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**Job Title**  
Medieval Quarter and Glade of Light

**Prepared for**  
Manchester City Council

**Report Type**  
Phase 1A -Drainage & SuDS  
Maintenance

**Date**  
22 October 2021



*Image courtesy of BCA Landscape Architects 2021*

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### Phase 1A -Drainage & SuDS Maintenance

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## 1. Introduction

This drainage maintenance document has been prepared in support of the planning application for the Medieval Quarter and Glade of Light (GoL) Development.

This maintenance document aims to establish the appropriate schedule of maintenance for the Medieval Quarter GoL drainage system. The adopting authority, Manchester City Council (MCC), is ultimately responsible for the maintenance of the proposed drainage and should follow the guidelines outlined in this report.

The proposed drainage strategy for the site is presented in the Flood Risk Assessment and Drainage Strategy appended herein.

## 2. Maintenance

This maintenance document is intended to give an overview of the operation and maintenance of the drainage features included within the drainage strategy and in relation to typical details. Where propriety products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document, unless specifically noted otherwise due to project constraints.

The recommended maintenance actions and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation of the system. The frequency should then be adjusted to suit the site-specific requirements.

The surface water network has been designed to accommodate the 1 in 100-year rainfall event plus a 40% allowance for climate change. As the flows are attenuated on site there will be a period after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48 hours, appropriate action should be taken as noted in this section.

### 2.1 Components

The following components are included within the drainage design for the proposed development:

- Inspection and manhole chambers including flow controls
- Pipes, including perforated pipes.
- Filter drains and raingardens

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

It is assumed that the maintenance of the drainage network will be the responsibility of the MCC Highways maintenance.

A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual

It is recommended that the drainage system is inspected on a yearly basis, as a minimum, with the system also being inspected after any major storm event.

During the winter months, drainage features such as channels should be cleared of ice, snow, debris or litter.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the filter drains and the upstream/downstream chambers.

## **2.2 Inspection and Manhole Chambers including flow controls**

Generally, access points have been located at the head of each run, at abrupt changes in direction and at a change of pipe size in accordance with Building Regulations Part H. The perforated filter drains have been laid with gradual changes in direction to suit the landscaping layout and inspection chamber catchpits provided at convenient regular locations.

Inspection chambers and manholes are proprietary products; the manufacturer's maintenance recommendation should therefore be followed. The information regarding operation and maintenance can be found within the manufacturer's specification and should be included in the hand-over documentation.

The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access. Double locked and sealed manholes must be sealed and locked correctly post maintenance operation.

*Table 1: Maintenance Schedule for manholes and chambers*

| Activity                                                                                                 | Required Action                                                                                                            | Frequency                           |
|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required) | Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed | Annually                            |
|                                                                                                          | Inspect flow control devices for signs of build up or blockage                                                             | Annually or as required             |
| Regular maintenance/ inspection                                                                          | Inspect and identify any areas that are not operating correctly. If required, take remedial action                         | Monthly for 3 months, then annually |
|                                                                                                          | Remove debris from the catchment surface (where it may cause risks to performance)                                         | Monthly                             |
| Remedial action                                                                                          | Repair/rehabilitate inlets, outlet, overflows and vents                                                                    | As required                         |
|                                                                                                          | Remove sedimentation or debris build-up from inside of chamber                                                             | As required                         |

## 2.3 Pipes, including perforated pipes

Pipes are proprietary products and the materials used are generally uPVC or PP. As such, the appropriate manufacturer's recommendations should be followed.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the drainage rate. They are intended to be dry except for during rainfall events. Solid wall pipes which are proposed simply to convey water around the site have been designed such that they are considered to be self-cleansing.

Filter drains are design to collect surface water run-off from the adjacent hardstand. The filter trenches are wrapped in permeable geotextile to prevent fines entering the stone itself and the perforated pipe network. The perforated pipes convey surface water run-off to the main carrier drain and the outfall beyond.

Access for maintenance is provided through access chambers and manholes. Catchpits are provided along the filter drains which further add a level of protection against silt build up within the system and ultimately discharge into the River Irwell.

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not drain correctly thus exposing the development to a greater level of flood risk. The recommended maintenance schedule for pipes is presented in Table 1.

Table 2: Maintenance Schedule for Pipes

| Activity                       | Required Action                                                                                        | Frequency                                         |
|--------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Monitoring                     | Initial inspection should be provided as post-construction CCTV survey.                                | N/A                                               |
| Regular maintenance/inspection | Inspect for evidence of poor operation via water level in chambers. If required, take remedial action. | 3-monthly, 48 hours after large storms            |
| Remedial action                | Rod through poorly performing pipe-runs as initial remediation.                                        | As required                                       |
|                                | If continued poor performance jet and CCTV survey poorly performing pipe-runs.                         | As required                                       |
|                                | Seek advice as to remediation techniques suitable for the type of performance issue and location.      | As required if above does not improve performance |

## 2.4 Filter Drains and Raingardens

All soft landscaping within the Glade of Light and the individual raingardens close to the outfall have been designed with a filter drain linked to a stone blanket. The filter drains and blanket provide filtration for surface water run-off and slow down the rate of flow into the main surface water system. They also provide attenuation for storm events up to the 1:100 year plus 40% climate change, below ground. Due to the rate of flow through the filter drain stone material there may be occasions where surface ponding is visible for short durations during higher intensity storms. This is normal and intended to be restricted to within the soft landscaped raingarden areas.

The surface of the filter drains should be cleared of leaves and debris on a regular basis to avoid the breakdown of organic matter which could affect the operation of the filter drain.

Table 3 presents the recommended maintenance schedule for the Filter Drains and Raingardens.

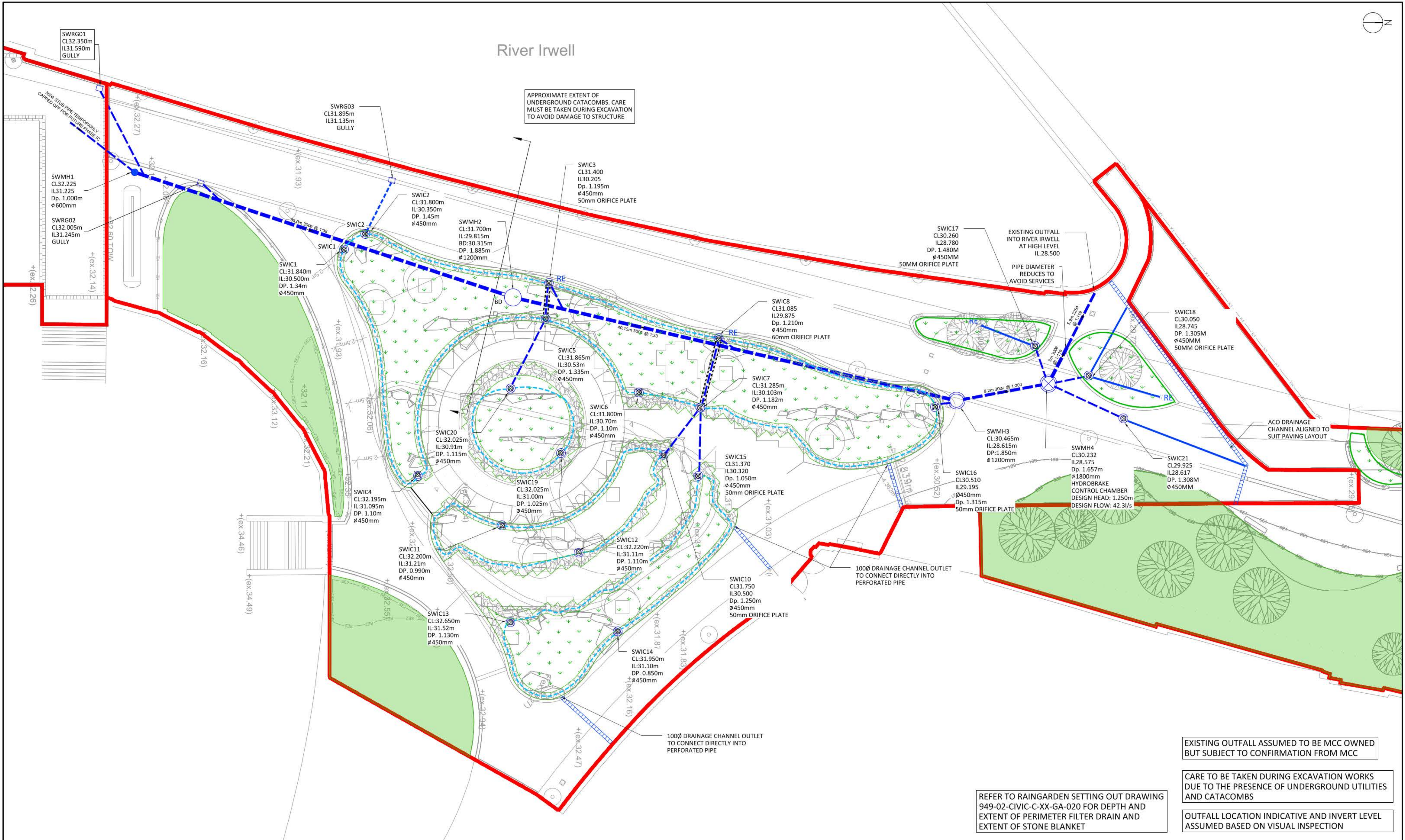
**Medieval Quarter and Glade of Light  
Phase 1A -Drainage & SuDS Maintenance**

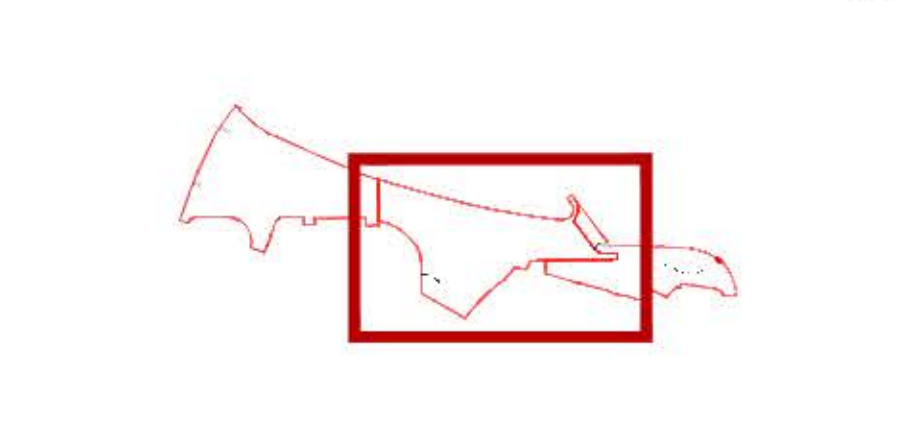
*Table 3: Maintenance schedule for filter drains*

| Activity                                                                                                 | Required Action                                                                                                                          | Frequency                                                                                                   |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required) | Initial inspection                                                                                                                       | Half yearly and after large storms                                                                          |
|                                                                                                          | Monitor accumulation of silt at inlet/ outlet infrastructure. If silt build-up is significant, take action to prevent blocking of drain. | Monthly (can be monitored and adjusted based on the operation of the system)                                |
| Regular maintenance/ inspection                                                                          | Remove litter (including leaf litter) and debris from filter drain surface                                                               | Monthly or as required                                                                                      |
|                                                                                                          | Manage other vegetation and remove nuisance plants                                                                                       | Monthly at start, or when required. Or as per landscape maintenance strategy whichever is the more frequent |
|                                                                                                          | Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours              | Monthly, or when required                                                                                   |
|                                                                                                          | Inspect vegetation coverage                                                                                                              | Monthly for 6 months, quarterly for 2 years, then half yearly                                               |
| Remedial action                                                                                          | Repair erosion or other damage by re-turfing or reseeding                                                                                | As required                                                                                                 |
|                                                                                                          | Relevel uneven surfaces and reinstate design levels                                                                                      | As required                                                                                                 |
|                                                                                                          | Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface   | As required                                                                                                 |
|                                                                                                          | Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip                                           | As required                                                                                                 |
|                                                                                                          | Remove and dispose of oils or petrol residues using safe standard practices                                                              | As required                                                                                                 |

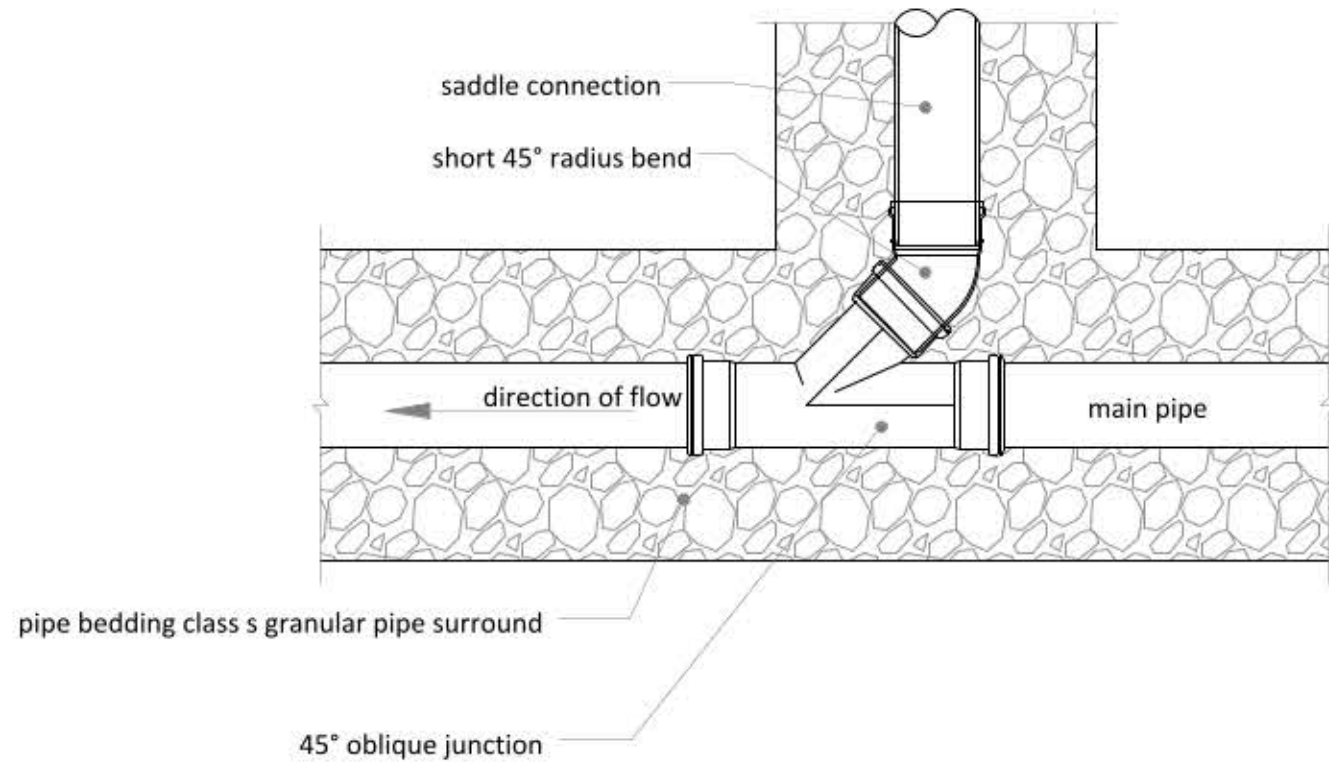
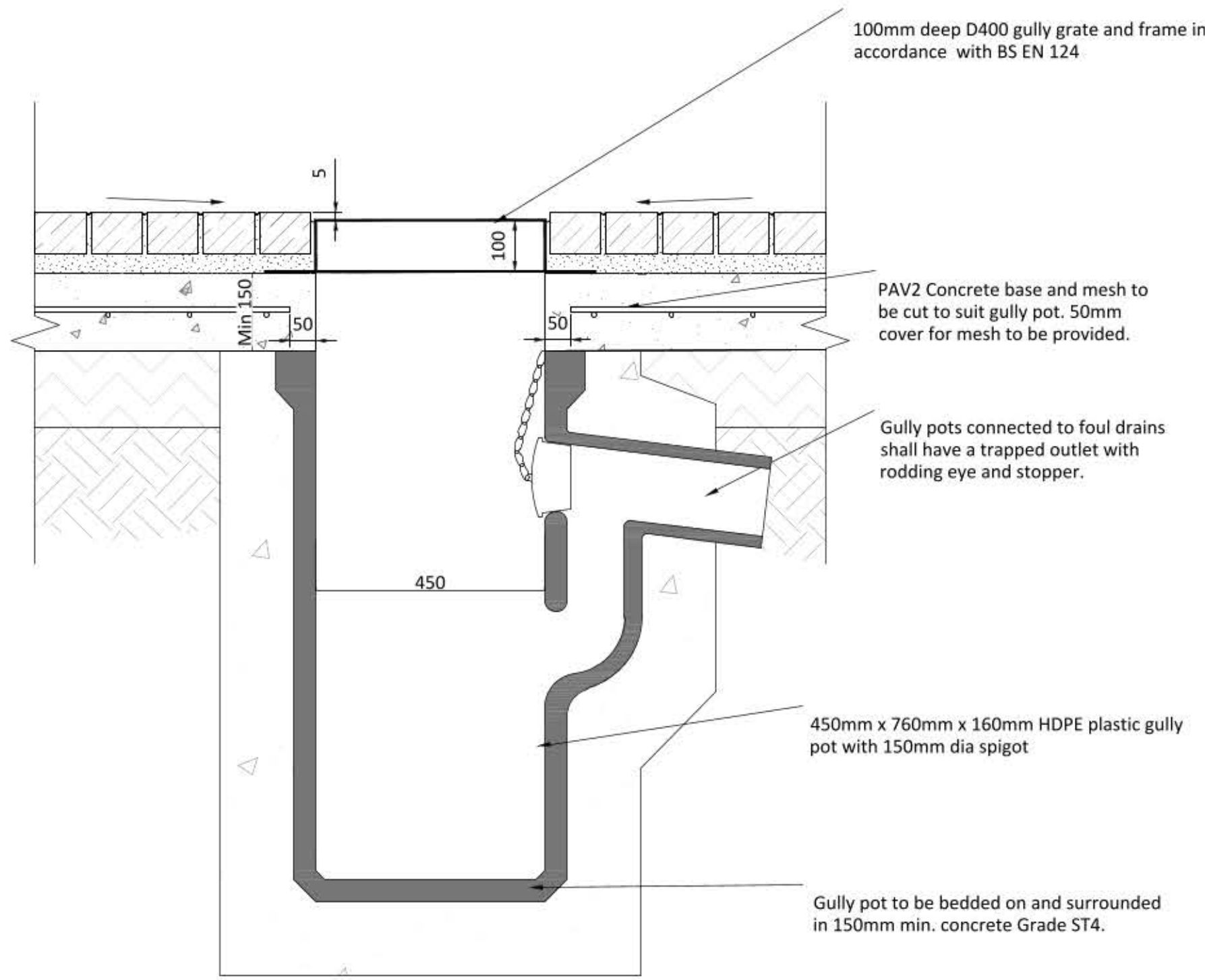
## Appendices

## Appendix A - Drainage Layout

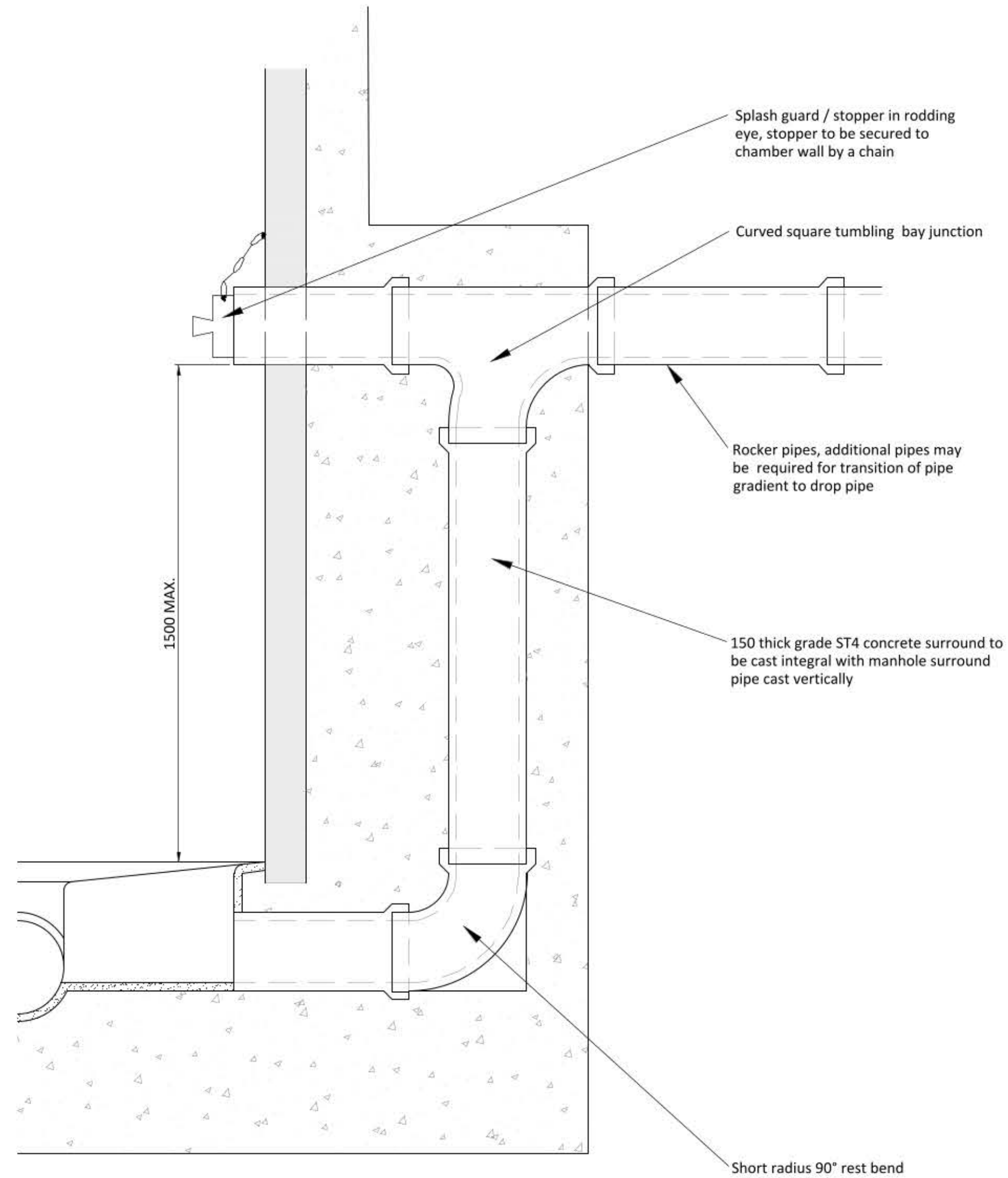


|                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| <p>Location Plan</p>  | <p>Standard Notes</p> <ol style="list-style-type: none"> <li>This drawing is to be read in conjunction with all relevant Architect's and Engineer's drawings and the specification.</li> <li>This drawing should not be scaled.</li> <li>All dimensions are to be verified by the contractor on site.</li> <li>All discrepancies should be reported to the C.A. prior to the commencement of the works.</li> </ol> <p>© CIVIC ENGINEERS</p> | <p>Notes and Keys</p> <ol style="list-style-type: none"> <li>PROPOSED GENERAL ARRANGEMENT, SITE BOUNDARY ARE AS PER PLANT-IE DRAWING 'PL1784-VW-001-23-PLANIT IE WORKING FILE', RECEIVED ON 02/07/2020.</li> </ol> | <p>Notes and Keys</p> <ul style="list-style-type: none"> <li>— — — — — ZONE AND SITE BOUNDARY</li> <li>— — — — — PROPOSED SW DRAINAGE</li> <li>— — — — — PROPOSED 100mm PERFORATED SW DRAIN (LAID AT MIN 1:100 FALLS)</li> <li>— — — — — EXISTING UNITED UTILITIES SEWER</li> <li>— — — — — PROPOSED SURFACE WATER SOLID PIPE</li> <li>— — — — — PROPOSED PERFORATED PIPE (100mmØ)</li> <li>— — — — — PROPOSED SW MANHOLE/IC</li> <li>— — — — — PROPOSED FLOW CONTROL CHAMBER</li> </ul> | <p>Notes and Keys</p> <ul style="list-style-type: none"> <li>-XX-XX- PROPOSED LEVELS CONTOURS</li> <li>— — — — — PROPOSED 300mm DEEP STONE BLANKET</li> <li>— — — — — PROPOSED LAWN AREA</li> <li>— — — — — PROPOSED GULLY TO BE ACO M100D SUMPED OUTLET UNIT</li> <li>— — — — — ACO M150D 0.0 CHANNEL DRAIN FITTED WITH HEEL GUARD COVER</li> <li>RE — — — — — PROPOSED RODDING EYE</li> <li>— — — — — PROPOSED IMPERMEABLE MEMBRANE</li> <li>10m³ PROPOSED MINIMUM STORAGE VOLUME WITHIN STONE BLANKET BASED ON 30% VOID RATIO</li> </ul> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| <p>14/10/21</p> <p>Date</p>                                                                              | <p>001</p> <p>Rev</p>                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>AS BUILT DRAINAGE</p> <p>Description</p>                                                                                                                                                                        | <p>CD</p> <p>Drawn</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>CFR</p> <p>Chk</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

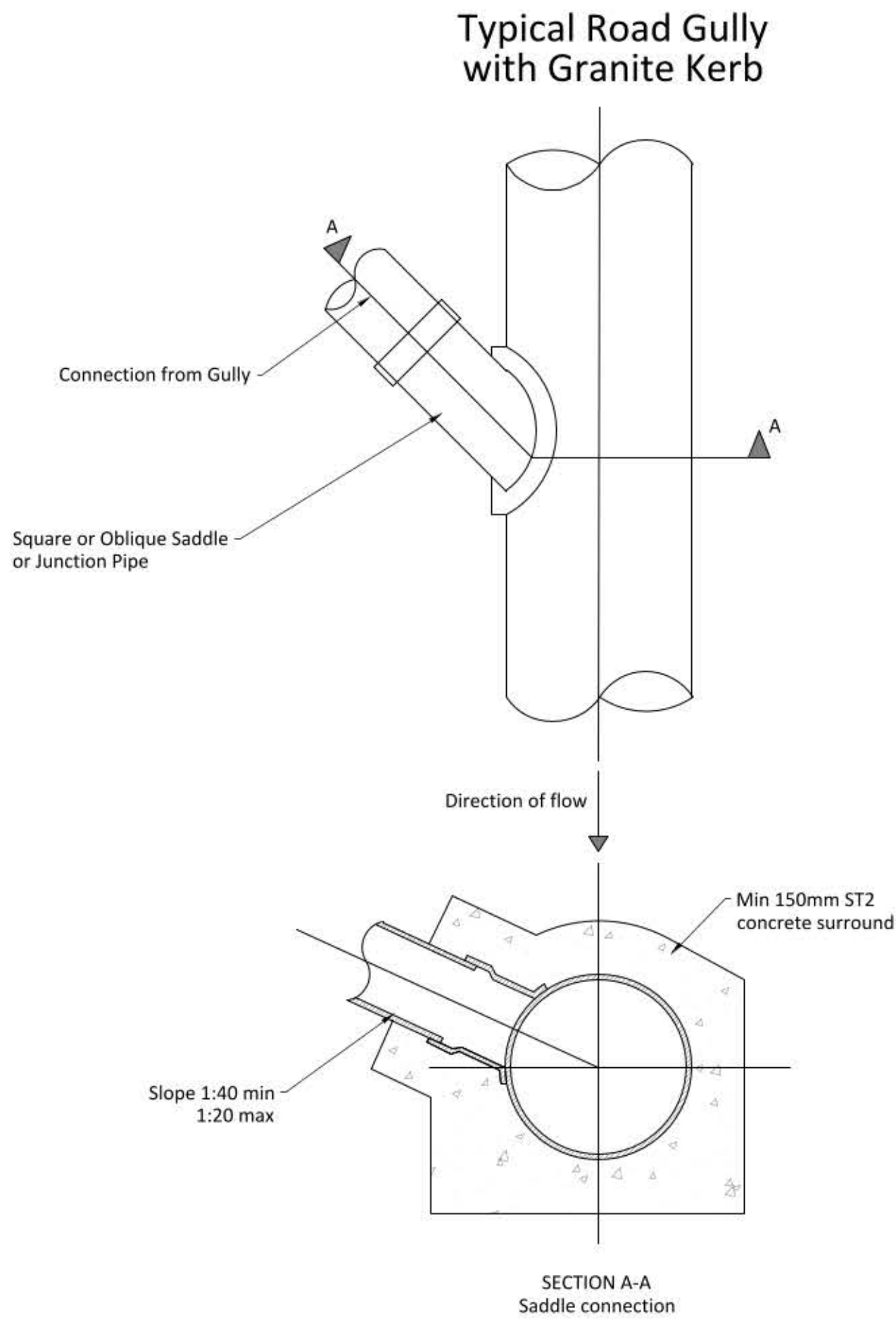
## Appendix B - Drainage and Raingarden Details



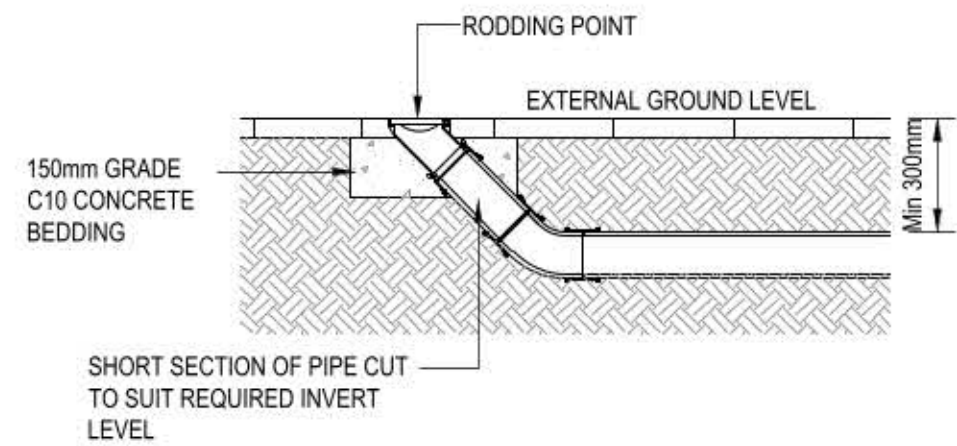
Typical 45° Pipe Junction Connection For Connecting To Existing Gully Tails  
(Scale 1:20@A1)



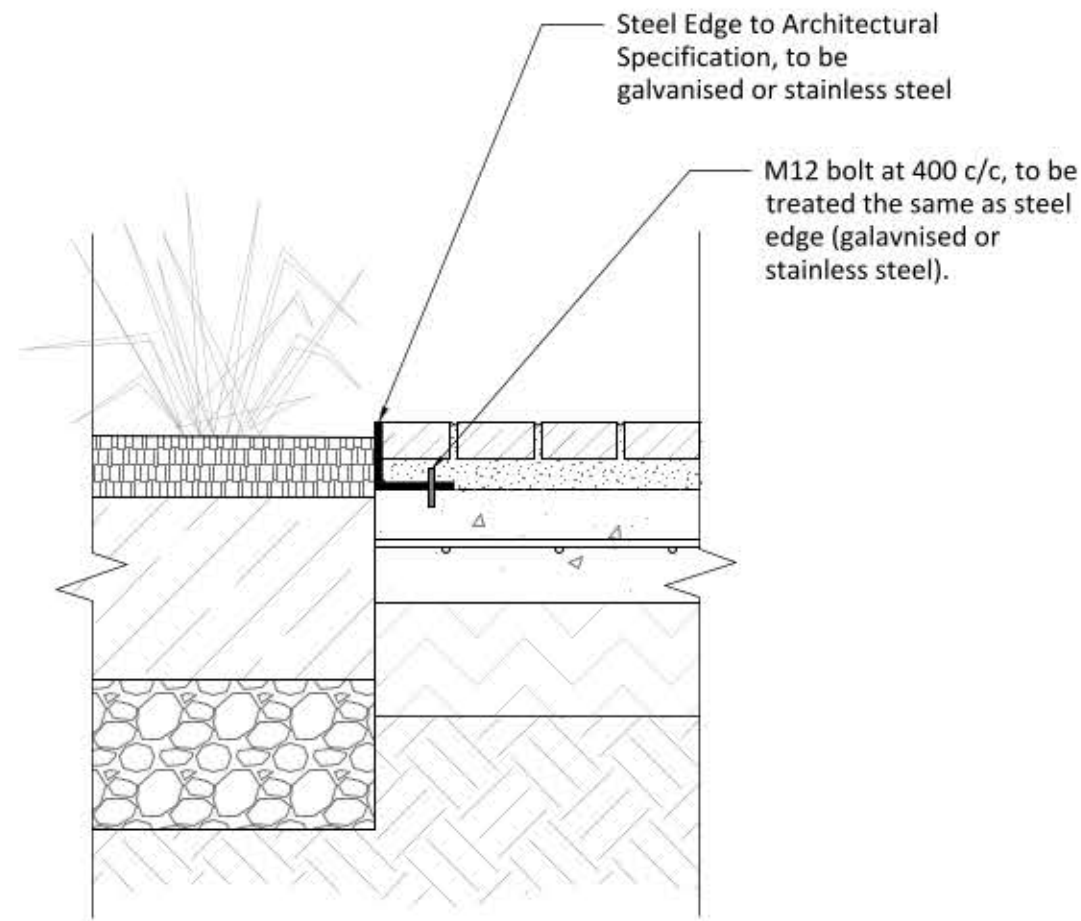
Typical Backdrop Detail  
(scale 1:20)



Gully Connection to Existing Sewer or Carrier Drain  
(NTS)



TYPICAL RODDING POINT DETAIL



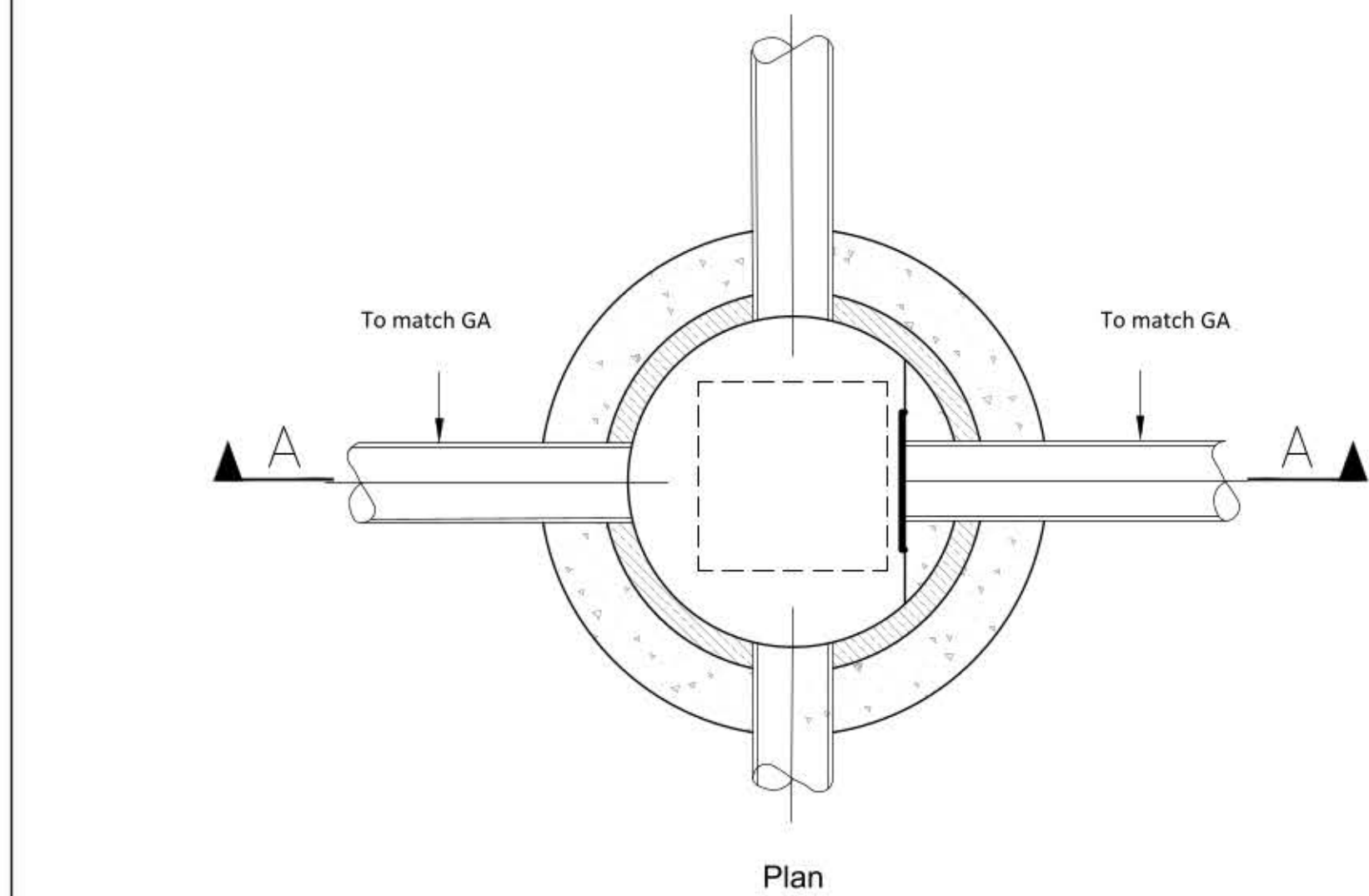
Steel Edge Fixing Detail  
(Scale 1:10@A1)

| Standard Notes | Notes and Keys | Notes and Keys | Notes and Keys | Notes and Keys |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | </ |
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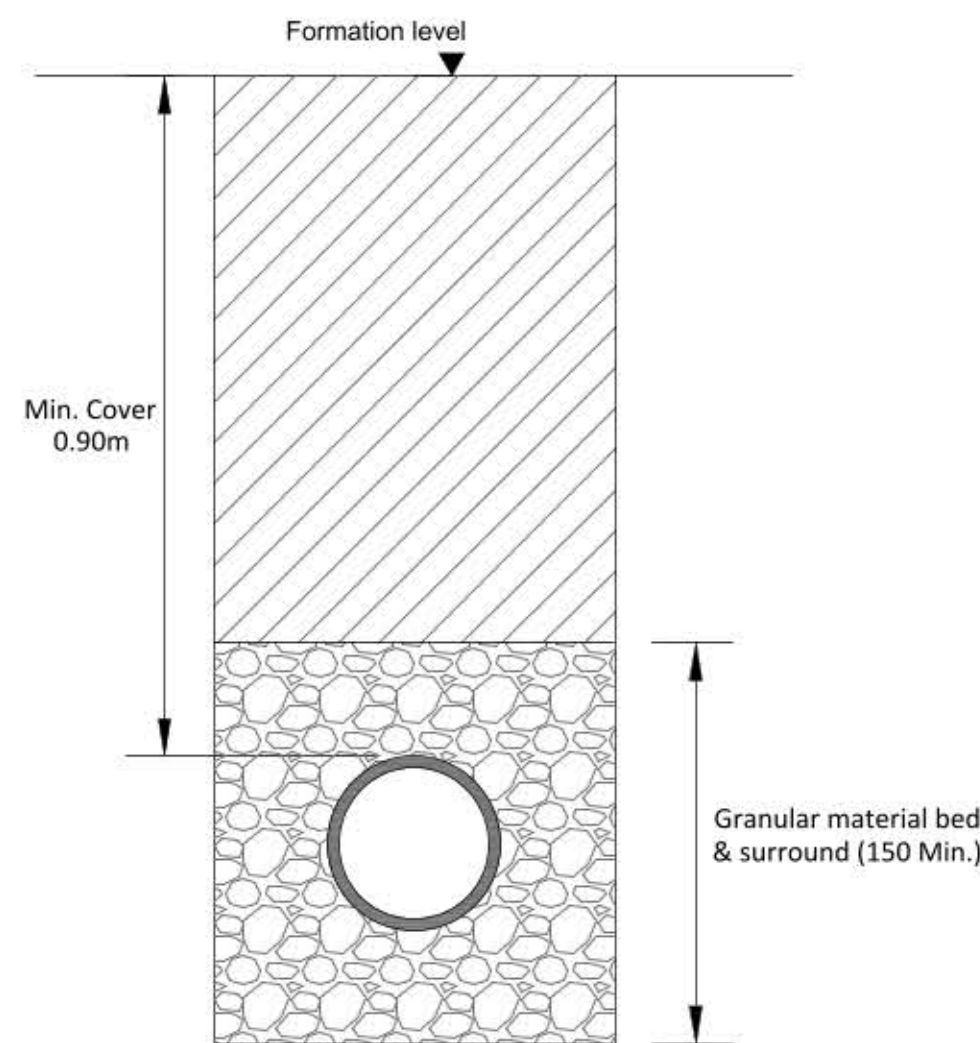
**Civic Engineers**

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Typical Pipe Bedding Detail 1  
Landscaped Areas  
Class S - Granular Bed & Surround  
(No Vehicular Over-run)  
Scale 1:10



Typical Pipe Bedding Detail 2  
Landscaped Areas  
Class S - Granular Bed & Surround  
(Potential Vehicular Over-run)  
Scale 1:10



| Granular bedding and sidefill material to be:- |                              |                            |
|------------------------------------------------|------------------------------|----------------------------|
| 100 & 150 dia.                                 | - 10 single size stone       | (graded not permitted).    |
| 225 & 300 dia.                                 | - 10 or 20 single size stone | (or 20 to 5 graded).       |
| 375 to 500 dia                                 | - 20 single size stone       | (or 20 to 5 graded).       |
| 600 dia. +                                     | - 20 or 50 single size stone | (or 20 or 40 to 5 graded). |

Concrete bed & haunch strength minimum C20/25 (to BS EN-206:2013)

Bedding mortar

Paviments directly adjacent to channel must be bedded using a polymer modified mortar

Block

Polymer Modified Mortar

minimum above top of edge rail

210

200

200

525x525 COVER

475

SHUTTERED EXTERNAL RIBS

475B POLYPROPYLENE RAISING RIBS (TO SUIT INSPECTION CHAMBER BASE BY HEPWORTH OR EQUIVALENT APPROVED)

475B POLYPROPYLENE INSPECTION CHAMBER BASE (BASE TYPE TO SUIT SEE INSET) BY HEPWORTH OR EQUIVALENT APPROVED

NOTE: STRAIGHT & BEND PIPEWORK COMBINATION TO MAIN RUN TO BE DETERMINED BY CONTRACTOR ON SITE

1:40 PERFORMED FALL (REFER TO I.C. NOTE 3)

MIN 150 GEN 3 CONCRETE SURROUND

MIN 150 GEN 1/ST2 CONCRETE BASE

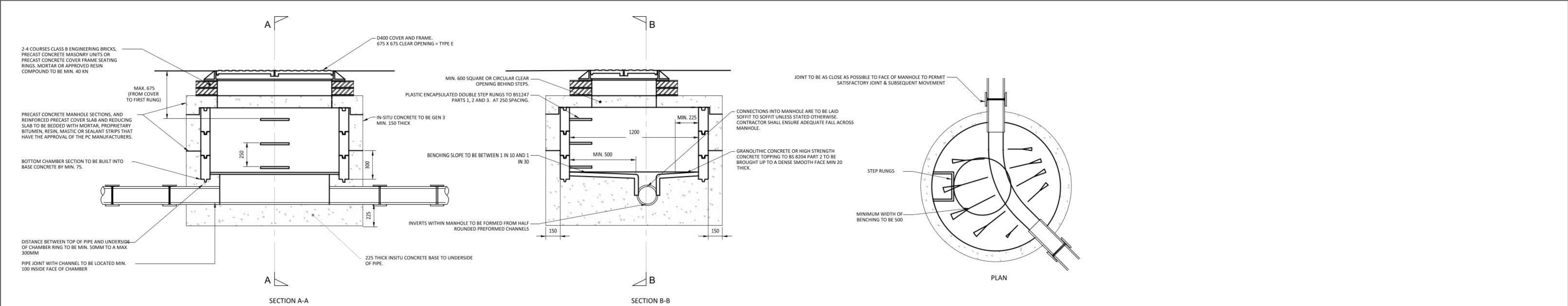
SHORT LENGTH OF PIPE (600mm LONG) TO BE USED ON ALL INCOMING/OUTGOING CONNECTIONS

FLEXIBLE ADAPTORS BETWEEN POLYPROPYLENE CHAMBER & CAST IRON OR CLAY PIPEWORK (BY TIMESAVER OR HEPWORTH OR EQUIVALENT APPROVED)

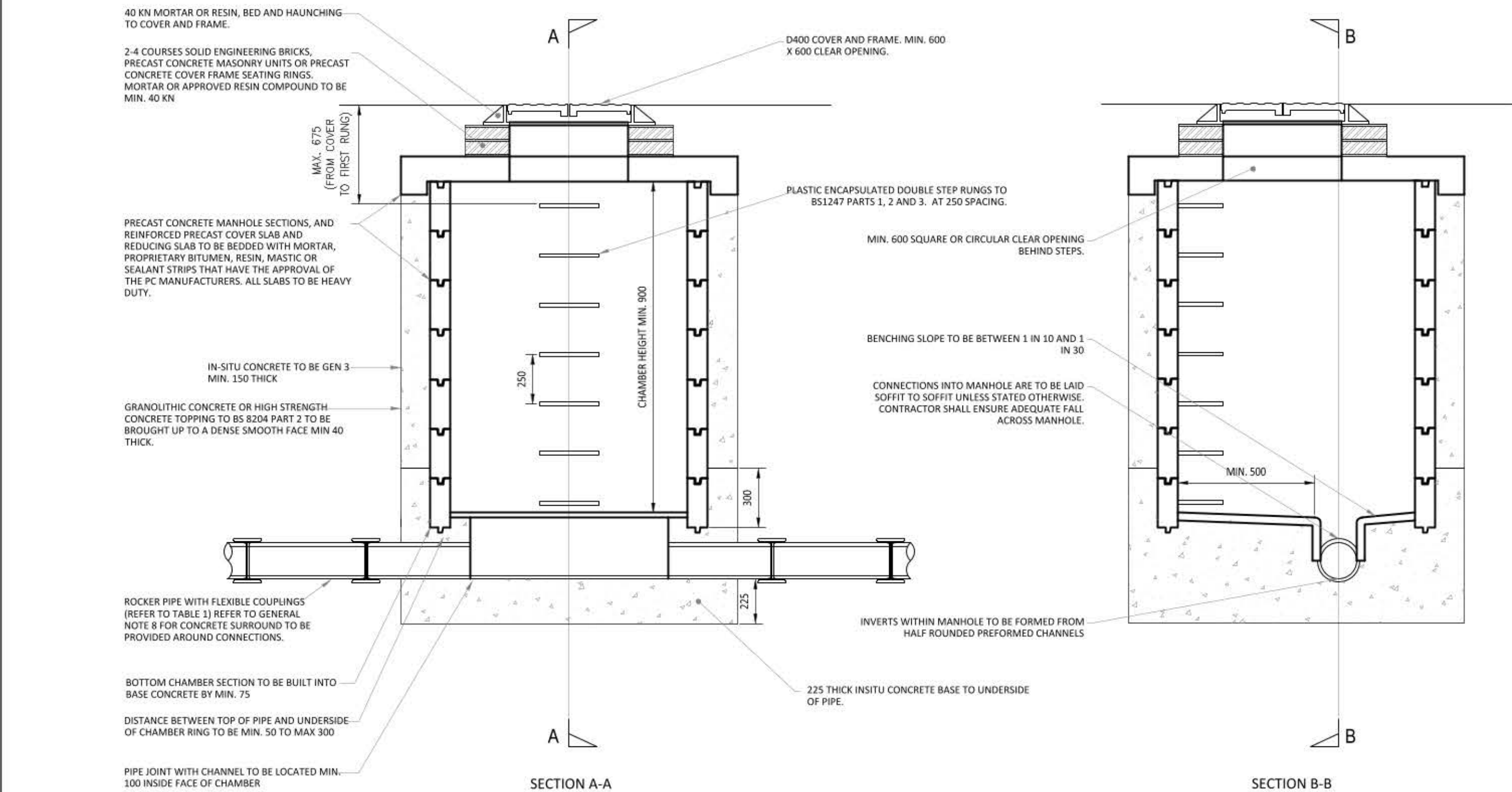
ROCKER PIPE (600mm LONG) TO BE USED ON ALL INCOMING/OUTGOING CONNECTIONS

POLYPROPYLENE INSPECTION CHAMBER (PPIC) (MAXIMUM  
PIPE DIAMETER 100 & 150Ø) (MAXIMUM DEPTH TO INVERT  
600-3000mm)

[illegible]



**CIRCULAR PRECAST CONCRETE MANHOLE DETAIL**  
**(MANHOLE TYPE E)**  
(DEPTH TO SOFFIT 1.00m-1.50m TYPE E)  
SCALE 1:20



**CIRCULAR PRECAST CONCRETE MANHOLE DETAIL**  
**(MANHOLE TYPE B)**  
(DEPTH TO SOFFIT 1.50m-3.00)  
SCALE 1:20

|                |  |                |  |                |  |                |  |                |  |  |  |  |  |  |  |  |  |         |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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## Appendix C - Site Record Photos

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Job number: 949-02

Job title: Medieval Quarter Glade of Light

Date: 08/11/2021

Name: C. Kendrick

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Central Raingarden to Glade of Light





Impermeable Membrane to base of raingarden

- Reduces surface water infiltration to sub-soil and reduces potential for infiltration into existing service ducts
- Membrane lapped up around silt trap chambers



*Impermeable membrane and filter drain installation*



*Filter drain installation. Filter drain pre-wrapped in permeable geotextile*



*Glade of light raingardens*

*Left* Geotextile wrapped perforated pipe to filter drains around perimeter of rain garden

*Right:* Type 3 stone infill to rain garden blanket



Raingarden blanket - Type 3 MOT to blanket and filter drain surround  
Left: Forming filter drain to perimeter of raingarden  
Right: Trimming impermeable membrane to edges of filter drain



Raingarden to central Halo prior to permeable membrane installation



*Filter Drain installation*

*Left: Backfilled filter drain*

*Right: Topsoil overlaid onto permeable membrane. Permeable membrane to separate*



*Topsoil over permeable membrane*

*Left: View north towards Deansgate*

*Right: View from north towards Halo and Chetham's*