

Sustainable Drainage Strategy

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Re-development of site including demolition of existing office building and replacement with a three-storey headquarters office building, together with associated supporting infrastructure, including car parking and hard and soft landscaping.

32-34 Bournemouth Road, Chandler's Ford, Eastleigh SO53 3ZL

Planning Application No. F/25/99876

Local Planning Authority: *Eastleigh Borough Council*

Lead Local Flood Authority: *Hampshire County Council*

Project No.: 25042

Rev: 02

Date: *March 2026*

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Revision	Prepared by	Checked by	Date	Status
00	CAC	RR	24/03/26	
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1. Executive Summary

BACKGROUND			
Location	32-34 Bournemouth Road, Chandler's Ford, Eastleigh SO53 3ZL		
Site Area	3532m ²		
Proposed Development	Re-development of site including demolition of existing office building and replacement with a three-storey headquarters office building, together with associated supporting infrastructure, including car parking and hard and soft landscaping. (F/25/99876)		
Current Site	Commercial office within industrial estate.		
Topography	The site is predominately flat.		
Hydrology	No watercourses within 250m of the site.		
Ground Conditions	A site investigation was carried out by Lucion in November 2025 and uncovered conditions comprising a surface layer of locally reinforced concrete hardstanding to between 0.12m and 0.22m depth, covering made ground to between 0.70m and 2.70m depth, and in turn the expected solid geology Wittering Formation to at least the base of the deepest borehole at 15.00m depth. Groundwater seepages were locally struck as shallow as 3.00m depth. On completion, water was recorded at 3.70m depth in, 3.93m depth, and 5.40m depth in BH01. During monitoring of the standpipes, groundwater was recorded as shallow as 5.18m below ground level in BH01.		
Infiltration Potential	Historic soakage testing carried out by Southern Testing in 2015 showed "fair" infiltration in TP1, but this was carried out within made ground and close to contaminated soils, making the result unsuitable for SuDS design. Combined with Lucion's 2025 findings (widespread made ground, contamination, and shallow groundwater), infiltration SuDS are not appropriate, and a non-infiltrating drainage strategy is required.		
Fluvial Flooding	The site lies within EA Flood Zone 1. Refer to the FRA prepared by Scott White and Hopkins October 2025.		
Surface Water Flood Risk	Very low risk of flooding. Refer to the FRA prepared by Scott White and Hopkins October 2025.		
Groundwater Flood Risk	Flooding from groundwater is low. Refer to the FRA prepared by Scott White and Hopkins October 2025.		
Existing and Proposed Site Layout	Ground Cover	Existing (m²)	Proposed (m²)
	Buildings	905	1234
	Hard Landscape	2627	2611
	Soft	0	921
	Total Impermeable Area	3532	3532
Changes in Impermeable Area	The proposed development increases the permeable area of the site by 26% and will therefore decrease the post development runoff rate and volume.		

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PROPOSED SUDS			
Run off Rates	Greenfield (l/s)	Pre-Development (l/s)	Post Development - without SuDS (l/s)
Qbar	1.95	-	-
1 in 1	1.65	68.95	51.40
1 in 30	4.67	161.24	151.96
1 in 100	6.21	203.38	212.10
Proposed discharge rate	The proposed discharge rate is 2.0l/s.		
Storage Required to meet Planning Requirements	The storage estimates to achieve the run-off rate of 2.00l/s is 235m³. This is achieved by a combination of a geocellular tank, lined stone drainage blanket under the permeable access road, and localised flooding above the access road (for the 1 in 100yr + CC). Summary of Volumes: <u>Geocellular Tank (below ground)</u> Plan Area = 150m² Height = 1.20m Effective volume = 150 x 1.20 x 0.95 = 171m³ <u>Drainage Blanket (below ground)</u> Plan Area = 517m² Height = 0.30m Effective volume = 517 x 0.30 x 0.30 = 46.5m³ <u>Above access road (above ground)</u> Plan Area = 517m² Height = 0.10m Effective volume = 517 x 0.10 = 51.7m³ Total volume = 269m³ The volume required for the 1 in 30 yr is 111m³. No flooding will occur for this even since the volume of the below ground storage elements equate to a volume much higher than 111m³.		
Drainage Hierarchy	The proposed development cannot discharge to ground and no watercourses are available. As such, the development will discharge to the existing surface water sewer on site.		
SuDS Strategy	The proposal will reduce the storm water runoff rate to 2.0 l/s for all events. This will be achieved by providing a flow control unit. Surface water falling onto the front access road will be managed via the lined drainage blanket installed beneath it, ensuring water is safely collected and conveyed without allowing any infiltration into the underlying ground. The lining provides a protective barrier that prevents		

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	mobilising contaminants within the made ground, maintaining separation between surface water and potentially impacted soils. Across the rest of the site, footpaths generally drain onto adjacent soft-landscaped areas, allowing surface water to be managed at shallow levels; however, the footpath at the front of the site drains directly onto the access road, where it is also captured by the lined drainage blanket system. This arrangement ensures robust control of runoff while preventing infiltration in areas of contamination risk.
Conclusion	With the proposed SuDS mitigation measures which have been introduced into the scheme, we believe that the proposed development will reduce local flood risk and therefore be in compliance with the LLFA's current planning policy and the NPPF.

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2. Introduction

This report has been prepared to assess the surface water drainage considerations for the proposed development and to establish an appropriate strategy that responds to the site's ground conditions, contamination constraints, and regulatory requirements. The site is underlain by variable made ground with confirmed areas of hydrocarbon impact, and both historic and recent ground investigations have shown that infiltration into the underlying soils is not feasible or environmentally acceptable. As a result, the drainage design must be based entirely on non-infiltrating measures that prevent the mobilisation of contaminants while providing safe, compliant management of surface water runoff.

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The report outlines the relevant site characteristics, reviews applicable local policy requirements, and presents a drainage solution that manages runoff in a controlled manner, prevents infiltration into contaminated strata, and aligns with the overarching principles of sustainable drainage. The strategy focuses on engineered, lined systems where necessary and incorporates appropriate runoff management tailored to the site's constraints.

3. Site

The site covers an area of 3,532 m² and forms part of a previously fully developed commercial/industrial plot. Historically, the entire site was 100% hard-surfaced, with all areas positively drained via the existing impermeable network. Following the proposed redevelopment, the site layout now incorporates 921 m² of soft, undrained landscape areas and 2,611 m² of hard, drained surfaces, representing a material reduction in impermeable coverage compared with the original condition.

Ground investigations undertaken previously have confirmed that the site is underlain by variable made ground, typically comprising mixed soils, granular fill, and anthropogenic material, overlying the natural strata of the Wittering Formation. These soils are heterogeneous, contain localised contamination, and exhibit perched groundwater in places. As a result, infiltration into the underlying ground is not feasible and must be avoided to prevent the mobilisation of hydrocarbons and other contaminants encountered during both the historic (Southern Testing, 2014) and recent (Lucion, 2025) investigations.

Surface water from the new development is therefore managed exclusively via non-infiltrating drainage measures. Hardstanding areas drain to a lined and controlled drainage system, including the lined drainage blanket beneath the access road, which prevents downward migration of water and isolates the drainage from contaminated strata. The soft landscape areas contribute marginal reductions in runoff rates and volumes but are intentionally kept shallow and unlined to avoid penetration into made ground. Collectively, the updated site arrangement reduces the impermeable footprint while ensuring that all surface water is managed in a controlled, environmentally safe manner consistent with site constraints and

local policy requirements.



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Image 1: Aerial view of site

The site is predominately flat. The topographical survey can be found on Appendix C.

This document is not a flood risk assessment (FRA). An FRA was submitted as part of the planning application No. F/25/99876, and indicates that:

- The site is in Flood Zone 1
- The site is at low risk of flooding from surface water.
- The site very low risk from rivers and sea.

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4. Existing Drainage

A SW sewer (discharge point) is located on the industrial site (to the west of our red line boundary). This was confirmed via a CCTV drainage survey (Appendix D).

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5. Constraints and Opportunities

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The development is influenced by a series of physical, environmental and operational constraints, but it also presents several opportunities to improve the site's overall surface-water management performance when compared with its historic condition. Ground investigations undertaken across the site have confirmed the presence of extensive made ground with localised hydrocarbon contamination, together with highly variable underlying soils and shallow perched groundwater. These factors collectively prevent the use of infiltration-based SuDS, as any downward movement of water would risk mobilising existing contaminants and compromising the underlying Secondary (A) Aquifer. The unpredictable nature of the fill material and the sensitivity of the water environment further restrict the feasibility of naturalised SuDS components such as swales, infiltration basins or unlined conveyance features. Space within the proposed layout is also limited, creating practical constraints on incorporating a wider SuDS "treatment train". As a result, the drainage strategy must be based on non-infiltrating, fully lined systems, and only a single engineered treatment stage is technically achievable and environmentally safe.

Despite these constraints, the redevelopment introduces several valuable opportunities. Historically, the site was 100% hard surfaced, whereas the proposed layout incorporates 921m² of soft landscape, reducing total impermeable area and supporting a modest reduction in runoff generation. The installation of a lined drainage blanket beneath the access road provides a robust, controlled means of collecting and conveying surface water without allowing infiltration into contaminated ground, representing a substantial improvement over the legacy drainage arrangement. Although multiple naturalised treatment stages cannot be provided, the proposed system still offers a significant improvement in water quality management compared with the previous unmitigated runoff. The redevelopment also enables outdated and fragmented drainage infrastructure to be replaced with a modern, compliant system specifically designed to manage contamination risk, control runoff, and meet local policy requirements. Additionally, the introduction of soft landscaped areas, enhances site amenity, assists with shallow interception of rainfall, and contributes positively to the overall drainage performance. Collectively, these opportunities ensure that the proposed system delivers safe, controlled, and environmentally responsible surface-water management within the limitations imposed by the site's ground conditions.

6. Applications of the Hierarchy of Drainage Control

	Hierarchy	Discussions on Suitability	Suitable	Adopted
1	store rainwater for later use	Not practical	No	No
2	use infiltration techniques, such as porous surfaces in non-clay areas	Due to the presence of Clay, infiltration not viable in clays.	No	No
3	attenuate rainwater in ponds or open water features for gradual release	Not viable as there is not enough space to do so.	No	No
4	attenuate rainwater by storing in tanks or sealed water features for gradual release	Surface Water to be stored in geocell and a stone tank and released slowly through an orifice and vortex device.	Yes	Yes
5	discharge rainwater direct to a watercourse	None available	No	No
6	discharge rainwater to a surface water sewer/drain	Discharge to the existing SW discharge point on site.	Yes	Yes
7	discharge rainwater to the combined sewer		No	No

7. SuDS Treatment Train & Water Quality

Rainwater falling on the permeable paved areas and driveway will filter through the gap graded stone base.

Here are the indices from the Index Based Analysis using The Simple Index Method as Chapter 26 of the SuDS Manual.

Source	Pollution Indices T26.2 SuDS Manual			
Land Use	Pollutant Risk Level	TTS	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Car Parking	Low	0.5	0.4	0.4

The treatment provided by the permeable paving and stone drainage layer is taken from the SuDS manual.

Source	Treatment Indices T26.3 SuDS Manual		
SuDS Component	TTS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7

It can be seen that the treatment index for the SuDS component is bigger than the pollution hazard index.

8. Amenity and Biodiversity

The proposed development introduces defined soft-landscaped areas that improve the site's visual quality and provide limited but measurable biodiversity enhancement compared with the previous fully hard-surfaced condition. New planting zones are positioned at the site entrance, along boundaries, and within the central courtyard. These areas provide visual screening, soften building edges, and create clear pedestrian routes without affecting the drainage strategy.

Biodiversity benefits are modest but meaningful for a commercial site. The inclusion of mixed planting blocks, boundary hedging, climbers on retaining walls, and small tree groups increases vegetation coverage and introduces basic habitat opportunities where none previously existed. Although the site cannot support infiltration SuDS or ecological water features due to contamination constraints, the landscape proposals still deliver improved green cover, support general urban wildlife, and contribute positively to environmental quality without compromising engineered drainage requirements.

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9. Description of the Sustainable Drainage System

The proposed Sustainable Drainage System is a fully non-infiltrating, lined network designed in response to the site's made-ground conditions, hydrocarbon contamination and perched groundwater. Infiltration SuDS are not used anywhere on site to avoid creating pathways for contaminant mobilisation.

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Surface water runoff from roofs, hardstanding and the main access road is collected through a sealed piped system and conveyed to a lined drainage blanket beneath the permeable access road. This feature provides the single feasible treatment stage for the development and delivers controlled conveyance and settlement prior to flow control.

Downstream, a flow-control device limits discharge to the allowable rate of 2.0L/s.

Storage Provision

To meet the required controlled run-off rate of 2.00 L/s via a flow control unit. The system incorporates below-ground storage, the lined drainage blanket, and limited above-ground storage during extreme events.

The total available storage volume is 269 m³, provided as follows:

Geocellular Tank (below ground)

Plan area: 150 m²

Height: 1.20 m

Effective volume: $150 \times 1.20 \times 0.95 = 171 \text{ m}^3$

Lined Drainage Blanket (below ground)

Plan area: 517 m²

Height: 0.30 m

Effective volume: $517 \times 0.30 \times 0.30 = 46.5 \text{ m}^3$

Above Access Road (above ground)

Plan area: 517 m²

Height: 0.10 m

Effective volume: $517 \times 0.10 = 51.7 \text{ m}^3$

Total Storage Volume: 269 m³

For comparison, the storage requirement for the 1 in 30-year event is 111 m³. The provided storage significantly exceeds this requirement, ensuring no flooding occurs from such events even without the above-ground allowance.

Supporting Drawings

The full surface water drainage layout, storage arrangement, and flow control system are illustrated on the 25042-13100-series drawings, included in Appendix E.

10. Hydraulic Calculations and Parameters

Calculations are included in Appendix F. Qbar rural is calculated in accordance with the “Flood estimation for small catchments Marshall DCW and Bayliss AC. IOH Report No.124. Institute of hydrology, Wallingford, 1994”.

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Run off Rates	Greenfield (l/s)
Qbar	1.95
1 in 1	1.65
1 in 30	4.67
1 in 100	6.21

The uplift for Climate Change was considered in the range 20% Centre to 40% Upper (NPPF) and a value of 40% was selected given the sensitivity of the site.

The volume to be stored is considered by balancing storm inflows and limited outflows with a hydrograph based on the Wallingford Modified Rational Method.

The flow/head characteristics of the flow control devices are used in calculating storage volumes.

The total volume required is 235m³. No reduction is made for the interception storage.

Time for tank to reach half empty is 1170 minutes (19.5 hours) after a 360minute 1 in 100 year + CC storm.

Abstracted from the spreadsheets in the hydraulic calculations the comparative flow and volumes are tabulated below.

Run off Rates	Proposed Q _{PEAK} (l/s)	Greenfield (l/s)	Existing Q _{PEAK} (l/s)	Betterment (%)
1 in 1	2.0	1.65	68.95	97%
1 in 30	2.0	4.67	161.24	99%
1 in 100	2.0	6.21	203.38	99%
100 + CC	2.0			

11. Exceedance Flows

The proposed exceedance flows are as per the existing being towards the west of the site.

Exceedance plan included in Appendix H.

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12. Management of the SuDS

The SuDS is intended to be simple and robust. The system will need to be maintained regularly to ensure that the design capacity and attenuation characteristics provide the required storage volume. Management and maintenance of the system will be managed by building management.

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Further guidance on management of SuDS can be found in the SuDS Manual published by CIRIA as Report C735. It is available as a free download from

http://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

13. Maintenance of the SuDS

A SuDS maintenance table is attached below and on the drawings.

SuDS maintenance may be considered to be:

- Regular maintenance, including inspections,
- Occasional Maintenance, and
- Remedial Maintenance.

Items described as regular or occasional can be included in the landscape maintenance. Items described as remedial may require design and result in a capital expenditure.

The frequency of maintenance may require to be ascertained after the system has been in use.

Where SuDS elements need to be replaced then the design drawings should be used to specify replacement material.

At the end of construction this schedule will be updated as required, combined with a plan and laminated for maintenance contractors as described in the Enfield guide.

Maintenance Schedule starts on next page.

	SuDS Element	Activity	Frequency	Notes
1	Gullies & Drainage Channels	Inspect to check for sediment and empty if full.	Annually or as required.	Routine/Occasional Material removed should be disposed of as contaminated.
2	Underground Drains	Pipes to be cleaned if blocked	As required	Occasional
3	Flow Control Unit	Inspect for blocked flow control unit in Spring and Autumn. Unblock if necessary.	Twice a year.	Routine/Remedial <i>Use chain secured under the manhole cover to open bypass to drain manhole before unblocking flow</i>

				control unit
4	Permeable Paving	Clean of leaves and debris	Every other month or as required	Routine Maintenance
5	Permeable Paving	Vacuum Cleaning the surface	After first, third and fifth years then as required.	Routine Maintenance
6	Stone Drainage Blanket	Lifted, cleaned of silt and re-laid.	After 20 to 40 years or when sign shows that no longer functioning.	Remedial Maintenance Trial area be exposed and checked when paving re-laid. Material removed should be disposed of as contaminated.
7	Geocell Tank	Expose, clean of silt, re-lay if needed	Only if performance drops significantly	Rare—only required if severe siltation occurs

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Appendix A. Existing and Proposed Drawings

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G1	First Issue	21-07-25	EO	SS
Rev	Comments	Date	Dr	Ch

Existing Site Plan

WKDRY- BSL - ZZ - XX - DR - A - 1003 - G1
Workdry HQ Office Redevelopment 25046
Bournemouth Road, Chandlers Ford 1:200 @ A1
Workdry International PLANNING

Suite E, Ferry House
Canute Road
Southampton
Hampshire
SO14 3FJ

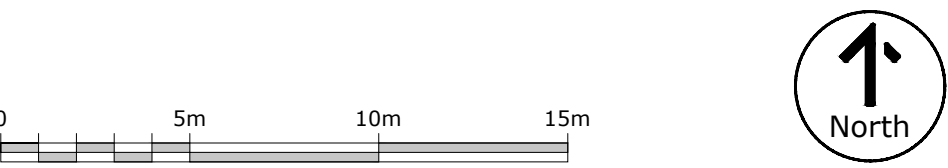
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1. Replacement low-level brickwork wall.
 2. Existing masonry features to be overlaid with brickwork to match proposed building.
 3. 3no. Proposed flag poles
 4. Christmas tree location (seasonal).
 5. Landscape margin to building frontage to provide buffer to opening doors and projecting features
 6. Electrical Vehicle Charging Point (typical)
 7. Managed site gates, closed after hours for security
 8. Security fence and personnel/maintenance gate.
 9. Allow to rebuild existing boundary wall with matching brickwork.
 10. Banked soft landscaping to mitigate level changes
 11. Brick faced features to mitigate level changes.
 12. Additional steps and railings to mitigate level changes.
 13. New retaining wall is brick faced.
 14. Re-align pedestrian route around proposals
 15. Automated barrier, controlled by neighbouring (existing) security hut
 16. Amenity area

Refer to drawing
WKDRY-IND-00-DR-L-1000
Proposed Landscape Masterplan
for further details



G1	Planning Issue	21-07-25	EO	SS
Rev	Comments	Date	Dr	Ch

Proposed Site Plan

WKDRY- BSL - ZZ - XX - DR - A - 1006 - G1

Workdry HQ Office Redevelopment 25046

Bournemouth Road, Chandlers Ford 1:200 @ A1

Workdry International PLANNING

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Appendix B. Proposed Landscape Plan

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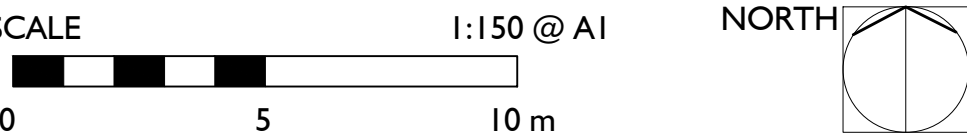
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- KEY**
- Proposed fastigate tree eg. Hornbeam
 - Other proposed native trees
 - Proposed Portuguese Laurel hedge
 - Proposed Bay Laurel hedge
 - Proposed shrub/ mixed planting
 - Proposed ground cover planting
 - Proposed ground cover planting with trailing plants
 - Proposed native thicket mix
 - Proposed specimen shrub planting
 - Proposed climbing plants
 - Proposed Green Wall
 - Proposed permeable asphalt surfacing to road
 - Proposed block paving to parking areas
 - Proposed flag paving to building perimeter and courtyard
 - Proposed pergola structure
 - Proposed raised planter

GENERAL NOTES:
This drawing is to be read in conjunction with all other relevant disciplines drawings, schedules, specifications and supporting information. Any discrepancies are to be reported to Indigo Landscape Architects Limited and resolution sought prior to proceeding. This drawing is subject to copyright.



P02	Issued for Planning	2025-10-08	ML	CB
P01	Issued for Planning	2025-07-29	ML	CB
rev	description	date	by	chk

project
WORKDRY INTERNATIONAL HQ

client
BOYLE AND SUMMERS

drawing title
PROPOSED LANDSCAPE MASTERPLAN

project	org	lvi	type	role	dwg no.	revision	scale
WKDRY-IND-00-DR-L					1000	P02	1:150@A1

Appendix C. Site Survey/Topo

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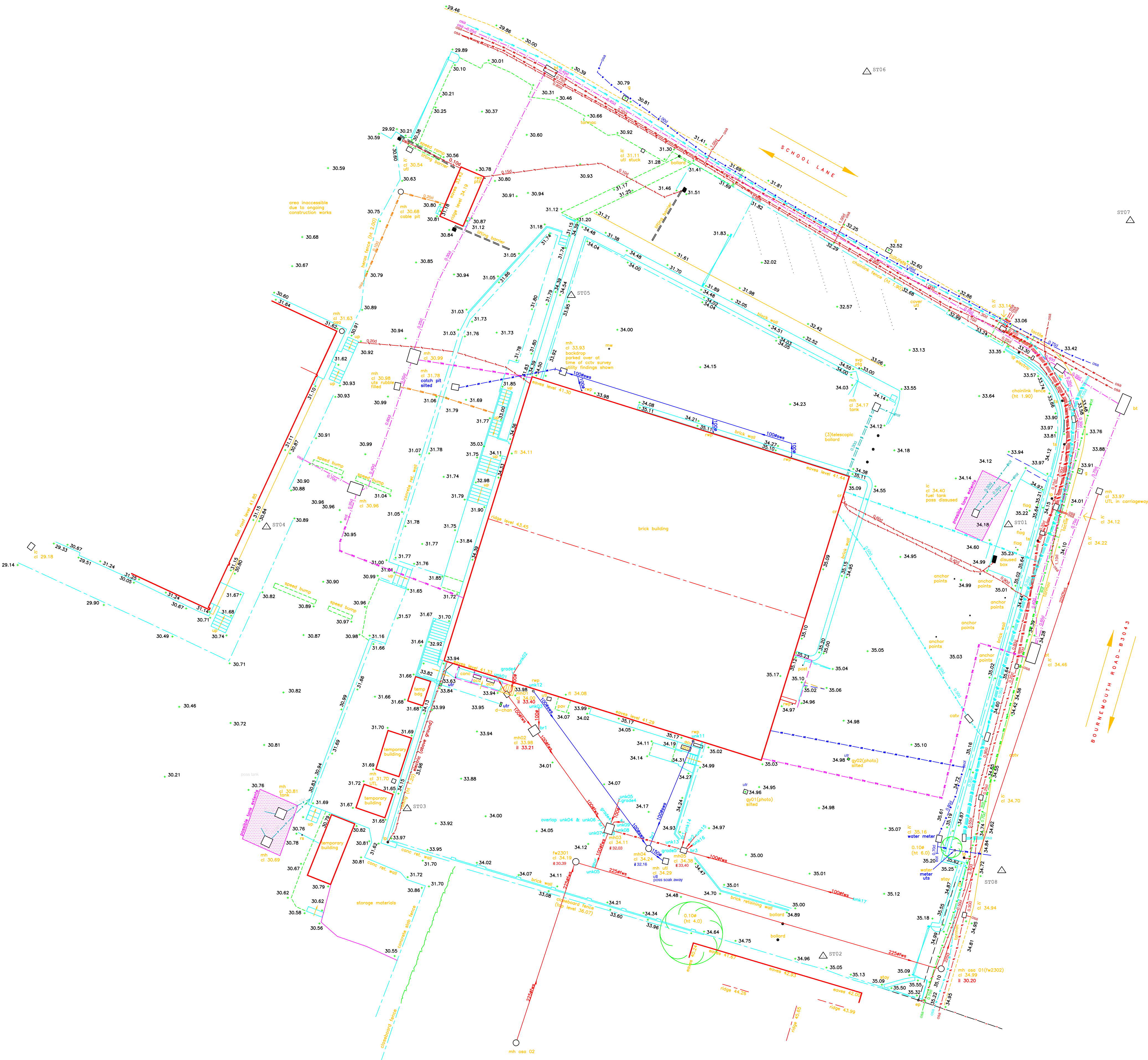
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NOTES

GENERAL NOTES :-

ALL LEVELS ARE IN METRES DERIVED FROM GPS TRANSFORMATION.
GRID COORDINATES ARE ORDNANCE SURVEY NATIONAL GRID DERIVED FROM GPS TRANSFORMATION.
GPS COORDINATES AND LEVELS SET AT ST03 (NO SCALE FACTOR APPLIED)
THIS DRAWING HAS BEEN PRODUCED WITH A PLOT SCALE ACCURACY OF 1:200
SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS / DETAILS SURVEYED FROM SURFACE
INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED
TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL
OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL
VARIATION, AND SHOULD BE TREATED AS APPROXIMATE
THE SURVEYOR WILL NOT BE RESPONSIBLE FOR THE OMISSION OF DETAILS OBSERVED DURING SITE SURVEY
RICS PROFESSIONAL STANDARDS 3RD EDITION RULE 1.19 APPLIES TO THIS SURVEY.

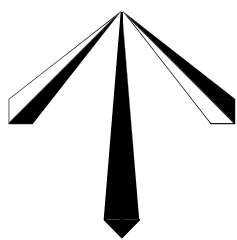
TOPOGRAPHICAL SURVEY/UTILITY KEY :-

(ht) = height
d = diameter
p = post trap
a/s = above ground
a/r = assumed route
av = air valve
bb = bellina beacon
bd = back drop
bl = bed level
bol = bollard
bos = bottom of shaft
bt = telecom
c/h fence = closeboard fence
c/box = control box
ctv = cable television
cl = cover level
con = conifer
cr = cable riser
cws = combined water sewer
d/chan = drainage channel
ep = electric junction box
elec = electric
eol = end of trace
ep = electric pole
er = earth rod
f/bd = flower bed
fh = fire hydrant
fl = floor level
fs = fire switch
fw = foul water sewer
g = gully
g/run = gully run
gr = gas riser
h/chestnut = horse chestnut
h/thorn = hawthorn
ic = inspection cover
il = invert level
il = illuminated
int = interceptor
lp = lamp post
mh = manhole cover
mw = marker
np = no visible pipes
o/h = over head
ol = off lot
osa = off survey area
OSBM = ordnance survey bench mark
p & r fence = post & rail fence
pd = pit depth
pr = pipe riser
p/s = pipe to ground
p/sa = pipe to surface
ra = road sign
ret wall = retaining wall
rs = road sign
rwp = rain water pipe
s/birch = silver birch
s/p = safety pinning
sag = sagging
sec fence = security fence
sfc = soil filled chamber
sl = spot light
st = stop top
sv = stop valve
sw = soil vent pipe
sas = storm water sewer
TBM = temporary bench mark
tfr = taken from records
tl = threshold level
top = top of cap
top = top of tank
tp = telecom pole
ts = traffic signal
V/A = trench scar
u/s = understore
ut = unable to lift
ut = unable to road
uta = unable to survey
utl = unable to trace
vp = vent pipe
w/c = water filled chamber
wl = water level
wm = water meter
wp = waste pipe
wr = water riser

SURVEY CONTROL :-

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	443299.633	120368.030	35.239
ST02	443281.931	120326.824	35.018
ST03	443242.196	120340.911	33.953
ST04	443228.747	120367.820	30.830
ST05	443257.865	120389.941	33.990
ST06	443286.110	120411.284	32.261
ST07	443311.268	120397.084	33.181
ST08	443295.912	120334.564	34.856

NORTH



UTILITY SURVEY KEY :-

HATCHED AREA	WATER PIPE	ELECTRIC CABLE
BOREHOLE	FOUL SEWER	WATER PIPE
CPT	STORM SEWER	FOUL SEWER
TRIAL PIT	COMBINED SEWER	COMBINED SEWER
HAND PIT	DUCTS	DUCTS
WINDOW SAMPLE	CABLE TELEVISION	CABLE TELEVISION
	TELECOM CABLE	TELECOM CABLE
	DATA CABLE	DATA CABLE
	UNIDENTIFIED SERVICE	UNIDENTIFIED SERVICE
	OTHER	OTHER
	CTV	CTV
	TRAFFIC LIGHT	TRAFFIC LIGHT
	OFFSET FILL	OFFSET FILL
	VENT	VENT
	FUEL PIPE	FUEL PIPE
	GAUGE LINES	GAUGE LINES
	PIPE	PIPE
	AR	AR
	TAKEN FROM RECORDS	TAKEN FROM RECORDS

DISCLAIMER :-

Electromagnetic techniques have been used in the location of underground services. The results are not infallible and trial excavations should be carried out to confirm service identification, positions and particularly depths, where these are critical. The completeness of the underground services information cannot be guaranteed.
This method of survey does not differentiate between live and dead services, and as such all services should be treated as live. This drawing may not include the location of all public services that may cross the site, therefore the relevant service drawings should be obtained from the appropriate utility company and used in conjunction with this drawing.
Private service pipes and cables in highways are not shown, but their presence should be anticipated.
Additional below ground structures or obstructions not shown on this drawing may be present. Reference should be made to historical plans and as-built drawings.
Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document avoiding dangers from underground services.
Please note that factors such as ground conditions, proximity of other utilities, material and method of construction have an influence on the quality of the data collected on site.
TSA Standards - "A utility mapping survey can be considered a 100% accurate depiction of the sub-surface environment, and the use of these drawings does not remove the requirement for the use of safe digging techniques at all times, in line with requirements of HSG47 and current CDM regulations".

UTILITY NOTES

GAS HAS BEEN TRACED IN PARTS, SMALL AMOUNT HAS BEEN TAKEN FROM RECORD.
UNABLE TO LOCATE WATER TO BUILDING.
UNABLE TO LOCATE GAS TO BUILDING.
CATV DOWN SCHOOL LOANE HAS BEEN TAKEN FROM RECORD, NO EVIDENCE OF THIS ON SITE.



Lucion Survey Ltd
Protecting People and Planet

Contact Details
Tel: 01926 810811 Email: mail@luciongroup.com Website: www.luciongroup.com

Client DAVE CAGE.

Project WORKORY, SCHOOL LANE, CHANDLERS FORD, EASTLEIGH, SO53 4DG.

Title TOPOGRAPHICAL & UTILITY SURVEY.

Date JULY 2025. Revisions

Scale 1:200@A1

Dwg No 132612/1

Surveyor S.P./T.J.

Checked J.S.

TOPOGRAPHICAL / BUILDING / 3D LASER SCANNING & REVIT MODELLING
UTILITY / CCTV DRAINAGE SURVEYS & REMEDIAL DRAINAGE REPAIRS

Appendix D. CCTV Drainage Survey

Can be provided on request

Chris Christou
CEng MStructE
Director

Richard Russell
CEng MStructE
Director

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Appendix E. SuDS Drawings

Chris Christou

CEng MlstructE
Director

Richard Russell

CEng MlstructE
Director

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MANHOLE SCHEDULE										
MANHOLE N°	APPROX. COVER LEVEL	INVERT LEVEL IN	INVERT LEVEL OUT	DEPTH (mm)	PIPE SIZE OUT (mm)	GRADIENT OUT	TYPE/COMMENT		COVER	ADDITIONAL NOTES
							SIZE / Ø	TYPE		
ESMH01	31.03	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	Ex. T.B.C.	EXISTING MANHOLE SILTED UP, TO BE CLEARED AND SURVEYED PRIOR TO COMMENCING WORKS. IF FOUND TO BE ADEQUATE RETAIN AND ADJUST COVER TO NEW LEVELS, IN INADEQUATE THEN REPLACE WITH NEW MANHOLE T.B.C.
PSMH01	34.22	T.B.C.	T.B.C.	T.B.C.	150Ø	1:100	1050Ø	P.C.C. RING (DET. 1)	600x600 DUCTILE IRON 'C250'	"R"
PSMH02	34.20	32.30	32.30	1900	150Ø	1:100	450Ø	PLASTIC RING NEIC (DET. 4)	350Ø PLASTIC 'B125'	"R"
PSMH03	34.22	32.40	32.40	2120	150Ø	1:100	1050Ø	P.C.C. RING WITH F.C.U. (DET. 2)	600x600 DUCTILE IRON 'C250'	"R", ADDITIONAL 300mm DEPTH TO ACCOMMODATE F.C.U.
PSMH04	34.22	32.64	32.64	1780	150Ø	1:100	450Ø	PLASTIC RING NEIC WITH SILT PIT (DET. 3)	350Ø PLASTIC 'B125'	"R", ADDITIONAL 200mm DEPTH DUE TO SILT PIT
PSMH05	34.22	33.62	33.62	600	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH06	34.22	33.62	33.62	600	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH07	34.22	32.92	32.92	600	150Ø	1:100	450Ø	PLASTIC RING NEIC (DET. 4)	350Ø PLASTIC 'B125'	"R"
PSMH08	34.22	33.62	33.62	600	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH09	34.22	33.62	33.62	600	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH10	34.20	32.40	32.40	2000	225Ø	1:100	600Ø	PLASTIC RING NEIC WITH SILT PIT (DET. 3)	350Ø PLASTIC 'B125'	"R", ADDITIONAL 200mm DEPTH DUE TO SILT PIT
PSMH11	34.20	33.60	33.60	600	100Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH12	34.20	33.60	33.60	600	100Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH13	34.20	32.92	32.92	1480	225Ø	1:35	600Ø	PLASTIC RING NEIC (DET. 4)	350Ø PLASTIC 'B125'	"R"
PSMH14	34.08	33.48	33.48	600	100Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø DUCTILE IRON 'C250'	"R"
PSMH15	34.20	33.60	33.60	600	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH16	34.20	33.60	33.60	600	225Ø	1:50	450Ø	PLASTIC RING UIC (DET. 4)	450Ø PLASTIC 'B125'	"R"
PSMH17	30.90	T.B.C.	T.B.C.	T.B.C.	150Ø	1:100	450Ø	PLASTIC RING UIC (DET. 4)	450Ø DUCTILE IRON 'C250'	
ANNOTATIONS					MANHOLE COVERS TO BS EN 124					
"R"	ALLOW FOR ALTERNATIVE RECESSED STEEL COVER, INFILLED TO MATCH SURROUNDING EXTERNAL FINISHES				CLASS A	LIGHT DUTY	PEDESTRIAN ONLY			
					CLASS B	MEDIUM DUTY	LIGHT VEHICLES			
P.C.C. RING/ TRAD./NEIC/ UIC/SIC	SEE 130300 FOR CHAMBER CONSTRUCTION DET.S				CLASS C	HEAVY DUTY	CARRIAGEWAY <0.5m FROM KERB			
					CLASS D	HEAVY DUTY	CARRIAGEWAY & HARD SHOULDERS			
NOTE:	ALL CATCH/SILT PIT MANHOLES ARE 200mm DEEPER THAN INVERT LEVELS SHOWN (REFER TO DETAIL X)									

MAINTENANCE SCHEDULE			
SuDS ELEMENT	ACTIVITY	FREQUENCY	NOTES
GULLIES & DRAINAGE CHANNELS	INSPECT TO CHECK FOR SEDIMENT AND EMPTY IF FULL	ANNUALLY OR AS REQUIRED	MATERIAL REMOVED SHOULD BE DISPOSED OF AS CONTAMINATED WASTE
UNDERGROUND DRAINS	PIPES TO BE CLEANED IF BLOCKED	AS REQUIRED	OCCASIONAL
PERMEABLE PAVING	BRUSHING CLEAN OF LEAVES AND DEBRIS	THREE TIMES PER YEAR OR AS REQUIRED	ROUTINE MAINTENANCE
	VACUUM CLEANING THE SURFACE	FIRST, THIRD, AND FIFTH YEARS THEN AS REQUIRED	ROUTINE MAINTENANCE PER MANUFACTURER GUIDANCE
	REMOVE WEEDS/STABILISE EDGES	AS REQUIRED	PART OF LANDSCAPE MAINTENANCE
STONE DRAINAGE BLANKET	LIFTED, CLEANED OF SILT AND RE-LAID	AFTER 20 TO 40 YEARS OR IF SIGNS OF FAILURE	REMEDIAL MAINTENANCE. DISPOSE OF WASTE APPROPRIATELY
GEOCELLULAR TANK	EXPOSED, CLEANED OF SILT AND RE-LAID IF NEEDED	ONLY IF PERFORMANCE DROPS SIGNIFICANTLY	RARE--ONLY REQUIRED IF SEVERE SILTATION OCCURS
INITIAL INSPECTION	INITIAL SYSTEM INSPECTION	MONTHLY FOR FIRST THREE MONTHS; 48 HOURS AFTER STORMS	ENSURES BASELINE PERFORMANCE
PAVING OPERATION INSPECTION	INSPECT FOR POOR OPERATION/WEED GROWTH	ANUALLY	TAKE REMEDIAL ACTION IF REQUIRED
SEDIMENT INSPECTION	INSPECT SILT ACCUMULATION AND ADJUST BRUSHING FREQUENCY	ANUALLY	ADJUST MAINTENANCE BASED ON FINDINGS
INSPECT CHAMBERS	MONITOR INSPECTION CHAMBERS	ANUALLY	PART OF SYSTEM MONITORING

FLOW RESTRICTOR REQUIREMENTS			
MANHOLE N°	FLOW LIMIT (l/s)	MAXIMUM HEAD (m)	INTEGRAL BYPASS
PSMH03	2.0	1.6	"HYDRO-BRAKE OPTIMUM SHE-0060-2000-1600-2000"

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P02	Preliminary	JL	CC	2026/03/30
P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
Drainage Notes Sheet 1

AMA Project N°:
25042

Drawn By:
JL

First Issued:
Mar 2026

Status:
S2

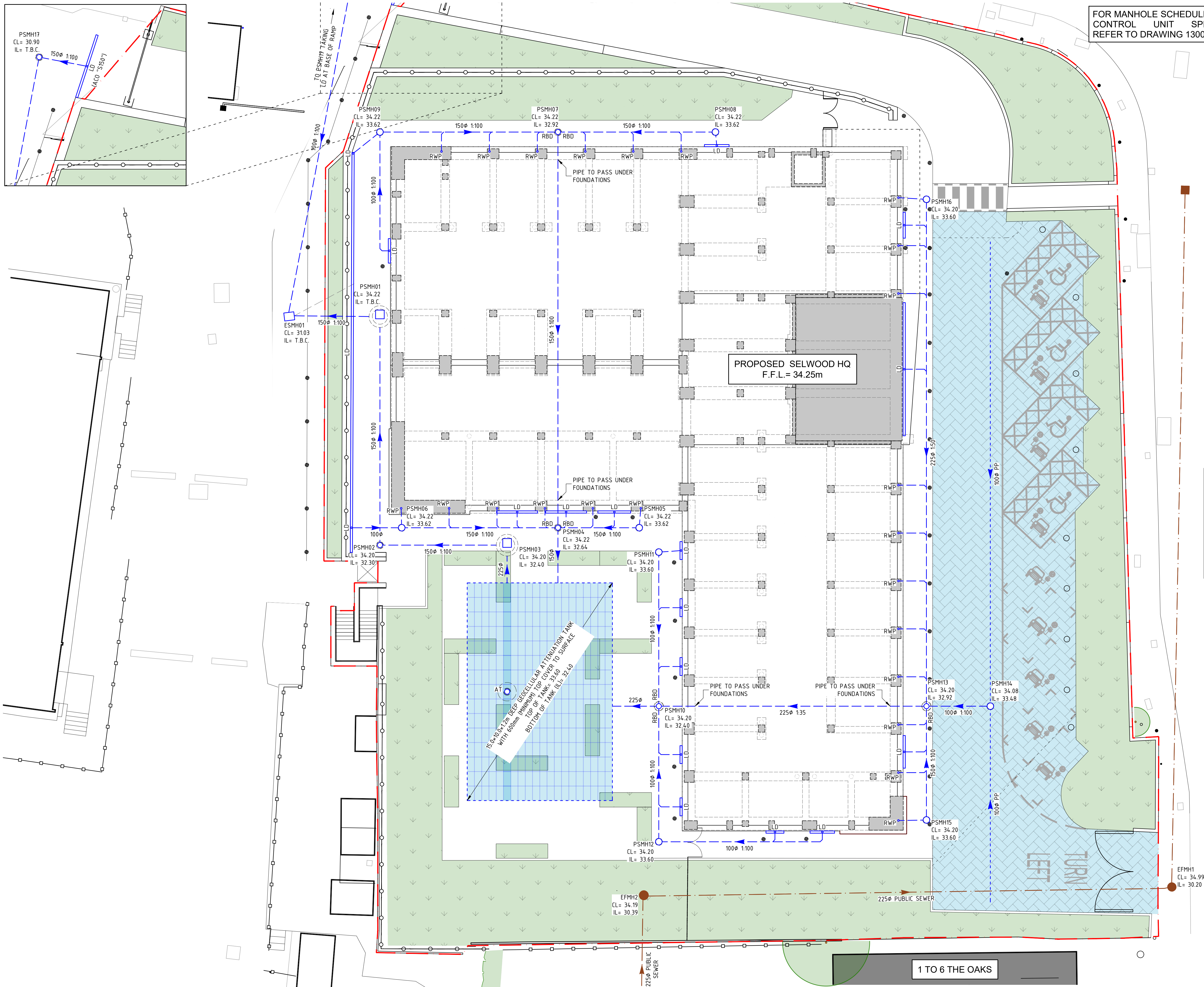
Checked By:
CC

Scale @ A1:
N/A

Revision:
P02

AMA Consulting Engineers

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DRAINAGE NOTES

NOTATION KEY

- FOUL WATER PIPE RUN
- FOUL WATER MANHOLE OR INSPECTION CHAMBER
- SURFACE WATER PIPE RUN
- SURFACE WATER MANHOLE OR INSPECTION CHAMBER
- RWP: RAIN WATER PIPE
- SVP: SOIL VENT PIPE
- SS: STUB STACK
- LD: LINEAR DRAIN (ACO OR SIMILAR)
- TG: TRAPPED GULLY
- VBD: VERTICAL BACKDROP
- RBD: RAMPED BACKDROP
- AT: ACCESS TURRET (TO GEOCELLULAR TANK)
- EFMH: EXISTING FOUL WATER MANHOLE
- PFMH: PROPOSED FOUL WATER MANHOLE
- PSMH: PROPOSED SURFACE WATER MANHOLE
- P.C.C. RING: PRECAST CONCRETE RING CHAMBER
- NEIC: NON-ENTRY INSPECTION CHAMBER (PLASTIC)
- UIC: UNIVERSAL INSPECTION CHAMBER (PLASTIC)
- SIC: SHALLOW INSPECTION CHAMBER (PLASTIC)

SPECIFICATION

1. MAIN FOUL DRAINS AND BRANCHES TO TOILETS ARE TO BE 100mm NOMINAL DIAMETER LAID AT A GRADIENT NOT FLATTER THAN 1:70 WITH BRANCHES TO OTHER OUTLETS LAID AT 1:40 (FLOW RATE <1l/s) U.N.O.
2. MAIN SURFACE DRAINS AND BRANCHES ARE TO BE 100mm NOMINAL DIAMETER LAID AT A GRADIENT NOT FLATTER THAN 1:100 U.N.O.
3. DRAINS ARE TO BE CONSTRUCTED USING FLEXIBLE UPVC PIPES TO BS4660 OR VITRIFIED CLAY PIPES TO BS 65 WITH FLEXIBLE JOINTS BEDDED AND BACKFILLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND BS 8301.
4. 100mm RIGID PIPES WITH LESS THAN 300mm COVER OR PIPES OF 150mm OR GREATER DIAMETER WITH LESS THAN 600mm COVER ARE TO BE SURROUNDED BY 150mm OF CONCRETE WITH MOVEMENT JOINTS PROVIDED AT EVERY PIPE JOINT.
5. FLEXIBLE PIPES WITH LESS THAN 600mm COVER ARE TO BE SURROUNDED WITH CONCRETE OR TO HAVE CONCRETE PAVING SLABS LAID AS BRIDGING ABOVE THE PIPE. PIPES UNDER BUILDINGS ARE TO BE SURROUNDED WITH 100mm MIN. OF GRANULAR MATERIAL.
6. ACCESS TO DRAINS MAY PROVIDED BY VITRIFIED CLAY, GRP OR POLYPROPYLENE INSPECTION CHAMBERS TO BS 7158, OR MANHOLES CONSTRUCTED USING CLASS B ENGINEERING BRICKS TO BS 3921, OR PRECAST CONCRETE SECTIONS TO BS 5911, SURROUNDED WITH 150mm OF CONCRETE MINIMUM DIMENSIONS TO CONFORM TO TABLE 8 OF BS 8301. COVERS AND FRAMES FOR MANHOLES/INSPECTION CHAMBERS MUST COMPLY WITH THE APPROPRIATE LOADING GRADE OF BS 4397 OR BS 5911.
7. PROVIDE GULLIES AND RWP'S WITH RODDABLE ACCESS.
8. ALL PIPES THAT CONNECT TO MAIN RUN DRAINAGE MANHOLES TO BE FIXED 'CROWNS ADJACENT'.
9. CONCRETE BEDDING & SURROUND TO BE MIX TYPE GEN 1 TO TABLE 6 OF BS 5328-PART 2 U.N.O. IF A DIFFERENT 'GEN' MIX IS SPECIFIED IT WILL BE TO THE ABOVE TABLE.
10. ALL RWP'S TO CONNECT INTO RODDABLE GULLIES.
11. VENTILATION OF FOUL WATER SYSTEM TO BE CONFIRMED AND DESIGNED BY OTHERS TO COMPLY WITH BUILDING REGS.

P02	Preliminary	JL	CC	2026/03/30
P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

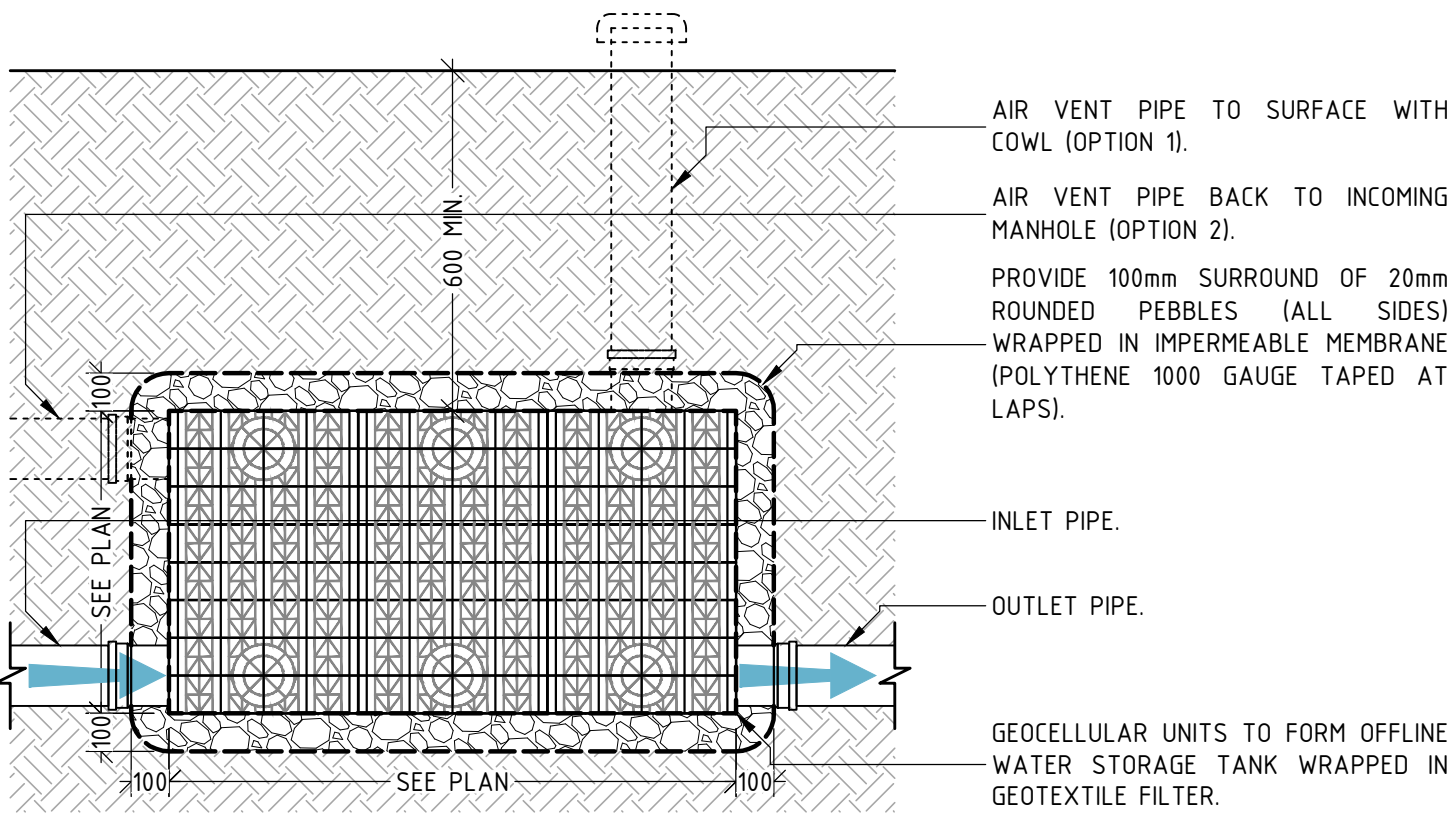
Project Name:
Selwood HQ

Drawing Title:
Drainage G.A. Sheet 1
Proposed Site Drainage Layout

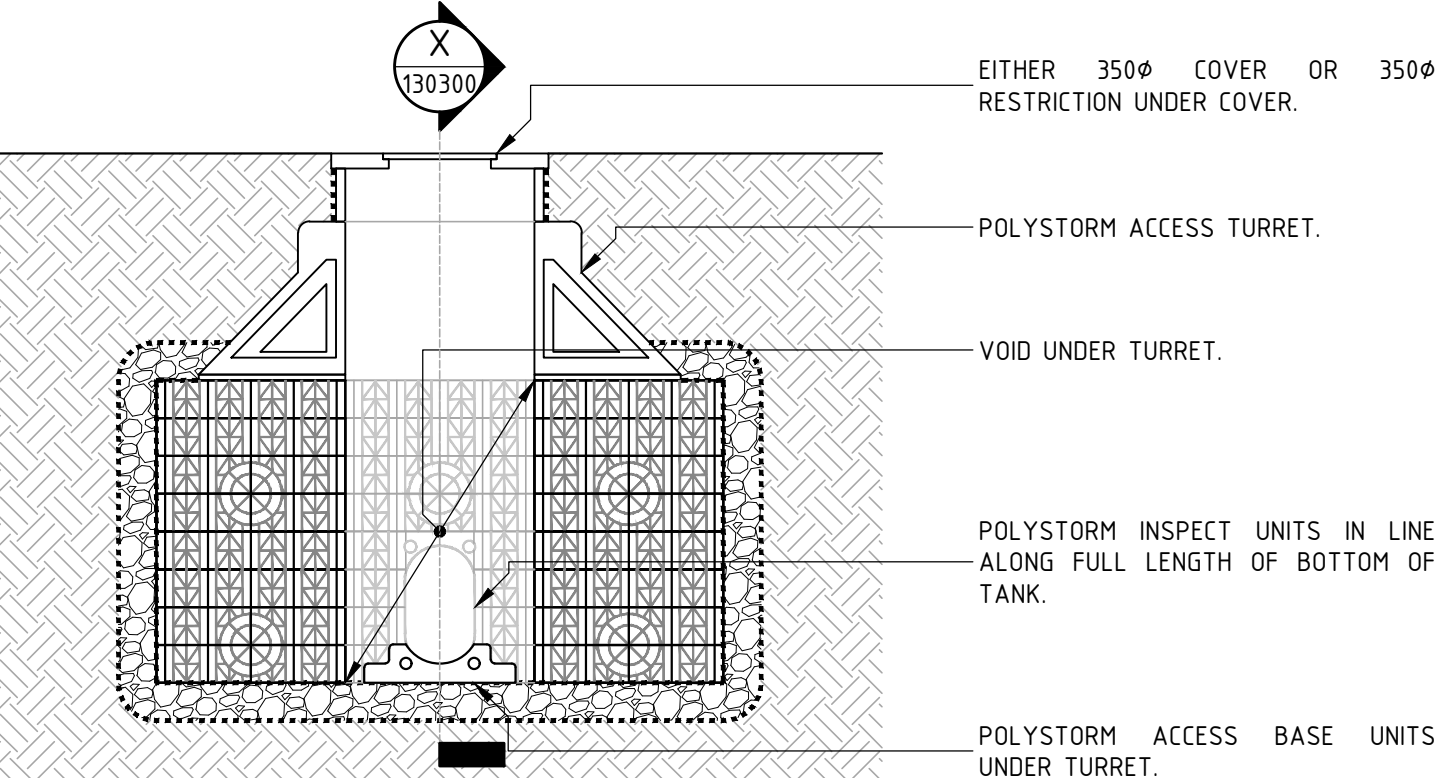
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Drawn By:	JL	Checked By: CC
First Issued:	Mar 2026	Scale @ A1: 1:125
Status:	S2	P02
Revision:		6A Nesbitts Alley, Hadley, Barnet, EN5 5XG +44(0)20 8361 8827 www.amad.co.uk

BIM Document Ref:
25042 - AMA - 01 - ZZ - DR - D - 130100
PROJECT N° - ORIGINATOR - VOLUME - LEVEL - FILE TYPE - ROLE - DRAWING N°

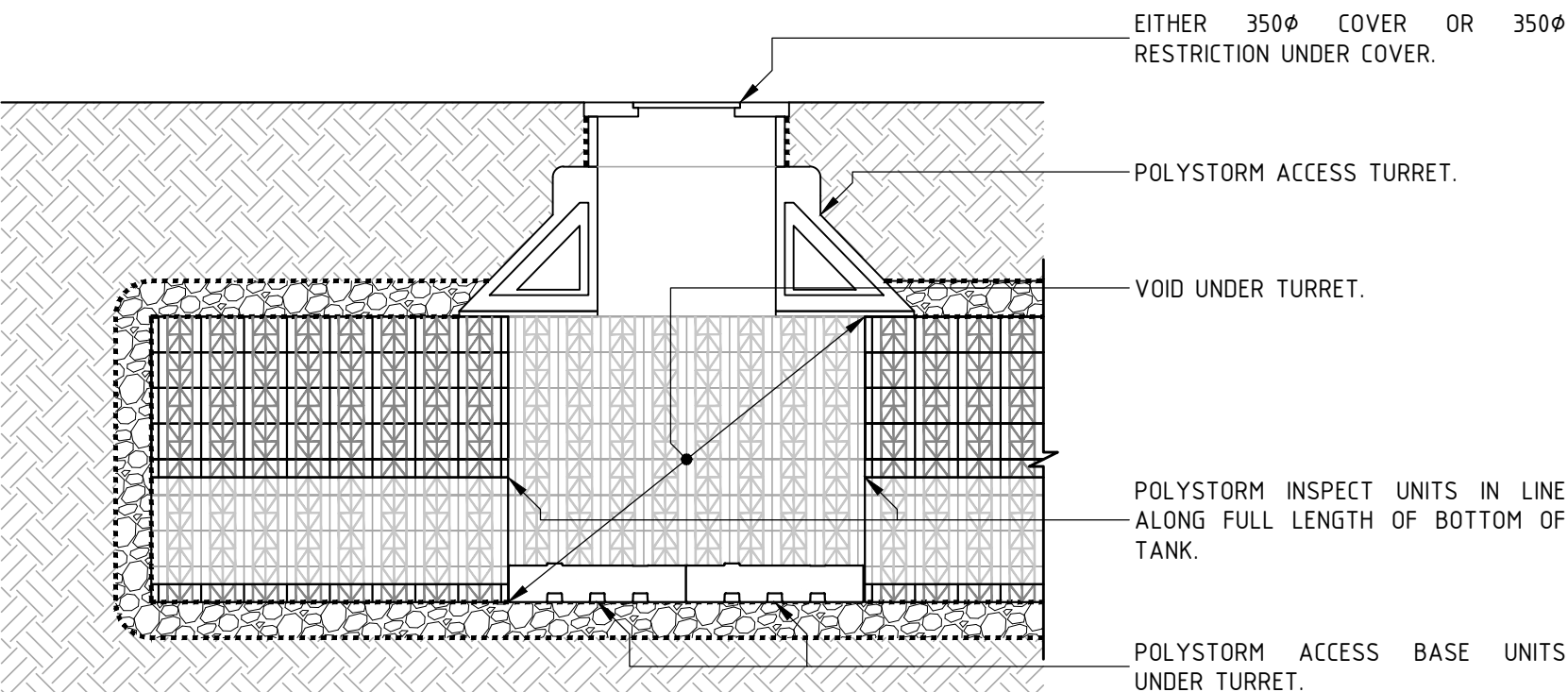
TYPICAL ATTENUATION TANK
BUILT IN GEOCELLULAR UNITS (SECTION)
NOT TO SCALE



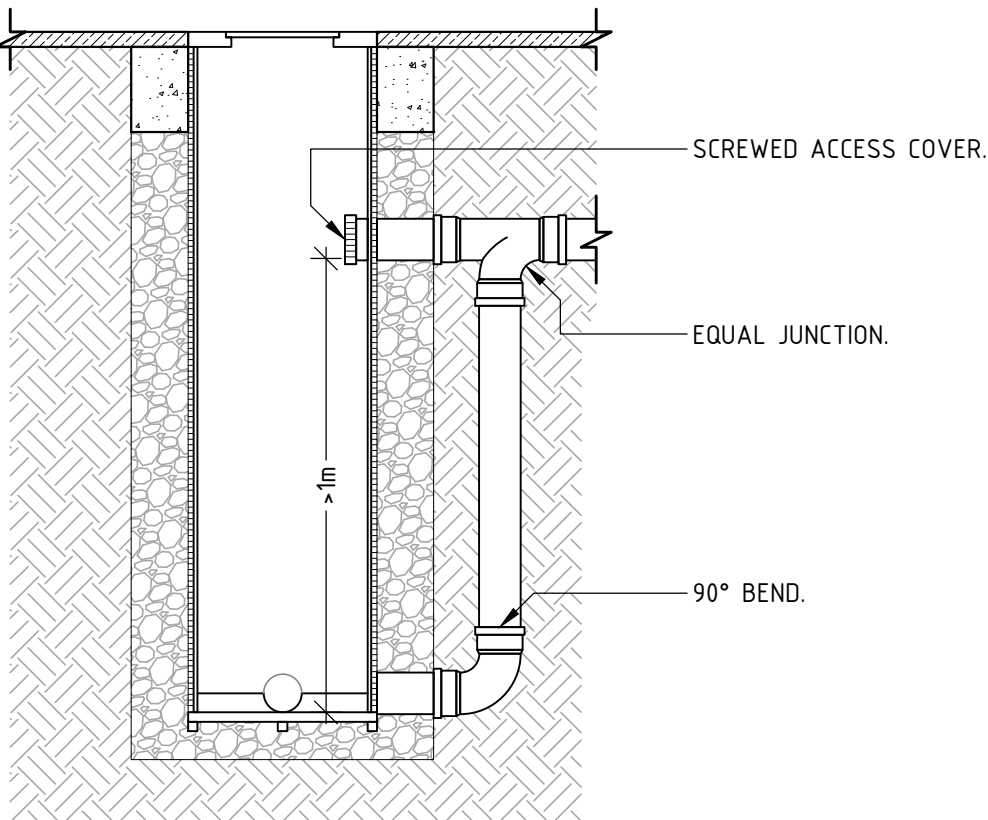
TYPICAL GEOCELLULAR TANK
ACCESS TURRET DETAIL (SECTION)
NOT TO SCALE



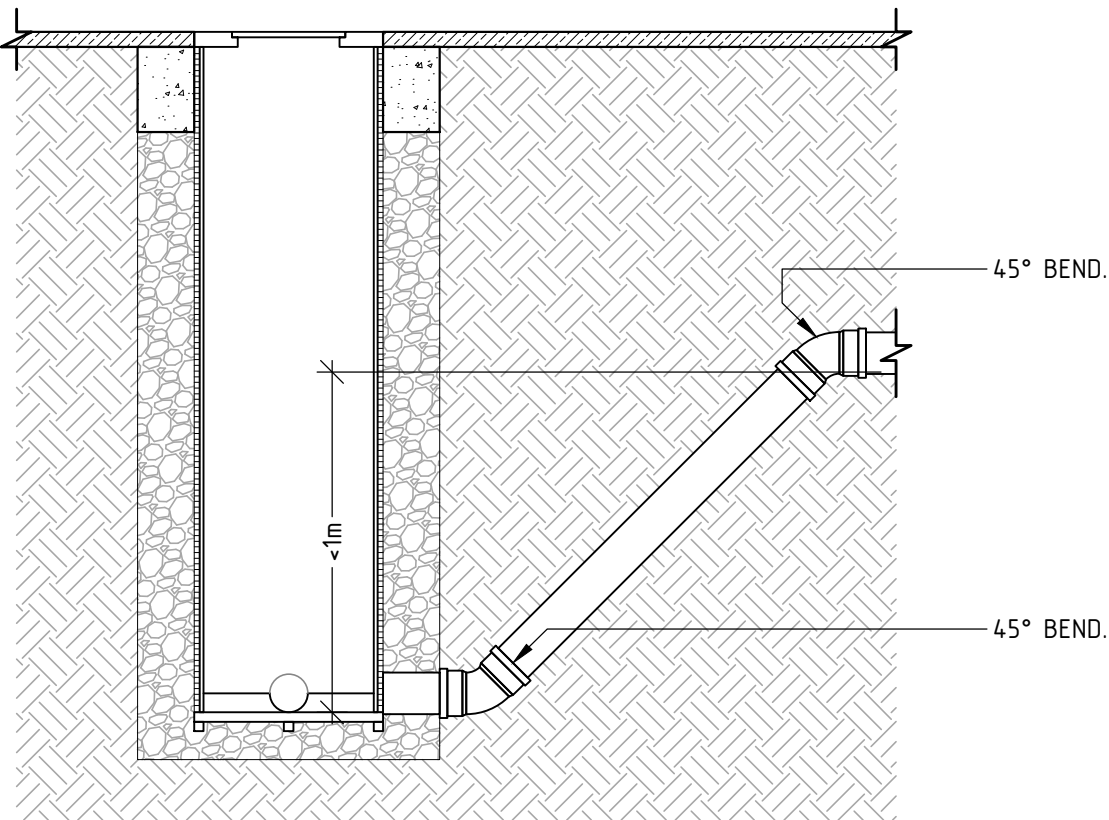
SECTION X-X
NOT TO SCALE



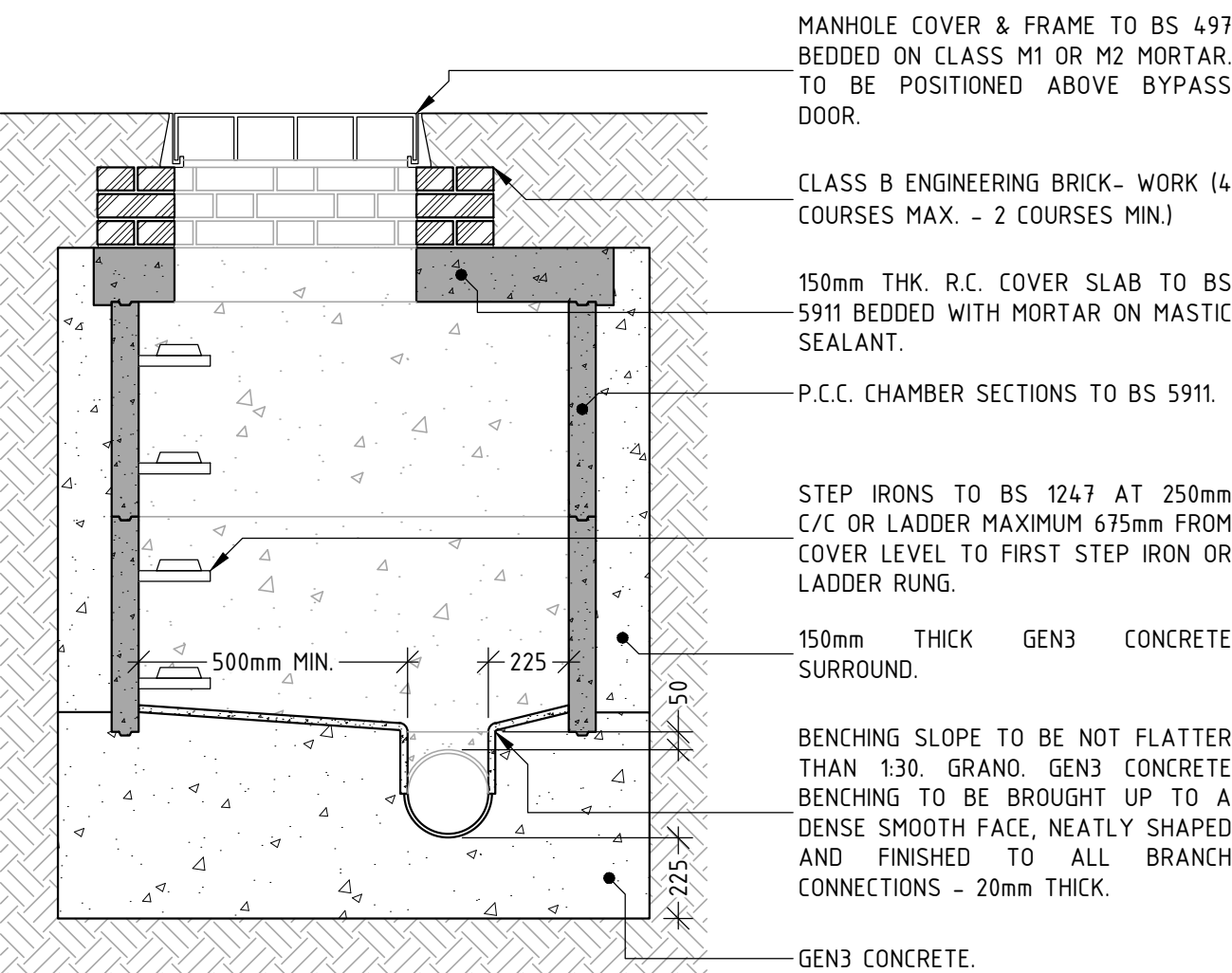
VERTICAL BACKDROP CONNECTION
(VBD) FOR DROPS GREATER THAN 1m
NOT TO SCALE



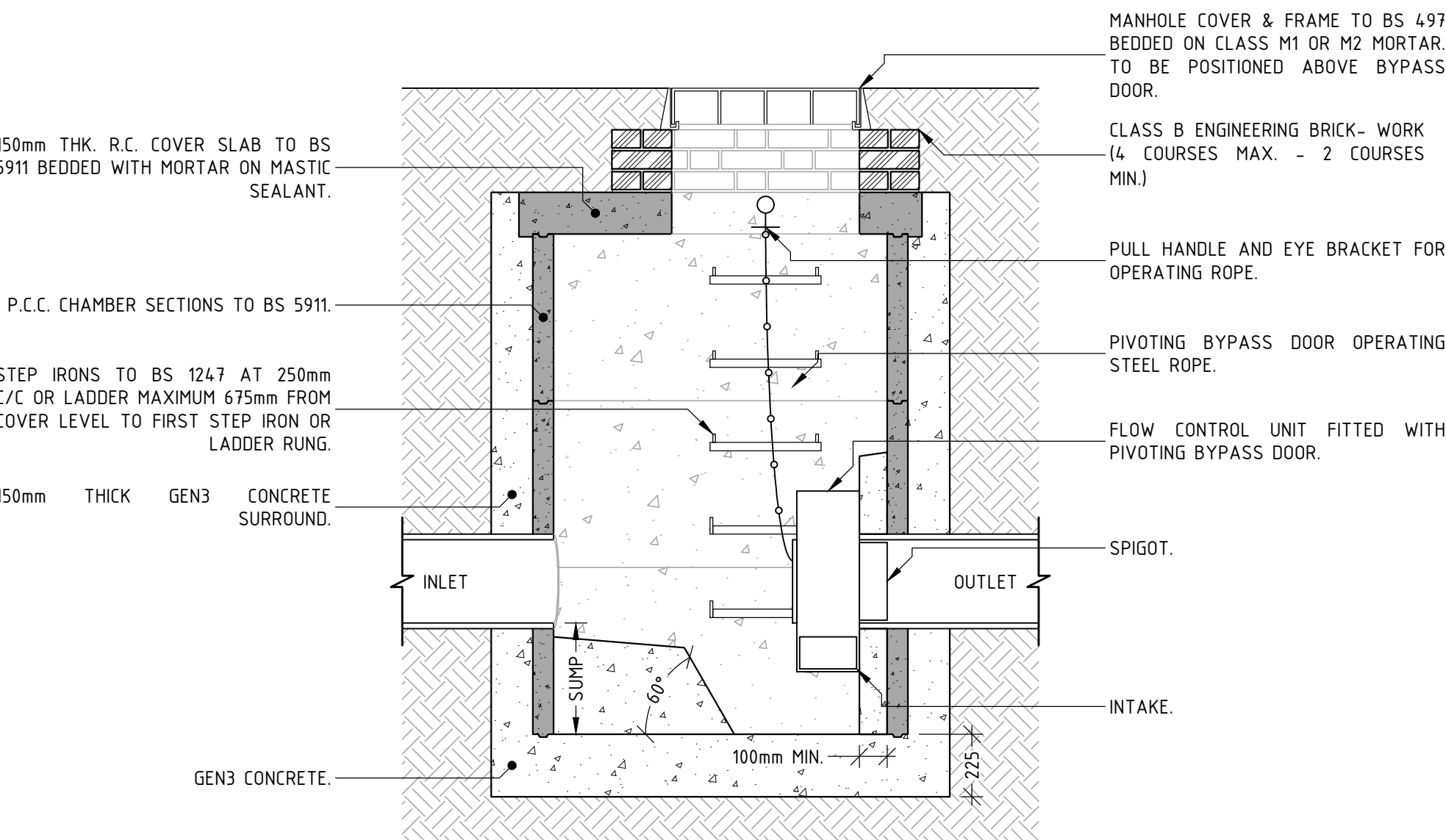
RAMPED BACKDROP CONNECTION
(RBD) FOR DROPS LESS THAN 1m
NOT TO SCALE



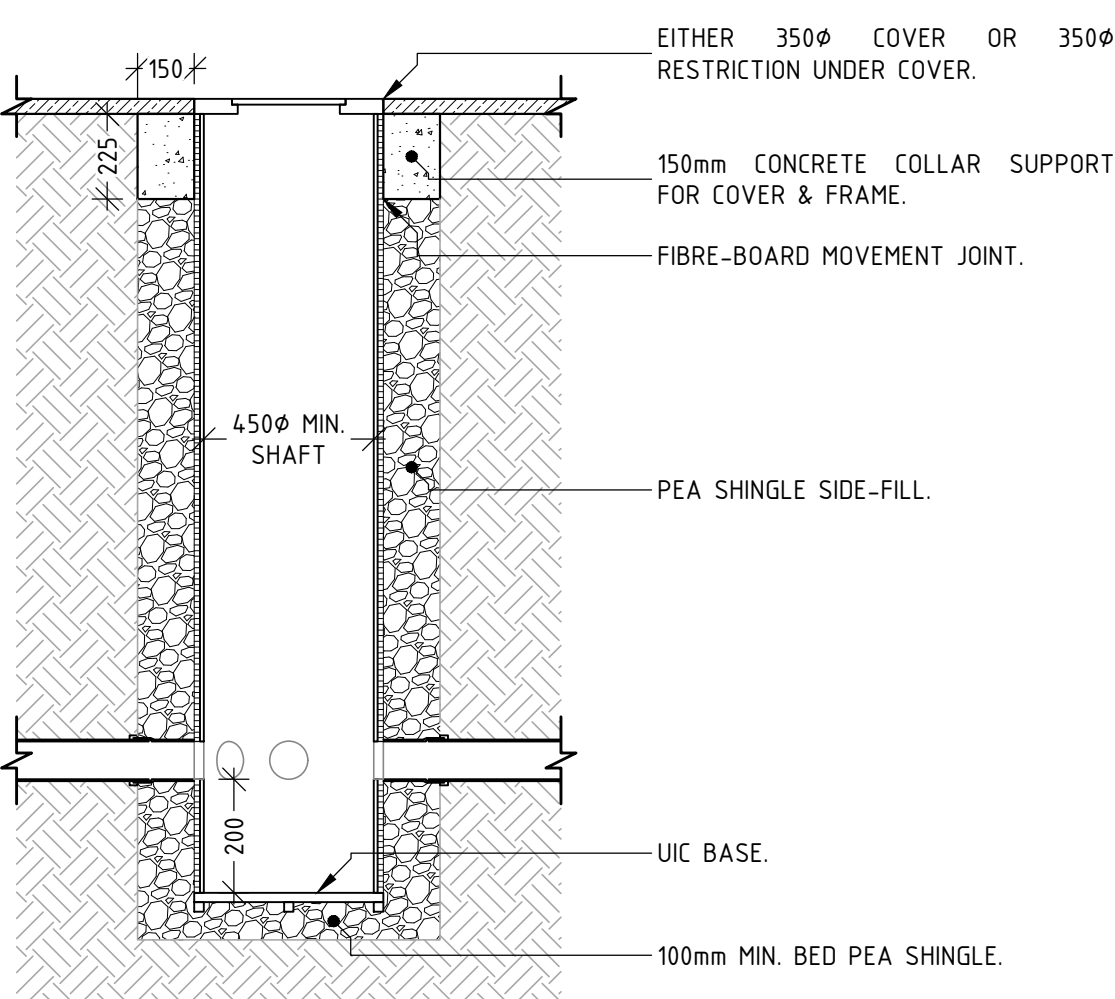
DETAIL 1: PRECAST CONCRETE
MANHOLE (P.C.C. RING) 1.2 - 3.0m DEEP
NOT TO SCALE



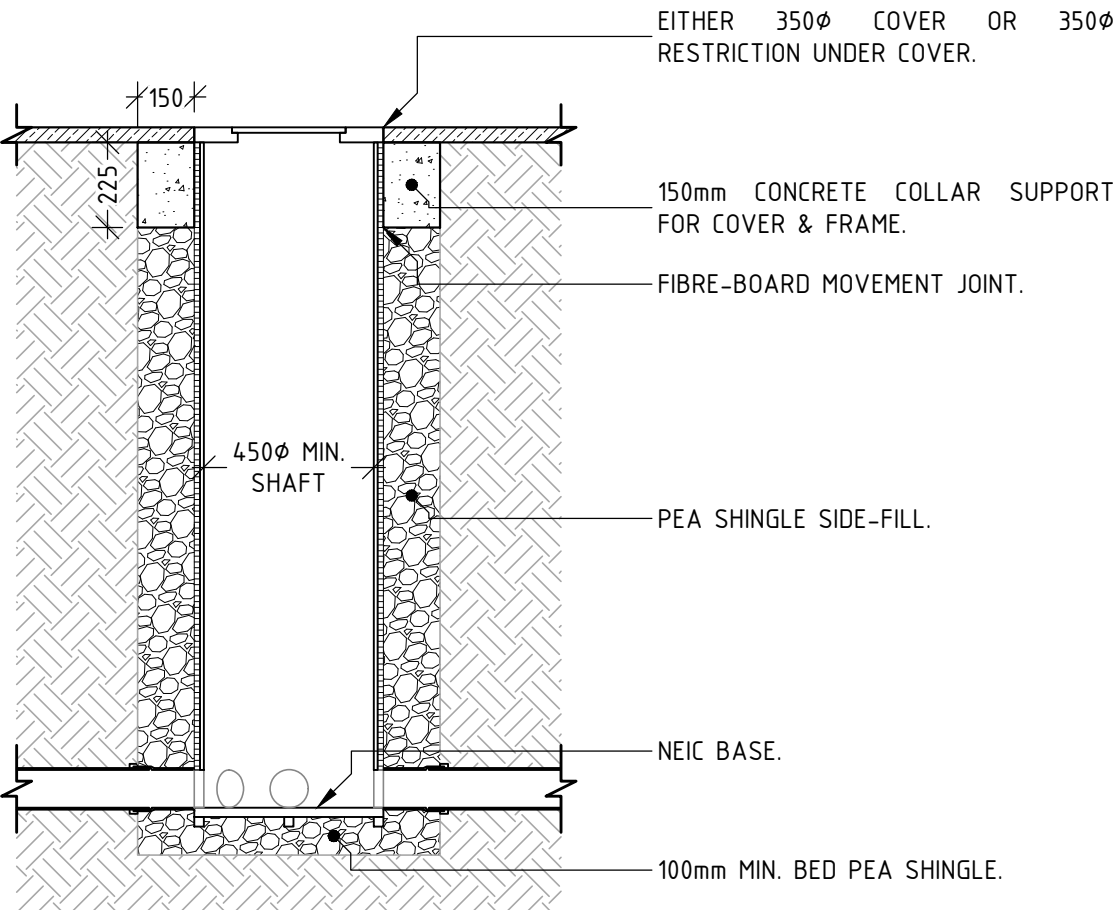
DETAIL 2: PRECAST CONCRETE MANHOLE WITH
FLOW CONTROL UNIT (P.C.C. RING WITH F.C.U.) 1.2 - 3.0m DEEP
1:20 @ A1/1:40 @ A3



DETAIL 3: NON-ENTRY INSPECTION
CHAMBER WITH SILT PIT (NEIC) 1.2 - 2.0m DEEP
NOT TO SCALE



DETAIL 4: NON-ENTRY INSPECTION CHAMBER (NEIC) 1.2 - 3.0m DEEP
NOT TO SCALE



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P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

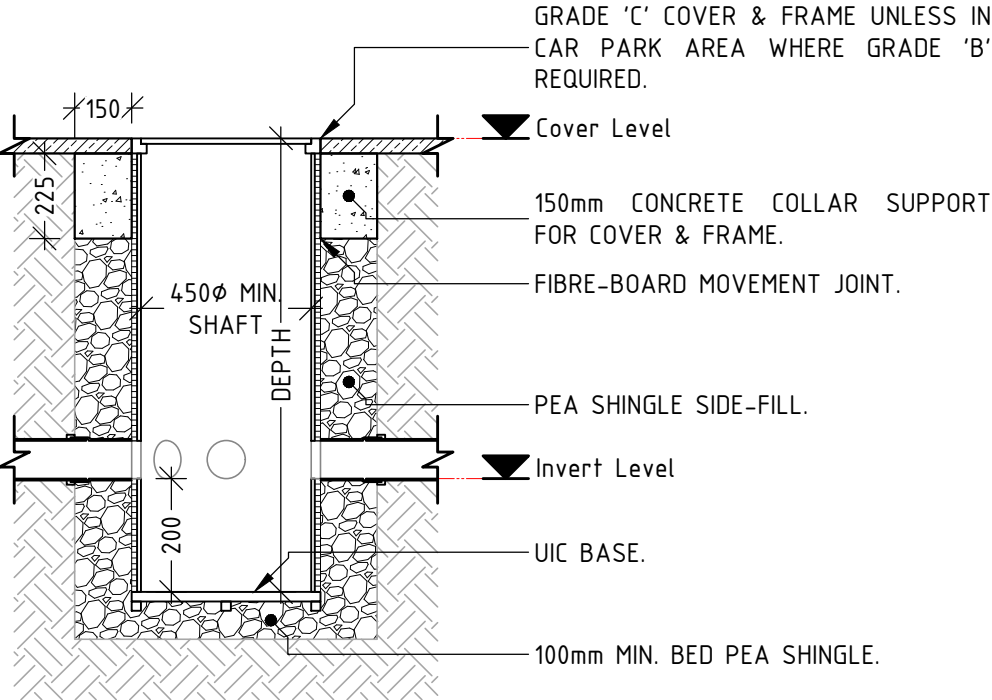
Drawing Title:
Drainage Details Sheet 1

AMA Project N°:	25042	AMA Consulting Engineers
Drawn By:	JL	
First Issued:	Mar 2026	
Status:	S2	
Checked By:	CC	
Scale @ A1:	As Noted	
Revision:	+44(0)20 8361 8827	
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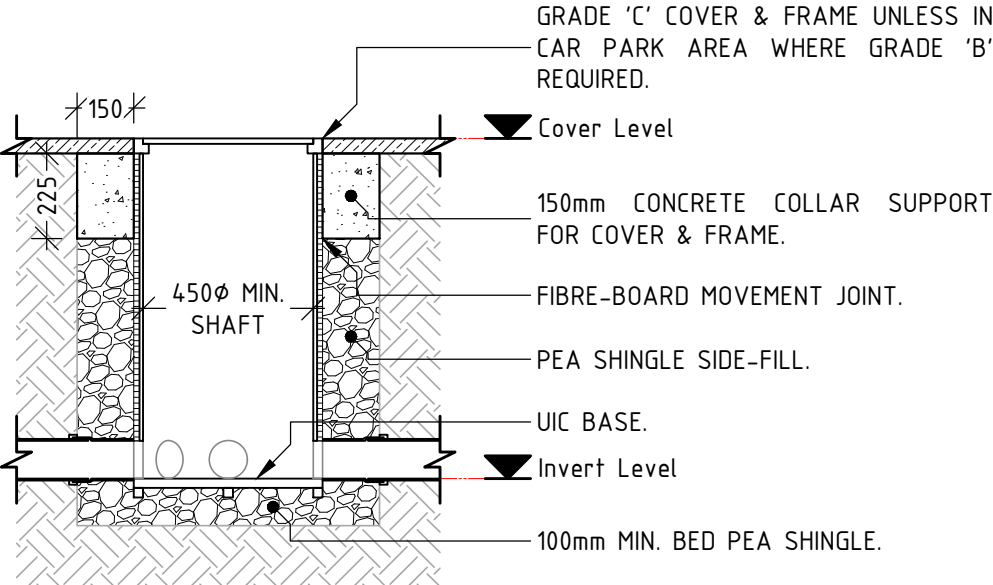
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25042 - AMA - 01 - ZZ - DR - D - 130300

PROJECT N° - ORIGINATOR - VOLUME - LEVEL - FILE TYPE - ROLE - DRAWING N°

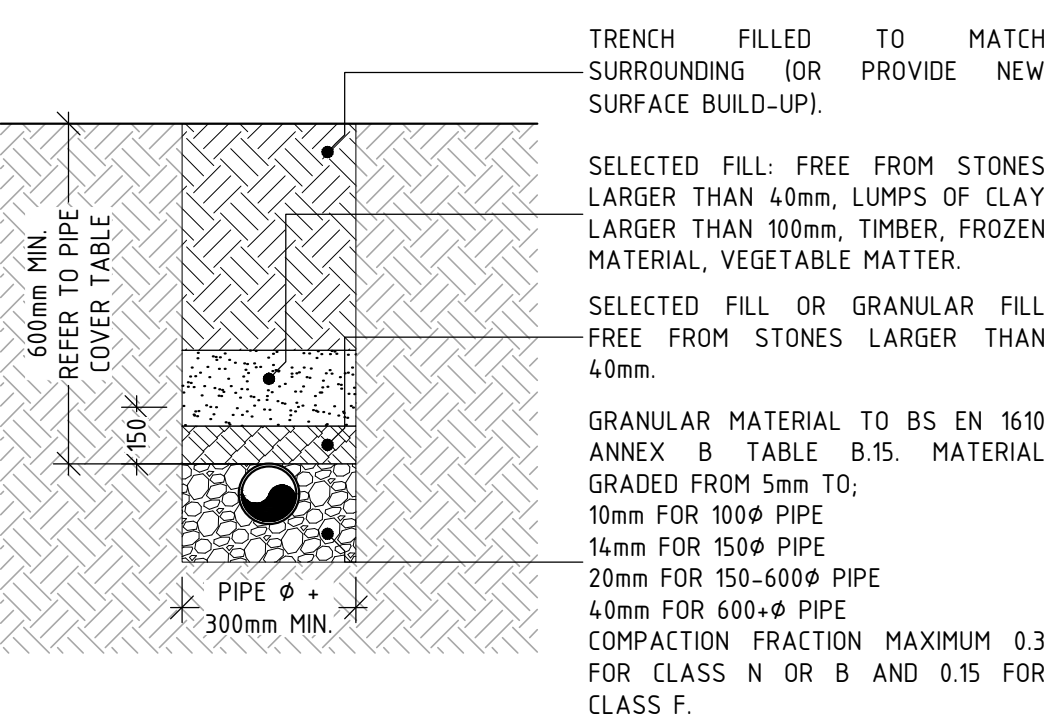
DETAIL 5: UNIVERSAL INSPECTION CHAMBER (UIC) CATCH-PIT 0.6 – 1.2m DEEP
NOT TO SCALE



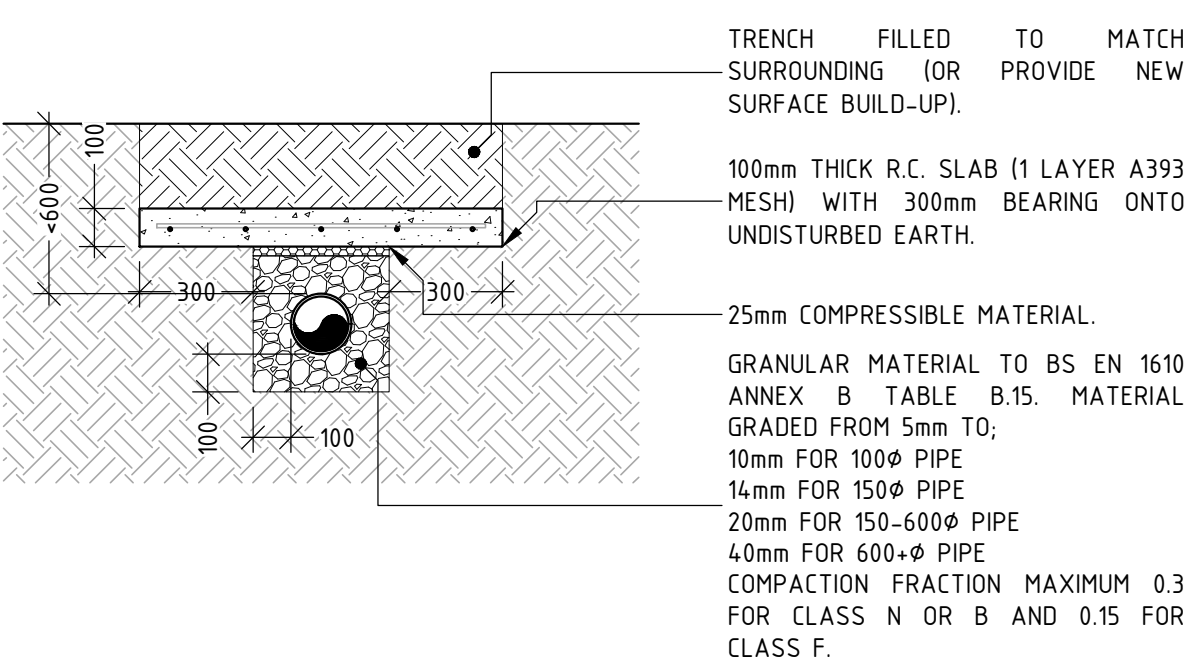
DETAIL 6: UNIVERSAL INSPECTION CHAMBER (UIC) 0.6 – 1.2m DEEP
NOT TO SCALE



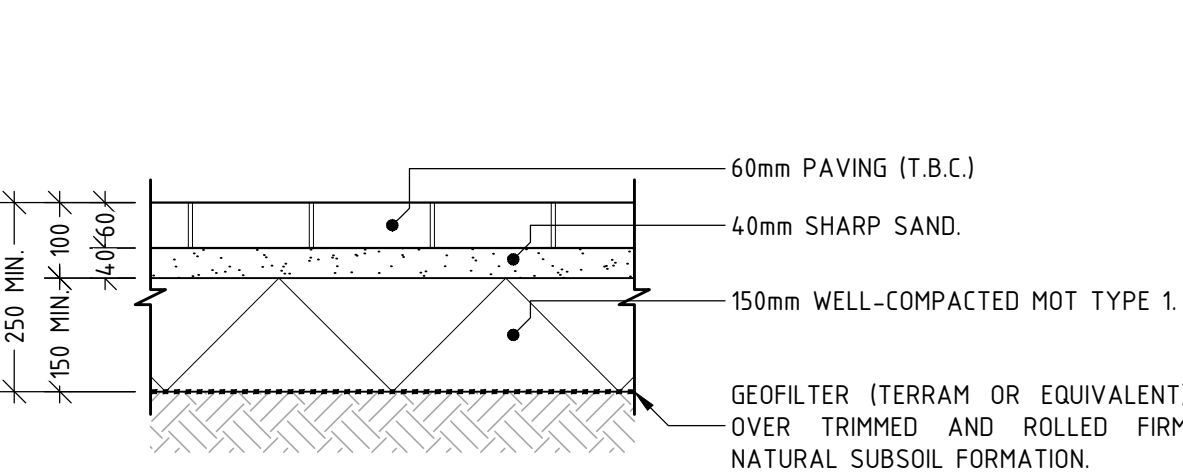
TYPICAL FLEXIBLE PIPE BEDDING
DETAIL FOR DEPTHS OF 0.6m OR GREATER
NOT TO SCALE



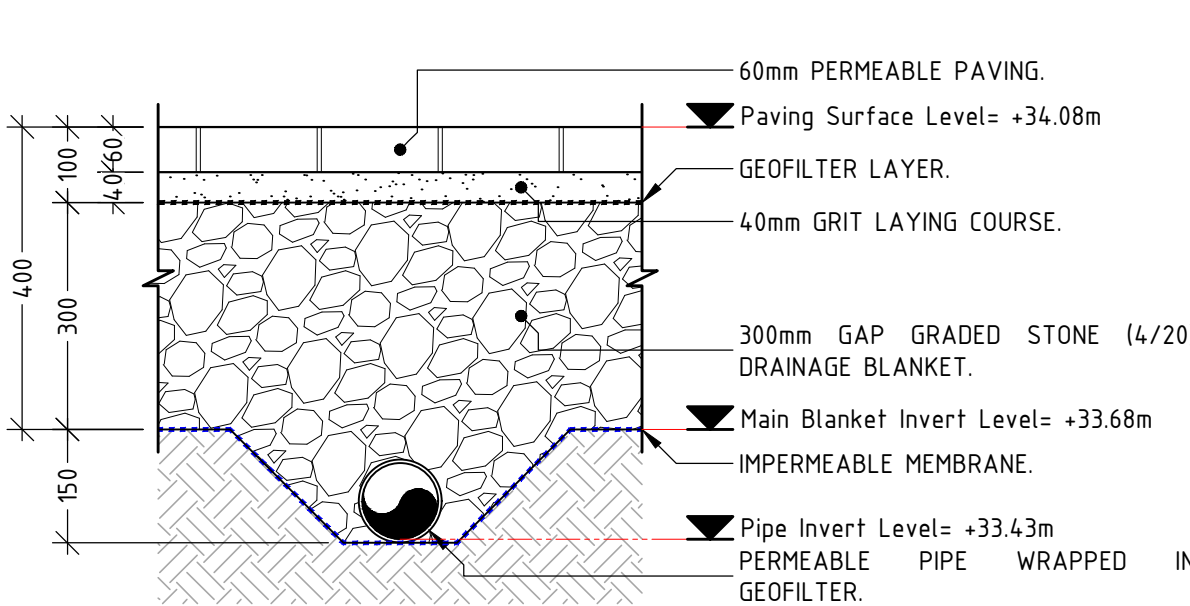
TYPICAL PIPE BEDDING
DETAIL FOR DEPTHS OF LESS THAN 0.6m
NOT TO SCALE



FOOTPATH PAVING BUILD-UP (SECTION)
1:10 @ A1/1:20 @ A3



ACCESS ROAD PERMEABLE PAVING OVER
300mm DEEP LINED STONE DRAINAGE BLANKET BUILD-UP (SECTION)
1:10 @ A1/1:20 @ A3



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P02	Preliminary	JL	CC	2026/03/30
P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
Drainage Details Sheet 2

AMA Project N°:		25042		
Drawn By:	JL	Checked By:	CC	
First Issued:	Mar 2026	Scale @ A1:	As Noted	
Status:	S2	Revision:	P02	
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Appendix F. Hydraulic Calculations

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Project	Selwood	Overall Site Information		
Client	RMC	Made by	Date	Project No
Description	Overall Site Information	CC	24-3-26	25042
SuDs Storage v1.0		Checked	Revision	
		CC	0	

1.0 - SCHEDULE OF AREAS

Total Area of the Entire Site	A_{site}	3532	m^2	$A_{pre,impervious} = A_{site} - A_{pre,pervious}$ $A_{post,impervious} = A_{site} - A_{post,pervious}$
Pre-Development Pervious Area	$A_{pre,pervious}$	0	m^2	
Pre-Development Impervious Area	$A_{pre,impervious}$	3532	m^2	
Post-Development Pervious Area	$A_{post,pervious}$	921	m^2	
Post-Development Impervious Area	$A_{post,impervious}$	2611	m^2	

2.0 - LOCATION SPECIFIC HYDROLOGICAL DATA

2.1 - SITE LOCATION

Site Location in UK	England and Wales	For assessment of J factors for hydraulic curves Wallingford Table 6.1
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2.2 - WALLINGFORD COEFFICIENTS

Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20	mm	Obtained from UKSUDs Website using IH124 Method
Ratio Between the M5-60 and the M5-2day Storm Intensity	r	0.40	---	Obtained from UKSUDs Website using IH124 Method

2.3 - FLOOD ESTIMATE FOR SMALL CATCHMENT AREAS

Winter Rainfall Acceptance Potential (Soil Type)	WRAP	4	---	Obtained from UKSUDs Website using IH124 Method
Soil Runoff Coefficient	SPR	0.47	---	Obtained from UKSUDs Website using IH124 Method
Standard Annual Average Rainfall	SAAR	784	mm	Obtained from UKSUDs Website using IH124 Method

2.4 - INCREASE FOR CLIMATE CHANGE

Percentage Increase on Rainfall Intensity i	High (Upper)	40%	---	National Planning Policy Framework (NPPF) Guidance Table 2 for 50-95 Year Life
---	--------------	-----	-----	--

2.5 - URBAN CREEP

Uplift on Storage	Omit	N/A	---	Applies to developments with houses only Refer to lead local flood authority (LLFA) Typical value is 10%
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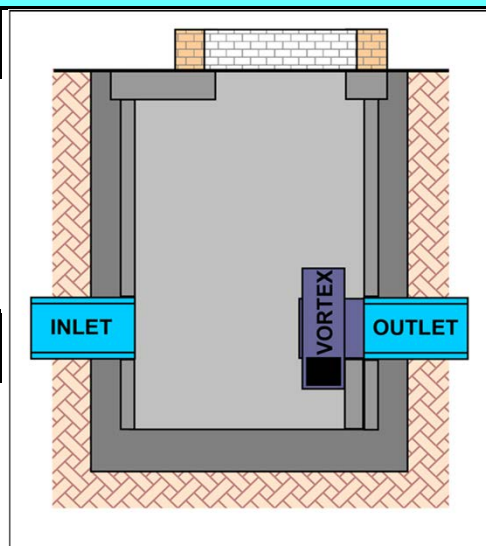
3.0 - OUTFLOW CONTROL METHOD FROM STORAGE TANK

3.1 - PRIMARY FLOW CONTROL DEVICE

Primary Flow Control Device (Installed on a Weir within the Flow Control Manhole)	None
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3.2 - SECONDARY OUTFLOW CONTROL DEVICE

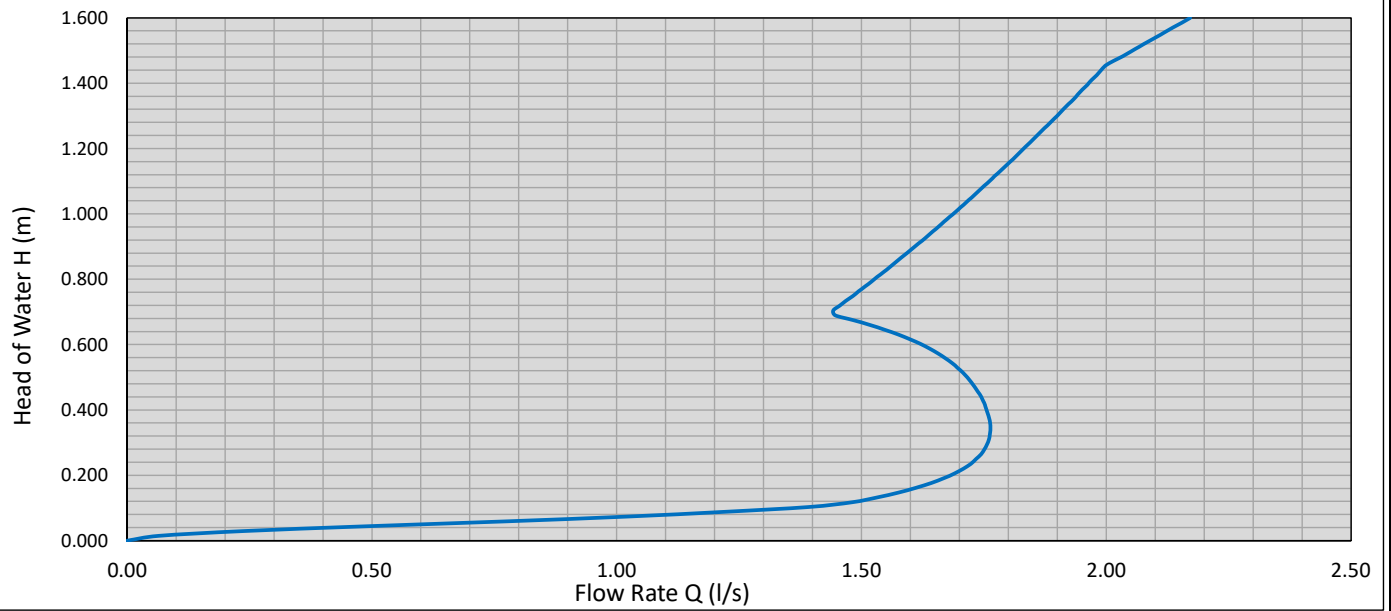
Outflow Control Device (Installed on Outflow Pipe within Flow Control Manhole)	Vortex
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Section Through Flow Control Manhole

Product Code	SHE-0060-2000-1600-2000		
Product Type	Hydro-Brake Optimum®		
Design Head	H_{design}	1.6	m
Design Flow	Q_{design}	2	l / s
Flush Head	H_{flush}	0.263	m
Flush Flow	Q_{flush}	1.501	l / s
Kick Head	H_{kick}	0.536	m
Kick Flow	Q_{kick}	1.22	l / s
Mean Flow Over Head	Q_{mean}	1.528	l / s
Minimum Clearance	$H_{clearance}$	0.0029	m^2

4.0 - OUTFLOW HYDRAULIC CURVE (FLOW RATE PLOTTED AGAINST HEAD OF WATER IN THE FLOW CONTROL MANHOLE)



 ama Consulting Engineers	a: 6a Nesbitts Alley, London, EN5 5XG	Project	Selwood		Calculation of Runoff QBAR		
	t: +44(0)20 8361 6827	Client	RMC		Made by	Date	Project No
	e: ama@amaci.co.uk	Description	Qbar/Existing/Proposed Flows & Volumes		CC	24-3-26	25042
	w: www.amaci.co.uk				Checked	Revision	
	SuDs Storage v1.0				CC	0	

1.0 - SITE INFORMATION					
Area of the Site	A _{site}	3532.0	m ²	User Input - Defined Previously and now expressed in multiple units	
		0.003532	km ²		
		0.3532	hectares		
Pre-Development Pervious Area	A _{pre,pervious}	0.0	m ²	User Input - Defined Previously and now expressed in multiple units	
		0.000000	km ²		
		0.0000	hectares		
Post-Development Pervious Area	A _{post,pervious}	921.0	m ²	User Input - Defined Previously and now expressed in multiple units	
		0.000921	km ²		
		0.0921	hectares		
Soil Runoff Coefficient	SPR	0.47	---	User Input - Defined Previously	
Standard Annual Average Rainfall	SAAR	784.0	mm	User Input - Defined Previously	

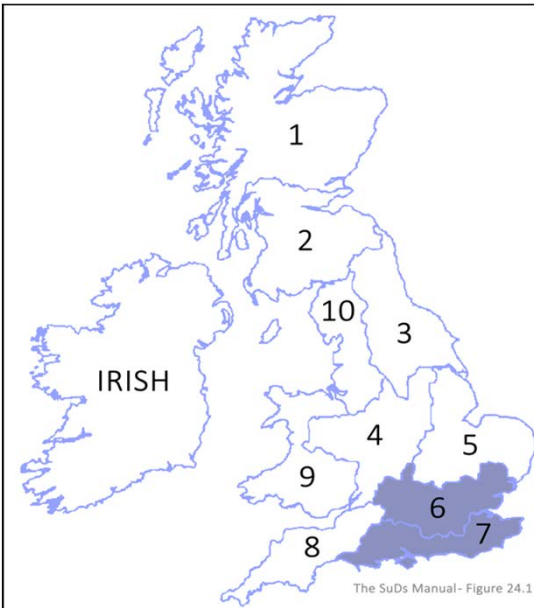
2.0 - CALCULATION OF RUNOFF RATE FOR DIFFERENT SITE DEVELOPMENT STAGES: QBAR _{rural}					
Greenfield Site (using A = A _{site})	QBAR _{RURAL,GF}	0.0019	m ³ / s	for: 50 hectares ≤ A < 200 hectares QBAR _{rural} = 0.00108 * A ^{0.89} x SAAR ^{1.17} x SPR ^{2.17}	
		1.947	l / s		
Pre-Development Pervious Area (using A = A _{pre,pervious})	QBAR _{RURAL,Pre}	0.0000	m ³ / s	for: A < 50 hectares QBAR _{rural} = 0.00108 * [(A/0.5) * 0.5 ^{0.89}] * SAAR ^{1.17} * SPR ^{2.17} A is area in units of km ² in these formulas QBAR _{rural} Formula from: "Flood estimation for small catchments" Marshall DCW and Bayliss AC. IOH Report No.124. Institute of hydrology, Wallingford, 1994 QBAR _{rural} is in units of m ³ / s	
		0.000	l / s		
Post-Development Pervious Area (using A = A _{post,pervious})	QBAR _{RURAL,Post}	0.0005	m ³ / s		
		0.508	l / s		

3.0 - HYDROMETRIC AREA & RUNOFF RATE QBAR

Hydrometric Area for the Site		6 & 7		
3.1 - GROWTH CURVES AND RUNOFF FOR HYDROMETRIC AREA: 6 & 7				
Return Period	Growth Factor	Greenfield	Pre-Development	Post-Development
		QBAR _{GF}	QBAR _{pre}	QBAR _{post}
		l/s	l/s	l/s
1 Year	0.85	1.65	0.00	0.43
2 Years	0.88	1.71	0.00	0.45
5 Years	1.28	2.49	0.00	0.65
10 Years	1.62	3.15	0.00	0.82
25 Years	2.14	4.17	0.00	1.09
30 Years	2.4	4.67	0.00	1.22
50 Years	2.62	5.10	0.00	1.33
100 Years	3.19	6.21	0.00	1.62
500 Years	4.49	8.74	0.00	2.28

Growth Factor from SuDs Manual - Table 24.2

QBAR = QBAR_{rural} * Growth Factor



4.0 - CALCULATE RAINFALL INTENSITY FOR DIFFERENT STORM RETURN PERIODS (OVER SET DURATIONS)

Storm Duration for 1 in 1 Year Storm	D	4	minutes	User Input
Storm Duration for 1 in 30 Year Storm	D	4	minutes	User Input
Storm Duration for 1 in 100 Year Storm	D	4	minutes	User Input
Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20.0	mm	User Input - Defined Previously
Ratio Between the M5-60 and the M5-2day Storm Intensity	r	0.4	---	User Input - Defined Previously
4.1 - 1 in 1 Year Storm of Duration D = 4 minutes				
Return Period of Storm	T	1	Years	
Wallingford Factor	Z ₁	0.324	---	From Wallingford Modified Rational Method Equation 6.1
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 4 minutes	M5-4	6.485	mm	$M5-4 = \min\{200\text{mm} ; \max\{Z_1 * M5-60 ; 5\text{mm}\}\}$
J Factors for England and Wales	J ₀	1699	$\times 10^{-4}$	From Wallingford Modified Rational Method Table 6.1
	J ₁	2800	$\times 10^{-6}$	From Wallingford Modified Rational Method Table 6.1
	J ₂	114000	$\times 10^{-9}$	From Wallingford Modified Rational Method Table 6.1
C _r Factor	C _r	0.193	---	$Cr = J_0 + (J_1 * M5-4) + (J_2 * M5-4^2)$
Wallingford Factor	Z ₂	0.617	---	Z ₂ = interpolated from Table 6.2 or 6.3 (Wallingford)
Rainfall Intensity for 1 in 1 Year Storm with Duration D = 4 minutes	M1-4	4.001	mm	$M1-4 = Z_2 * M5-4$
4.2 - 1 in 30 Year Storm of Duration D = 4 minutes				
Return Period of Storm	T	30	Years	
Wallingford Factor	Z ₁	0.324	---	From Wallingford Modified Rational Method Equation 6.1
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 4 minutes	M5-4	6.485	mm	$M5-4 = \min\{200\text{mm} ; \max\{Z_1 * M5-60 ; 5\text{mm}\}\}$
J Factors for England and Wales	J ₀	1699	$\times 10^{-4}$	From Wallingford Modified Rational Method Table 6.1
	J ₁	2800	$\times 10^{-6}$	From Wallingford Modified Rational Method Table 6.1
	J ₂	114000	$\times 10^{-9}$	From Wallingford Modified Rational Method Table 6.1
C _r Factor	C _r	0.193	---	$Cr = J_0 + (J_1 * M5-4) + (J_2 * M5-4^2)$
Wallingford Factor	Z ₂	1.443	---	$Z_2 = \exp(Cr * [\ln(T) - 1.5])$
Rainfall Intensity for 1 in 30 Year Storm with Duration D = 4 minutes	M30-4	9.357	mm	$M30-4 = Z_2 * M5-4$
4.3 - 1 in 100 Year Storm of Duration D = 4 minutes				
Return Period of Storm	T	100	Years	
Wallingford Factor	Z ₁	0.324	---	From Wallingford Modified Rational Method Equation 6.1
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 4 minutes	M5-4	6.485	mm	$M5-4 = \min\{200\text{mm} ; \max\{Z_1 * M5-60 ; 5\text{mm}\}\}$
J Factors for England and Wales	J ₀	1699	$\times 10^{-4}$	From Wallingford Modified Rational Method Table 6.1
	J ₁	2800	$\times 10^{-6}$	From Wallingford Modified Rational Method Table 6.1
	J ₂	114000	$\times 10^{-9}$	From Wallingford Modified Rational Method Table 6.1
C _r Factor	C _r	0.193	---	$Cr = J_0 + (J_1 * M5-4) + (J_2 * M5-4^2)$
Wallingford Factor	Z ₂	1.820	---	$Z_2 = \exp(Cr * [\ln(T) - 1.5])$
Rainfall Intensity for 1 in 100 Year Storm with Duration D = 4 minutes	M100-4	11.802	mm	$M100-4 = Z_2 * M5-4$

5.0 - CALCULATE RUNOFF PEAK FLOWS FROM IMPERVIOUS AREAS

5.1 - 1 in 1 Year Storm of Duration D = 4 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	60.018	mm/hr	$i = M1-4$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	68.95	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	50.97	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

5.2 - 1 in 30 Year Storm of Duration D = 4 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	140.349	mm/hr	$i = M30-4$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	161.24	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	119.19	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

5.3 - 1 in 100 Year Storm of Duration D = 4 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	177.030	mm/hr	$i = M100-4$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	203.38	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	150.34	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

6.0 - SUMMARY OF RUNOFF PEAK FLOW RATES

Percentage Increase for Climate Change	CC	40%	%	User Input - Defined Previously
--	----	-----	---	---------------------------------

Return Period	Storm Duration D	Greenfield Runoff Rate	Pre-Development Runoff Rate	Post-Development Runoff Rate	Allowable Runoff Rate	Betterment vs Pre-Dev
	Minutes	l / s	l / s	l / s	l / s	%
1 in 1 Year	4	1.65	68.95	51.40	2	97%
1 in 30 Years	4	4.67	161.24	120.41	2	99%
1 in 100 Years	4	6.21	203.38	151.96	2	99%
1 in 100 Years + Climate Change	4	---	---	212.10	2	
	User Input	= QBAR	= $QBAR_{pre} + Q_{pre}$	= $QBAR_{post} + Q_{post}$ = $QBAR_{post} + (Q_{post} * (1+CC))$	User Input	= $(1 - (RO_{Allow} / RO_{Pre-Dev})) * 100$

7.0 - CALCULATE RAINFALL INTENSITY FOR DIFFERENT STORM RETURN PERIODS (OVER SET DURATIONS)					
Storm Duration for 1 in 1 Year Storm	D	15	minutes	User Input - Defined Previously	
Storm Duration for 1 in 30 Year Storm	D	240	minutes	User Input - Defined Previously	
Storm Duration for 1 in 100 Year Storm	D	360	minutes	User Input - Defined Previously	
Rainfall Intensity for Storm with 5 Year Return Period and 60min	M5-60	20.0	mm	User Input - Defined Previously	
Ratio Between the M5-60 and the M5-2day Storm Intensity	r	0.4	---	User Input - Defined Previously	
7.1 - 1 in 1 Year Storm of Duration D = 15 minutes					
Return Period of Storm	T	1	Years		
Wallingford Factor	Z ₁	0.630	---	From Wallingford Modified Rational Method Equation 6.1	
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 15 minutes	M5-15	12.594	mm	M5-15 = min{200mm ; max{Z ₁ * M5-60 ; 5mm}}	
J Factors for England and Wales	J ₀	1644	x10 ⁻⁴	From Wallingford Modified Rational Method Table 6.1	
	J ₁	5831	x10 ⁻⁶	From Wallingford Modified Rational Method Table 6.1	
	J ₂	-134300	x10 ⁻⁹	From Wallingford Modified Rational Method Table 6.1	
C _r Factor	C _r	0.217	---	Cr = J0 + (J1 * M5-15) + (J2 * M5-15^2)	
Wallingford Factor	Z ₂	0.615	---	Z ₂ = interpolated from Table 6.2 or 6.3 (Wallingford)	
Rainfall Intensity for 1 in 1 Year Storm with Duration D = 15 minutes	M1-15	7.748	mm	M1-15 = Z ₂ * M5-15	
7.2 - 1 in 30 Year Storm of Duration D = 240 minutes					
Return Period of Storm	T	30	Years		
Wallingford Factor	Z ₁	1.445	---	From Wallingford Modified Rational Method Equation 6.1	
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 240 minutes	M5-240	28.906	mm	M5-240 = Z ₁ * M5-60	
J Factors for England and Wales	J ₀	1644	x10 ⁻⁴	From Wallingford Modified Rational Method Table 6.1	
	J ₁	5831	x10 ⁻⁶	From Wallingford Modified Rational Method Table 6.1	
	J ₂	-134300	x10 ⁻⁹	From Wallingford Modified Rational Method Table 6.1	
C _r Factor	C _r	0.221	---	Cr = J0 + (J1 * M5-240) + (J2 * M5-240^2)	
Wallingford Factor	Z ₂	1.521	---	Z ₂ = exp(Cr * [ln(T) - 1.5])	
Rainfall Intensity for 1 in 30 Year Storm with Duration D = 240 minutes	M30-240	43.979	mm	M30-240 = Z ₂ * M5-240	
7.3 - 1 in 100 Year Storm of Duration D = 360 minutes					
Return Period of Storm	T	100	Years		
Wallingford Factor	Z ₁	1.599	---	From Wallingford Modified Rational Method Equation 6.1	
Rainfall Intensity for 1 in 5 Year Storm with Duration D = 360 minutes	M5-360	31.985	mm	M5-360 = Z ₁ * M5-60	
J Factors for England and Wales	J ₀	2644	x10 ⁻⁴	From Wallingford Modified Rational Method Table 6.1	
	J ₁	-1621	x10 ⁻⁶	From Wallingford Modified Rational Method Table 6.1	
	J ₂	3150	x10 ⁻⁹	From Wallingford Modified Rational Method Table 6.1	
C _r Factor	C _r	0.216	---	Cr = J0 + (J1 * M5-360) + (J2 * M5-360^2)	
Wallingford Factor	Z ₂	1.954	---	Z ₂ = exp(Cr * [ln(T) - 1.5])	
Rainfall Intensity for 1 in 100 Year Storm with Duration D = 360 minutes	M100-360	62.507	mm	M100-360 = Z ₂ * M5-360	

8.0 - CALCULATE RUNOFF PEAK FLOW RATES FROM IMPERVIOUS AREAS

8.1 - 1 in 1 Year Storm of Duration D = 15 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	30.991	mm/hr	$i = M1-15$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	35.60	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	26.32	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

8.2 - 1 in 30 Year Storm of Duration D = 240 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	10.995	mm/hr	$i = M30-240$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	12.63	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	9.34	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

8.3 - 1 in 100 Year Storm of Duration D = 360 minutes

Volumetric Runoff Coefficient	C_v	0.900	---	CIRIA SuDS Guide - Equation 24.5
Dimensionless Routing Coefficient	C_R	1.30	---	CIRIA SuDS Guide - Equation 24.5
Rainfall Intensity	i	10.418	mm/hr	$i = M100-360$ converted into mm per hour
Pre-Development Impervious Area	$A_{pre,impervious}$	0.3532	hectares	User Input - Defined Previously
Post-Development Impervious Area	$A_{post,impervious}$	0.2611	hectares	User Input - Defined Previously
Peak Flow Rate Pre-Development (Runoff)	Q_{pre}	11.97	l / s	$Q_{pre} = 2.78 * C_v * C_R * i * A_{pre,impervious}$
Peak Flow Rate Post-Development (Runoff)	Q_{post}	8.85	l / s	$Q_{post} = 2.78 * C_v * C_R * i * A_{post,impervious}$

9.0 - SUMMARY OF RUNOFF VOLUMES

Percentage Increase for Climate Change	CC	40%	%	User Input - Defined Previously
Percentage Increase for Urban Creep	UC	0%	%	User Input - Defined Previously

Return Period	Storm Duration D	Greenfield Runoff Volume	Pre-Development Runoff Volume	Post-Development Runoff Volume
	Minutes	m ³	m ³	m ³
1 in 1 Year	15	1.489	32.04	24.08
1 in 30 Years	240	67.287	181.88	152.00
1 in 100 Years	360	134.154	258.51	226.08
1 in 100 Years + Climate Change	360	---	---	302.53
	User Input	= QBAR * D	= (QBAR + Q_{pre}) * D	= (QBAR + [$Q_{pre} * (1+UC)$]) * D = (QBAR + [$Q_{pre} * (1+CC) * (1+UC)$]) * D

Total Runoff Volumes shown above do not account for any off site discharge

Project	Selwood	Storage Tank Sizing		
Client	RMC	Made by	Date	Project No
Description	Storage Tank Sizing	CC	24-3-26	25042
		Checked	Revision	
SuDs Storage v1.0		CC	0	

1.0 - INPUT STORAGE TANK DIMENSIONS

Position in the Ground	Description of the Individual Storage Tank	Height of the Individual Storage Tank	Plan Area of the Tank	Type of Storage Tank	Max Head of Water (Cumulative)	Voids Ratio	Effective Plan Area	Storage Volume
		H _{TANK}	A _{TANK}		H		A _{eff}	V _{TANK}
		m	m ²		m	m ²	m ³	
Deepest	TANK 1	0.100	517.000	Above Ground	0.10	100%	517.00	51.700
V	TANK 2	0.300	517.000	Stone Infill	0.40	30%	155.1	46.530
	TANK 3	1.200	150.000	Geocell	1.60	95%	142.5	171.000
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
				None				
Shallowest				None				

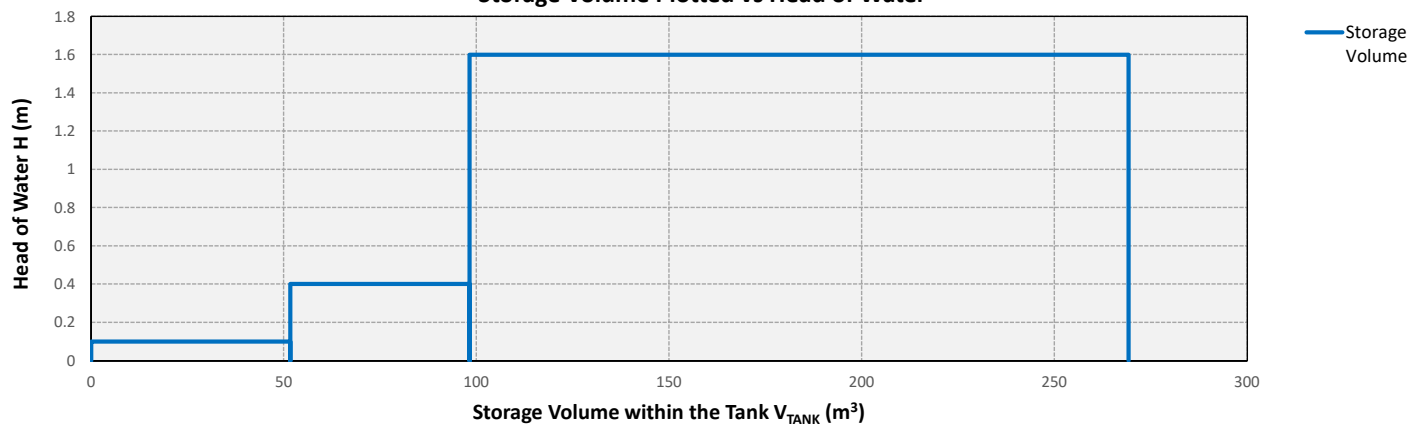
Total Storage Available V_{TOTAL} (m ³)	269.230
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$$A_{\text{eff}} = A_{\text{TANK}} * R_{\text{VOIDS}} \quad V_{\text{TANK}} = H_{\text{TANK}} * A_{\text{TANK}} * R_{\text{VOIDS}} \quad V_{\text{TOTAL}} = \Sigma V_{\text{TANK}}$$

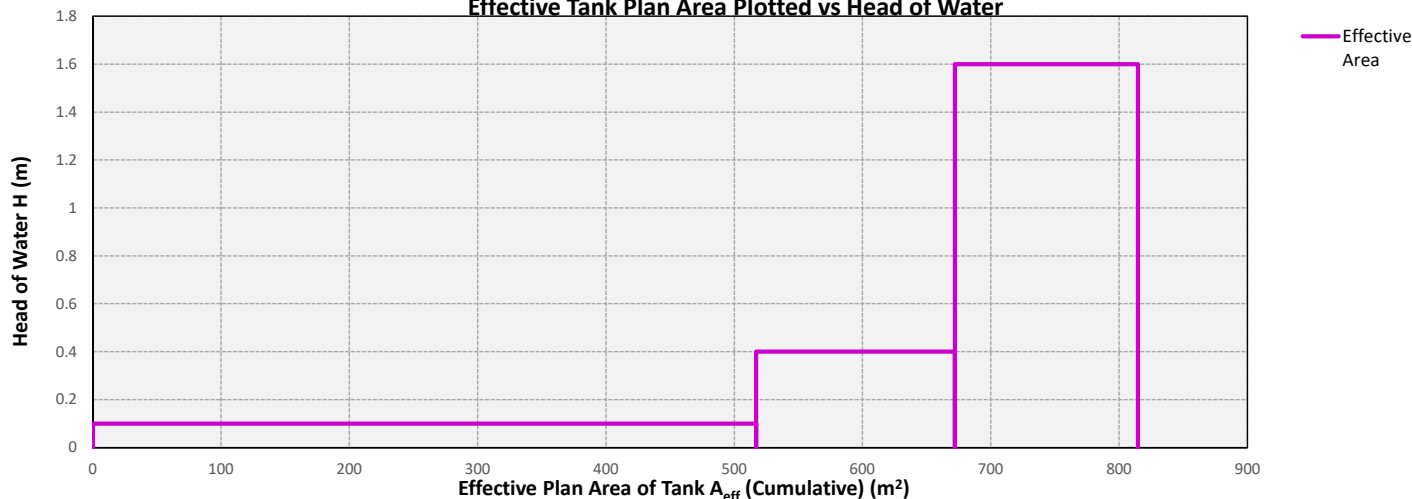
Maximum Head of Water Available from all the Individual Storage Tanks H_{TOTAL} (m)	1.600
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2.0 - PLOT STORAGE VOLUME

Storage Volume Plotted vs Head of Water



Effective Tank Plan Area Plotted vs Head of Water



Project	Selwood	Hydraulic Curve - 1 in 1 Year Storm		
Client	RMC	Made by	Date	Project No
Description	1 in 1 Year Storm Event (Storage Tank Discharge)	CC	24-3-26	25042
SuDs Storage v1.0		Checked	Revision	
		CC	0	

1.0 - INPUT DATA

Return Period of Storm Event	T	1	Years	User Input
Ratio Relating to the Type of Rainfall Expected	r	0.4	---	User Input - Defined Previously
Site Location	England and Wales			User Input - Defined Previously
Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20	mm	User Input - Defined Previously

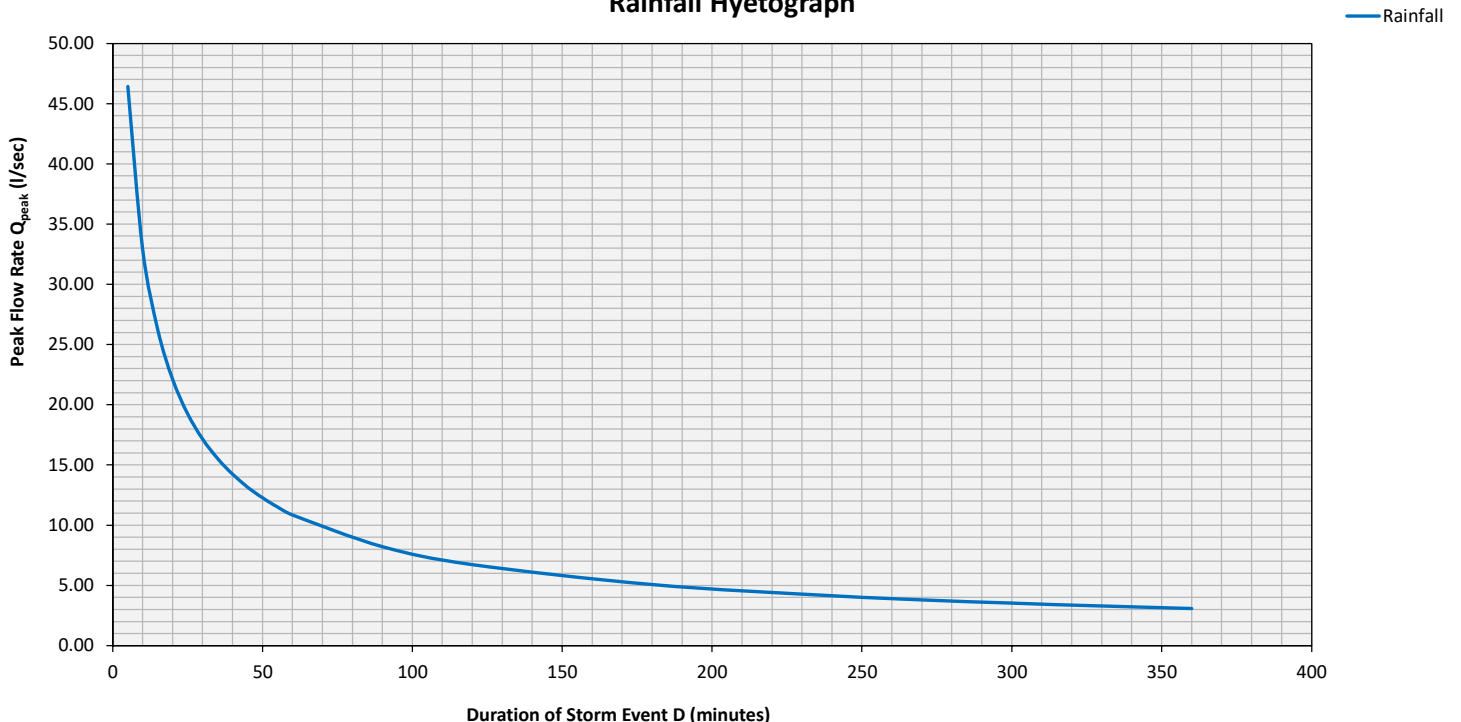
2.0 - AREAS USED FOR VOLUME CALCULATIONS AND ALLOWANCE FOR CLIMATE CHANGE

Area of the Site used for Storage Calculations	Post-Development Impervious			User Input - Defined Previously
	post,impervious	2611	m ²	
Allowance for Urban Creep	UC	0%	%	Afinal = Apost,impervious * (1 + Urban Creep%)
Final Area Used for Hydraulic Calculations	Afinal	2611	m ²	
Percentage Increase on Rainfall Intensity for Climate Change	CC	0%	%	No increase for Climate Change for 1 in 1 Year Storm
Volumetric Runoff Coefficient	C _v	0.90	---	User Input - Defined Previously
Dimensionless Routing Coefficient	C _R	1.30	---	User Input - Defined Previously

3.0 - PLOT HYDRAULIC CURVE (RAINFALL ON THE SITE AND DISCHARGE FROM THE STORAGE TANK)

Duration	WATER LANDING ON THE SITE FROM THE RAINFALL EVENT												STORAGE TANK OUTFLOW			
	Wallingford Factor	Rainfall Intensity	J Factors			C _r Factor	Wallingford Factor	Rainfall Intensity for 1 Year Storm	Rainfall Intensity for M1-D	Rainfall Intensity for M1-D + Climate Change	Peak Flow Rate	Run Off Volume Over Time Step	Head of Water in Storage Tank	Outflow from Storage Tank	Discharge from Storage Tank	Storage Volume
	D	Z ₁	M5-D	J ₀	J ₁	J ₂	C _r	Z ₂	M1-D	i	i _{climate,change}	Q _{peak}	V _{runoff}	H	Q _{outflow}	V _{outflow}
mins	---	mm	x10 ⁻⁴	x10 ⁻⁶	x10 ⁻⁹	---	---	mm	mm/hr	mm/hr	l / sec	m ³	m	l / sec	m ³	m ³
5	0.371	7.411	1699	2800	114000	0.197	0.615	4.559	54.710	54.710	46.43	13.928	0.000	0.000	0.01	13.918
10	0.530	10.591	1644	5831	-134300	0.211	0.611	6.473	38.840	38.840	32.96	19.775	0.027	0.209	0.07	19.702
15	0.630	12.594	1644	5831	-134300	0.217	0.615	7.748	30.991	30.991	26.30	23.668	0.038	0.388	0.19	23.479
20	0.703	14.058	1644	5831	-134300	0.220	0.618	8.690	26.069	26.069	22.12	26.545	0.045	0.515	0.34	26.202
25	0.761	15.217	1644	5831	-134300	0.222	0.621	9.448	22.674	22.674	19.24	28.861	0.051	0.616	0.53	28.333
30	0.809	16.179	1644	5831	-134300	0.224	0.625	10.107	20.215	20.215	17.15	30.877	0.055	0.694	0.74	30.140
35	0.850	17.005	1644	5831	-134300	0.225	0.628	10.679	18.308	18.308	15.54	32.624	0.058	0.761	0.96	31.660
40	0.887	17.730	1644	5831	-134300	0.226	0.631	11.187	16.780	16.780	14.24	34.173	0.061	0.812	1.21	32.965
45	0.919	18.379	1644	5831	-134300	0.226	0.634	11.643	15.524	15.524	13.17	35.568	0.064	0.855	1.46	34.104
50	0.948	18.966	1644	5831	-134300	0.227	0.636	12.060	14.472	14.472	12.28	36.841	0.066	0.892	1.73	35.109
55	0.975	19.504	1644	5831	-134300	0.227	0.638	12.444	13.575	13.575	11.52	38.013	0.068	0.925	2.01	36.004
60	1.000	20.000	1644	5831	-134300	0.227	0.640	12.800	12.800	12.800	10.86	39.102	0.070	0.954	2.30	36.806
90	1.120	22.394	1644	5831	-134300	0.228	0.650	14.547	9.698	9.698	8.23	44.438	0.071	0.981	4.06	40.376
120	1.209	24.186	1644	5831	-134300	0.227	0.657	15.884	7.942	7.942	6.74	48.524	0.078	1.082	6.01	42.514
180	1.344	26.871	1644	5831	-134300	0.224	0.667	17.936	5.979	5.979	5.07	54.792	0.082	1.139	10.11	44.682
240	1.445	28.906	1644	5831	-134300	0.221	0.676	19.529	4.882	4.882	4.14	59.660	0.086	1.196	14.42	45.243
270	1.489	29.774	1644	5831	-134300	0.219	0.679	20.219	4.493	4.493	3.81	61.767	0.088	1.211	16.60	45.169
300	1.528	30.568	2644	-1621	3150	0.218	0.681	20.821	4.164	4.164	3.53	63.605	0.087	1.209	18.77	44.831
330	1.565	31.302	2644	-1621	3150	0.217	0.683	21.367	3.885	3.885	3.30	65.272	0.087	1.200	20.94	44.337
360	1.599	31.985	2644	-1621	3150	0.216	0.684	21.876	3.646	3.646	3.09	66.830	0.086	1.187	23.07	43.758
Maximum Volume to be Stored in Storage Tank m ³																45.243

Rainfall Hyetograph



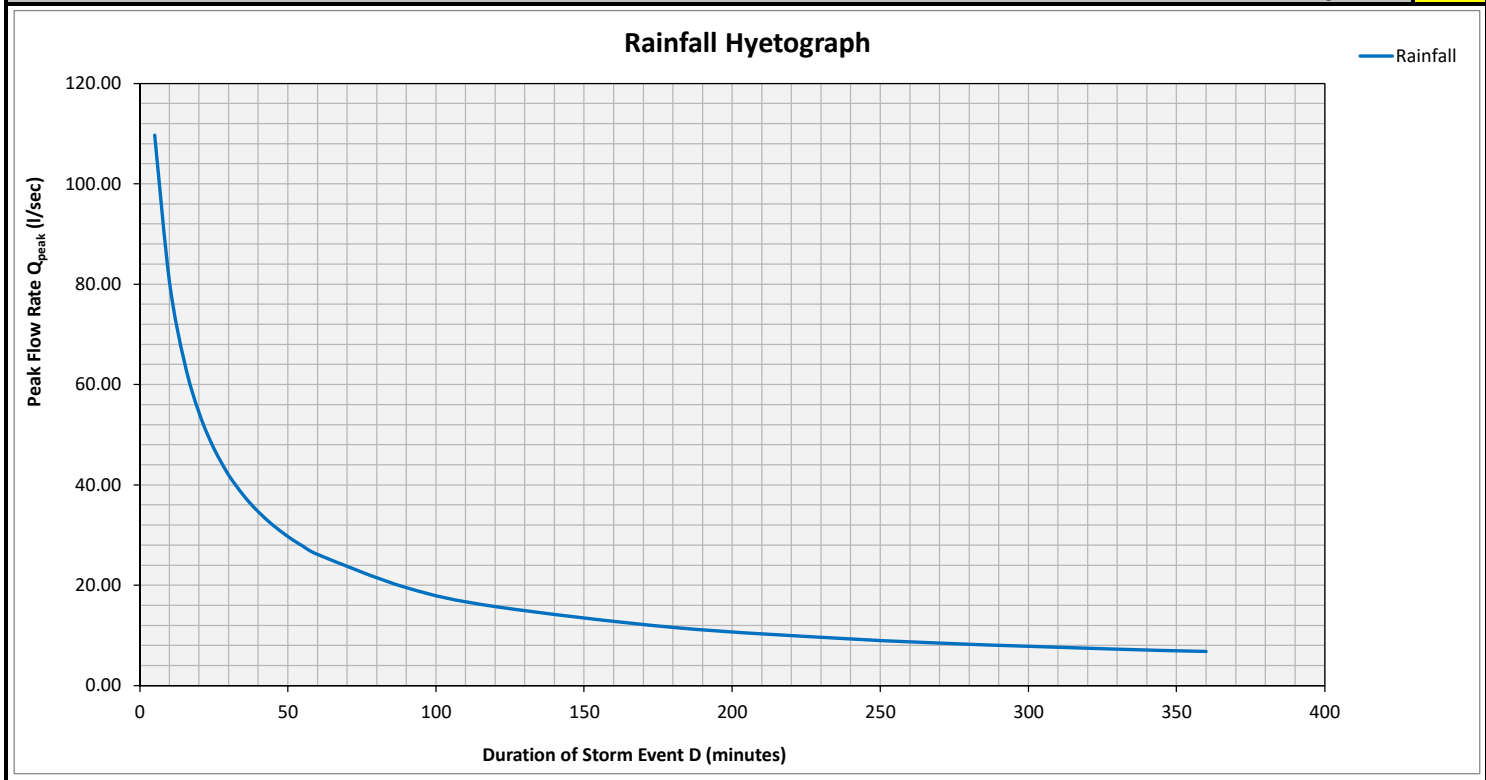
4.0 - FORMULAS USED IN SECTION 3.0			
Variable			Formula
Water Landing on the Site from the Rainfall Event	Wallingford Factor	Z ₁	$Z_1 = \frac{\exp \left(\ln(D) + \ln \left[1.08 \frac{M5-60}{48r} \right] + \left[\ln \left(\frac{721}{1+15D} \right) * \frac{\ln \left(\frac{48r}{1.08} \right)}{\ln \left(\frac{721}{16} \right)} \right] \right)}{M5-60}$ From Wallingford Equation 6.1. Duration D is specified in Hours
	Rainfall Intensity for Storm with 5 Year Return Period and Duration D (mm)	M5-D	M5-D = Z ₁ * M5-60 Wallingford Equation 6.1
	J Factors	J ₀ , J ₁ , J ₂	From Wallingford Modified Rational Method Table 6.1
	C _r Factor	C _r	C _r = J ₀ + (J ₁ * M5-60) + (J ₂ * M5-60 ²) Wallingford Equation 6.3
	Wallingford Factor - Wallingford Equation 6.2	Z ₂	Z ₂ = interpolated from Table 6.2 T = Return period of storm (years) Wallingford Equation 6.2 (rearranged)
	Rainfall Intensity for 1 Year Storm of Duration D	M1-D	M1-D = M5-D * Z ₂ Wallingford Equation 6.2. In units of mm
	Rainfall Intensity for M1-D	i	i = M1-D * (60 / D) Same as M1-D but in units of mm/hr
	Rainfall Intensity for M1-D + Climate Change	i _{climate,change}	i _{climate,change} = i * (1 + percentage increase) mm/hr
	Peak Flow Rate	Q _{peak}	Q _{peak} = i _{climate,change} * A _{site} * (1/1000) * (1/3600) * 1000 litres/second
Storage Tank Outflow	Runoff Volume Over Time Step	V _{runoff}	V _{runoff} = Q _{peak} * D * (1/1000) * 60 (D specified in minutes) m ³
	Head of Water in Storage Tank	H	Calculated by assuming the first 5 minutes of rain is stored and then using this volume of stored water to determine a head from the sizing of the storage tank
	Outflow from Storage Tank	Q _{outflow}	Once the head of water in the tank is known the outflow can be worked out from the orifice equation or from the data from the Hydrobrake flow curves
	Discharge from Storage Tank	V _{outflow}	A running total of the outflow from the storage tank
	Storage Volume	V _{storage}	The difference between the outflowing water and the inflowing water from the tank

 a: 6a Nesbitts Alley, London, EN5 5XG t: +44(0)20 8361 6827 e: ama@amad.co.uk w: www.amad.co.uk	Project	Selwood	Hydraulic Curve - 1 in 30 Year Storm		
	Client	RMC	Made by	Date	Project No
	Description	1 in 30 Year Storm Event (Storage Tank Discharge)	CC	24-3-26	25042
	SuDs Storage v1.0		Checked	Revision	
			CC	0	

1.0 - INPUT DATA						
Return Period of Storm Event	T	30	Years	User Input - Valid Range 5-100 Years		
Ratio Relating to the Type of Rainfall Expected	r	0.4	---	User Input - Defined Previously		
Site Location	England and Wales			User Input - Defined Previously		
Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20	mm	User Input - Defined Previously		
2.0 - AREAS USED FOR VOLUME CALCULATIONS AND ALLOWANCE FOR CLIMATE CHANGE						
Area of the Site used for Storage Calculations	Post-Development Impervious			User Input - Defined Previously		
	post,impervious	2611	m ²			
Allowance for Urban Creep	UC	0%	%			
Final Area Used for Hydraulic Calculations	A _{final}	2611	m ²	A _{final} = A _{post,impervious} * (1 + Urban Creep%)		
Percentage Increase on Rainfall Intensity for Climate Change	CC	0%	%	No increase for Climate Change for 1 in 30 Year Storm		
Volumetric Runoff Coefficient	C _v	0.90	---	User Input - Defined Previously		
Dimensionless Routing Coefficient	C _R	1.30	---	User Input - Defined Previously		

3.0 - PLOT HYDRAULIC CURVE (RAINFALL ON THE SITE AND DISCHARGE FROM THE STORAGE TANK)

Duration	WATER LANDING ON THE SITE FROM THE RAINFALL EVENT											STORAGE TANK OUTFLOW				
	Wallingford Factor	Rainfall Intensity	J Factors			C _r Factor	Wallingford Factor	Rainfall Intensity for 100 Year Storm	Rainfall Intensity for M30-D	Rainfall Intensity for M30-D + Climate Change	Peak Flow Rate	Run Off Volume Over Time Step	Head of Water in Storage Tank	Outflow from Storage Tank	Discharge from Storage Tank	Storage Volume
	D	Z ₁	M5-D	J ₀	J ₁	J ₂	C _r	Z ₂	M30-D	i	i _{climate,change}	Q _{peak}	V _{runoff}	H	Q _{outflow}	V _{outflow}
mins	---	mm	x10 ⁻⁴	x10 ⁻⁶	x10 ⁻⁹	---	---	mm	mm/hr	mm/hr	l / sec	m ³	m	l / sec	m ³	m ³
5	0.371	7.411	1699	2800	114000	0.197	1.454	10.776	129.316	129.316	109.73	32.920	0.000	0.000	0.01	32.910
10	0.530	10.591	1644	5831	-134300	0.211	1.494	15.822	94.930	94.930	80.55	48.333	0.064	0.853	0.27	48.067
15	0.630	12.594	1644	5831	-134300	0.217	1.509	19.009	76.035	76.035	64.52	58.069	0.104	1.401	0.69	57.383
20	0.703	14.058	1644	5831	-134300	0.220	1.519	21.352	64.056	64.056	54.36	65.227	0.164	1.617	1.17	64.056
25	0.761	15.217	1644	5831	-134300	0.222	1.525	23.209	55.701	55.701	47.27	70.899	0.207	1.692	1.68	69.220
30	0.809	16.179	1644	5831	-134300	0.224	1.530	24.749	49.499	49.499	42.00	75.606	0.241	1.727	2.20	73.409
35	0.850	17.005	1644	5831	-134300	0.225	1.533	26.069	44.690	44.690	37.92	79.637	0.268	1.746	2.72	76.916
40	0.887	17.730	1644	5831	-134300	0.226	1.535	27.225	40.837	40.837	34.65	83.168	0.290	1.755	3.25	79.921
45	0.919	18.379	1644	5831	-134300	0.226	1.537	28.254	37.673	37.673	31.97	86.314	0.310	1.760	3.78	82.538
50	0.948	18.966	1644	5831	-134300	0.227	1.539	29.184	35.021	35.021	29.72	89.153	0.327	1.762	4.30	84.848
55	0.975	19.504	1644	5831	-134300	0.227	1.540	30.031	32.762	32.762	27.80	91.742	0.342	1.763	4.83	86.909
60	1.000	20.000	1644	5831	-134300	0.227	1.541	30.811	30.811	30.811	26.15	94.124	0.355	1.763	5.36	88.762
90	1.120	22.394	1644	5831	-134300	0.228	1.542	34.521	23.014	23.014	19.53	105.456	0.367	1.762	8.53	96.922
120	1.209	24.186	1644	5831	-134300	0.227	1.539	37.229	18.615	18.615	15.80	113.731	0.421	1.750	11.68	102.047
180	1.344	26.871	1644	5831	-134300	0.224	1.531	41.146	13.715	13.715	11.64	125.696	0.457	1.737	17.94	107.759
240	1.445	28.906	1644	5831	-134300	0.221	1.521	43.979	10.995	10.995	9.33	134.349	0.497	1.717	24.12	110.232
270	1.489	29.774	1644	5831	-134300	0.219	1.516	45.146	10.032	10.032	8.51	137.915	0.515	1.706	27.19	110.727
300	1.528	30.568	2644	-1621	3150	0.218	1.513	46.248	9.250	9.250	7.85	141.281	0.518	1.704	30.26	111.026
330	1.565	31.302	2644	-1621	3150	0.217	1.510	47.264	8.593	8.593	7.29	144.385	0.520	1.702	33.32	111.066
360	1.599	31.985	2644	-1621	3150	0.216	1.507	48.206	8.034	8.034	6.82	147.263	0.521	1.702	36.38	110.882
Maximum Volume to be Stored in Storage Tank m ³																111.066



4.0 - FORMULAS USED IN SECTION 3.0

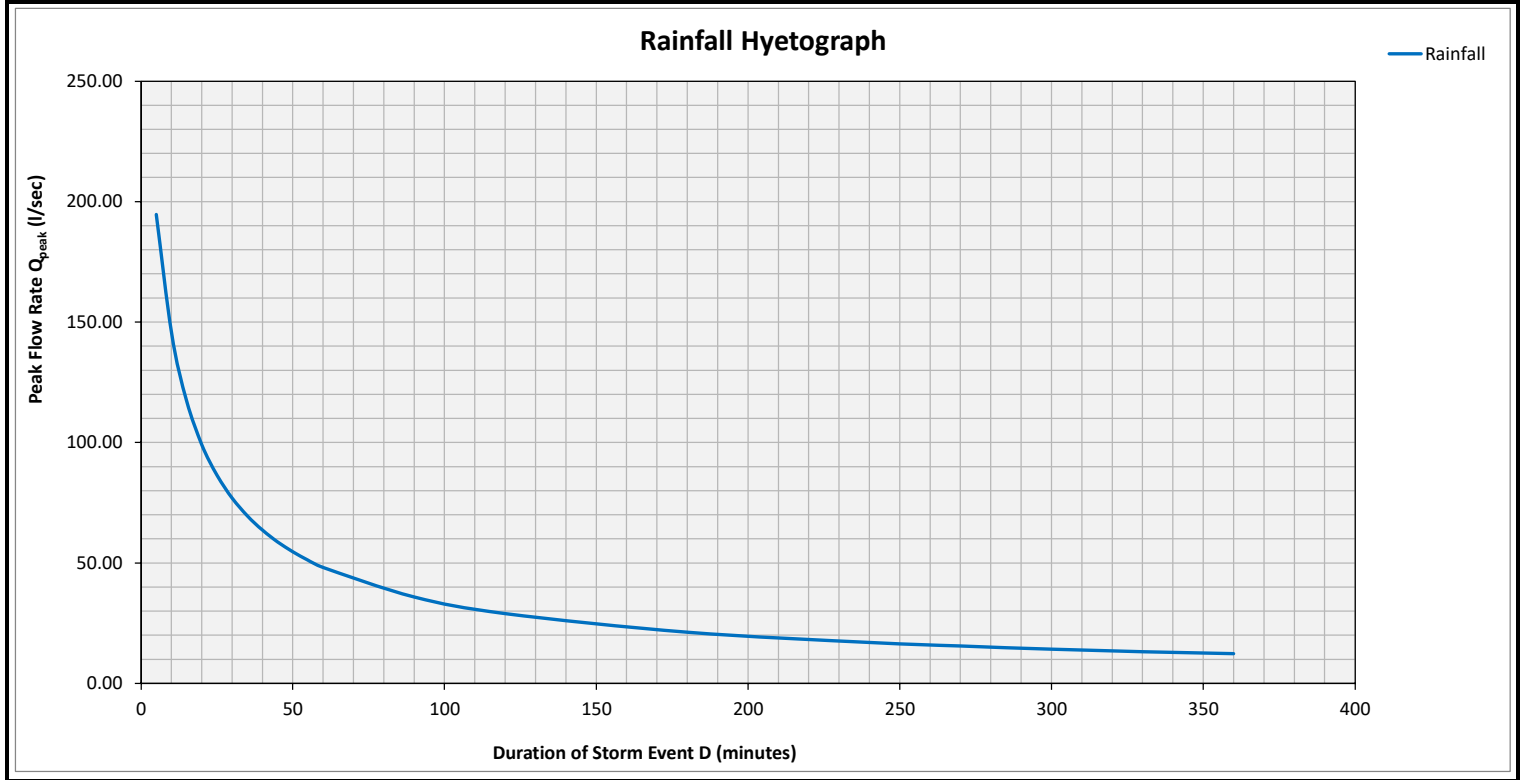
Variable			Formula
Water Landing on the Site from the Rainfall Event	Wallingford Factor	Z ₁	$Z_1 = \frac{\exp \left(\ln(D) + \ln \left[1.08 \frac{M5-60}{48r} \right] + \left[\ln \left(\frac{721}{1+150} \right) * \frac{\ln \left(\frac{48r}{1.08} \right)}{\ln \left(\frac{721}{16} \right)} \right] \right)}{M5-60}$ From Wallingford Equation 6.1. Duration D is specified in Hours
	Rainfall Intensity for Storm with 5 Year Return Period and Duration D (mm)	M5-D	M5-D = Z ₁ * M5-60 Wallingford Equation 6.1
	J Factors	J ₀ , J ₁ , J ₂	From Wallingford Modified Rational Method Table 6.1
	C _r Factor	C _r	C _r = J ₀ + (J ₁ * M5-60) + (J ₂ * M5-60 ²) Wallingford Equation 6.3
	Wallingford Factor - Wallingford Equation 6.2	Z ₂	$Z_2 = \exp(C_r * [\ln(T) - 1.5])$ T = Return period of storm (years) Wallingford Equation 6.2 (rearranged)
	Rainfall Intensity for 30 Year Storm of Duration D	M30-D	M30-D = M5-D * Z ₂ Wallingford Equation 6.2. In units of mm
	Rainfall Intensity for M30-D	i	i = M30-D * (60 / D) Same as M30-D but in units of mm/hr
	Rainfall Intensity for M30-D + Climate Change	i _{climate,change}	i _{climate,change} = i * (1 + percentage increase) mm/hr
	Peak Flow Rate	Q _{peak}	Q _{peak} = i _{climate,change} * A _{site} * (1/1000) * (1/3600) * 1000 litres/second
Storage Tank Outflow	Runoff Volume Over Time Step	V _{runoff}	V _{runoff} = Q _{peak} * D * (1/1000) * 60 (D specified in minutes) m ³
	Head of Water in Storage Tank	H	Calculated by assuming the first 5 minutes of rain is stored and then using this volume of stored water to determine a head from the sizing of the storage tank
	Outflow from Storage Tank	Q _{outflow}	Once the head of water in the tank is known the outflow can be worked out from the orifice equation or from the data from the Hydrobrake flow curves
	Discharge from Storage Tank	V _{outflow}	A running total of the outflow from the storage tank
	Storage Volume	V _{storage}	the tank

 a: 6a Nesbitts Alley, London, EN5 5XG t: +44(0)20 8361 6827 e: ama@amad.co.uk w: www.amad.co.uk	Project	Selwood			Hydraulic Curve - 1 in 100 Year Storm		
	Client	RMC			Made by	Date	Project No
	Description	1 in 100 Year Storm Event (Storage Tank Discharge)			CC	24-3-26	25042
					Checked	Revision	
					CC	0	
SuDs Storage v1.0							

1.0 - INPUT DATA					
Return Period of Storm Event	T	100	Years	User Input - Valid Range 5-100 Years	
Ratio Relating to the Type of Rainfall Expected	r	0.4	---	User Input - Defined Previously	
Site Location	England and Wales			User Input - Defined Previously	
Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20	mm	User Input - Defined Previously	
2.0 - AREAS USED FOR VOLUME CALCULATIONS AND ALLOWANCE FOR CLIMATE CHANGE					
Area of the Site used for Storage Calculations	Post-Development Impervious			User Input - Defined Previously	
	Apost,impervious	2611	m ²		
Allowance for Urban Creep	UC	0%	%	Afinal = Apost,impervious * (1 + Urban Creep%)	
Final Area Used for Hydraulic Calculations	Afinal	2611	m ²		
Percentage Increase on Rainfall Intensity for Climate Change	CC	40%	%	User Input - Defined Previously (NPPF Table 2)	
Volumetric Runoff Coefficient	Cv	0.90	---	User Input - Defined Previously	
Dimensionless Routing Coefficient	CR	1.30	---	User Input - Defined Previously	

3.0 - PLOT HYDRAULIC CURVE (RAINFALL ON THE SITE AND DISCHARGE FROM THE STORAGE TANK)

Duration	WATER LANDING ON THE SITE FROM THE RAINFALL EVENT												STORAGE TANK OUTFLOW			
	Wallingford Factor	Rainfall Intensity	J Factors			C _r Factor	Wallingford Factor	Rainfall Intensity for 100 Year Storm	Rainfall Intensity for M100-D	Rainfall Intensity for M100-D + Climate Change	Peak Flow Rate	Run Off Volume Over Time Step	Head of Water in Storage Tank	Outflow from Storage Tank	Discharge from Storage Tank	Storage Volume
D	Z ₁	M5-D	J ₀	J ₁	J ₂	C _r	Z ₂	M100-D	i	i _{climate,change}	Q _{peak}	V _{runoff}	H	Q _{outflow}	V _{outflow}	V _{storage}
mins	---	mm	x10 ⁻⁴	x10 ⁻⁶	x10 ⁻⁹	---	---	mm	mm/hr	mm/hr	l / sec	m ³	m	l / sec	m ³	m ³
5	0.371	7.411	1699	2800	114000	0.197	1.843	13.659	163.914	229.479	194.73	58.419	0.000	0.000	0.01	58.409
10	0.530	10.591	1644	5831	-134300	0.211	1.926	20.400	122.399	171.359	145.41	87.246	0.171	1.631	0.50	86.747
15	0.630	12.594	1644	5831	-134300	0.217	1.959	24.670	98.681	138.153	117.23	105.510	0.354	1.763	1.03	104.482
20	0.703	14.058	1644	5831	-134300	0.220	1.979	27.822	83.465	116.851	99.16	118.988	0.474	1.729	1.55	117.441
25	0.761	15.217	1644	5831	-134300	0.222	1.993	30.321	72.770	101.879	86.45	129.677	0.565	1.663	2.05	127.632
30	0.809	16.179	1644	5831	-134300	0.224	2.002	32.395	64.789	90.705	76.97	138.546	0.637	1.564	2.52	136.031
35	0.850	17.005	1644	5831	-134300	0.225	2.009	34.168	58.575	82.004	69.59	146.132	0.696	1.444	2.95	143.184
40	0.887	17.730	1644	5831	-134300	0.226	2.015	35.720	53.580	75.012	63.65	152.767	0.746	1.480	3.39	149.375
45	0.919	18.379	1644	5831	-134300	0.226	2.019	37.099	49.465	69.252	58.77	158.666	0.790	1.517	3.85	154.819
50	0.948	18.966	1644	5831	-134300	0.227	2.022	38.341	46.010	64.414	54.66	163.979	0.828	1.550	4.31	159.667
55	0.975	19.504	1644	5831	-134300	0.227	2.024	39.472	43.060	60.285	51.16	168.815	0.862	1.577	4.79	164.029
60	1.000	20.000	1644	5831	-134300	0.227	2.025	40.510	40.510	56.713	48.13	173.252	0.892	1.603	5.27	167.986
90	1.120	22.394	1644	5831	-134300	0.228	2.028	45.405	30.270	42.378	35.96	194.188	0.920	1.625	8.19	185.996
120	1.209	24.186	1644	5831	-134300	0.227	2.023	48.923	24.461	34.246	29.06	209.234	1.047	1.722	11.29	197.942
180	1.344	26.871	1644	5831	-134300	0.224	2.006	53.891	17.964	25.149	21.34	230.480	1.130	1.783	17.71	212.769
240	1.445	28.906	1644	5831	-134300	0.221	1.985	57.367	14.342	20.078	17.04	245.347	1.234	1.855	24.39	220.959
270	1.489	29.774	1644	5831	-134300	0.219	1.974	58.763	13.059	18.282	15.51	251.321	1.292	1.894	27.80	223.523
300	1.528	30.568	2644	-1621	3150	0.218	1.967	60.113	12.023	16.832	14.28	257.094	1.310	1.906	31.23	225.865
330	1.565	31.302	2644	-1621	3150	0.217	1.960	61.357	11.156	15.618	13.25	262.411	1.326	1.917	34.68	227.733
360	1.599	31.985	2644	-1621	3150	0.216	1.954	62.507	10.418	14.585	12.38	267.330	1.339	1.925	38.14	229.185
Maximum Volume to be Stored in Storage Tank m ³																229.185



4.0 - FORMULAS USED IN SECTION 3.0

Variable			Formula
Water Landing on the Site from the Rainfall Event	Wallingford Factor	Z_1	$Z_1 = \frac{\exp \left(\ln(D) + \ln \left[1.06 \frac{M5-60}{48} \right] + \left[\ln \left(\frac{721}{1+15D} \right) * \frac{\ln \left(\frac{48}{1.06} \right)}{\ln \left(\frac{721}{16} \right)} \right] \right)}{M5-60}$ From Wallingford Equation 6.1. Duration D is specified in Hours
	Rainfall Intensity for Storm with 5 Year Return Period and Duration D (mm)	M5-D	M5-D = Z_1 * M5-60 Wallingford Equation 6.1
	J Factors	J_0, J_1, J_2	From Wallingford Modified Rational Method Table 6.1
	C_r Factor	C_r	$C_r = J_0 + (J_1 * M5-60) + (J_2 * M5-60^2)$ Wallingford Equation 6.3
	Wallingford Factor - Wallingford Equation 6.2	Z_2	$Z_2 = \exp(C_r * [\ln(T) - 1.5])$ T = Return period of storm (years) Wallingford Equation 6.2 (rearranged)
	Rainfall Intensity for 100 Year Storm of Duration D	M100-D	M100-D = M5-D * Z_2 Wallingford Equation 6.2. In units of mm
	Rainfall Intensity for M100-D	i	i = M100-D * (60 / D) Same as M100-D but in units of mm/hr
	Rainfall Intensity for M100-D + Climate Change	$i_{climate,change}$	$i_{climate,change} = i * (1 + \text{percentage increase})$ mm/hr
	Peak Flow Rate	Q_{peak}	$Q_{peak} = i_{climate,change} * A_{site} * (1/1000) * (1/3600) * 1000$ litres/second
Storage Tank Outflow	Runoff Volume Over Time Step	V_{runoff}	$V_{runoff} = Q_{peak} * D * (1/1000) * 60$ (D specified in minutes) m^3
	Head of Water in Storage Tank	H	Calculated by assuming the first 5 minutes of rain is stored and then using this volume of stored water to determine a head from the sizing of the storage tank
	Outflow from Storage Tank	$Q_{outflow}$	Once the head of water in the tank is known the outflow can be worked out from the orifice equation or from the data from the Hydrobrake flow curves
	Discharge from Storage Tank	$V_{outflow}$	A running total of the outflow from the storage tank
	Storage Volume	$V_{storage}$	The difference between the outflowing water and the inflowing water from the tank



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Project	Selwood	Design Storms		
Client	RMC	Made by	Date	Project No
Description	Design Storms	CC	24-3-26	25042
		Checked	Revision	
SuDs Storage v1.0		CC	0	

1.0 - SITE INFO (WALLINGFORD INPUTS)

Return Period T	100	Years
Site Location	England and Wales	
r	0.40	---
M5-60	20	mm

2.0 - AREA USED FOR RUNOFF CALCULATION

Area of Used in Calculations	Post-Development Impervious	
Chosen Area: Apost,impervious	2611	m ²
Include Allowance for Urban Creep	Omit	
Multiplier for Urban Creep	1.00	---
Final Area Used in Calculations	2611	m ²
	0.00261	km ²
	0.26110	hectares

3.0 - CLIMATE CHANGE INCREASE

Include Increase for Climate Change	YES	
Multiplier for Climate Change Increase	1.4	Multiplier

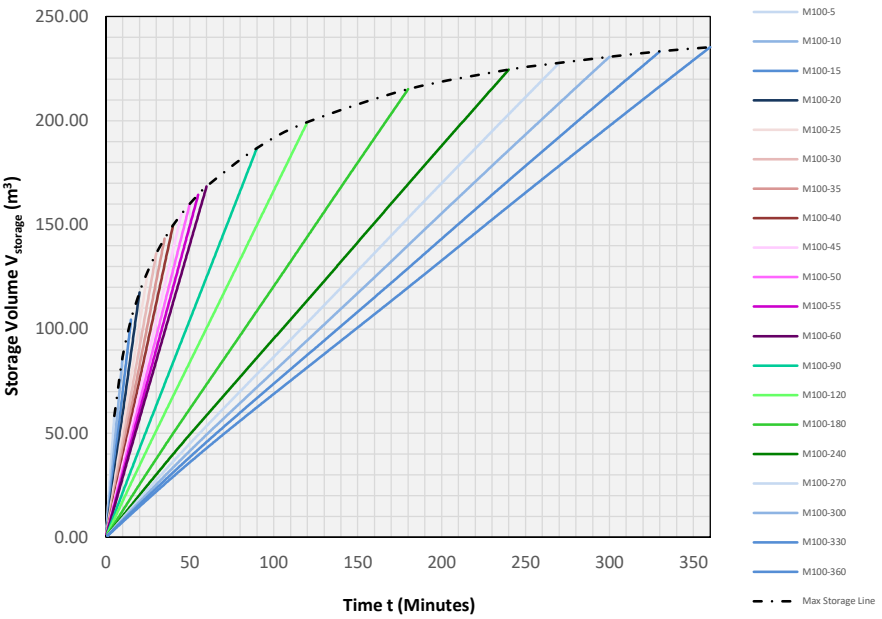
4.0 - ROUTING COEFFICIENTS

Volumetric Runoff Coefficient	0.90	---
Dimensionless Routing Coefficient	1.30	---

5.0 - SUMMARY OF DESIGN STORM RESULTS

Storm Type	Duration	Peak Flow Rate	Max Storage Volume
	D	Q _{peak}	V _{storage}
	minutes	l / sec	m ³
M100-5	5	194.73	58.21
M100-10	10	145.41	86.62
M100-15	15	117.23	104.46
M100-20	20	99.16	117.52
M100-25	25	86.45	127.79
M100-30	30	76.97	136.25
M100-35	35	69.59	143.43
M100-40	40	63.65	149.66
M100-45	45	58.77	155.14
M100-50	50	54.66	160.03
M100-55	55	51.16	164.45
M100-60	60	48.13	168.46
M100-90	90	35.96	186.82
M100-120	120	29.06	199.21
M100-180	180	21.34	215.04
M100-240	240	17.04	224.42
M100-270	270	15.51	227.64
M100-300	300	14.28	230.63
M100-330	330	13.25	233.16
M100-360	360	12.38	235.29
Max Storage Volume (m ³)			235.29

6.0 - GRAPH SHOWING STORAGE VOLUME PLOTTED AGAINST TIME FOR ALL DESIGN STORMS



Project	Selwood	Time for Storage Tank to Empty		
Client	RMC	Made by	Date	Project No
Description	Storage Tank Emptying Time	CC	24-3-26	25042
SuDs Storage v1.0		Checked	Revision	
		CC	0	

1.0 - INPUT DATA

Return Period of Storm Event	T	100	Years	User Input - Valid Range 5-100 Years
Ratio Relating to the Type of Rainfall Expected	r	0.4	---	User Input - Defined Previously
Site Location	England and Wales			User Input - Defined Previously
Rainfall Intensity for Storm with 5 Year Return Period and 60min Duration	M5-60	20	mm	User Input - Defined Previously

2.0 - AREAS USED FOR VOLUME CALCULATIONS AND ALLOWANCE FOR CLIMATE CHANGE

Area of the Site used for Storage Calculations	Post-Development Impervious			User Input - Defined Previously
	Apost,impervious	2611	m ²	
Allowance for Urban Creep	UC	0%	%	Afinal = Apost,impervious * (1 + Urban Creep%)
Final Area Used for Hydraulic Calculations	Afinal	2611	m ²	
Include Increase in Rainfall Intensity for Climate Change?	Include			User Input - Defined Previously
Percentage Increase on Rainfall Intensity for Climate Change	CC	40%	%	
Volumetric Runoff Coefficient	Cv	0.90	---	
Dimensionless Routing Coefficient	CR	1.30	---	

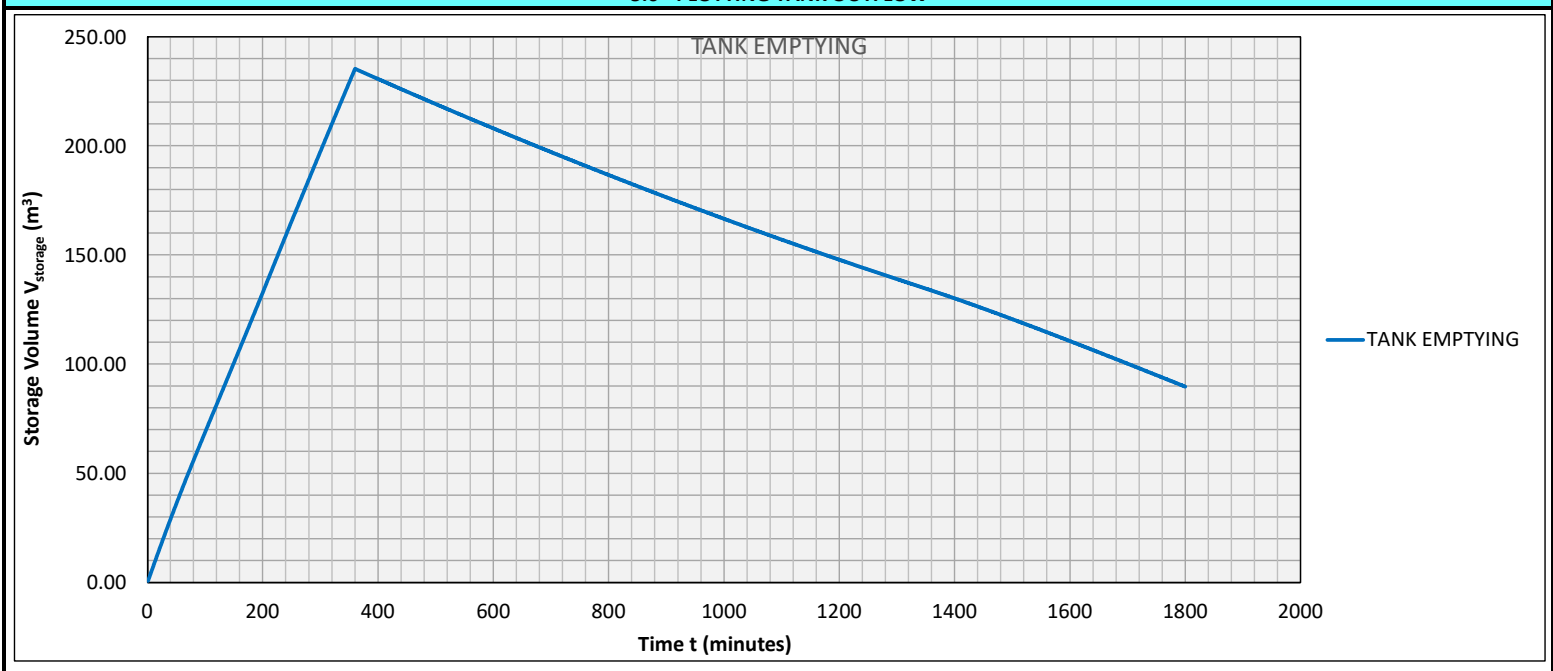
3.0 - CHOSEN STORM DURATION

Storm Duration	D	360	minutes	6hrs
Peak Flow Rate	Qpeak	12.38	l / s	Q = Qpeak * 60 * (1/1000)
Flow Rate into the Storage Tank	Q	0.74	m ³ / min	

4.0 - TIME FOR TANK TO EMPTY

Percentage of Tank Full After 24hrs (includes storm duration within 24hr period)	Tempty	38%	%	
Time for Tank to Empty to 50% After Storm Ends	T50%	1170	minutes	

5.0 - PLOTTING TANK OUTFLOW



Technical Specification

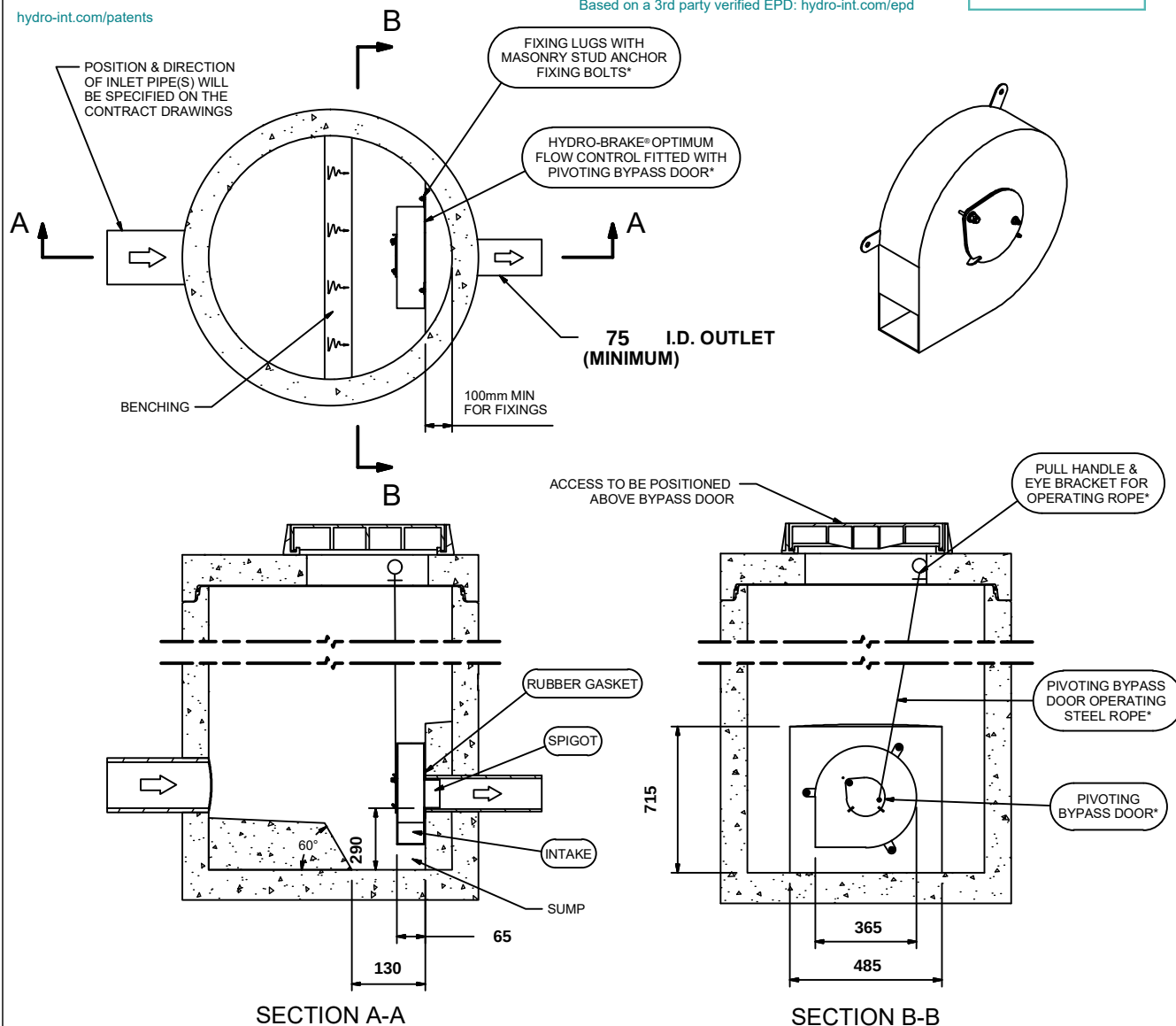
Control Point	Head (m)	Flow (l/s)
Primary Design	1.600	2.000
Flush-Flo™	0.263	1.501
Kick-Flo®	0.536	1.220
Mean Flow		1.528

hydro-int.com/patents

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 10 kg
- Product Carbon Footprint: 30.46 kgCO2e

Based on a 3rd party verified EPD: hydro-int.com/epd



IMPORTANT: ○ LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
 ALL CIVIL AND INSTALLATION WORK BY OTHERS
 * WHERE SUPPLIED
 HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY
 HYDRO INTERNATIONAL

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

DESIGN ADVICE



The head/flow characteristics of this SHE-0060-2000-1600-2000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**
 A CRH COMPANY

DATE	24/03/2026 11:04
SITE	Selwood
DESIGNER	Christos Christou
REF	Selwood

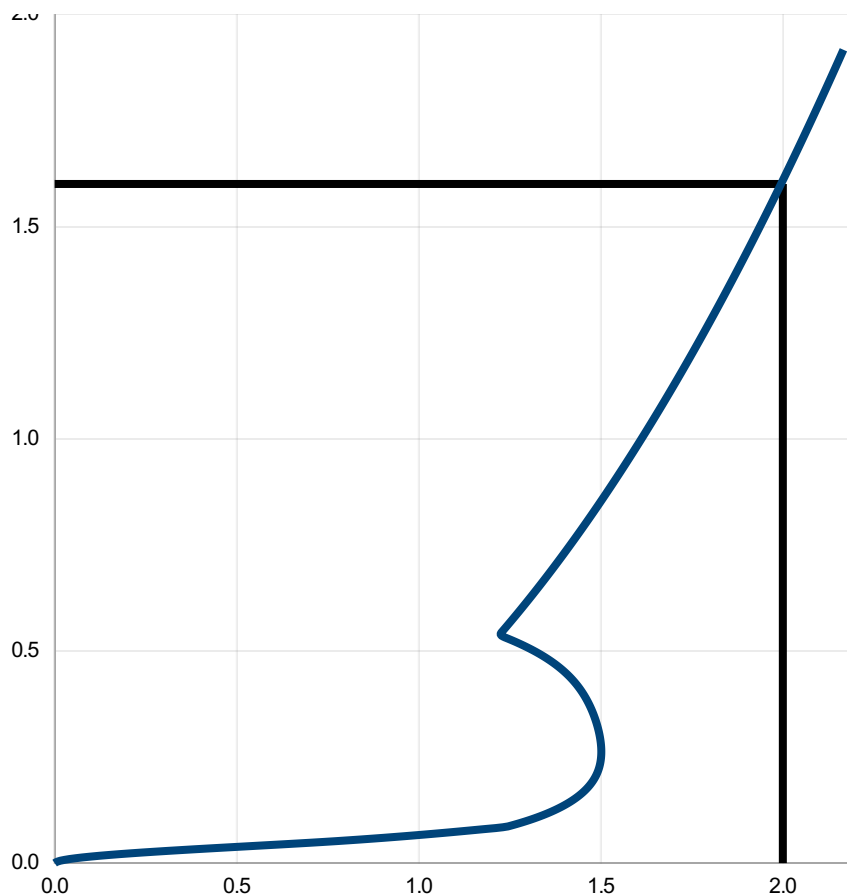
SHE-0060-2000-1600-2000
 Hydro-Brake® Optimum

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.600	2.000
Flush-Flo™	0.263	1.501
Kick-Flo®	0.536	1.220
Mean Flow		1.528



hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.055	0.832
0.110	1.333
0.166	1.449
0.221	1.494
0.276	1.501
0.331	1.488
0.386	1.460
0.441	1.412
0.497	1.324
0.552	1.235
0.607	1.289
0.662	1.340
0.717	1.388
0.772	1.435
0.828	1.480
0.883	1.524
0.938	1.566
0.993	1.607
1.048	1.647
1.103	1.685
1.159	1.723
1.214	1.760
1.269	1.795
1.324	1.830
1.379	1.865
1.434	1.898
1.490	1.931
1.545	1.963
1.600	1.995

DESIGN ADVICE



The head/flow characteristics of this SHE-0060-2000-1600-2000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE 24/03/2026 11:04

Site Selwood

DESIGNER Christos Christou

Ref Selwood

SHE-0060-2000-1600-2000

Hydro-Brake® Optimum

Appendix G. Catchment Plan Existing and Proposed

Chris Christou

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Director

Richard Russell

CEng MInstructE
Director

AMA Consulting Engineers Ltd

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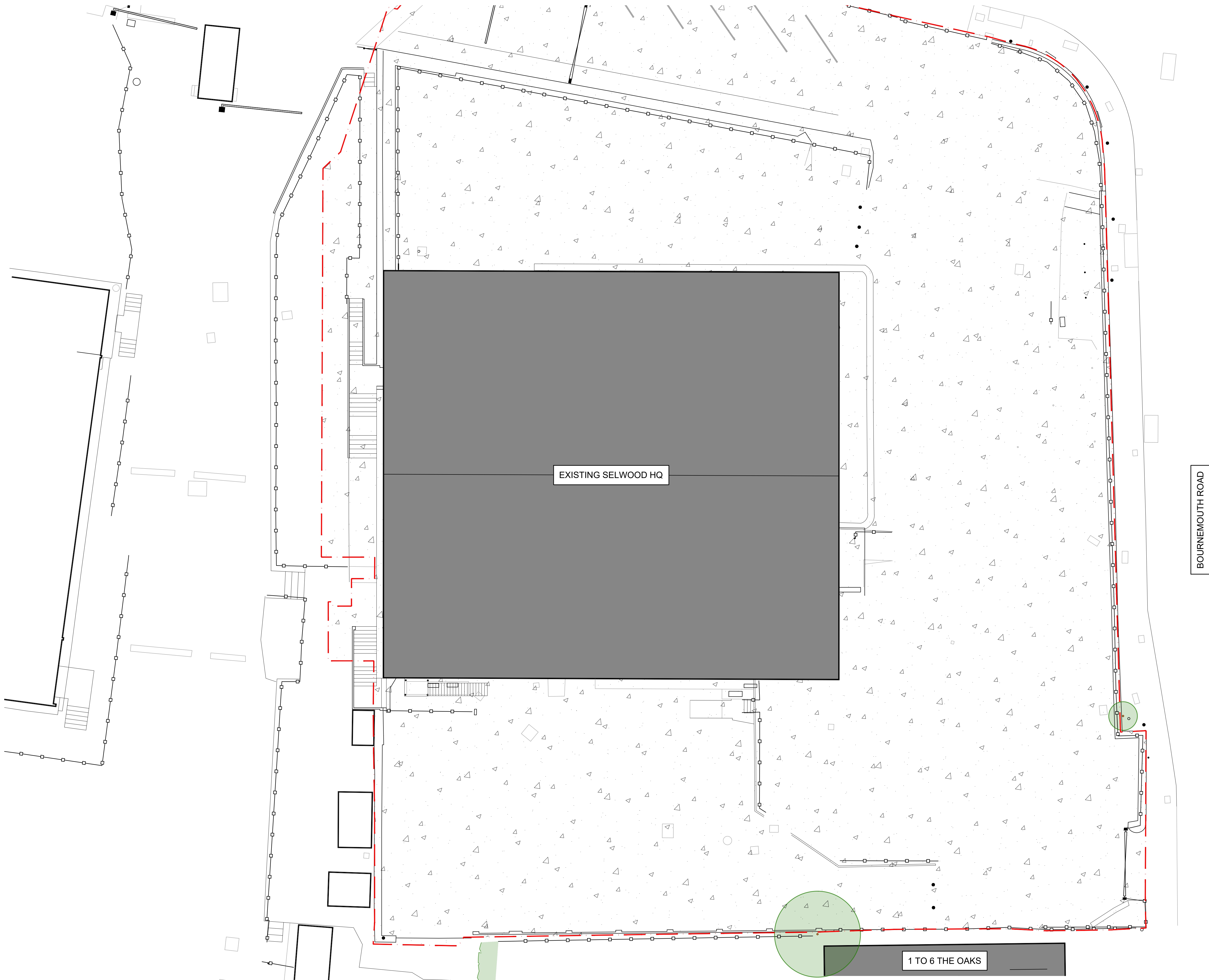
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TOTAL SITE AREA (RED LINE BOUNDARY)= 3532m²

DRAINED SURFACE LEGEND		
HATCH	DESIGNATION	AREA (m²)
	EXISTING BUILDING ROOF	905
	EXISTING CONCRETE	2627
TOTAL		3532

P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

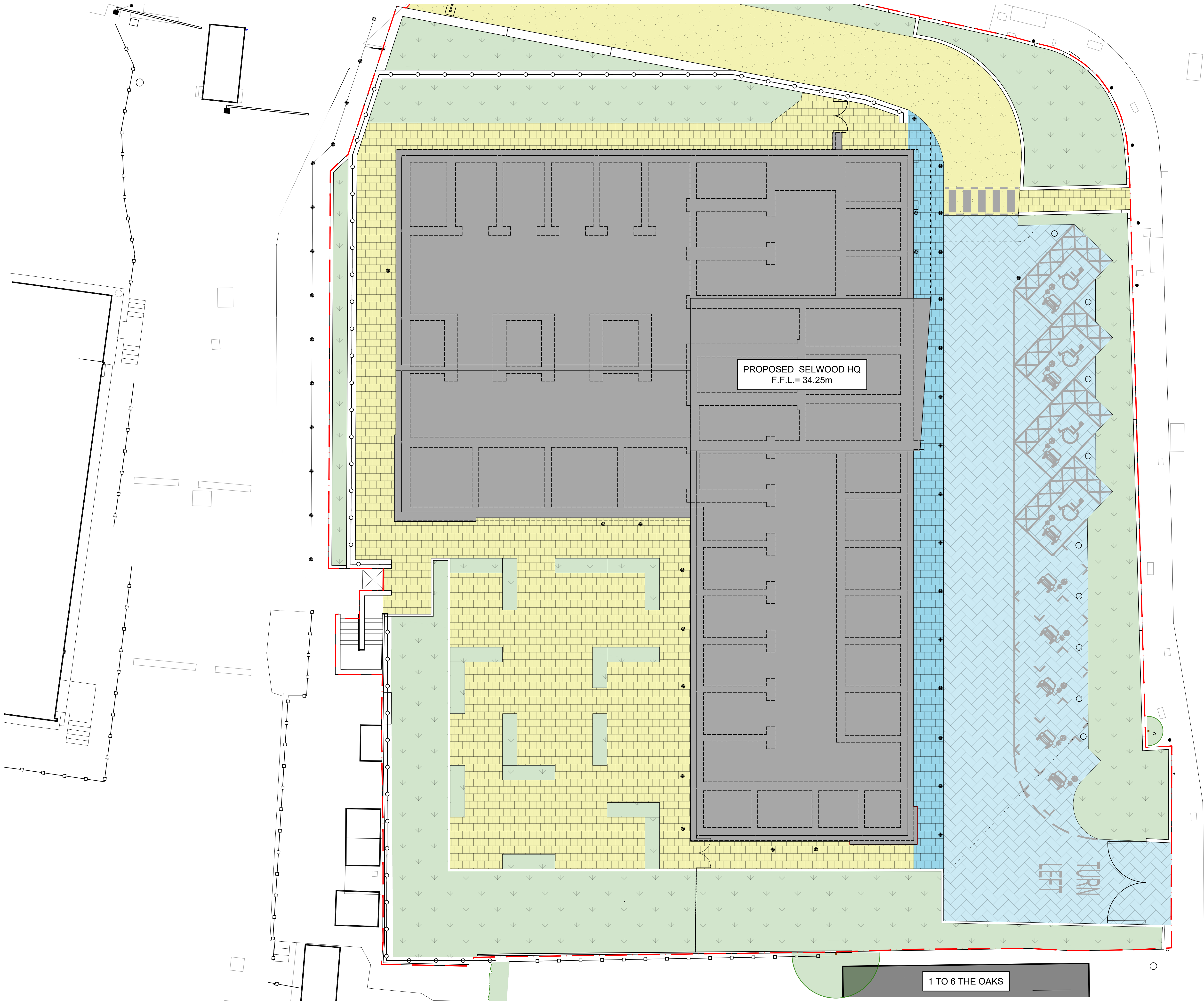
Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
SuDS Sheet 1
Existing Site Catchment Layout

AMA Project N°:		25042	
Drawn By:	JL	Checked By: CC	
First Issued:	Mar 2026	Scale @ A1: 1:125	
Status:	S2	P01	
Revision:		+44(0)20 8361 8827 www.amad.co.uk	

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TOTAL SITE AREA (RED LINE BOUNDARY)= 3532m²

DRAINED SURFACE LEGEND

HATCH	DESIGNATION	AREA (m²)
	BUILDING ROOF DRAINED INTO MAIN STONE INFILTRATION TANK	1234
	IMPERMEABLE FOOTPATH PAVING INTO ACCESS ROAD PERMEABLE PAVING	95
	PERMEABLE ACCESS ROAD PAVING	517
	IMPERMEABLE ACCESS ROAD SURFACE	215
TOTAL		2061

UNDRAINED SURFACE LEGEND

HATCH	DESIGNATION	AREA (m²)
	SOFT LANDSCAPE	921
	IMPERMEABLE FOOTPATH PAVING INTO SOFT LANDSCAPE	550
TOTAL		1471

P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
SuDS Sheet 2
Proposed Site Catchment Layout

AMA Project N°:
25042

Drawn By: JL Checked By: CC

First Issued: Mar 2026 Scale @ A1: 1:125

Status: S2 P01

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BIM Document Ref:
25042 - AMA - 01 - ZZ - DR - D - 139102
PROJECT N° - ORIGINATOR - VOLUME - LEVEL - FILE TYPE - ROLE - DRAWING N°

Appendix H. Exceedance

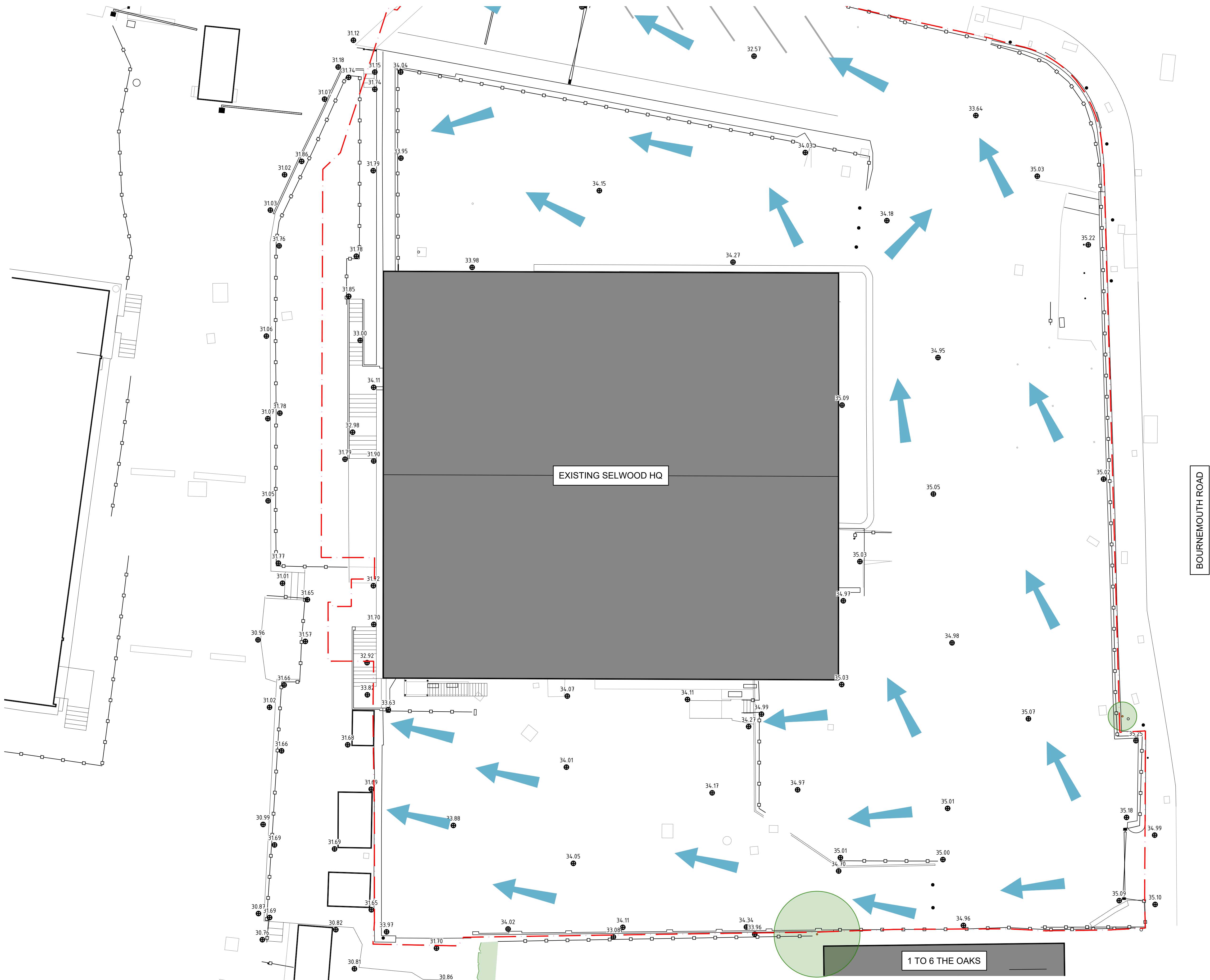
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CEng MStructE
Director

Richard Russell
CEng MStructE
Director

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ANNOTATION KEY	
MARK	DESIGNATION
00.00 ⊕	DENOTES EXISTING SPOT LEVEL (SURVEY)
00.00 +	DENOTES PROPOSED SPOT LEVEL
←	DENOTES DIRECTION OF EXCEEDANCE FLOW

P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

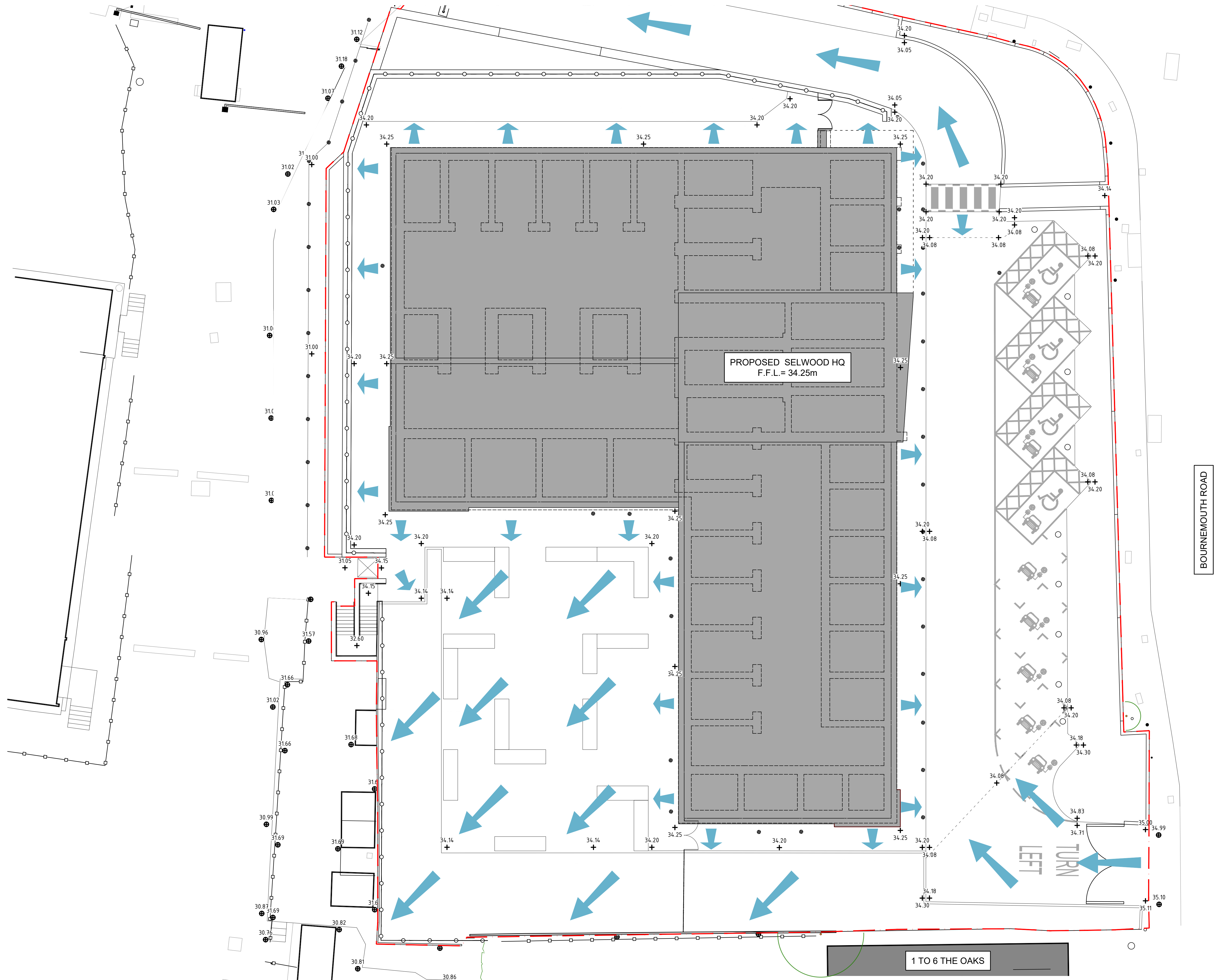
Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
SuDS Sheet 3
Existing Site Exceedance Layout

AMA Project N°: 25042		
Drawn By: JL	Checked By: CC	
First Issued: Mar 2026	Scale @ A1: 1:125	
Status: S2	P01	

BIM Document Ref:
25042 - AMA - 01 - ZZ - DR - D - 139103
PROJECT N° - ORIGINATOR - VOLUME - LEVEL - FILE TYPE - ROLE - DRAWING N°



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ANNOTATION KEY	
MARK	DESIGNATION
00.00 ⊕	DENOTES EXISTING SPOT LEVEL (SURVEY)
00.00 +	DENOTES PROPOSED SPOT LEVEL
←	DENOTES DIRECTION OF EXCEEDANCE FLOW

P01	Preliminary	JL	CC	2026/03/24
REV	DETAIL	Dr	Ch	DATE

Client Name:
Richard Morris Construction Ltd.

Project Name:
Selwood HQ

Drawing Title:
SuDS Sheet 4
Proposed Site Exceedance Layout

AMA Project N°: 25042		
Drawn By: JL	Checked By: CC	
First Issued: Mar 2026	Scale @ A1: 1:125	
Status: S2	P01	

BIM Document Ref:
25042 - AMA - 01 - ZZ - DR - D - 139104
PROJECT N° - ORIGINATOR - VOLUME - LEVEL - FILE TYPE - ROLE - DRAWING N°

Appendix I. List of References

Ground Investigation Reports

1. Southern Testing Laboratories Ltd (2014).

Desk Study, Site Investigation & Risk Assessment Report – Selwood Site, Bournemouth Road, Chandlers Ford.

Project Ref: J11960.

2. Lucion Ground Engineering (2025).

Ground Investigation Report – School Lane / Selwood Site, Chandlers Ford.

Ref: 132887.

Flood Risk Assessment

3. Scott White & Hookins (2025).

Flood Risk Assessment – Workdry Ltd New Headquarters Office Building, Bournemouth Road, Chandlers Ford.

Report Ref: 304846-SWH-ZZ-ZZ-T-C-0001, Revision 03, October 2025.

All reports can be provided on request.

Chris Christou
CEng MStructE
Director

Richard Russell
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Director