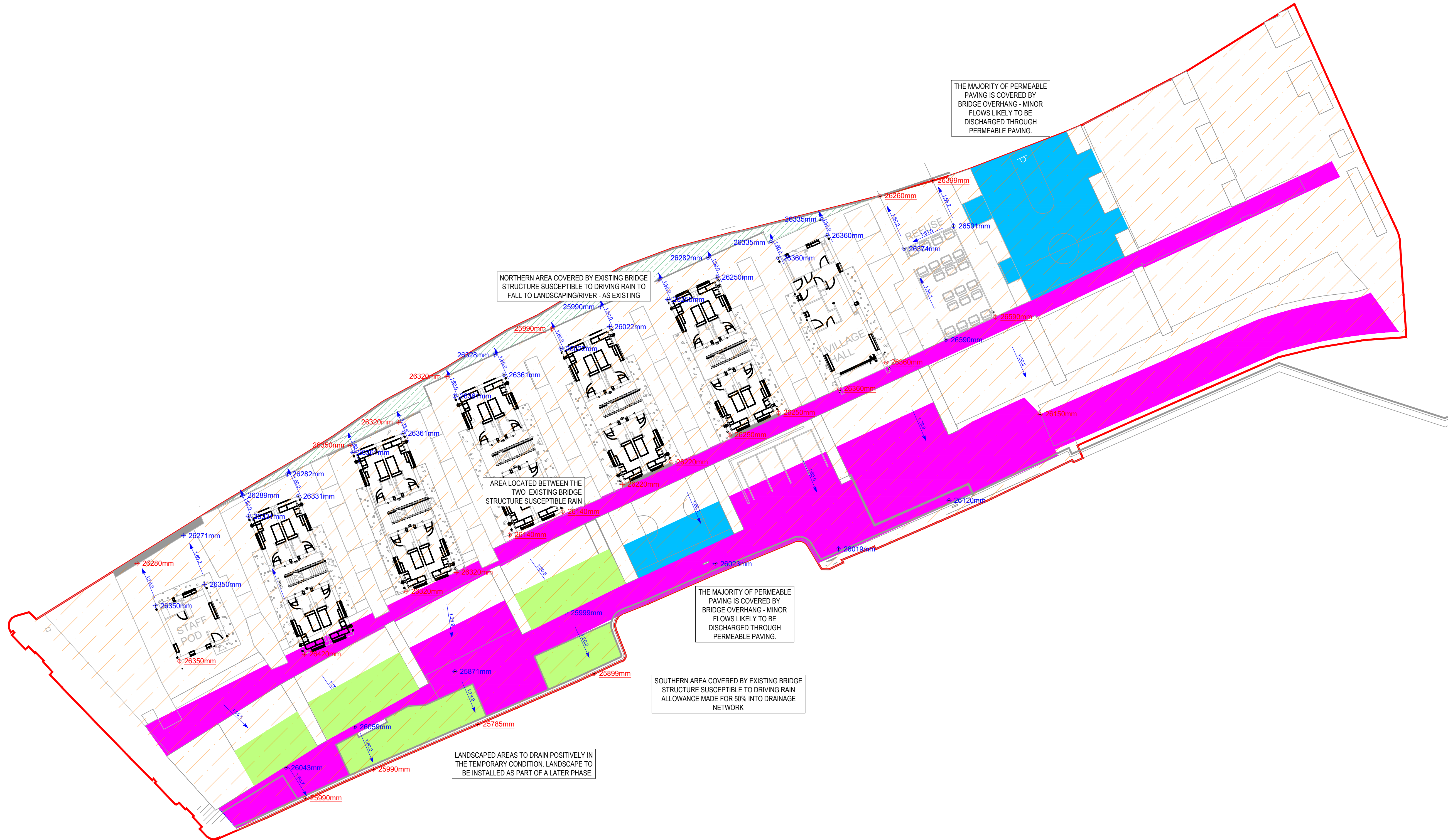
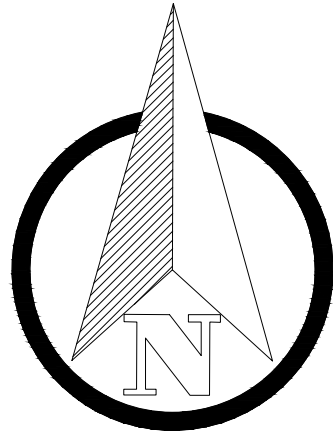
Project: **EMBASSY VILLAGE**

Dwg Title: **EXISTING IMPERMEABLE AREAS**

Drawn By JC	Designed By CS	Checked By CG
Project No 077442	Date 03/01/24	Scales @ A1 1:250
Project Code - Originator - Function - Spatial - Form - Discipline - Number		
Revision		

077442 - CUR - XX - XX - D - C - 92510 P01

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5. REFER TO NOTES DRAWING 077442-CUR-XX-XX-D-C-92510.

KEY:

- LANDSCAPED AREA TO POSITIVELY DRAIN IN THE TEMPORARY WORKS. LANDSCAPED AREAS TO BE INSTALLED AS PART OF A LATER PHASE - 0.027ha
- IMPERMEABLE AREA POSITIVELY DRAINING - 0.120ha
- IMPERMEABLE AREA NOT DRAINING AS IT IS UNDER COVER FROM THE BRIDGES - 0.40ha
- PERMEABLE AREA POSITIVELY DRAINING TO THE SURFACE WATER NETWORK - 0.028ha

P02	STAGE 4 DRAFT - UPDATED TO LATEST LANDSCAPE LEVELS	01/03/24	CG	CG
P01	STAGE 4 DRAFT - ISSUED FOR PLANNING CONDITION DISCHARGE	31/01/24	CS	CG

Rev:	Description:	Date:	By:	Chkd:
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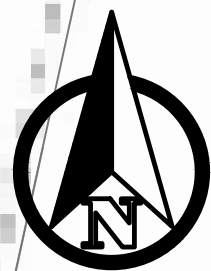
Status: **SUITABLE FOR AUTHORIZATION** **S4**

Project: **EMBASSY VILLAGE**

Orig Title: **PROPOSED CATCHMENT AREAS**

Drawn By	Designed By	Checked By
JC	CS	CG
Project No	Date	Scales @ A1
077442	03/01/24	1:250
Project Code - Originator - Function - Spatial - Form - Discipline - Number		
Revision		

077442 - CUR - XX - XX - D - C - 92580 P02

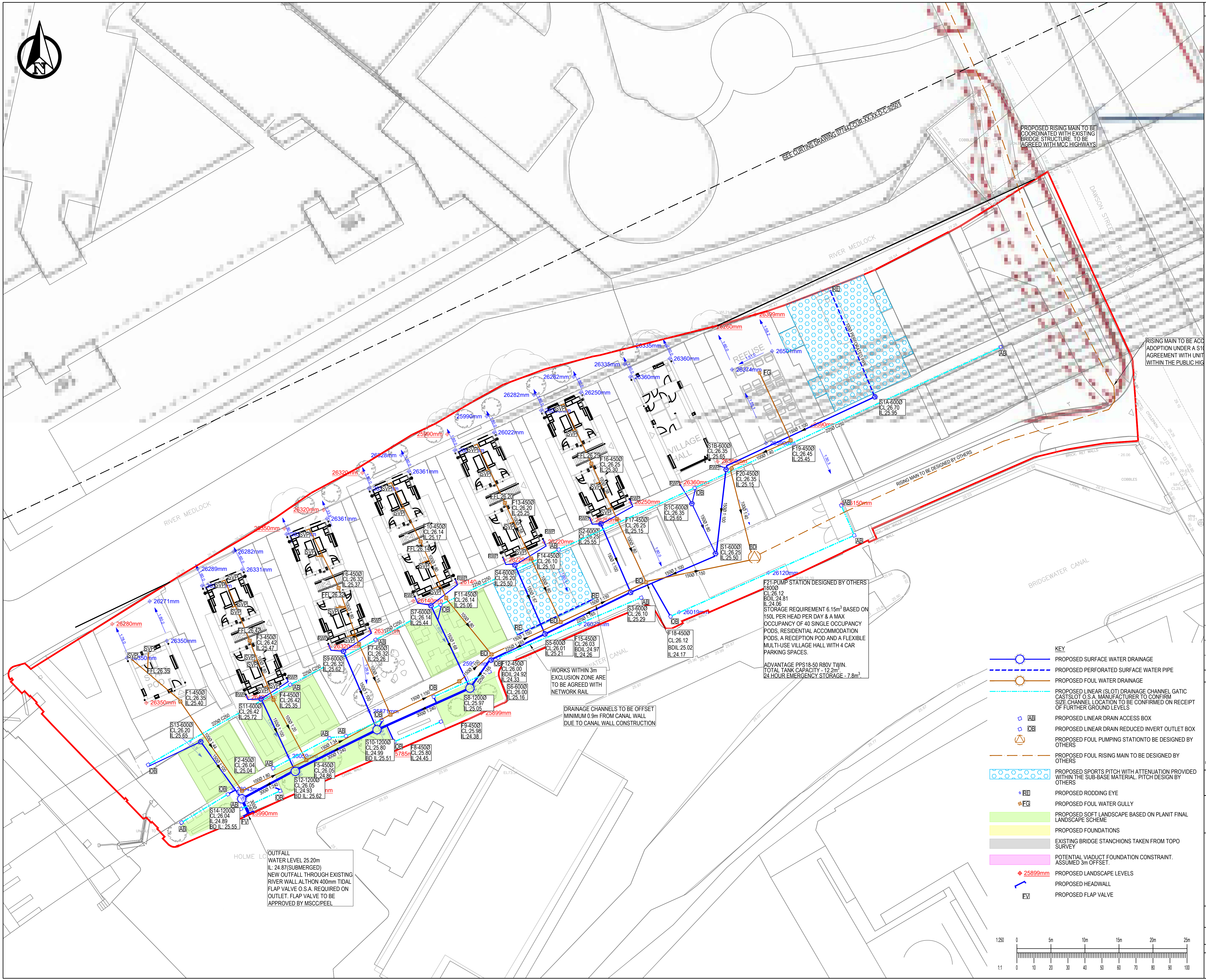


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- REFER TO NOTES DRAWING 077442-CUR-XX-XX-D-C-92510.

DESIGN PHILOSOPHY
SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 45% CLIMATE CHANGE EVENT.
SW FLOW RATE IS NOT RESTRICTED BASED ON THE OUTFALL BEING SURCHARGED WITHIN THE CANAL
OUTFALL DETAILS TO BE AGREED WITH MSCC/PEEL PORTS. TBC FOLLOWING FURTHER DESIGN AND SURVEY WORK.
POLLUTION TREATMENT: N/A
SUSTAINABLE DRAINAGE: PERMEABLE PAVING
INFILTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN
FW PEAK FLOW RATE:TBC
OUTFALL: MH6802 WATER STREET (TO BE AGREED WITH UNITED UTILITIES AND SUBJECT TO OFF SITE INVESTIGATIONS).
LEVELS INDICATE THAT PUMPING WILL BE REQUIRED.
FOUL WATER STORAGE REQUIRED: 6.15m³ (24 HOURS FLOW AS REQUIRED, BY BUILDING REGS), STORAGE BASED ON 150L PER PERSON PER DAY. MAXIMUM OCCUPANCY BASED ON 41 PEOPLE ONSITE.



- KEY**
- PROPOSED SURFACE WATER DRAINAGE
 - PROPOSED PERFORATED SURFACE WATER PIPE
 - PROPOSED FOUL WATER DRAINAGE
 - PROPOSED LINEAR (SLOT) DRAINAGE CHANNEL GATIC CAST/SLOT O.S.A. MANUFACTURER TO CONFIRM SIZE CHANNEL LOCATION TO BE CONFIRMED ON RECEIPT OF FURTHER GROUND LEVELS
 - PROPOSED LINEAR DRAIN ACCESS BOX
 - PROPOSED LINEAR DRAIN REDUCED INVERT OUTLET BOX
 - PROPOSED FOUL PUMPING STATION TO BE DESIGNED BY OTHERS
 - PROPOSED FOUL RISING MAIN TO BE DESIGNED BY OTHERS
 - PROPOSED SPORTS PITCH WITH ATTENUATION PROVIDED WITHIN THE SUB-BASE MATERIAL. PITCH DESIGN BY OTHERS
 - PROPOSED RODDING EYE
 - PROPOSED FOUL WATER GULLY
 - PROPOSED SOFT LANDSCAPE BASED ON PLANIT FINAL LANDSCAPE SCHEME
 - PROPOSED FOUNDATIONS
 - EXISTING BRIDGE STANCHIONS TAKEN FROM TOPO SURVEY
 - POTENTIAL VIADUCT FOUNDATION CONSTRAINT. ASSUMED 3m OFFSET.
 - PROPOSED LANDSCAPE LEVELS
 - PROPOSED HEADWALL
 - PROPOSED FLAP VALVE

P03	STAGE 4 DRAFT - FOUL OUTFALL UPDATED	25/04/24	CG	CG
P02	STAGE 4 DRAFT - UPDATED TO LANDSCAPING LEVELS	01/03/24	CG	CG
P01	STAGE 4 DRAFT - ISSUED FOR PLANNING CONDITION DISCHARGE	31/01/24	CS	CG

Rev: Description: Date: By: Chkd:

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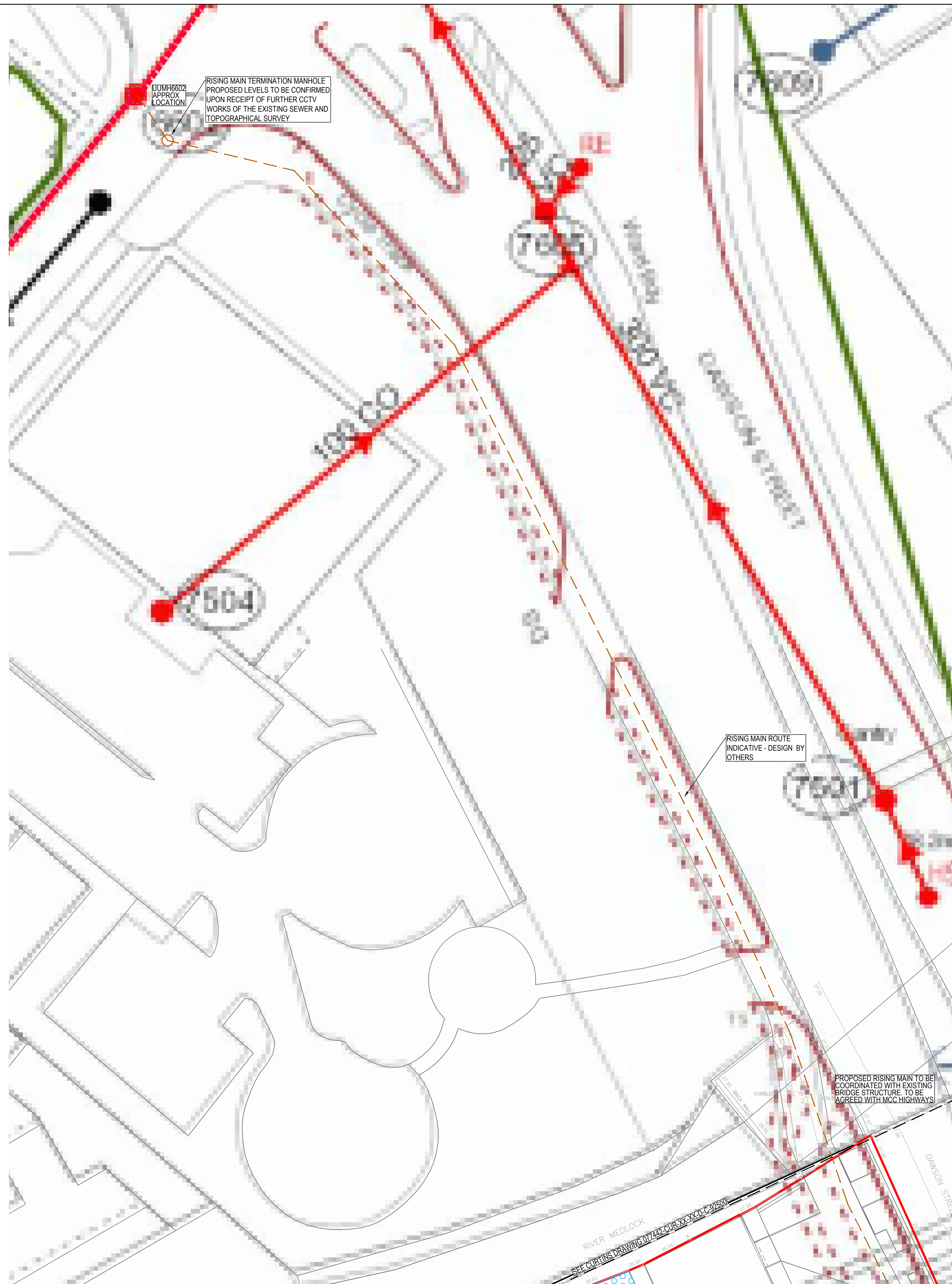
Status: **SUITABLE FOR INFORMATION**

Project: **EMBASSY VILLAGE**

Dwg Title: **DRAINAGE STRATEGY SHEET 1 OF 2**

Drawn By	CG	Designed By	CG	Checked By	CG
Project No	077442	Date	05/12/2023	Scales @ A1	1:200
Project Code - Originator - Function - Spatial - Form - Discipline - Number					Revision
077442 - CUR-XX-XX- D - C- 92500					P03

\\ms-b-1\Projects\07701 - 07800\077442 - Embassy Village\04-Production\A-Model Drawings\CA0925



GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF THE DESIGN.
4. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
5. REFER TO NOTES DRAWING 077442-CUR-XX-XX-C-92510.

DESIGN PHILOSOPHY

SURFACE WATER DESIGN
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 45% CLIMATE CHANGE EVENT.
SW FLOW RATE IS NOT RESTRICTED BASED ON THE OUTFALL BEING SURCHARGED WITHIN THE CANAL
OUTFALL DETAILS TO BE AGREED WITH MSCC/PEEL PORTS. TBC FOLLOWING FURTHER DESIGN AND SURVEY WORK.
POLLUTION TREATMENT: N/A
SUSTAINABLE DRAINAGE: PERMEABLE PAVING
INFILTRATION IS NOT CONSIDERED APPROPRIATE FOR THIS SCHEME.

FOUL WATER DESIGN

FW PEAK FLOW RATE:TBC
OUTFALL: MH6602 WATER STREET (TO BE AGREED WITH UNITED UTILITIES AND SUBJECT TO OFF SITE INVESTIGATIONS).
LEVELS INDICATE THAT PUMPING WILL BE REQUIRED.
FOUL WATER STORAGE REQUIRED: 6.15m³ (24 HOURS FLOW AS REQUIRED, BY BUILDING REGS), STORAGE BASED ON 150L PER PERSON PER DAY. MAXIMUM OCCUPANCY BASED ON 41 PEOPLE ONSITE.

P03	STAGE 4 DRAFT - FOUL OUTFALL UPDATED	25/04/24	CG	CG
P02	STAGE 4 DRAFT - UPDATED TO LANDSCAPING LEVELS	01/03/24	CG	CG
P01	STAGE 4 DRAFT -ISSUED FOR PLANNING CONDITION DISCHARGE	31/01/24	CS	CG
Rev:	Description:	Date:	By:	Chkd:

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Status: **SUITABLE FOR INFORMATION** **S2**

Project:

EMBASSY VILLAGE

Drug Title:

DRAINAGE STRATEGY
SHEET 2 OF 2

Drawn By CG	Designed By CG	Checked By CG
Project No 077442	Date 05/12/2023	Scales @ A1 1:200
Project Code - Originator - Function - Spatial - Form - Discipline - Number 077442 - CUR - XX - XX - D - C - 92501		Revision P03



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	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)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.600
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)
S1A	0.020	5.00	26.700	600	382754.147	397489.873	0.750
S1B	0.010	5.00	26.350	600	382732.277	397479.195	0.700
S1			26.250	600	382730.724	397466.827	0.700
S2	0.005	5.00	26.250	600	382713.884	397471.189	0.700
S3	0.057	5.00	26.100	600	382718.252	397461.118	0.810
S4	0.005	5.00	26.200	600	382701.234	397465.161	0.700
S5			26.010	600	382705.661	397455.008	0.800
S6			26.000	600	382697.753	397451.175	0.840
S7	0.015	5.00	26.140	600	382688.905	397459.177	0.700
S8			25.970	1200	382694.335	397447.714	0.920
S9	0.005	5.00	26.320	600	382676.052	397452.464	0.700
S10	0.051	5.00	25.800	1200	382680.721	397441.519	0.810
S11	0.005	5.00	26.420	600	382664.080	397445.525	0.700
S12			26.050	1200	382668.520	397435.816	1.120
S13	0.016	5.00	26.200	600	382655.084	397439.165	0.550
S14			26.040	1200	382661.101	397430.772	1.150
OUTFALL			25.990	1	382661.982	397428.313	1.120

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)
1.000	S1A	S1B	24.338	0.600	25.950	25.650	0.300	81.1	150	5.36	45.3
1.001	S1B	S1	12.465	0.600	25.650	25.550	0.100	124.7	150	5.55	44.5
1.002	S1	S3	13.717	0.600	25.550	25.365	0.185	74.1	150	5.71	43.7
1.003	S3	S5	13.995	0.600	25.290	25.210	0.080	174.9	225	5.94	42.9
1.004	S5	S6	8.788	0.600	25.210	25.160	0.050	175.8	225	6.08	42.4
1.005	S6	S8	4.864	0.600	25.160	25.125	0.035	139.0	300	6.15	42.1
1.006	S8	S10	14.957	0.600	25.050	24.990	0.060	249.3	300	6.40	41.4

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)
1.000	1.117	19.7	2.5	0.600	0.550	0.020	0.0	35	0.760
1.001	0.899	15.9	3.6	0.550	0.550	0.030	0.0	49	0.731
1.002	1.169	20.7	3.6	0.550	0.585	0.030	0.0	42	0.875
1.003	0.985	39.2	10.7	0.585	0.575	0.092	0.0	80	0.843
1.004	0.983	39.1	11.1	0.575	0.615	0.097	0.0	82	0.850
1.005	1.332	94.1	11.1	0.540	0.545	0.097	0.0	69	0.899
1.006	0.991	70.1	12.6	0.620	0.510	0.112	0.0	86	0.756

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)
1.007	S10	S12	13.468	0.600	24.990	24.930	0.060	224.5	300	6.62	40.7
1.008	S12	S14	8.971	0.600	24.930	24.890	0.040	224.3	300	6.77	40.3
1.009	S14	OUTFALL	2.612	0.600	24.890	24.870	0.020	130.6	300	6.82	40.1
2.000	S2	S3	10.977	0.600	25.550	25.340	0.210	52.3	150	5.35	45.8
3.000	S4	S5	11.076	0.600	25.500	25.260	0.240	46.2	150	5.35	46.0
4.000	S7	S8	12.684	0.600	25.440	25.175	0.265	47.9	150	5.38	45.2
5.000	S9	S10	11.899	0.600	25.620	25.510	0.110	108.2	225	5.18	44.6
6.000	S11	S12	10.676	0.600	25.720	25.620	0.100	106.8	150	5.19	45.3
7.000	S13	S14	10.327	0.600	25.650	25.550	0.100	103.3	150	5.30	45.5

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)
1.007	1.045	73.9	18.5	0.510	0.820	0.168	0.0	102	0.874
1.008	1.046	73.9	18.9	0.820	0.850	0.173	0.0	103	0.877
1.009	1.374	97.1	20.5	0.850	0.820	0.189	0.0	93	1.098
2.000	1.394	24.6	0.6	0.550	0.610	0.005	0.0	17	0.595
3.000	1.485	26.2	0.6	0.550	0.600	0.005	0.0	16	0.619
4.000	1.458	25.8	1.8	0.550	0.645	0.015	0.0	27	0.849
5.000	1.256	50.0	0.6	0.475	0.065	0.005	0.0	17	0.423
6.000	0.972	17.2	0.6	0.550	0.280	0.005	0.0	20	0.459
7.000	0.988	17.5	2.0	0.400	0.340	0.016	0.0	34	0.659

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)
1.000	24.338	81.1	150	Circular	26.700	25.950	0.600	26.350	25.650	0.550
1.001	12.465	124.7	150	Circular	26.350	25.650	0.550	26.250	25.550	0.550
1.002	13.717	74.1	150	Circular	26.250	25.550	0.550	26.100	25.365	0.585
1.003	13.995	174.9	225	Circular	26.100	25.290	0.585	26.010	25.210	0.575
1.004	8.788	175.8	225	Circular	26.010	25.210	0.575	26.000	25.160	0.615
1.005	4.864	139.0	300	Circular	26.000	25.160	0.540	25.970	25.125	0.545
1.006	14.957	249.3	300	Circular	25.970	25.050	0.620	25.800	24.990	0.510
1.007	13.468	224.5	300	Circular	25.800	24.990	0.510	26.050	24.930	0.820
1.008	8.971	224.3	300	Circular	26.050	24.930	0.820	26.040	24.890	0.850
1.009	2.612	130.6	300	Circular	26.040	24.890	0.850	25.990	24.870	0.820

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1A	600	Manhole	Adoptable	S1B	600	Manhole	Adoptable
1.001	S1B	600	Manhole	Adoptable	S1	600	Manhole	Adoptable
1.002	S1	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
1.003	S3	600	Manhole	Adoptable	S5	600	Manhole	Adoptable
1.004	S5	600	Manhole	Adoptable	S6	600	Manhole	Adoptable
1.005	S6	600	Manhole	Adoptable	S8	1200	Manhole	Adoptable
1.006	S8	1200	Manhole	Adoptable	S10	1200	Manhole	Adoptable
1.007	S10	1200	Manhole	Adoptable	S12	1200	Manhole	Adoptable
1.008	S12	1200	Manhole	Adoptable	S14	1200	Manhole	Adoptable
1.009	S14	1200	Manhole	Adoptable	OUTFALL	1	Manhole	Adoptable



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)
2.000	10.977	52.3	150	Circular	26.250	25.550	0.550	26.100	25.340	0.610
3.000	11.076	46.2	150	Circular	26.200	25.500	0.550	26.010	25.260	0.600
4.000	12.684	47.9	150	Circular	26.140	25.440	0.550	25.970	25.175	0.645
5.000	11.899	108.2	225	Circular	26.320	25.620	0.475	25.800	25.510	0.065
6.000	10.676	106.8	150	Circular	26.420	25.720	0.550	26.050	25.620	0.280
7.000	10.327	103.3	150	Circular	26.200	25.650	0.400	26.040	25.550	0.340

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
2.000	S2	600	Manhole	Adoptable	S3	600	Manhole	Adoptable
3.000	S4	600	Manhole	Adoptable	S5	600	Manhole	Adoptable
4.000	S7	600	Manhole	Adoptable	S8	1200	Manhole	Adoptable
5.000	S9	600	Manhole	Adoptable	S10	1200	Manhole	Adoptable
6.000	S11	600	Manhole	Adoptable	S12	1200	Manhole	Adoptable
7.000	S13	600	Manhole	Adoptable	S14	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1A	382754.147	397489.873	26.700	0.750	600				
S1B	382732.277	397479.195	26.350	0.700	600				
S1	382730.724	397466.827	26.250	0.700	600				
S2	382713.884	397471.189	26.250	0.700	600				
S3	382718.252	397461.118	26.100	0.810	600				
S4	382701.234	397465.161	26.200	0.700	600				
S5	382705.661	397455.008	26.010	0.800	600				

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S6	382697.753	397451.175	26.000	0.840	600	1 0	1 0	1.004 1.005	25.160 25.160	225 300
S7	382688.905	397459.177	26.140	0.700	600	0	0	4.000	25.440	150
S8	382694.335	397447.714	25.970	0.920	1200	1 2 0	1 2 0	4.000 1.005 1.006	25.175 25.125 25.050	150 300 300
S9	382676.052	397452.464	26.320	0.700	600	0	0	5.000	25.620	225
S10	382680.721	397441.519	25.800	0.810	1200	1 2 0	1 2 0	5.000 1.006 1.007	25.510 24.990 24.990	225 300 300
S11	382664.080	397445.525	26.420	0.700	600	0	0	6.000	25.720	150
S12	382668.520	397435.816	26.050	1.120	1200	1 2 0	1 2 0	6.000 1.007 1.008	25.620 24.930 24.930	150 300 300
S13	382655.084	397439.165	26.200	0.550	600	0	0	7.000	25.650	150
S14	382661.101	397430.772	26.040	1.150	1200	1 2 0	1 2 0	7.000 1.008 1.009	25.550 24.890 24.890	150 300 300
OUTFALL	382661.982	397428.313	25.990	1.120	1	1	1	1.009	24.870	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/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 %)
30	0	0	0
100	45	0	0

Node **OUTFALL** Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		
Applies to All storms					

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	0.280	300	0.280	600	0.280	900	0.280	1200	0.280
60	0.280	360	0.280	660	0.280	960	0.280	1260	0.280
120	0.280	420	0.280	720	0.280	1020	0.280	1320	0.280
180	0.280	480	0.280	780	0.280	1080	0.280	1380	0.280
240	0.280	540	0.280	840	0.280	1140	0.280	1440	0.280

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1A	10	26.005	0.055	5.8	0.0451	0.0000	OK
15 minute winter	S1B	10	25.732	0.082	8.6	0.0466	0.0000	OK
15 minute winter	S1	11	25.620	0.070	8.4	0.0198	0.0000	OK
15 minute winter	S2	10	25.575	0.025	1.5	0.0106	0.0000	OK
15 minute winter	S3	11	25.437	0.147	26.3	0.2486	0.0000	OK
15 minute winter	S4	10	25.524	0.024	1.5	0.0103	0.0000	OK
15 minute winter	S5	11	25.359	0.149	27.3	0.0420	0.0000	OK
15 minute winter	S6	11	25.289	0.129	27.4	0.0364	0.0000	OK
15 minute winter	S7	10	25.482	0.042	4.4	0.0297	0.0000	OK
15 minute winter	S8	11	25.244	0.194	31.6	0.2192	0.0000	OK
15 minute winter	S9	10	25.647	0.027	1.5	0.0115	0.0000	OK
15 minute winter	S10	11	25.227	0.237	47.0	0.5660	0.0000	OK
15 minute winter	S11	10	25.750	0.030	1.5	0.0129	0.0000	OK
15 minute winter	S12	11	25.196	0.266	48.4	0.3007	0.0000	OK
15 minute winter	S13	10	25.705	0.055	4.7	0.0478	0.0000	OK
15 minute winter	S14	11	25.170	0.280	52.8	0.3168	0.0000	OK
15 minute summer	OUTFALL	1	25.150	0.280	50.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1A	1.000	S1B	5.7	0.729	0.290	0.1916	
15 minute winter	S1B	1.001	S1	8.4	0.947	0.531	0.1112	
15 minute winter	S1	1.002	S3	8.5	1.065	0.411	0.1125	
15 minute winter	S2	2.000	S3	1.5	0.491	0.060	0.0765	
15 minute winter	S3	1.003	S5	25.8	0.941	0.660	0.3869	
15 minute winter	S4	3.000	S5	1.5	0.514	0.056	0.0778	
15 minute winter	S5	1.004	S6	27.4	1.071	0.702	0.2252	
15 minute winter	S6	1.005	S8	27.4	1.025	0.292	0.1333	
15 minute winter	S7	4.000	S8	4.4	1.027	0.169	0.0744	
15 minute winter	S8	1.006	S10	31.6	0.592	0.451	0.8060	
15 minute winter	S9	5.000	S10	1.5	0.554	0.029	0.0313	
15 minute winter	S10	1.007	S12	46.9	0.745	0.635	0.8463	
15 minute winter	S11	6.000	S12	1.5	0.586	0.085	0.0265	
15 minute winter	S12	1.008	S14	48.3	0.718	0.654	0.6032	
15 minute winter	S13	7.000	S14	4.6	0.812	0.264	0.0587	
15 minute winter	S14	1.009	OUTFALL	52.8	0.771	0.543	0.1788	22.6

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.75%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1A	10	26.029	0.079	10.9	0.0643	0.0000	OK
15 minute winter	S1B	12	25.897	0.247	16.2	0.1402	0.0000	SURCHARGED
15 minute winter	S1	12	25.800	0.250	15.0	0.0708	0.0000	SURCHARGED
15 minute winter	S2	12	25.693	0.143	3.1	0.0607	0.0000	OK
15 minute winter	S3	11	25.691	0.401	45.3	0.6776	0.0000	SURCHARGED
15 minute winter	S4	12	25.568	0.068	2.7	0.0291	0.0000	OK
15 minute winter	S5	12	25.565	0.354	44.9	0.1003	0.0000	SURCHARGED
15 minute winter	S6	11	25.465	0.305	45.4	0.0864	0.0000	SURCHARGED
15 minute winter	S7	10	25.498	0.058	8.2	0.0412	0.0000	OK
15 minute winter	S8	11	25.448	0.398	52.5	0.4498	0.0000	SURCHARGED
15 minute winter	S9	10	25.656	0.036	2.7	0.0154	0.0000	OK
15 minute winter	S10	11	25.401	0.411	79.1	0.9821	0.0000	SURCHARGED
15 minute winter	S11	10	25.761	0.041	2.7	0.0176	0.0000	OK
15 minute winter	S12	11	25.298	0.368	81.6	0.4156	0.0000	SURCHARGED
15 minute winter	S13	10	25.729	0.079	8.7	0.0686	0.0000	OK
15 minute winter	S14	11	25.213	0.323	90.0	0.3654	0.0000	SURCHARGED
15 minute summer	OUTFALL	1	25.150	0.280	87.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1A	1.000	S1B	10.8	0.833	0.546	0.3254	
15 minute winter	S1B	1.001	S1	15.0	1.090	0.946	0.2194	
15 minute summer	S1	1.002	S3	15.3	1.048	0.740	0.2415	
15 minute winter	S2	2.000	S3	4.1	0.487	0.168	0.1915	
15 minute winter	S3	1.003	S5	42.7	1.074	1.090	0.5566	
15 minute summer	S4	3.000	S5	2.8	0.513	0.108	0.1172	
15 minute winter	S5	1.004	S6	45.4	1.143	1.163	0.3495	
15 minute winter	S6	1.005	S8	45.9	0.987	0.488	0.3425	
15 minute winter	S7	4.000	S8	8.1	0.977	0.316	0.1514	
15 minute winter	S8	1.006	S10	53.2	0.755	0.759	1.0533	
15 minute winter	S9	5.000	S10	2.7	0.662	0.053	0.0479	
15 minute winter	S10	1.007	S12	79.0	1.122	1.070	0.9484	
15 minute winter	S11	6.000	S12	2.7	0.694	0.155	0.0410	
15 minute winter	S12	1.008	S14	81.7	1.160	1.105	0.6317	
15 minute winter	S13	7.000	S14	8.6	0.948	0.491	0.0935	
15 minute winter	S14	1.009	OUTFALL	90.0	1.279	0.927	0.1813	44.8