



Drainage Strategy

AEG6577_OL12_Rochdale_07

Site Address: Land opposite 1-35 Bentley Street

Rochdale

OL12 6EU

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UK Experts in Flood Modelling, Flood Risk
Assessments, and Surface Water Drainage Strategies

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Document Issue Record

Project: Drainage Strategy

Prepared for: Koplar Group Ltd

Reference: AEG6577_OL12_Rochdale_07

Site Location: Land opposite 1-35 Bentley Street, Rochdale, OL12 6EU

Issue	Date	Author	Check	Auth.	Comments
1	20/11/2024	Daniel Buciak	Alix Rouvrais	James Mahoney	First issue
2	08/01/2025	Daniel Buciak	James Mahoney	James Mahoney	Appendices updated

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Summary

Development Description	Existing	Proposed
Development Type	Greenfield	Erection of two apartment blocks comprising 23 no. apartments (13 no 2-bed and 10 no 1-bed apartments), together with associated parking
Impermeable Surface Area	N/A- Greenfield	1,450m ²
Surface Water Drainage	N/A- Greenfield	Runoff attenuated at a restricted rate prior to discharge to United Utilities' public surface water sewer.
Site Size	Approximately 0.34ha	No change
Management Measures	Summary	Comment
Site Drainage Plan	No formal drainage arrangements are located within the site boundary.	It is proposed that surface water from roofs and hardstanding areas is attenuated on site within a below ground tank prior to discharge to the public surface water sewer in Bentley Street. Foul flows will communicate with the existing public combined sewer on Bentley Street.

1. Introduction

- 1.1. Aegaea were commissioned by the Client to prepare a Drainage Strategy to support planning application (ref. 24/00993/FUL) associated with the proposed development on land opposite 1-35 Bentley Street, Rochdale, OL12 6EU.

Site Overview

- 1.2. The site of the proposed development is shown in Figure 1 below.

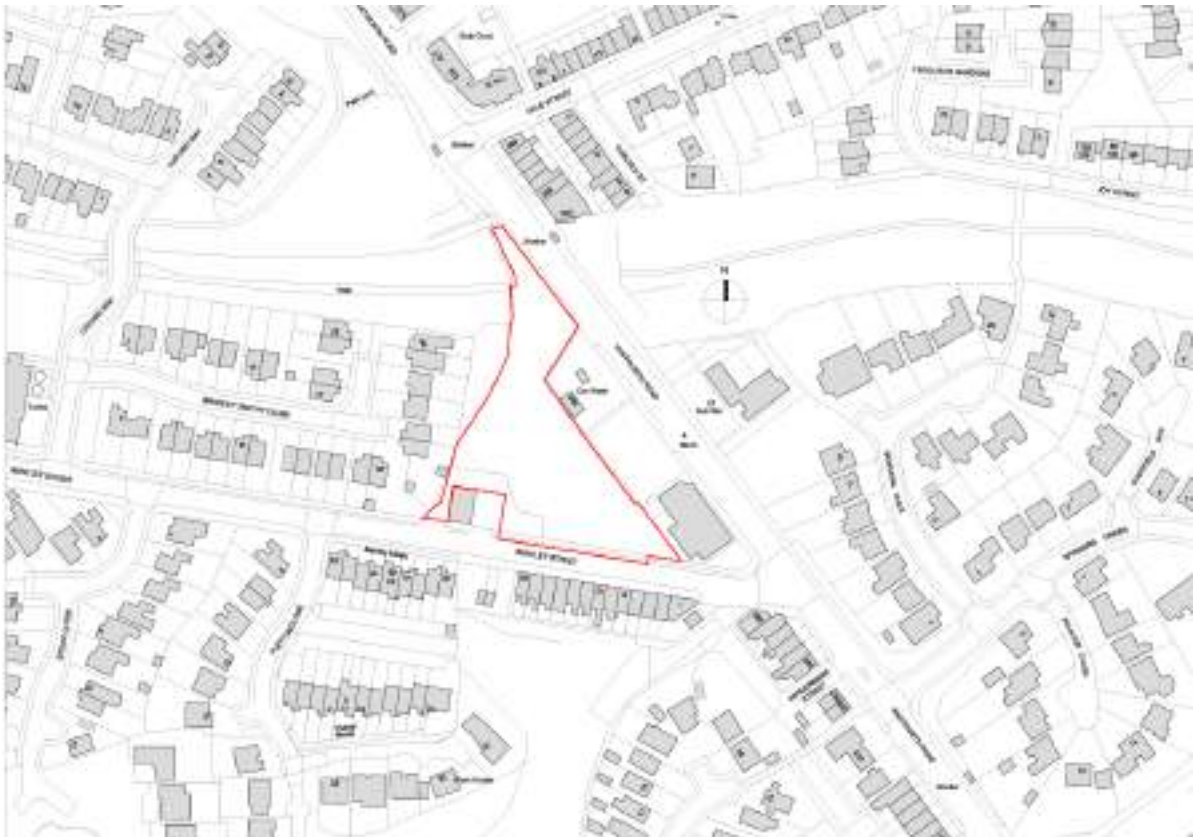


Figure 1: Site Location Plan

- 1.3. The overall site boundary (shown outlined in red above) measures approximately 0.34ha and is currently an undeveloped greenfield. The site is bound by a retaining slope along its eastern boundary and fronts onto Bentley Street along its southern boundary. The western boundary backs onto the rear of properties of Bradley Smithy Close and extends northwards towards Whitworth Road and the public footpath.

- 1.4. A topographical survey of the site is contained within Appendix A. It appears that since the topographical survey was conducted, some ground clearance has been undertaken within site. The site topography generally falls from east to west. The highpoint of the site appears to be in the northeast and the lowest point is located in the southwest.
- 1.5. United Utilities are the sewerage undertaker and water provider for the area. A public surface water sewer and a combined sewer are located within Bentley Street adjacent to the site's southern boundary.

Development Proposals

- 1.6. The development proposals comprise the erection of two apartment blocks comprising 23 apartments (13 no. 2-bed and 10 no. 1-bed apartments), together with associated parking and landscaping. The proposed development layout is contained within Appendix B.

2. Surface Water Drainage Strategy

Existing Drainage System

- 2.1. United Utilities' sewer records indicate an existing 150mm/225mm diameter public surface water sewer that flows westwards within the footway and carriageway of Bentley Street. Furthermore, a 500 x 700mm public combined sewer flows westwards within Bentley Street. An extract from United Utilities is shown in the figure below. A copy of the asset mapping is contained in Appendix C.



Figure 1: Extract from United Utilities safedig plans

- 2.2. No formal existing drainage arrangements have been identified within the site.

Ground Conditions

- 2.3. A site investigation report was produced by Earth Environmental & Geotechnical Ltd in September 2022. The report identified large extents and depths of made ground associated with the filling of the historic pond within the site. Superficial deposits of variable Clay and Sand with clay bands were encountered within the site and groundwater was noted at depths between 2.40m bgl and 5.80m bgl.
- 2.4. Based on the large extents of made ground, the presence of groundwater and clay (a soil with very low permeability), it is considered that the soils underlying the site are unsuitable for discharge of surface water into the underlying geology. Infiltration measures would also be further restricted by 5m offset requirements and therefore infiltration testing has not been carried out within the site as it is deemed unviable based on the information set out above.

Greenfield Runoff Rates

- 2.5. The greenfield runoff rates have been calculated based on proposed impermeable area of 0.145ha. The greenfield runoff rate (Q_{BAR}) has been calculated as 1.3 l/s using IH124 method via HR Wallingford Greenfield Runoff Estimation Tool as shown in Appendix D. Table 1 below shows a summary of the estimated greenfield runoff rates.

Return Period	Greenfield Runoff Rate
Q_{BAR}	1.3 l/s
1 in 1 Year	1.1 l/s
1 in 30 Year	2.2 l/s
1 in 100 Year	2.7 l/s

Table 1: Greenfield Runoff Rates

- 2.6. Due to the small greenfield runoff rates calculated above it is proposed to restrict flows to larger rates to manage the blockage risk associated with the flow control device. This is in accordance with the drainage pre application advice (ref. PreApp/0047/23) which states, *"The minimum practical flow control value that can be applied using a vortex flow control is 5 l/s so that the outlet diameter of the flow control does not block."*

Proposed Drainage Strategy

- 2.7. Current guidance indicates that the following surface water disposal options should be considered, listed in order of preference:
- Disposal via on-site infiltration systems:** As discussed above, discharge to the ground has been discounted due to unsuitable ground conditions.
 - Disposal to a watercourse/surface water body:** There are no watercourses within the vicinity of the site.
 - Disposal to surface water sewer:** Surface water flows from the proposed development are proposed to communicate with the surface water sewer in Bentley Street.
 - Disposal to combined sewer:** Discharge hierarchy satisfied above.
- 2.8. In accordance with the SuDS hierarchy, it is proposed that surface water is to drain to the surface water sewer in Bentley Street. Prior to discharge it is proposed that surface water is to be attenuated on-site using a below ground geocellular attenuation tank.
- 2.9. It is proposed that surface water is to be discharged at a controlled rate of 5 l/s, restricting flows via the use of a suitably sized vortex (HydroBrake OSA) flow control.

- 2.10. All SuDS features have been sized to accommodate surface water runoff from all proposed impermeable areas on site, including all modelled 1 in 100 year storm events with an appropriate allowance (45%) made for climate change.
- 2.11. The proposed drainage layout, catchment plans, exceedance flow routes and details can be found in Appendix E. Supporting drainage calculations can be found in Appendix F.

3. Future Maintenance Strategy

General Maintenance

- 3.1. The surface water drainage network will be managed throughout the lifetime by the owners of the proposed development in accordance with details set out below.
- 3.2. All drainage, whether piped or SuDS require regular maintenance. The tables below provide an overview of general maintenance tasks and frequency of which they need to be undertaken.

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in catchpits, gullies, attenuation devices and inside concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs.	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check attenuation devices	Annually

General maintenance for Surface Water Drainage Systems as per CIRIA C753.

- 3.3. The required maintenance for each component making up the drainage system is scheduled in the tables below, based on CIRIA report C753 – The SuDS manual.

Cellular Attenuation Tank

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct tank and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of tank)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check tank to ensure emptying is occurring	Annually

General maintenance for a Cellular Attenuation Tank as per CIRIA C753.

- 3.4. Maintenance will usually be carried out manually, although a suction tanker can be used for sediment/debris removal for large systems. If maintenance is not undertaken for long periods, deposits can become hard packed and require considerable effort to remove.

Hydro-Brake (Vortex Flow Control)

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Remove sediment and debris from flow control chambers and upstream manholes	Monthly (for the first 12 months, then 6 monthly).
Remedial Actions	Replace or clean hydrobrake if performance deteriorates or failure occurs.	As necessary.
Monitoring	Check flow control to ensure emptying is occurring.	Quarterly and post high intensity storm event.

Surface Water Drainage Systems

Maintenance Schedule	Required Action	Typical frequency
Regular Maintenance	Inspect for sediment and debris in catchpit manholes and gullies. Clean out as required	Twice Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris in catchpits, gullies, attenuation devices and inside concrete manhole rings.	As required, based on inspections.
Remedial actions	Reconstruct and/or replace components, if performance deteriorates or failure/blockage occurs.	As required
	Replacement of clogged components (flow restriction)	As required
Monitoring	Inspect silt traps/gullies/catchpits and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check attenuation devices	Annually

Permeable Paving

Maintenance Schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying.	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving.	As required
	Remediate work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required

	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hr after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

4. Pollution Prevention & Water Quality Management

SuDS Mitigation Indices

- 4.1. Chapter 26 of the CIRIA C753 The SuDS Manual, provides design advice to meet water quality standards by adopting the SuDS train treatment mechanism and thereby reduce the risk of pollution by evaluating potential pollution hazards at the outset.
- 4.2. The proposed site layout provides the opportunity to introduce SuDS into the scheme to reduce potential contaminant risk further.
- 4.3. Runoff from individual property driveways, residential car parks and low traffic roads are generally viewed as low risk (as per Table 26.2 of C753), shown in the tables below.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Individual property driveways, residential car parks and low traffic roads	Low	0.5	0.4	0.4

Pollutant Hazard Indices

	Mitigation Indices				Indices for Calculation		
	TSS	Metals	Hydrocarbons		TSS	Metals	Hydrocarbons
Permeable Paving	0.7	0.6	0.7	100%	0.7	0.6	0.7
Total Mitigation Indices score					0.7	0.6	0.7
Sufficiency of Pollution Mitigation Indices					Sufficient (No additional mitigation required)		

SuDS Mitigation Indices

- 4.4. The mitigation indices offered by the proposed permeable pavement exceed the hazard indices from parked bay and therefore provides adequate mitigation.

- 4.5. It is therefore considered that the proposed SuDS features on site are appropriate and acceptable in terms of water quality.

5. Foul Drainage Strategy

Proposed Strategy

- 5.1. Foul flows arising from the proposed development are proposed to discharge into the combined sewer along Bentley Street. A peak flow rate of 0.05 litres per second per dwelling is assumed for the proposed development in accordance with section B3 of the Design and Construction Guidance (DCG) for foul and surface water sewers. It is therefore anticipated that the total peak foul flows arising from the proposed development would be 1.15 l/s.
- 5.2. Full details of discharge and the proposed point of connection would be confirmed at detailed design stage and be agreed with United Utilities prior to construction.

Appendix A - Topographical Survey

All dimensions are to be checked on site, any discrepancies are to be reported to the Architect before work commences. Do not scale from this drawing.

This drawing is to be read in conjunction with all relevant consultants and specialists drawings / documents, any discrepancies are to be reported to the Architect before the affected work commences.

All structural components shown are indicative only. Details / calculations of structural members are to be provided by the Structural Engineer.

This drawing is copyright.

A	First Issue	07/01/2022
B	Amendments Following Comments Received From Planner on 03/03/2022	29/03/2022
C	Further Amendments Following Comments Received from LPA on 20/04/2022	29/04/2022



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Client:
Dream Developments Northwest Ltd

Project:
Land opposite to 1-35 Bentley Street, Rochdale
OL12 6EU

Drawing Title:
Existing Site Plan

Scale:
1:250 @ A1

Date:
October 2021

Drawing No:
9757/010

Revision:
C

Appendix B - Site Layout



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Client:
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Project:
Land opposite to 1-35 Bentley Street, Rochdale
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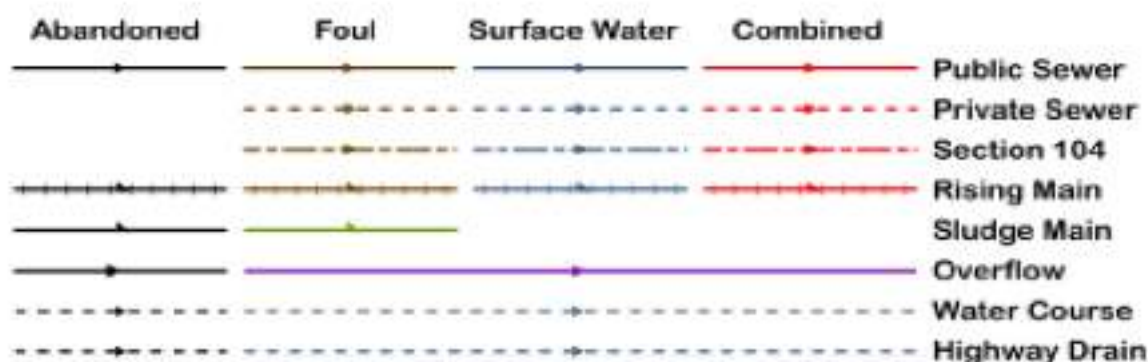
Drawing Title:
Proposed Site Plan

Scale: 1:250 @ A1 Date: May 2023

Drawing No: 9757/102 Revision: D

Appendix C - United Utilities Asset Map

Wastewater Symbolology



All point assets follow the standard colour convention: red – combined brown - foul
blue – surface water purple - overflow

- | | |
|------------------|------------------------------|
| Manhole | Side Entry Manhole |
| Head of System | Outfall |
| Extent of Survey | Screen Chamber |
| Rodding Eye | Inspection Chamber |
| Inlet | Bifurcation Chamber |
| Discharge Point | Lamp Hole |
| Vortex | T Junction / Saddle |
| Penstock | Catchpit |
| Washout Chamber | Valve Chamber |
| Valve | Vent Column |
| Air Valve | Vortex Chamber |
| Non Return Valve | Penstock Chamber |
| Soakaway | Network Storage Tank |
| Gully | Sewer Overflow |
| Cascade | Ww Treatment Works |
| Flow Meter | Ww Pumping Station |
| Hatch Box | Septic Tank |
| Oil Interceptor | Control Kiosk |
| Summit | DNM Network Monitoring Point |
| Drop Shaft | Change of Characteristic |
| Orifice Plate | |



SEWER RECORDS

Address or Site Reference

9 BENTLEY STREET,
ROCHDALE,
OL12 6EU

Scale: 1:1250
Date: 20/11/2024

Printed by: Property Searches

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix D - Greenfield Runoff Rate Calculations

Calculated by:

Daniel Buciak

Site name:

Bentley Road

Site location:

Site Details

Latitude:

53.63052° N

Longitude:

2.1604° W

Reference:

4124293269

Date:

Nov 13 2024 16:27

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):

0.145

Methodology

Q_{BAR} estimation method:

Calculate from SPR and SAAR

SPR estimation method:

Calculate from SOIL type

Notes

(1) Is $Q_{\text{BAR}} < 2.0 \text{ l/s/ha}$?

When Q_{BAR} is $< 2.0 \text{ l/s/ha}$ then limiting discharge rates are set at 2.0 l/s/ha .

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates $< 5.0 \text{ l/s}$?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1177	1177
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
-------------------------	---------	--------

Q_{BAR} (l/s):	1.29	1.29
1 in 1 year (l/s):	1.12	1.12
1 in 30 years (l/s):	2.19	2.19
1 in 100 year (l/s):	2.67	2.67
1 in 200 years (l/s):	3.05	3.05

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix E - Proposed Drainage Strategy



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APPROVED METHOD STATEMENT.

LEGEND

- SITE BOUNDARY
- EXISTING SURFACE WATER SEWER
- - - PROPOSED SURFACE WATER SEWER
- PROPOSED SURFACE WATER INSPECTION CHAMBER
- ⊙ HYDROBRAKE FLOW CONTROL CHAMBER (OSA)
- ▤ PROPOSED PERMEABLE PAVING
- ▤ GEOCELLULAR CRATES
- PROPOSED FOUL SEWER
- PROPOSED FOUL INSPECTION CHAMBER
- EXISTING COMBINED SEWER
- EXCEEDANCE FLOW ROUTES

GENERAL NOTES

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- DEPTH/INVERT LEVEL OF EXISTING UNITED UTILITIES' SEWERS TO BE ESTABLISHED TO CONFIRM THAT THERE ARE NO CLASHES WITH THE PROPOSED DRAINAGE ARRANGEMENTS. POSITIONS OF EXISTING SERVICES/STATUTORY UNDERTAKERS APPARATUS ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
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- ALL ATTENUATION HAS SIZED BASED UPON THE CURRENT SITE LAYOUT AND IS SUBJECT TO CHANGE FOLLOWING RECEIPT OF ANY REVISED LAYOUT AND APPROVAL BY LLFA.
- SUBJECT TO DETAILED DESIGN AND APPROVAL.

A01	19.11.24	FIRST ISSUE	DB
Rev	Date	Description	By

Client
KOPLAR GROUP LTD

Project
**LAND OPPOSITE 1-35 BENTLEY STREET,
ROCHDALE OL12 6EU**

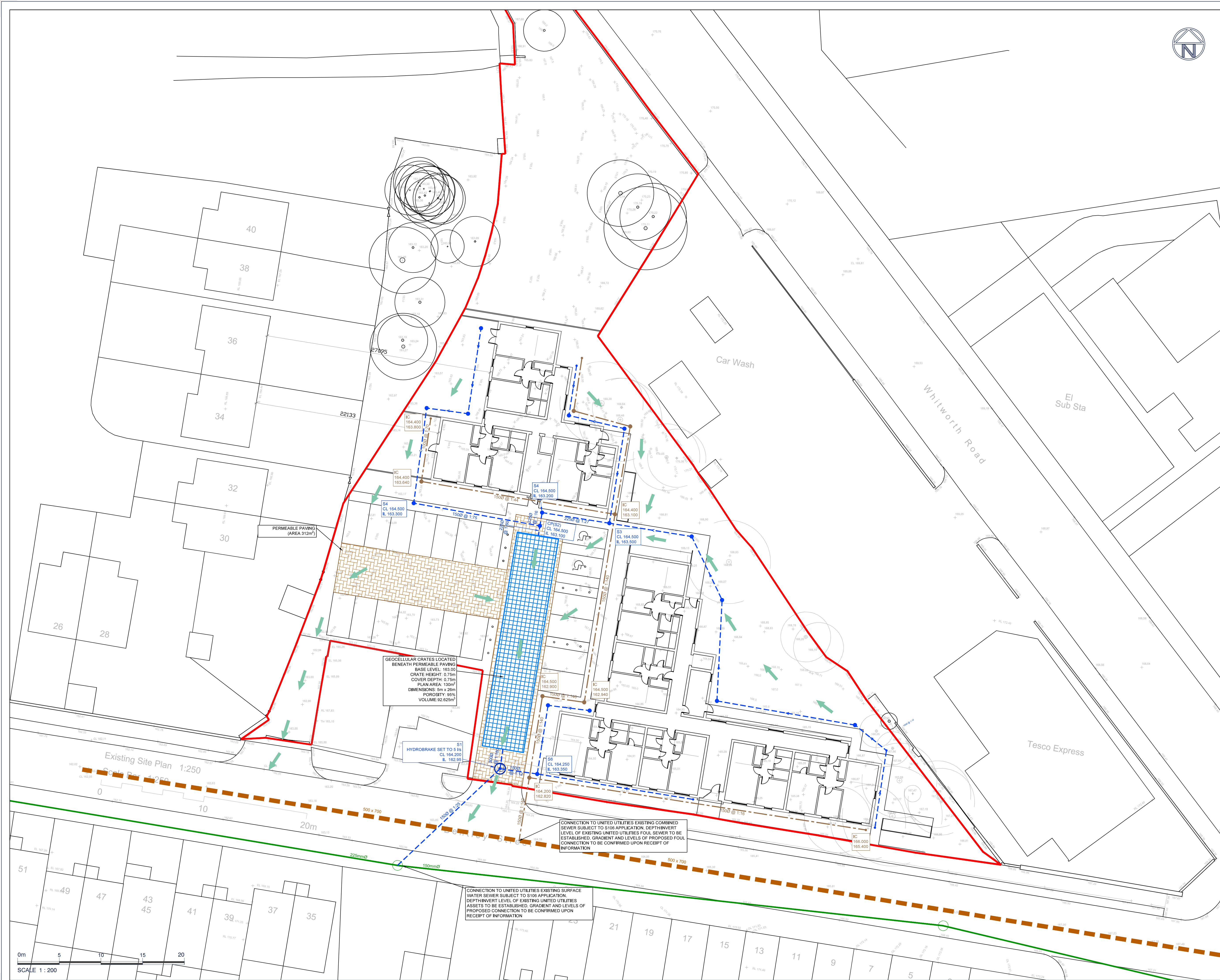
Title
DRAINAGE STRATEGY PLAN

Project No.	Drawing No.	Revision
AEG6577	CIV-001	A01

Drawn	Checked	Approved	Date	Scale @ A1
DB	JM	JM	NOV 2024	1:200

Drawing Status
FOR PLANNING

aegaea
water, civils and environment





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- PROPOSED SURFACE WATER INSPECTION CHAMBER
- ⊙ HYDROBRAKE FLOW CONTROL CHAMBER (OSA)
- PROPOSED PERMEABLE PAVING
- GEOCELLULAR CRATES
- CONTRIBUTING AREAS

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- SUBJECT TO DETAILED DESIGN AND APPROVAL.

A01 19.11.24 FIRST ISSUE DB

Rev	Date	Description	By
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Client

KOPLAR GROUP LTD

Project
LAND OPPOSITE 1-35 BENTLEY STREET,
ROCHDALE OL12 6EU

Title
CONTRIBUTING AREAS PLAN

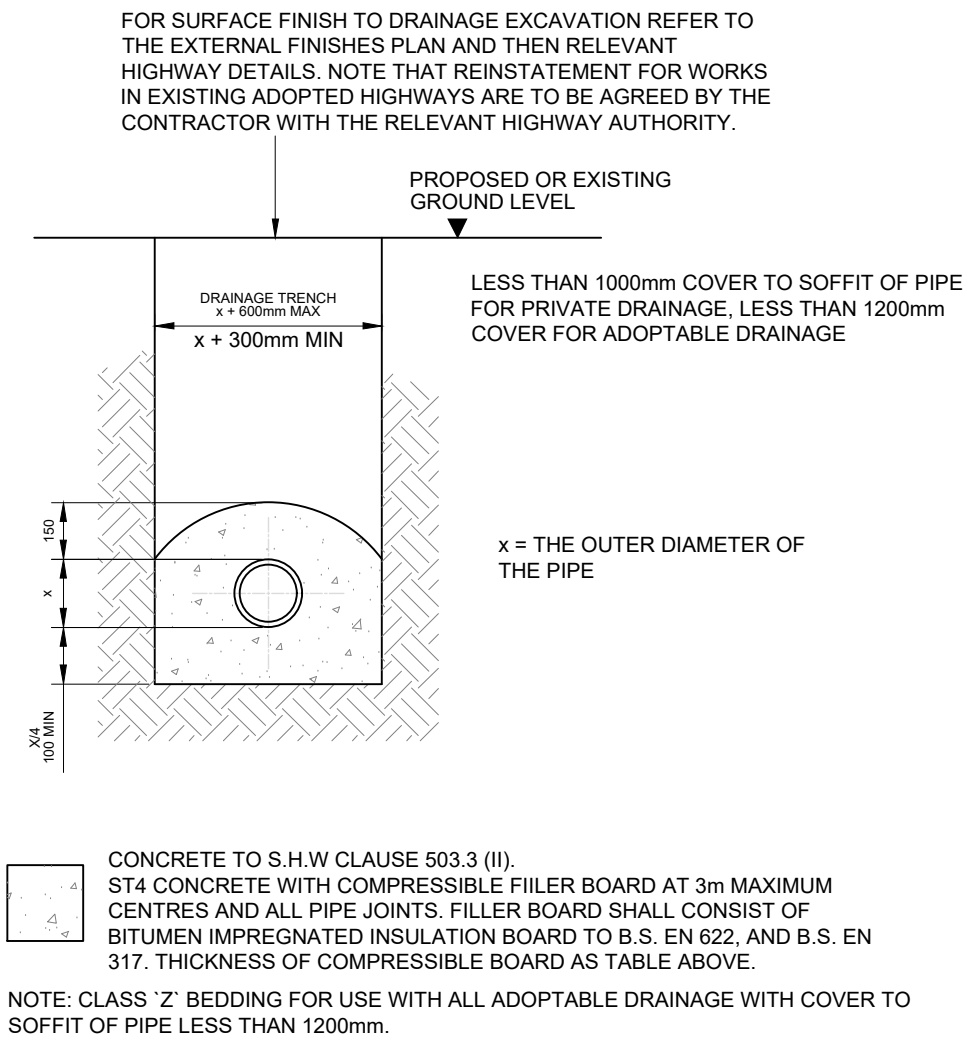
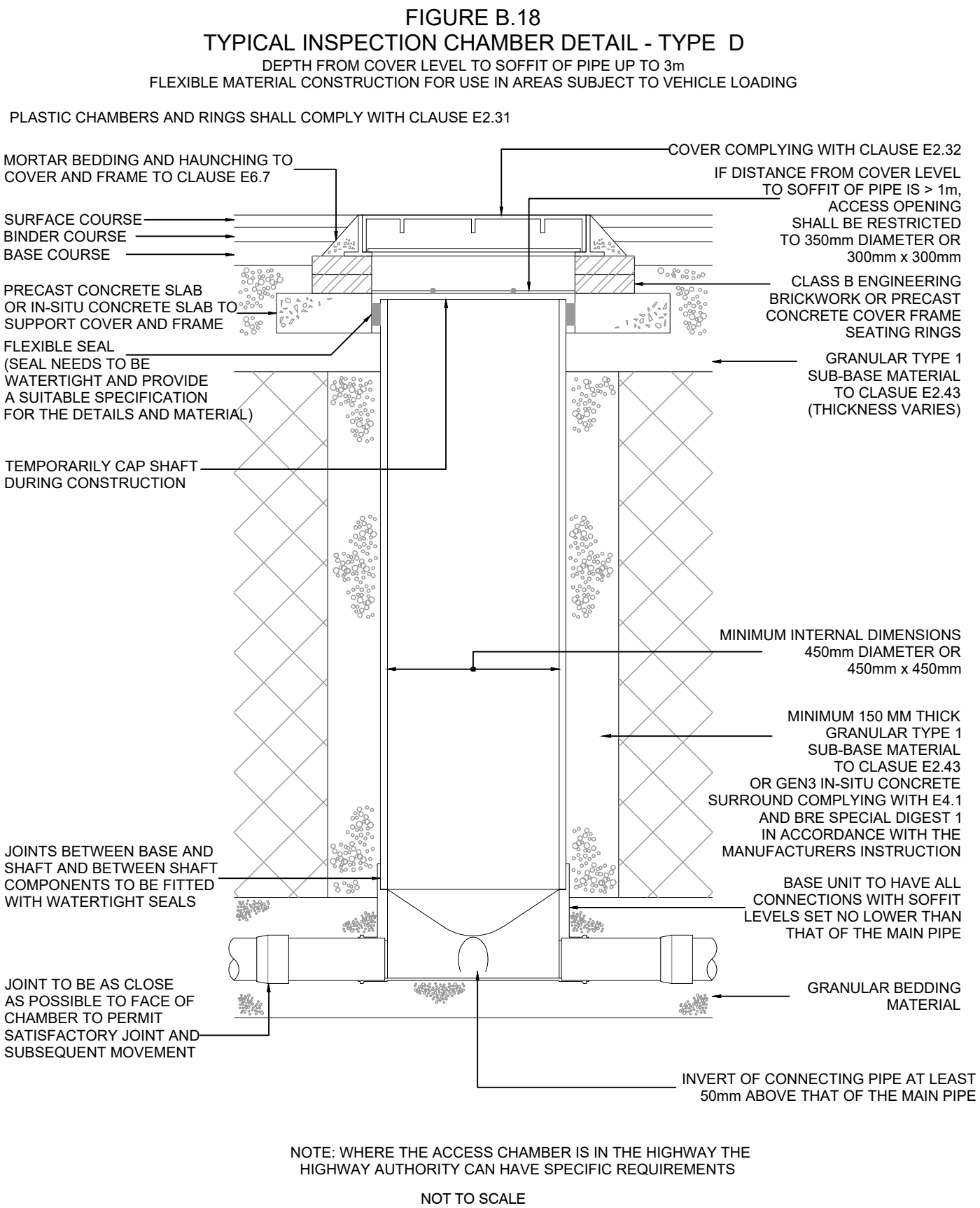
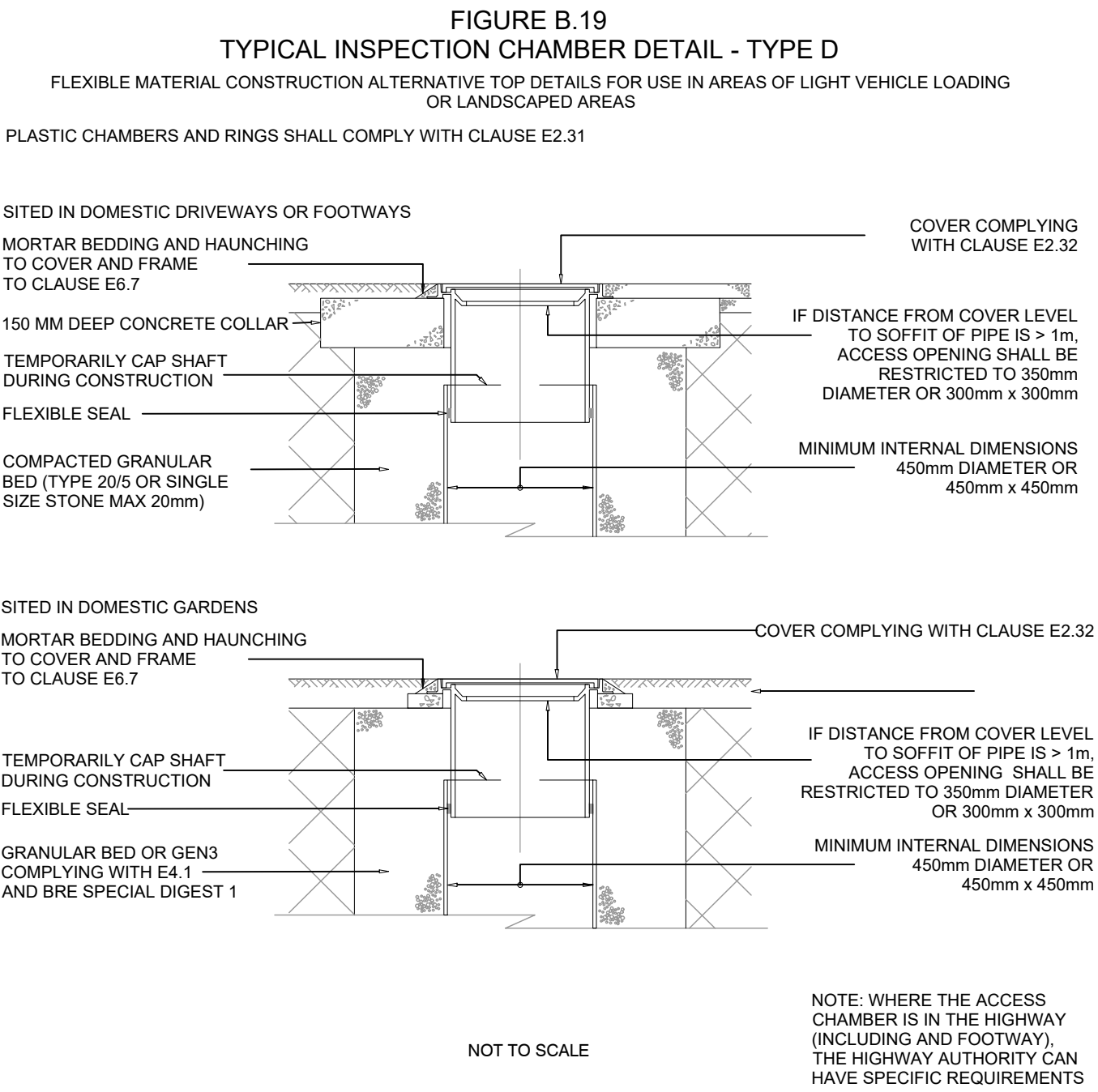
Project No.	Drawing No.	Revision		
AEG6577	CIV-002	A01		
Drawn	Checked	Approved	Date	Scale @ A1
DB	AR	JM	NOV 2024	1:200

Drawing Status

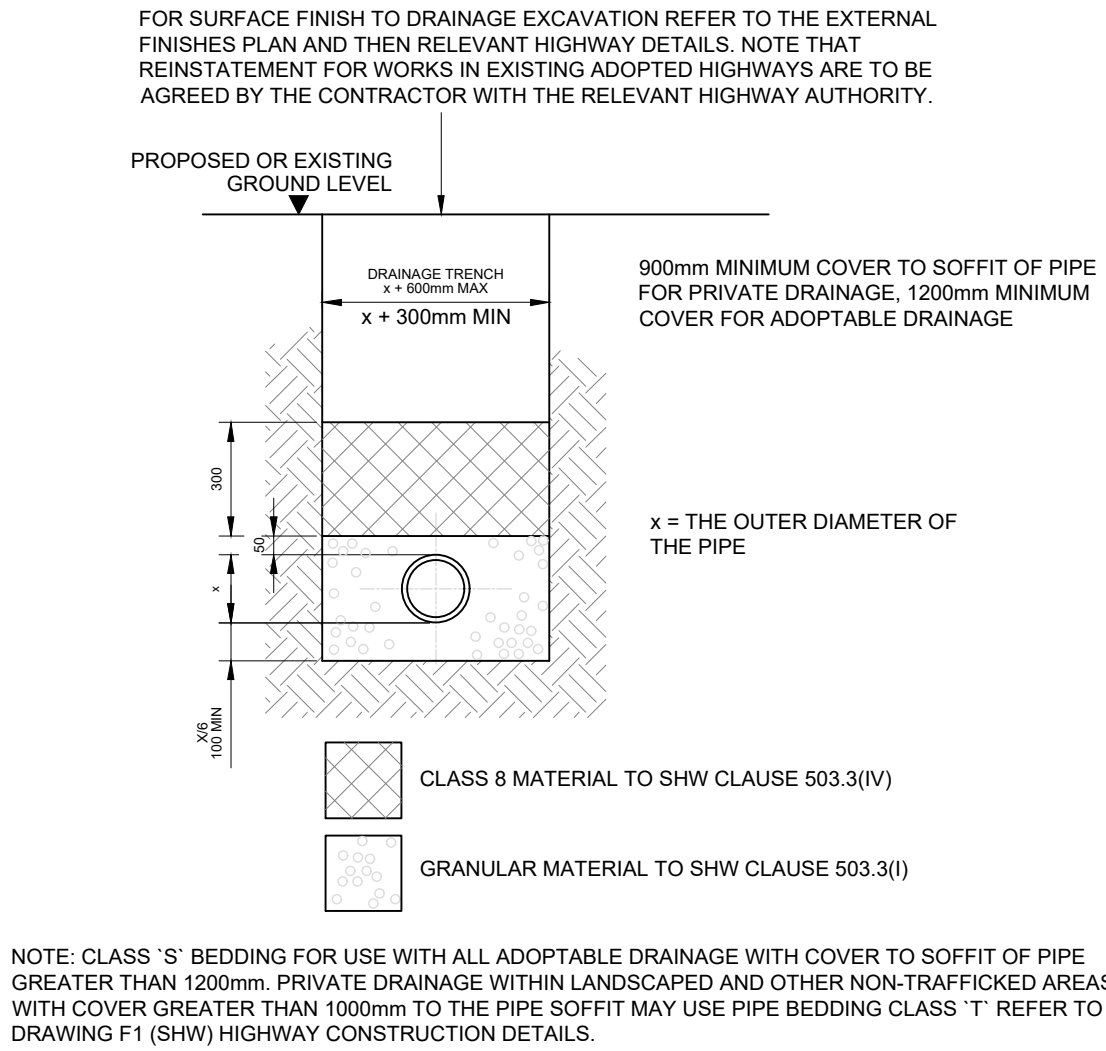
FOR PLANNING

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0m 5 10 15 20
SCALE 1 : 200



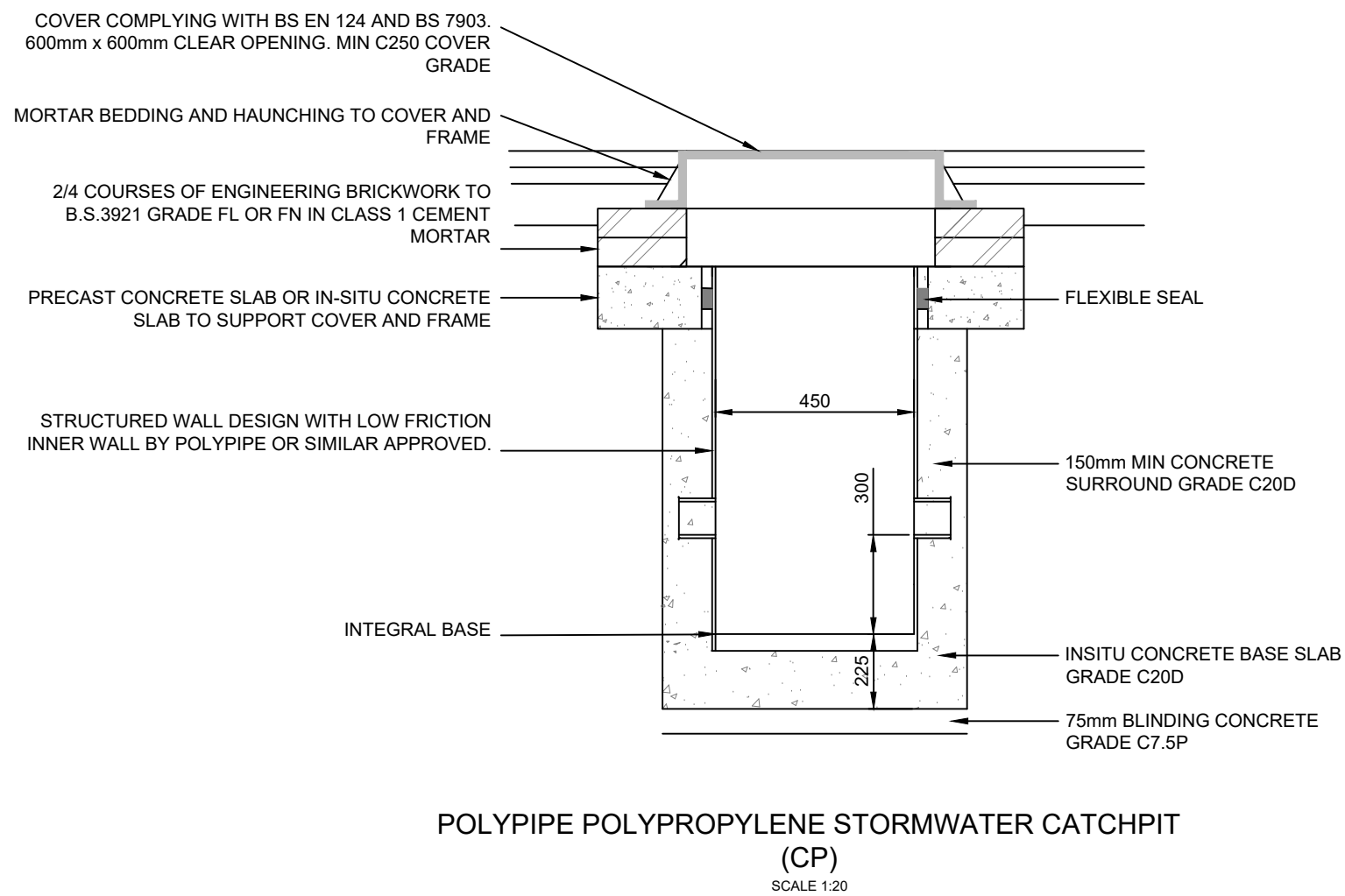
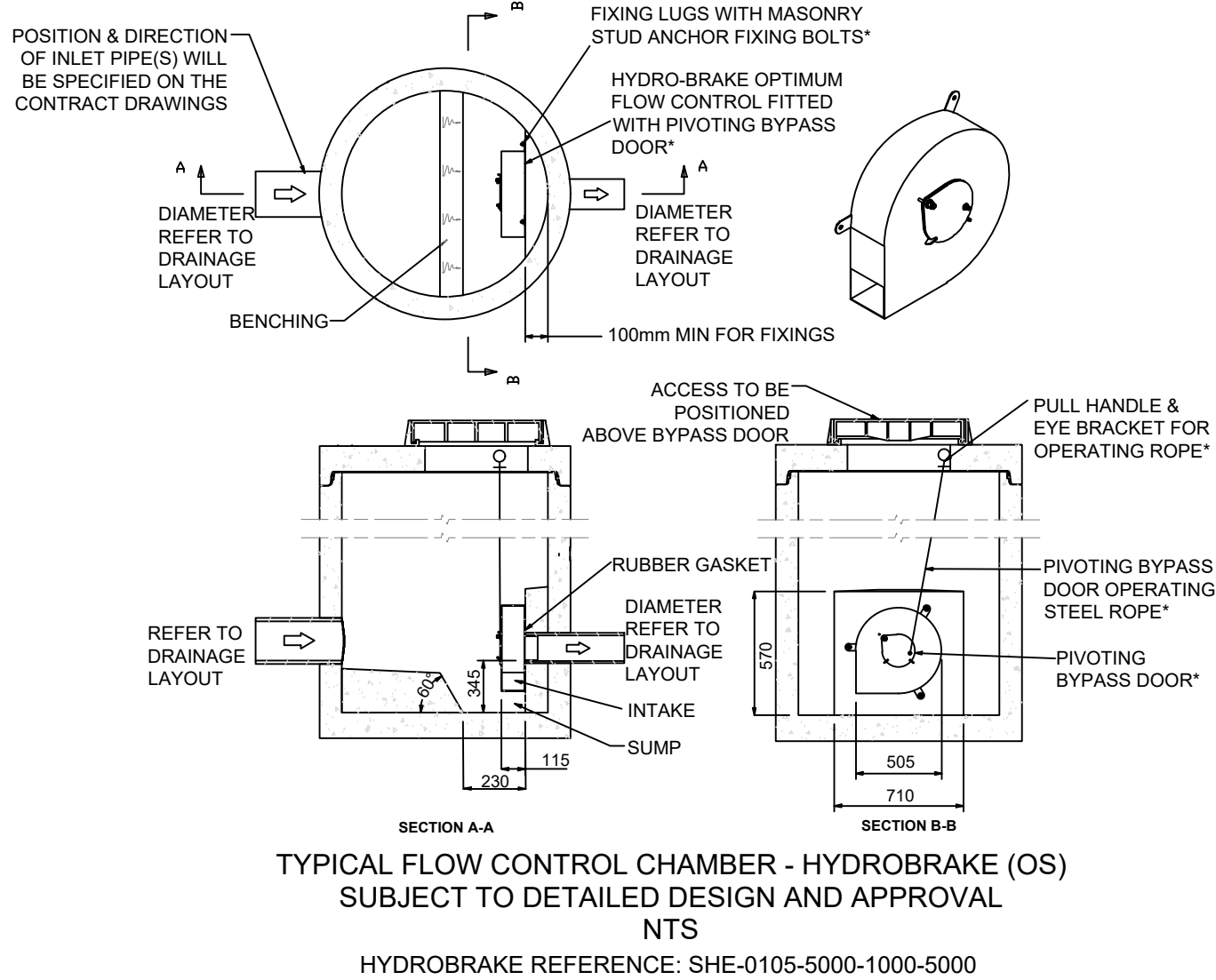
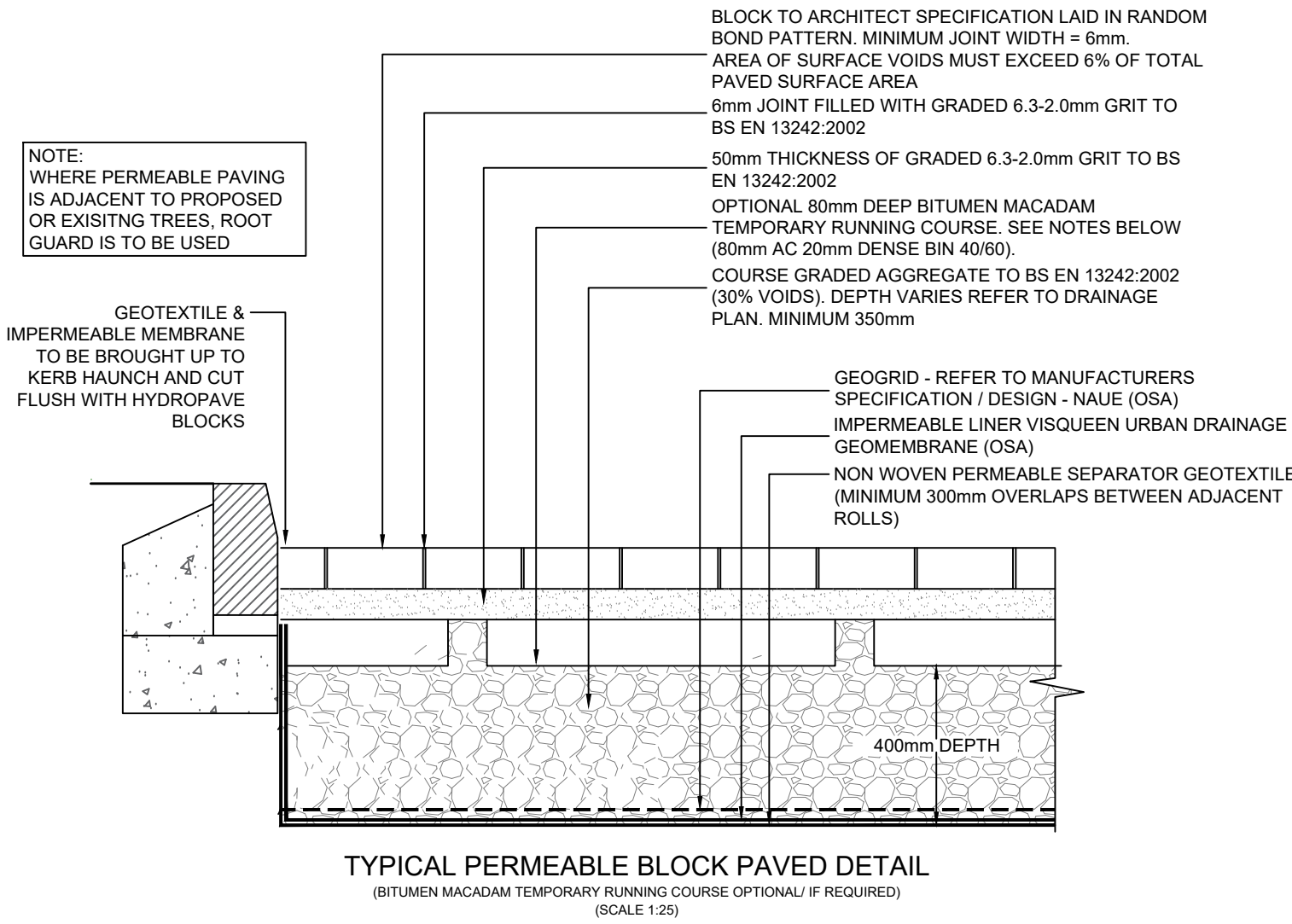
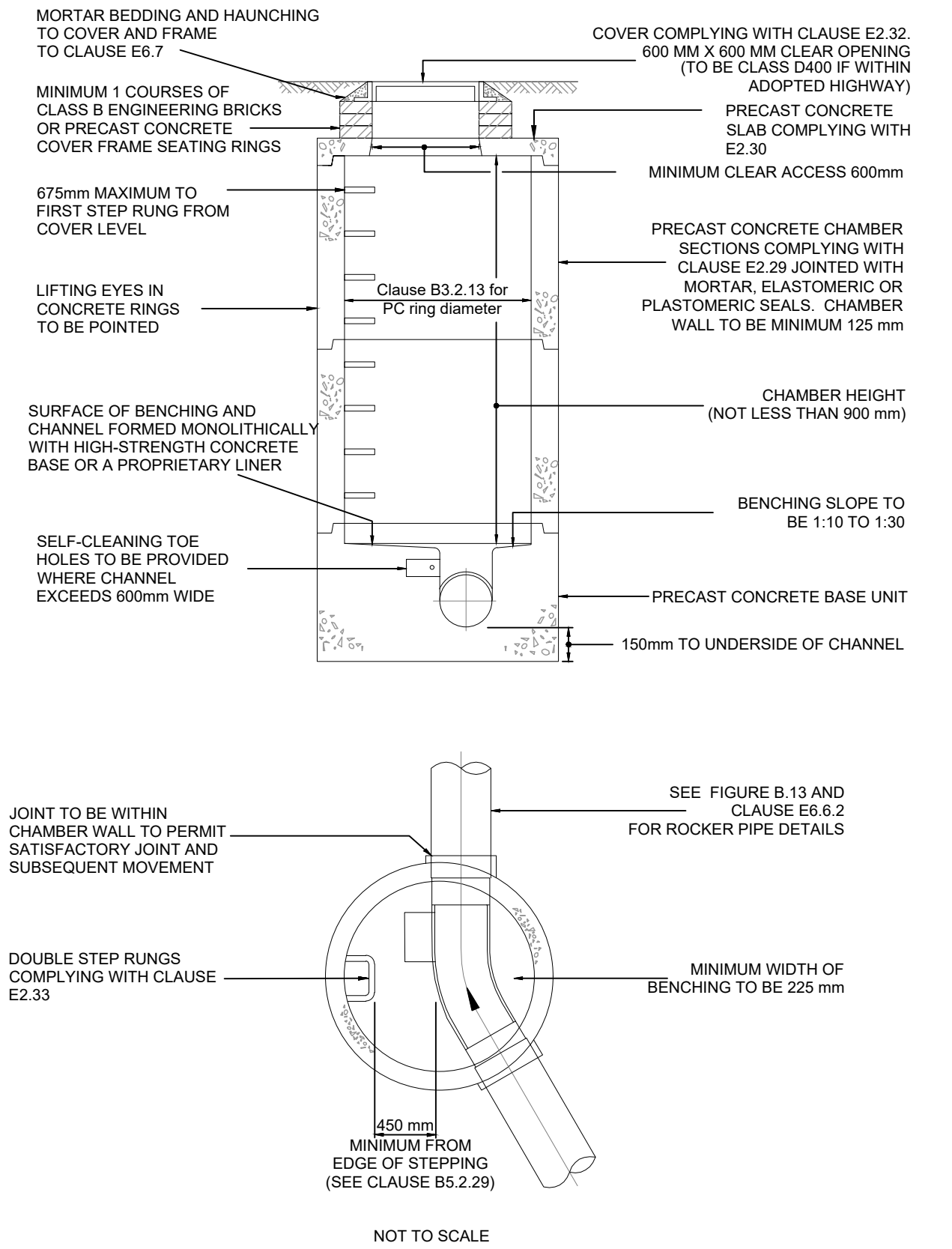
CLASS 'Z' PIPE BEDDING



CLASS 'S' PIPE BEDDING

- DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY. THE CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE. ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE ENGINEER FOR CLARIFICATION BEFORE PROCEEDING. THIS DRAWING IS COPYRIGHT AND OWNED BY AEGAEA.
- SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT) DOCUMENTATION WHERE APPLICABLE. IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN APPROVED METHOD STATEMENT.
- NOTES**
- ALL ADOPTABLE DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL AND SURFACE WATER SEWERS (DCG).
 - LOCATION AND INVERT LEVELS OF DOWNSTREAM DRAINAGE CONNECTION POINTS ARE TO BE CONFIRMED.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS/SPECIFICATIONS. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY. ALL DIMENSIONS ARE IN METERS.
 - ALL THE ABOVE REQUIREMENTS SHALL APPLY UNLESS OTHERWISE STATED IN THE GENERAL ARRANGEMENT DRAWINGS/SPECIFICATION. IN THE EVENT OF A CONTRADICTION THE CONTRACT SPECIFIC DOCUMENTS SHALL BE DEEMED TO PREVAIL.
 - THE CONTRACTOR IS TO CHECK AND VERIFY ALL SITE DIMENSIONS AND LEVELS, INCLUDING EXISTING SEWER INVERT LEVELS AND UTILITIES, PRIOR TO START ON SITE.
 - POSITIONS OF EXISTING SERVICES/STATUTORY UNDERTAKERS APPARATUS ADJACENT TO OR CROSSING PROPOSED EXCAVATIONS ARE TO BE CONFIRMED PRIOR TO START ON SITE.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AND CHECKED AGAINST ALL, ENGINEERING DETAILS, SPECIFICATIONS, GEOTECHNICAL AND OTHER RELEVANT DOCUMENTATION PROVIDED.
 - THIS DRAWING IS SCHEMATIC FOR CLARITY ONLY. POSITIONS OF PIPE RUNS AND MANHOLES MAY VARY ON SITE DUE TO SITE CONDITIONS.
 - WHERE TREES ADJACENT TO DRAINAGE ARE PROPOSED, ROOT BARRIERS ARE REQUIRED TO PREVENT STRUCTURAL DAMAGE.
 - ANY ANOMALY OR CONTRADICTIONS BETWEEN ANY OF THE ABOVE IS TO BE REPORTED IMMEDIATELY.
 - THE CONTRACTOR IS TO COMPLY IN ALL ASPECTS WITH THE CURRENT BRITISH STANDARDS, BUILDING REGULATIONS AND BUILDING LEGISLATION ETC.
 - SUBJECT TO DETAILED DESIGN AND APPROVAL.

FIGURE B.9
TYPICAL MANHOLE DETAIL - TYPE B
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 1.5m TO 3m RIGID MATERIAL CONSTRUCTION WITHOUT CONCRETE SURROUND



A01	19.11.24	FIRST ISSUE	DB	
Rev	Date	Description	By	
Client				
KOPLAR GROUP LTD				
Project				
LAND OPPOSITE 1-35 BENTLEY STREET, ROCHDALE OL12 6EU				
Title				
DRAINAGE DETAILS				
Project No.		Drawing No.	Revision	
AEG6577		CIV-003	A01	
Drawn	Checked	Approved	Date	Scale @ A1
DB	AR	JM	NOV 2024	As Stated
Drawing Status				
FOR PLANNING				



DO NOT SCALE THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
THE CONTRACTOR MUST CHECK & VERIFY ALL DIMENSIONS ON SITE.
ANY DISCREPANCIES MUST BE REPORTED IMMEDIATELY TO THE ENGINEER
FOR CLARIFICATION BEFORE PROCEEDING.
THIS DRAWING IS COPYRIGHT AND OWNED BY AEGAEA.

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
REFER TO THE RELEVANT CONSTRUCTION (DESIGN AND MANAGEMENT)
DOCUMENTATION WHERE APPLICABLE.
IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY
A COMPETENT CONTRACTOR, WORKING WHERE APPROPRIATE TO AN
APPROVED METHOD STATEMENT.

LEGEND

— SITE BOUNDARY

→ EXCEEDANCE FLOW ROUTES

GENERAL NOTES

1. THIS DRAWING IS INDICATIVE ONLY AND SUBJECT TO CHANGE DURING DETAILED DESIGN AND APPROVALS FROM RELEVANT STATUTORY BODIES.
2. EXCEEDANCE FLOW ROUTES SHOWN ARE BASED ON ASSUMED PRELIMINARY LEVELS PREPARED BY OTHERS. EXACT FLOW ROUTES TO BE CONFIRMED DURING DETAILED LEVELS WHICH SHOULD ENSURE EXCEEDANCE FLOWS ARE MANAGED TO MINIMISE RISKS TO PEOPLE, PROPERTY (NEW AND EXISTING) AND INFRASTRUCTURE.
3. SUBJECT TO DETAILED DESIGN AND APPROVAL.

A01	19.11.24	FIRST ISSUE	DB
Rev	Date	Description	By

Client
KOPLAR GROUP LTD

Project
LAND OPPOSITE 1-35 BENTLEY STREET,
ROCHDALE OL12 6EU

Title
EXCEEDANCE FLOW ROUTES

Project No.		Drawing No.		Revision
AEG6577		CIV-004		A01
Drawn	Checked	Approved	Date	Scale @ A1
DB	AR	JM	NOV 2024	1:200

Drawing Status
FOR PLANNING

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0m 5 10 15 20
SCALE 1 : 200

Appendix F - Drainage Calculations

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Junctions Storm Phase: Phase	Company Address:		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S1	Manhole	389452.388	414901.475	164.500	1.200	163.300	Circular	1.200
S2	Manhole	389467.305	414898.752	164.500	1.400	163.100	Circular	1.200
S5	Manhole	389462.524	414869.593	164.200	1.250	162.950	Circular	1.200
S7	Manhole	389450.225	414857.990	163.500	1.200	162.300	Circular	1.200
S6	Manhole	389466.989	414868.965	164.250	0.900	163.350	Circular	1.200
S3	Manhole	389475.640	414899.068	164.500	1.000	163.500	Circular	1.200
S4	Manhole	389467.574	414900.339	164.500	1.300	163.200	Circular	1.200

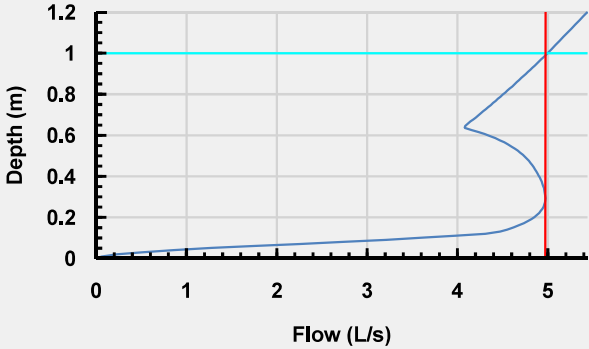
Name	Lock
S1	None
S2	None
S5	None
S7	None
S6	None
S3	None
S4	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
S1	Inlet	Catchment Area (19)	(None)	No Restriction
	Inlet (1)	Catchment Area (18)	(None)	No Restriction
	Inlet (2)	Catchment Area (14)	(None)	No Restriction
S2	Inlet	S1.000	(None)	No Restriction
	Inlet (1)	S2.001	(None)	No Restriction
	Inlet (2)	Catchment Area (2)	(None)	No Restriction
S5	Inlet (1)	S4.000	(None)	No Restriction
	Inlet (2)	S1.002	(None)	No Restriction
S7	Inlet	S1.003	(None)	No Restriction
S6	Inlet	Catchment Area (3)	(None)	No Restriction
	Inlet (1)	Catchment Area (4)	(None)	No Restriction
	Inlet (2)	Catchment Area (9)	(None)	No Restriction
	Inlet (3)	Catchment Area (8)	(None)	No Restriction
	Inlet (4)	Catchment Area (13)	(None)	No Restriction
S3	Inlet	Catchment Area (15)	(None)	No Restriction
	Inlet (1)	Catchment Area (16)	(None)	No Restriction
	Inlet (10)	Catchment Area (11)	(None)	No Restriction
	Inlet (11)	Catchment Area (10)	(None)	No Restriction
	Inlet (3)	Catchment Area (21)	(None)	No Restriction
	Inlet (4)	Catchment Area (20)	(None)	No Restriction
	Inlet (6)	Catchment Area (5)	(None)	No Restriction
	Inlet (7)	Catchment Area (6)	(None)	No Restriction
	Inlet (8)	Catchment Area (7)	(None)	No Restriction
S4	Inlet	S2.000	(None)	No Restriction
	Inlet (9)	Catchment Area (12)	(None)	No Restriction

Project:	Date: 12/11/2024			
	Designed by: danie	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Junctions Storm Phase: Phase				

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S1	Outlet	S1.000	Free Discharge
S2	Outlet	S1.001	Free Discharge
S5	Outlet	S1.003	Hydro-Brake®
	Invert Level (m)	162.950	
	Design Depth (m)	1.000	
	Design Flow (L/s)	5.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☒	
	Unit Reference	SHE-0105-5000-1000-5000	
			
S6	Outlet	S4.000	Free Discharge
S3	Outlet	S2.000	Free Discharge
S4	Outlet	S2.001	Free Discharge

Project:	Date: 12/11/2024		
	Designed by: daniel	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	164.450
Depth (m)	0.550
Base Level (m)	163.900
Paving Layer Depth (mm)	80
Membrane Percolation (m/hr)	5.0
Porosity (%)	30
Length (m)	36.165
Long. Slope (1:X)	300.00
Width (m)	8.832
Total Volume (m³)	45.515

Under Drain

Height Above Base (m)	0.000
Diameter (mm)	110
No. of Barrels	2
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (17)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	S3.000
Outlet Type	Under Drain

Advanced

Conductivity (m/hr)	500.0
---------------------	-------

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address:		



Cellular Storage

Type : Cellular Storage

Dimensions	
Exceedance Level (m)	164.500
Depth (m)	0.750
Base Level (m)	163.000
Number of Crates Long	1
Number of Crates Wide	1
Number of Crates High	1
Porosity (%)	95
Crate Length (m)	26
Crate Width (m)	5
Crate Height (m)	0.75
Total Volume (m³)	93.375

Inlets	
Inlet	
Inlet Type	Point Inflow
Incoming Item(s)	S1.001
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)	
Inlet Type	Point Inflow
Incoming Item(s)	S3.000
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets	
Outlet	
Outgoing Connection	S1.002
Outlet Type	Free Discharge

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Inflow Summary Storm Phase: Phase		Company Address:	



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Porous Paving		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (1)	Porous Paving		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (2)	S2		Time of Concentration	0.019	100	0	100	0.019
Catchment Area (3)	S6		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (4)	S6		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (5)	S3		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (6)	S3		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (7)	S3		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (8)	S6		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (9)	S6		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (10)	S3		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (11)	S3		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (12)	S3		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (13)	S6		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (14)	S1		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (15)	S3		Time of Concentration	0.005	100	0	100	0.005
Catchment Area (16)	S3		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (17)	Porous Paving		Time of Concentration	0.011	100	0	100	0.011
Catchment Area (18)	S1		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (19)	S1		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (20)	S3		Time of Concentration	0.004	100	0	100	0.004
Catchment Area (21)	S3		Time of Concentration	0.004	100	0	100	0.004
TOTAL		0.0		0.157				0.157

Project:	Date: 12/11/2024			
	Designed by: danie	Checked by:	Approved By:	
Report Details: Type: Outfall Details Storm Phase: Phase	Company Address:			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
S7	Free Discharge		

Project:	Date: 12/11/2024			
	Designed by: danie	Checked by:	Approved By:	
Report Title: Rainfall Analysis Criteria	Company Address:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall	
FSR	Type: FSR
Region	England And Wales
M5-60 (mm)	19.0
Ratio R	0.253
Summer	☐
Winter	☐

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	45.000
30.0	0.000
1.0	0.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase		Company Address:	



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 100 years: +45 %: 15 mins: Summer	0.03	21.2	9.216
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	7.0	3.057
Catchment Area (2)	FSR: 100 years: +45 %: 15 mins: Summer	0.02	12.8	5.541
Catchment Area (3)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	1.977
Catchment Area (4)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.1	0.903
Catchment Area (5)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	1.977
Catchment Area (6)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	1.9	0.816
Catchment Area (7)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	1.4	0.621
Catchment Area (8)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	2.007
Catchment Area (9)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	2.007
Catchment Area (10)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	2.007
Catchment Area (11)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	4.6	2.007
Catchment Area (12)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.1	0.903
Catchment Area (13)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	1.4	0.600
Catchment Area (14)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	3.2	1.371

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase		Company Address:	



Catchment Area (15)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	3.2	1.371
Catchment Area (16)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.0	0.861
Catchment Area (18)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.8	1.227
Catchment Area (19)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.8	1.227
Catchment Area (20)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.7	1.152
Catchment Area (21)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.6	1.149
Catchment Area (17)	FSR: 100 years: +45 %: 15 mins: Summer	0.01	7.1	3.087

Project:	Date: 12/11/2024		
	Designed by: daniel	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase	Company Address:		



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 30 years: +0 %: 15 mins: Summer	0.03	11.4	4.935
Catchment Area (1)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	3.8	1.638
Catchment Area (2)	FSR: 30 years: +0 %: 15 mins: Summer	0.02	6.8	2.967
Catchment Area (3)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.4	1.059
Catchment Area (4)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.1	0.486
Catchment Area (5)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.4	1.059
Catchment Area (6)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.0	0.435
Catchment Area (7)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	0.8	0.330
Catchment Area (8)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.5	1.074
Catchment Area (9)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.5	1.074
Catchment Area (10)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.5	1.074
Catchment Area (11)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	2.5	1.074
Catchment Area (12)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.1	0.486
Catchment Area (13)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	0.7	0.318
Catchment Area (14)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.7	0.738

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase		Company Address:	



Catchment Area (15)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.7	0.738
Catchment Area (16)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.1	0.465
Catchment Area (18)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.5	0.657
Catchment Area (19)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.5	0.657
Catchment Area (20)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.4	0.618
Catchment Area (21)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.4	0.618
Catchment Area (17)	FSR: 30 years: +0 %: 15 mins: Summer	0.01	3.8	1.656

Project:	Date: 12/11/2024			
	Designed by:	Checked by:	Approved By:	
	danie			
Report Details:	Company Address:			
Type: Inflows Summary				
Storm Phase: Phase				



FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Project:	Date: 12/11/2024		
	Designed by: daniel	Checked by:	Approved By:
Report Details: Type: Inflows Summary Storm Phase: Phase		Company Address:	



Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 1 years: +0 %: 15 mins: Summer	0.03	4.6	2.022
Catchment Area (1)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.5	0.669
Catchment Area (2)	FSR: 1 years: +0 %: 15 mins: Summer	0.02	2.8	1.212
Catchment Area (3)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.432
Catchment Area (4)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.5	0.198
Catchment Area (5)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.432
Catchment Area (6)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.4	0.177
Catchment Area (7)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.3	0.135
Catchment Area (8)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.441
Catchment Area (9)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.441
Catchment Area (10)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.441
Catchment Area (11)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.0	0.441
Catchment Area (12)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.5	0.198
Catchment Area (13)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.3	0.132
Catchment Area (14)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.7	0.300
Catchment Area (15)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.7	0.300
Catchment Area (16)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.4	0.192
Catchment Area (18)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.6	0.270
Catchment Area (19)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.6	0.270
Catchment Area (20)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.6	0.252
Catchment Area (21)	FSR: 1 years: +0 %: 15 mins: Summer	0.00	0.6	0.252
Catchment Area (17)	FSR: 1 years: +0 %: 15 mins: Summer	0.01	1.6	0.678

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S1	FSR: 100 years: +45 %: 360 mins: Summer	164.500	163.300	163.702	0.402	2.4	0.455	0.000	2.4	13.729	Surcharged
S2	FSR: 100 years: +45 %: 360 mins: Summer	164.500	163.100	163.702	0.602	13.9	0.681	0.000	13.5	79.933	Surcharged
S5	FSR: 100 years: +45 %: 360 mins: Summer	164.200	162.950	163.702	0.752	5.2	0.850	0.000	5.0	160.295	Surcharged
S7	FSR: 100 years: +45 %: 360 mins: Summer	163.500	162.300	162.338	0.038	5.0	0.000	0.000	5.0	160.279	OK
S6	FSR: 100 years: +45 %: 360 mins: Summer	164.250	163.350	163.702	0.352	4.8	0.398	0.000	4.8	26.938	Surcharged
S3	FSR: 100 years: +45 %: 360 mins: Summer	164.500	163.500	163.702	0.202	8.2	0.229	0.000	8.2	46.273	OK
S4	FSR: 100 years: +45 %: 360 mins: Summer	164.500	163.200	163.702	0.502	8.2	0.568	0.000	8.0	46.272	Surcharged

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S1	FSR: 30 years: +0 %: 15 mins: Summer	164.500	163.300	163.347	0.047	4.7	0.054	0.000	4.6	2.050	OK
S2	FSR: 30 years: +0 %: 240 mins: Summer	164.500	163.100	163.282	0.182	9.7	0.206	0.000	9.6	37.560	OK
S5	FSR: 30 years: +0 %: 240 mins: Summer	164.200	162.950	163.282	0.332	5.0	0.375	0.000	5.0	75.211	Surcharged
S7	FSR: 30 years: +0 %: 120 mins: Summer	163.500	162.300	162.338	0.038	5.0	0.000	0.000	5.0	53.195	OK
S6	FSR: 30 years: +0 %: 15 mins: Summer	164.250	163.350	163.392	0.042	9.3	0.048	0.000	9.2	4.011	OK
S3	FSR: 30 years: +0 %: 15 mins: Summer	164.500	163.500	163.564	0.064	15.9	0.072	0.000	15.7	6.897	OK
S4	FSR: 30 years: +0 %: 240 mins: Summer	164.500	163.200	163.282	0.082	5.6	0.093	0.000	5.6	21.744	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address:		




FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S1	FSR: 1 years: +0 %: 15 mins: Summer	164.500	163.300	163.330	0.030	1.9	0.034	0.000	1.8	0.838	OK
S2	FSR: 1 years: +0 %: 15 mins: Summer	164.500	163.100	163.168	0.068	10.9	0.077	0.000	10.6	4.870	OK
S5	FSR: 1 years: +0 %: 240 mins: Summer	164.200	162.950	163.095	0.145	3.9	0.164	0.000	3.9	33.852	OK
S7	FSR: 1 years: +0 %: 240 mins: Summer	163.500	162.300	162.334	0.034	3.9	0.000	0.000	3.9	33.847	OK
S6	FSR: 1 years: +0 %: 15 mins: Summer	164.250	163.350	163.377	0.027	3.8	0.030	0.000	3.7	1.644	OK
S3	FSR: 1 years: +0 %: 15 mins: Summer	164.500	163.500	163.540	0.040	6.5	0.045	0.000	6.4	2.820	OK
S4	FSR: 1 years: +0 %: 15 mins: Summer	164.500	163.200	163.241	0.041	6.4	0.046	0.000	6.2	2.819	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		



FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 100 years: +45 %: 60 mins: Summer	164.352	164.071	0.332	0.171	23.8	20.033	0.000	0.000	8.4	28.349	55.986	OK
Cellular Storage	FSR: 100 years: +45 %: 360 mins: Summer	163.702	163.702	0.702	0.702	19.6	86.678	0.000	0.000	4.9	133.427	7.172	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address:	




FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 30 years: +0 %: 60 mins: Summer	164.166	164.017	0.146	0.117	12.5	10.911	0.000	0.000	6.3	14.711	76.027	OK
Cellular Storage	FSR: 30 years: +0 %: 240 mins: Summer	163.282	163.282	0.282	0.282	13.7	34.830	0.000	0.000	4.8	62.564	62.699	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Company Address:		



FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 1 years: +0 %: 120 mins: Summer	164.081	163.976	0.061	0.076	4.2	5.433	0.000	0.000	3.0	8.357	88.063	OK
Cellular Storage	FSR: 1 years: +0 %: 240 mins: Summer	163.096	163.096	0.096	0.096	6.0	11.814	0.000	0.000	3.5	28.142	87.347	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		




FSR: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S1	S2	164.500	163.367	0.114	3.825	0.6	0.42	8.6	OK
S1.003	FSR: 100 years: +45 %: 360 mins: Summer	Pipe	S5	S7	164.200	163.702	0.039	160.279	1.4	0.14	5.0	Surcharged
S4.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S6	S5	164.250	163.413	0.135	7.490	1.2	0.32	17.1	OK
S2.000	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S3	S4	164.500	163.592	0.106	12.864	1.6	0.29	29.3	OK
S2.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S4	S2	164.500	163.320	0.141	12.841	1.1	0.22	28.7	OK
S1.001	FSR: 100 years: +45 %: 15 mins: Summer	Pipe	S2	Cellular Storage	164.500	163.261	0.169	21.899	2.2	0.73	49.2	OK
S1.002	FSR: 100 years: +45 %: 30 mins: Summer	Pipe	Cellular Storage	S5	164.500	163.340	0.300	4.748	0.1	0.04	5.0	Surcharged
S3.000	FSR: 100 years: +45 %: 60 mins: Summer	Pipe	Porous Paving	Cellular Storage	164.571	164.109	0.100	28.332	1.1	0.68	8.4	Surcharged

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		



HGL Up (m)	HGL Down (m)	EGL Up (m)	EGL Down (m)
163.367	163.261	163.385	163.404
163.702	162.338	163.723	162.436
163.413	163.219	163.483	163.271
163.592	163.320	163.721	163.413
163.320	163.261	163.413	163.404
163.261	163.219	163.404	163.430
163.340	163.339	163.340	163.377
164.071	163.481	164.129	163.614

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S1	S2	164.500	163.347	0.078	2.050	0.5	0.22	4.6	OK
S1.003	FSR: 30 years: +0 %: 120 mins: Summer	Pipe	S5	S7	164.200	163.267	0.039	53.195	1.4	0.14	5.0	Surcharged
S4.000	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S6	S5	164.250	163.392	0.084	4.011	0.9	0.17	9.2	OK
S2.000	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S3	S4	164.500	163.564	0.069	6.897	1.5	0.16	15.7	OK
S2.001	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S4	S2	164.500	163.274	0.091	6.895	1.0	0.12	15.4	OK
S1.001	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S2	Cellular Storage	164.500	163.208	0.079	11.912	2.1	0.39	26.3	OK
S1.002	FSR: 30 years: +0 %: 120 mins: Summer	Pipe	Cellular Storage	S5	164.500	163.267	0.292	43.441	0.2	0.04	4.9	OK
S3.000	FSR: 30 years: +0 %: 60 mins: Summer	Pipe	Porous Paving	Cellular Storage	164.571	164.014	0.100	14.699	0.8	0.51	6.3	Surcharged

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		



HGL Up (m)	HGL Down (m)	EGL Up (m)	EGL Down (m)
163.347	163.208	163.360	163.336
163.267	162.338	163.289	162.436
163.392	163.104	163.436	163.140
163.564	163.274	163.681	163.357
163.274	163.208	163.357	163.336
163.208	163.105	163.336	163.289
163.267	163.267	163.268	163.289
164.017	163.221	164.050	163.306

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		




FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
S1.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S1	S2	164.500	163.330	0.049	0.838	0.4	0.09	1.8	OK
S1.003	FSR: 1 years: +0 %: 240 mins: Summer	Pipe	S5	S7	164.200	163.095	0.034	33.847	1.3	0.11	3.9	OK
S4.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S6	S5	164.250	163.377	0.056	1.644	0.6	0.07	3.7	OK
S2.000	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S3	S4	164.500	163.540	0.040	2.820	1.3	0.06	6.4	OK
S2.001	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S4	S2	164.500	163.241	0.054	2.819	0.8	0.05	6.2	OK
S1.001	FSR: 1 years: +0 %: 15 mins: Summer	Pipe	S2	Cellular Storage	164.500	163.168	0.043	4.870	2.0	0.16	10.6	OK
S1.002	FSR: 1 years: +0 %: 240 mins: Summer	Pipe	Cellular Storage	S5	164.500	163.096	0.120	28.142	0.2	0.03	3.5	OK
S3.000	FSR: 1 years: +0 %: 120 mins: Summer	Pipe	Porous Paving	Cellular Storage	164.571	163.957	0.059	8.352	0.6	0.24	3.0	OK

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address:		



HGL Up (m)	HGL Down (m)	EGL Up (m)	EGL Down (m)
163.330	163.168	163.337	163.275
163.095	162.334	163.121	162.420
163.377	163.037	163.396	163.057
163.540	163.241	163.629	163.301
163.241	163.168	163.301	163.275
163.168	163.039	163.275	163.213
163.096	163.095	163.097	163.121
163.976	163.087	163.997	163.133

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		



Phase
FSR: 100 years: Increase Rainfall (%): +45: 360 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
S7			5.0	160.279
TOTAL	28.7	162.180	5.0	160.279

Project:	Date: 12/11/2024		
	Designed by: danie	Checked by:	Approved By:
Report Details: Type: Phase Management Storm Phase: Phase	Company Address:		



Phase
FSR: 30 years: Increase Rainfall (%): +0: 120 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
S7			5.0	53.195
TOTAL	28.4	59.850	5.0	53.195

Project:	Date: 12/11/2024			
	Designed by: danie	Checked by:	Approved By:	
Report Details:	Company Address:			
Type: Phase Management Storm Phase: Phase				



Phase
FSR: 1 years: Increase Rainfall (%): +0: 240 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
S7			3.9	33.847
TOTAL	8.9	34.560	3.9	33.847