

**Project:** Drainage and SUDS  
Design, ARTHUR STREET,  
BARWELL

**Project No:** 2017-C-R01

**Date:** May 2023

| Revision | Date     | Author | Checker |
|----------|----------|--------|---------|
| -        | 18.05.23 | AW     | CA      |

## Arcelle Consulting

T: 0116 254 6694 E: [info@arcelleconsulting.co.uk](mailto:info@arcelleconsulting.co.uk) W: [www.arcelleconsulting.co.uk](http://www.arcelleconsulting.co.uk)

### Leicester Office

103 London Road Leicester LE2 0PF

### London Office

49 Constable House Adelaide Road London NW3 3QA

## Executive Summary

This Drainage Assessment reviews the existing drainage arrangement at the application site and proposes a surface water drainage strategy in line with Hinckley and Bosworth Borough Council guidance.

The proposed development comprises the construction of a new block of residential dwellings and associated hardstanding and external garden areas.

The site is less than 1 hectare in size and within flood zone 1, so no flood risk assessment is required.

### Surface Water Drainage

The proposed strategy presented in detail in this report aims to restrict surface water discharge to 50% of the existing 1-year discharge rate in accordance with the Local Authority Requirements and best practice. Attenuation and reduced discharge will be provided for all storm events up to and including the 1 in 100-year storm plus 40% allowance for climate change.

Sustainable Drainage Systems (SuDS) shall be used, including extensive permeable paving.

Maintenance/management of all onsite drainage infrastructure has been considered within a separate maintenance plan appended to this report. This will be updated through the development process.

The proposed drainage strategy is entirely based on-site and therefore the only off-site works will be the foul and surface water outlets to the Severn Trent Water sewer.

Overall, the proposals provide a high level of water treatment, runoff reduction and flooding protection for the proposed development and are in accordance with all requirements of the Lead Local Flood Authority (LLFA).

### Foul Drainage

It is proposed to discharge the foul drainage from the site into the existing Severn Trent Water sewer in the street.

## Contents Page

|          |                                                                     |           |
|----------|---------------------------------------------------------------------|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>                                           | <b>3</b>  |
| <b>2</b> | <b>SITE DESCRIPTION.....</b>                                        | <b>4</b>  |
|          | 2.2 TOPOGRAPHY .....                                                | 4         |
| <b>3</b> | <b>DESIGN PRINCIPLES AND POLICY REQUIREMENTS .....</b>              | <b>5</b>  |
|          | 3.1 GENERAL PRINCIPLES FOR PROPOSED SITE RUN-OFF .....              | 5         |
|          | 3.2 SUSTAINABLE DRAINAGE SYSTEMS (SuDS) .....                       | 5         |
| <b>4</b> | <b>SURFACE WATER DRAINAGE DESIGN .....</b>                          | <b>7</b>  |
|          | 4.1 EXISTING SITE RUNOFF.....                                       | 7         |
|          | 4.2 DESIGN CONSIDERATIONS.....                                      | 7         |
|          | 4.3 EXISTING RUN-OFF RATES.....                                     | 7         |
|          | 4.4 DRAINAGE DESIGN .....                                           | 8         |
|          | 4.5 CONSENTS, OFFSITE WORKS AND DIVERSIONS .....                    | 8         |
|          | 4.6 MAINTENANCE.....                                                | 8         |
| <b>5</b> | <b>FOUL DRAINAGE .....</b>                                          | <b>9</b>  |
|          | 5.1 DISCHARGE TO PUBLIC SEWER NETWORK .....                         | 9         |
| <b>6</b> | <b>DRAINAGE DURING CONSTRUCTION .....</b>                           | <b>10</b> |
|          | 6.1 CONSTRUCTION RUN-OFF MANAGEMENT .....                           | 10        |
|          | 6.2 MANAGEMENT OF CONSTRUCTION (INCLUDING DRAINAGE) .....           | 10        |
|          | 6.3 TEMPORARY DRAINAGE DURING CONSTRUCTION .....                    | 10        |
|          | 6.4 PROTECTION OF DRAINAGE INFRASTRUCTURE DURING CONSTRUCTION ..... | 11        |

### List of Tables

|                                                           |   |
|-----------------------------------------------------------|---|
| Table 1: SuDS Selection Based on the SuDS Hierarchy ..... | 5 |
| Table 2: Site Areas .....                                 | 7 |
| Table 3: Existing Run-off Rates.....                      | 8 |

### List of Appendices

|                                                      |           |
|------------------------------------------------------|-----------|
| <b>APPENDIX A: PROPOSED DEVELOPMENT DETAILS.....</b> | <b>12</b> |
| <b>APPENDIX B: TOPOGRAPHIC SURVEY .....</b>          | <b>13</b> |
| <b>APPENDIX C: SuDS MAINTENANCE REPORT .....</b>     | <b>14</b> |

## **1 INTRODUCTION**

- 1.1.1 Arcelle Consulting was commissioned to undertake a Drainage Assessment for the proposed development of land located at Arthur Street, Barwell.
- 1.1.2 This Drainage Assessment has been produced in support of a planning application and should be read in conjunction with the other planning documents.
- 1.1.3 The development proposal comprises the construction of a new block of residential dwellings and associated external works. Development proposals are provided in Appendix A.
- 1.1.4 The site is less than 1 hectare in size and within flood zone 1, so no flood risk assessment is required.
- 1.1.5 The total site impermeable area is 1100 square metres.
- 1.1.6 Since April 2015, Lead Local Flood Authorities (LLFA's) have become a statutory consultee on surface water drainage for many planning applications. For this site, the following is considered to be the required level of details for planning approval.
  - SuDS: Designs, Maintenance Plans & Calculations - for SuDS proposed, the LLFA require product specifications or design drawings, all supporting calculations and a maintenance plan. This needs to include details of any SuDS structures, and the type of SuDS system in accordance with the CIRIA C753 SuDS Manual.

## **2 Site Description**

2.1.1 The site is located at Arthur St Street, Barwell

2.1.2 The site location information is as follows:

- Nearest Postcode: LE9 8GN

## **2.2 *Topography***

### *Site Topography*

2.2.1 The site is generally rectangular in shape with a gentle fall from rear to front.

### **3 Design principles and policy requirements**

#### **3.1 General Principles for Proposed Site Run-Off**

3.1.1 The DEFRA Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March, 2015) states that the following options must be considered for disposal of surface water runoff in order of preference:

- Discharge to ground
- Discharge to a surface water body
- Discharge to a surface water sewer
- Discharge to a combined sewer

##### ***Discharge to Ground***

3.1.2 The potential for surface water to discharge to ground has been assessed through a review of the geotechnical report.

3.1.3 The geology of the area is silty clay and so not suitable for infiltration due to lack of permeability.

##### ***Discharge to Surface Water Body***

3.1.4 There are no suitable surface water bodies near to the site that can be used for surface water discharge.

##### ***Discharge to Surface Water Sewer/Combined Sewer***

3.1.5 Discharge to the public sewer network should only be considered once all other options for draining surface water from the site have been exhausted.

3.1.6 There is an existing STW sewer in the street which will be used for discharge of surface water. STW have provided approval for this connection. See Appendix A.

#### **3.2 Sustainable Drainage Systems (SuDS)**

3.2.1 To maximise the potential use of SuDS at the site, a review has been undertaken as shown in Table 1 in accordance with the SuDS Hierarchy. This review highlights the components referenced in the SuDS Hierarchy and provides recommendations on whether the components could be incorporated into the development.

***Table 1: SuDS Selection Based on the SuDS Hierarchy***

| <b>Component</b>     | <b>Recommendation</b>                                                                                                                      |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Green (living) roofs | Whilst the use of green roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and |

| Component                | Recommendation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | <p>orientation must be considered. Access to undertake the construction and maintenance easily and safely is also a high priority.</p> <p>If feasible, depending on the roof design, a green roof will provide water quality, biodiversity and aesthetic benefits to the site. Additionally, the green roof/s will offer some attenuation for run-off, reducing volumes of run-off and in higher frequency events (i.e. 1in2 year storms) will result in no run-off for the building.</p> <p>The roof is pitched and so unsuitable for green roofs.</p> |
| Basins and Ponds         | <p>Ponds and attenuation basins can provide overland storage of surface water whilst also providing additional biodiversity and aesthetic/amenity value.</p> <p>There are no open areas on the site which are suitable for basins or ponds.</p>                                                                                                                                                                                                                                                                                                         |
| Filter Strips and Swales | <p>Swales are linear vegetated drainage features, which provide overland conveyance and storage of surface water whilst trapping sediments and hydrocarbons within run-off. They also create biodiverse areas for planting and habitat.</p> <p>Swales are not considered suitable for this site due to the urban setting restricting the availability of space and suitability of swales.</p>                                                                                                                                                           |
| Infiltration Devices     | <p>Tanked permeable paving is proposed for the site.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Permeable Paving         | <p>Whilst incorporating attenuation storage, permeable paving also provides treatment through filtration of silt (and attached pollutants), settlement and retention of solids, adsorption of pollutants and biodegradation of organic pollutants, including petrol and diesel.</p> <p>All external areas will be permeable paving.</p>                                                                                                                                                                                                                 |
| Tanked Systems           | <p>This is the least sustainable option in terms of the SuDS Hierarchy. However, the use of tanked systems would still be of benefit compared to traditional drainage systems as it does allow run-off to be slowed down to an acceptable discharge rate.</p> <p>There are no tanks proposed for the site</p>                                                                                                                                                                                                                                           |

## 4 Surface Water Drainage Design

### 4.1 *Existing Site Runoff*

4.1.1 The proposed areas are summarised below.

**Table 2: Site Areas**

| Parameter        | Proposed (m2) | Proposed (%) |
|------------------|---------------|--------------|
| Impermeable area | 1100          | 100          |
| Permeable area   | 0             | 0            |
| Total area       | 1100          | 100          |

### 4.2 *Design Considerations*

4.2.1 Consideration has been given to the following when calculating the proposed impermeable areas.

- The 2013 EA 'Rainfall Run-off Management for Developments' Report (SC030219) states that urban creep, the process of gradually increasing impermeable area within an urban area (through paving soft landscaped surfaces and constructed outbuildings etc), is an acknowledged issue. To include an allowance for urban creep, the impermeable area used in the drainage calculations would normally be increased by 10% in accordance with the recommendation made in SC030219. However, as the entire site is impermeable there can be no increase above 100%.

4.2.2 The climate change allowance used in the Drainage Strategy is in line with updated EA guidance values published in February 2016 for increased rainfall intensities by 2115.

### 4.3 *Existing Run-Off Rates*

4.3.1 The existing run-off rates for a variety of return periods have been calculated using the Wallingford method.

4.3.2 The total site area is 1100 square metres and is 100% impermeable resulting in an impermeable area of 459 square metres. Taking conservative peak 1 year, 30 year and 100-year rainfall rates of 50mm/hr, 125mm/hr and 185mm/hr respectively, the maximum existing peak discharge rates have been calculated as follows.

Contributing Area (ha) x 1 yr Rainfall (mm/hr) x 2.78

1100/1000 x 50 x 2.78 = **15.3 l/s**

Contributing Area (ha) x 30 yr Rainfall (mm/hr) x 2.78

1100/1000 x 125 x 2.78 = **38.2 l/s**

Contributing Area (ha) x 100yr Rainfall (mm/hr) x 2.78

1100/1000 x 185 x 2.78 = **56.6 l/s**

- 4.3.3 The discharge rates for the existing and proposed site are summarised below.

**Table 3: Existing Run-off Rates**

| Parameter     | Existing Discharge (l/s) | Proposed Discharge (l/s) |
|---------------|--------------------------|--------------------------|
| QBAR          | NA                       | NA                       |
| 1 year        | 15.3                     | 4.4                      |
| 30 year       | 38.2                     | 7.0                      |
| 100 year      | 56.6                     | 7.3                      |
| 100 year +40% | NA                       | 7.5                      |

#### **4.4 Drainage Design**

- 4.4.1 The proposed strategy aims to restrict surface water discharge to 50% of the existing 1-year discharge rate in accordance with the Local Authority Requirements and best practice.
- 4.4.2 The calculations include an assessment of the attenuation for the 100-year storm +40% climate change.
- 4.4.3 A total attenuation volume of approximately 50 cubic metres is proposed within the permeable paving subbase to cater for the 100 year +40% storm event.

#### **4.5 Consents, Offsite Works and Diversions**

- 4.5.1 The proposed surface water drainage strategy is accommodated mostly on-site, with the only requirement for off-site works being the connections to the Severn Trent Water sewer should they be required.

#### **4.6 Maintenance**

- 4.6.1 A SuDS maintenance plan has been prepared to outline the management of the potential SuDS features. The maintenance plan is provided in Appendix C.

## **5 Foul Drainage**

### **5.1 *Discharge to Public Sewer Network***

5.1.1 Severn Trent Water are the foul sewerage suppliers for the area.

5.1.2 The identified point of connection from the site is into the public foul sewer network in the street. A Sewer connection application will be submitted to Severn Trent Water for approval.

## **6 Drainage during construction**

### **6.1 Construction Run-off Management**

6.1.1 Installing the surface water and foul drainage system, whilst managing temporary run-off, are key aspects of the construction works involved in any development. The information provided below is in accordance with the 'C698 Site handbook for the construction of SUDS' (CIRIA, 2007).

6.1.2 Please note that the measures recommended below are recommendations only and need to be confirmed at the construction stage by the client and the contractor.

### **6.2 Management of Construction (Including Drainage)**

6.2.1 Drainage is typically an early activity in the construction stage of a development, taking form during the earthworks phase. However, final construction i.e. piped drainage system connections to the SuDS devices, should not take place until the end of site development work, unless a robust strategy for silt-removal is implemented prior to occupation of the site.

6.2.2 A plan for the management of construction (including phasing of works, details of any offsite works etc.) cannot be provided at this early stage, as construction work plans are not yet known. However, the following key points are general construction issues associated with SuDS which will be addressed when these plans are complete:

- Silt-laden waters from construction sites represent a common form of waterborne pollution;
- These silt-laden waters cannot enter SUDS drainage systems unless specifically designed to accept this as it can clog the systems and pollute receiving waters. Therefore, piped drainage systems should not be connected to the attenuation SuDS devices until the late stages of construction.
- Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to the attenuation SuDS devices.

### **6.3 Temporary Drainage During Construction**

6.3.1 The three principal aspects of drainage control during construction are trapping sediment, conveying run-off, and controlling run-off.

6.3.2 Sediment traps and barriers can include basin traps and sediment fences (with any necessary boundary controls). The principal basins are to be installed after the construction site is accessed. Sediment fences and barriers will then be installed as needed during grading.

6.3.3 Conveyance of run-off can be achieved through small ditches/stream, storm drains, channels and sloped drains with sufficient inlet/outlet protection.

6.3.4 Slope stability needs to be considered when using any channels to convey run-off across the site into any basins etc.

6.3.5 Run-off control measures will need to be implemented in order not overwhelm the temporary system and cause flooding issues. Run-off rates

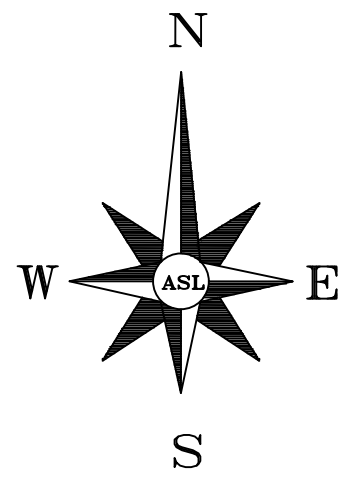
from the site will be managed so they are no greater than pre-development or in keeping with the best practice guidance to minimise risk of blockage. Any additional conveyance measures are to be installed as needed during grading.

- 6.3.6 Run-off control to include provision of perimeter ditches or appropriate levels grading to direct any water from the construction site to remain on site.
- 6.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 6.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

#### **6.4      *Protection of Drainage Infrastructure during Construction***

- 6.4.1 All drainage infrastructure should be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers, and storing construction materials away from the drainage infrastructure.

## **Appendix A: Proposed Development Details**



CONNECT COMBINED SEWER TO FOUL SEWER IN STREET

EXISTING CONNECTION TO  
EXISTING STW SEWER TO STW  
APPROVAL (IL 126.60 TBC)

NODE 1

NODE 2

NODE 3

NODE 4

NODE 5

NODE 6

NODE 7

NODE 8

NODE 9

NODE 10

NODE 11

NODE 12

NODE 13

NODE 14

NODE 15

NODE 16

NODE 17

NODE 18

NODE 19

NODE 20

NODE 21

NODE 22

NODE 23

NODE 24

NODE 25

NODE 26

NODE 27

NODE 28

NODE 29

NODE 30

NODE 31

NODE 32

NODE 33

NODE 34

NODE 35

NODE 36

NODE 37

NODE 38

NODE 39

NODE 40

NODE 41

NODE 42

NODE 43

NODE 44

NODE 45

NODE 46

NODE 47

NODE 48

NODE 49

NODE 50

NODE 51

NODE 52

NODE 53

NODE 54

NODE 55

NODE 56

NODE 57

NODE 58

NODE 59

NODE 60

NODE 61

NODE 62

NODE 63

NODE 64

NODE 65

NODE 66

NODE 67

NODE 68

NODE 69

NODE 70

NODE 71

NODE 72

NODE 73

NODE 74

NODE 75

NODE 76

NODE 77

NODE 78

NODE 79

NODE 80

NODE 81

NODE 82

NODE 83

NODE 84

NODE 85

NODE 86

NODE 87

NODE 88

NODE 89

NODE 90

NODE 91

NODE 92

NODE 93

NODE 94

NODE 95

NODE 96

NODE 97

NODE 98

NODE 99

NODE 100

NODE 101

NODE 102

NODE 103

NODE 104

NODE 105

NODE 106

NODE 107

NODE 108

NODE 109

NODE 110

NODE 111

NODE 112

NODE 113

NODE 114

NODE 115

NODE 116

NODE 117

NODE 118

NODE 119

NODE 120

NODE 121

NODE 122

NODE 123

NODE 124

NODE 125

NODE 126

NODE 127

NODE 128

NODE 129

NODE 130

NODE 131

NODE 132

NODE 133

NODE 134

NODE 135

NODE 136

NODE 137

NODE 138

NODE 139

NODE 140

NODE 141

NODE 142

NODE 143

NODE 144

NODE 145

NODE 146

NODE 147

NODE 148

NODE 149

NODE 150

NODE 151

NODE 152

NODE 153

NODE 154

NODE 155

NODE 156

NODE 157

NODE 158

NODE 159

NODE 160

NODE 161

NODE 162

NODE 163

NODE 164

NODE 165

NODE 166

NODE 167

NODE 168

NODE 169

NODE 170

NODE 171

NODE 172

NODE 173

NODE 174

NODE 175

NODE 176

NODE 177

NODE 178

NODE 179

NODE 180

NODE 181

NODE 182

NODE 183

NODE 184

NODE 185

NODE 186

NODE 187

NODE 188

NODE 189

NODE 190

NODE 191

NODE 192

NODE 193

NODE 194

NODE 195

NODE 196

NODE 197

NODE 198

NODE 199

NODE 200

NODE 201

NODE 202

NODE 203

NODE 204

NODE 205

NODE 206

NODE 207

NODE 208

NODE 209

NODE 210

NODE 211

NODE 212

NODE 213

NODE 214

NODE 215

NODE 216

NODE 217

NODE 218

NODE 219

NODE 220

NODE 221

NODE 222

NODE 223

NODE 224

NODE 225

NODE 226

NODE 227

NODE 228

NODE 229

NODE 230

NODE 231

NODE 232

NODE 233

NODE 234

NODE 235

NODE 236

NODE 237

NODE 238

NODE 239

NODE 240

NODE 241

NODE 242

NODE 243

NODE 244

NODE 245

NODE 246

NODE 247

NODE 248

NODE 249

NODE 250

NODE 251

NODE 252

NODE 253

NODE 254

NODE 255

NODE 256

NODE 257

NODE 258

NODE 259

NODE 260

NODE 261

NODE 262

NODE 263

NODE 264

NODE 265

NODE 266

NODE 267

NODE 268

NODE 269

NODE 270

NODE 271

NODE 272

NODE 273

NODE 274

NODE 275

NODE 276

NODE 277

NODE 278

NODE 279

NODE 280

NODE 281

NODE 282

NODE 283

NODE 284

NODE 285

NODE 286

NODE 287

NODE 288

NODE 289

NODE 290

NODE 291

NODE 292

NODE 293

NODE 294

NODE 295

NODE 296

NODE 297

NODE 298

NODE 299

NODE 300

NODE 301

NODE 302

NODE 303

NODE 304

NODE 305

NODE 306

NODE 307

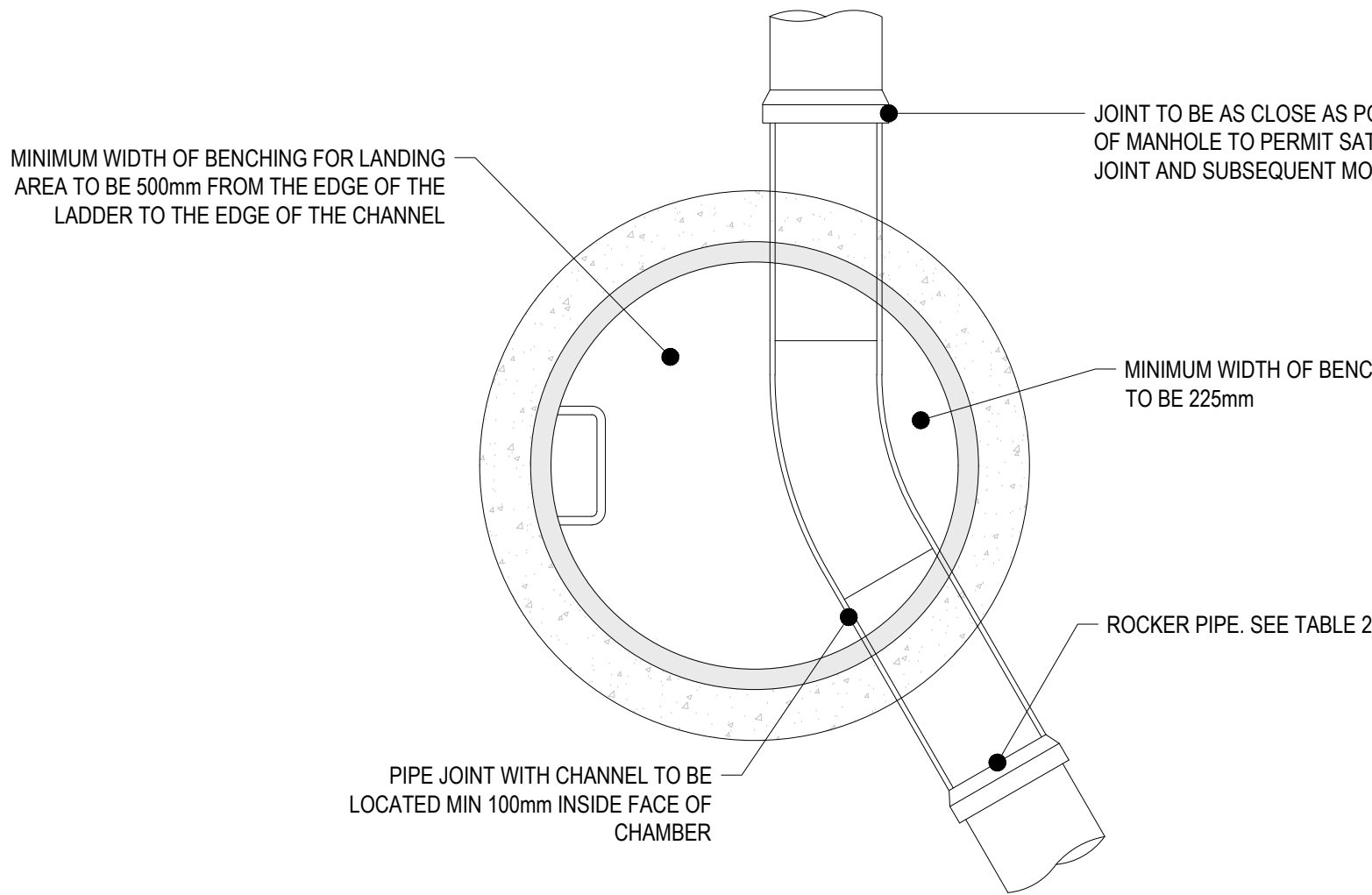
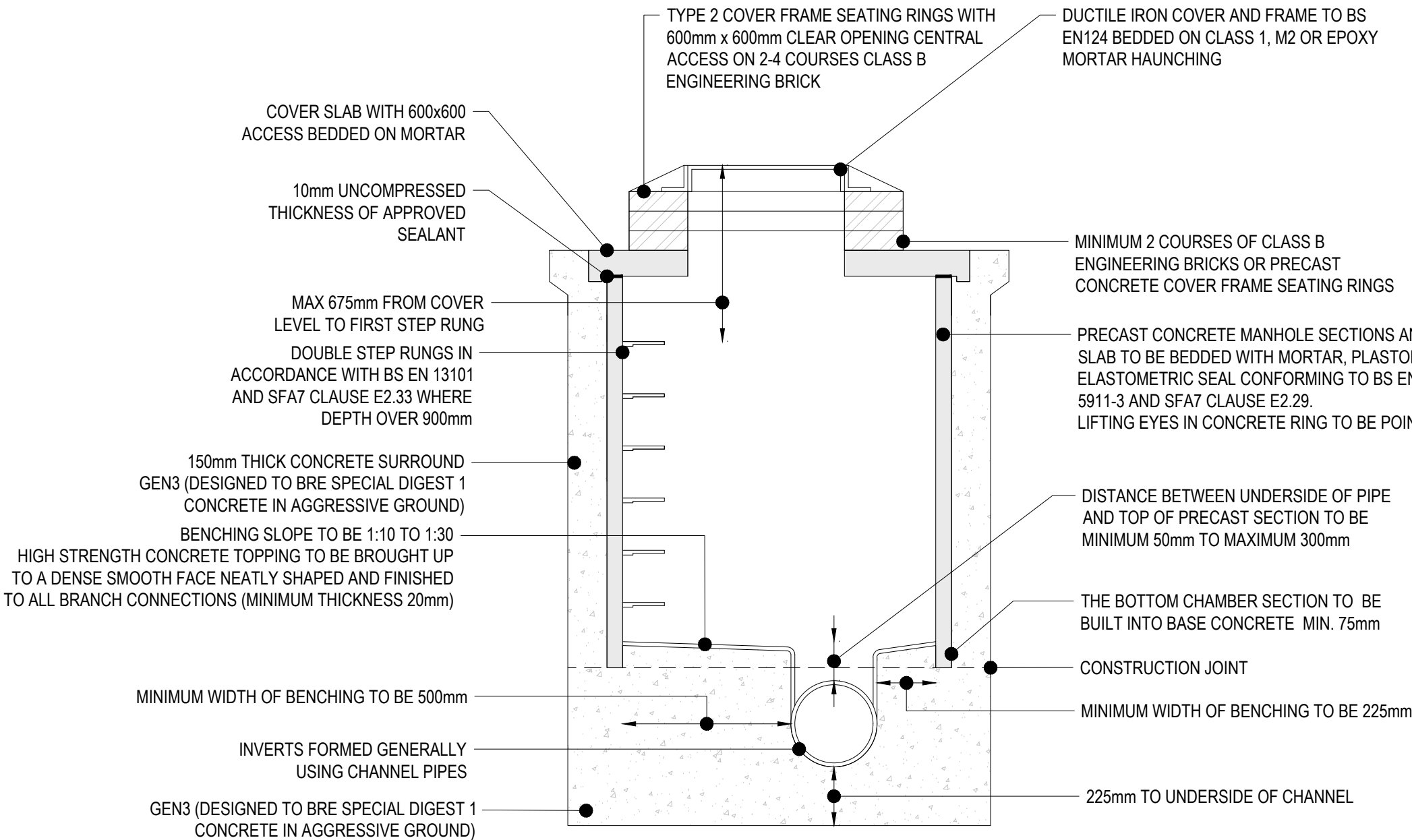
NODE 308

NODE 309

NODE 310

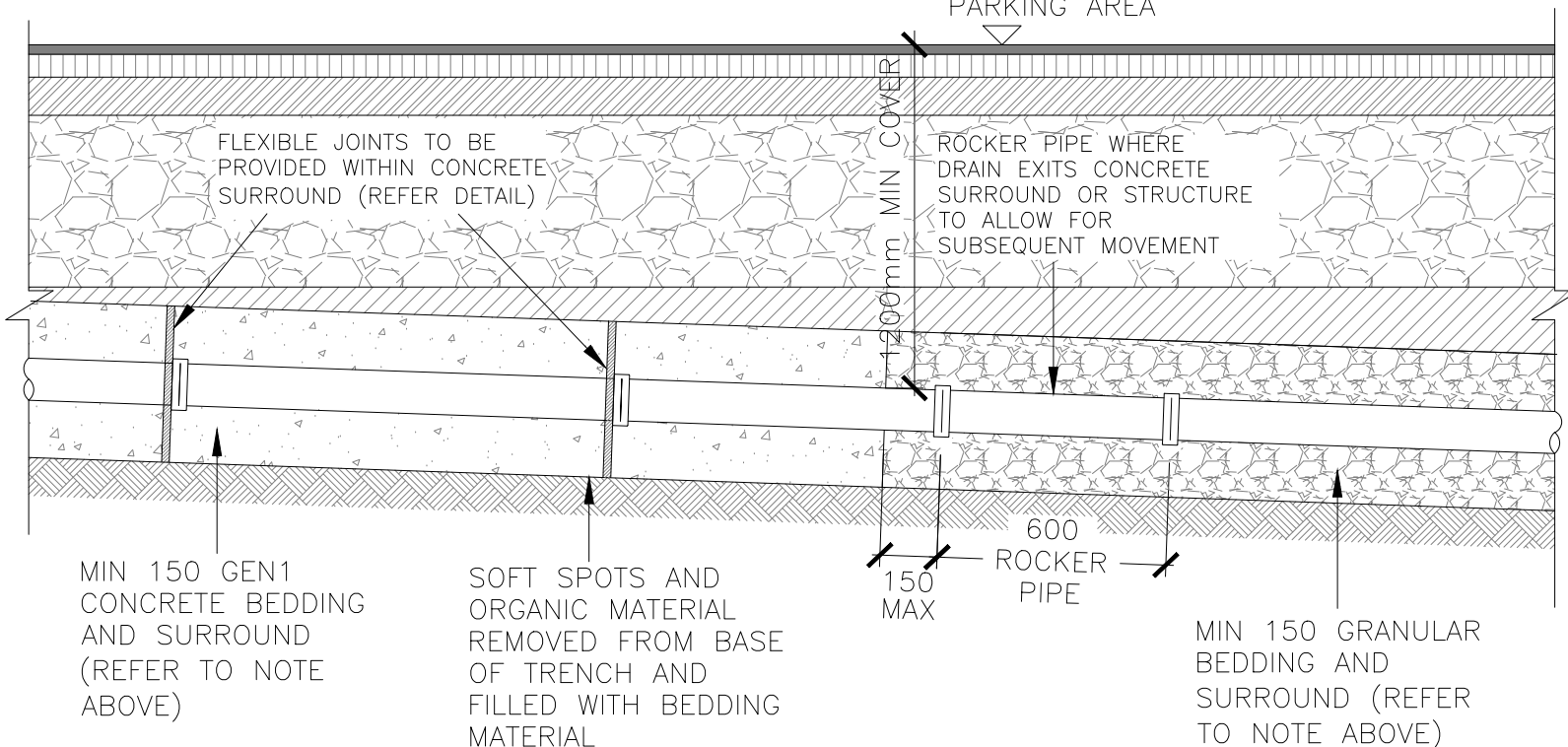
NODE 311

NODE



TYPICAL PCC MANHOLE DETAIL  
DEPTH TO PIPE SOFFIT LESS THAN 1.5m  
SCALE 1:20

NOTE: A 150mm GEN1 CONCRETE SURROUND SHALL BE USED ON ALL PIPE WORK PASSING BELOW GROUND BEARING FOUNDATIONS (I.E. STRIP FOOTINGS FOR LANDSCAPING WALLS / PLANTERS). 150mm GEN1 CONCRETE SURROUND SHALL BE USED ON ALL PIPE WORK (EXCEPT LAND DRAINS) WHICH ARE LESS THAN 1200mm BELOW TRAFFICABLE PAVED AREAS AND LESS THAN 600mm IN ALL OTHER EXTERNAL AREAS. ALL PIPEWORK WITHIN BUILDING FOOTPRINT TO BE BEDDED ON GEN1 CONCRETE TO A DEPTH OF AT LEAST HALF THE PIPE DIAMETER

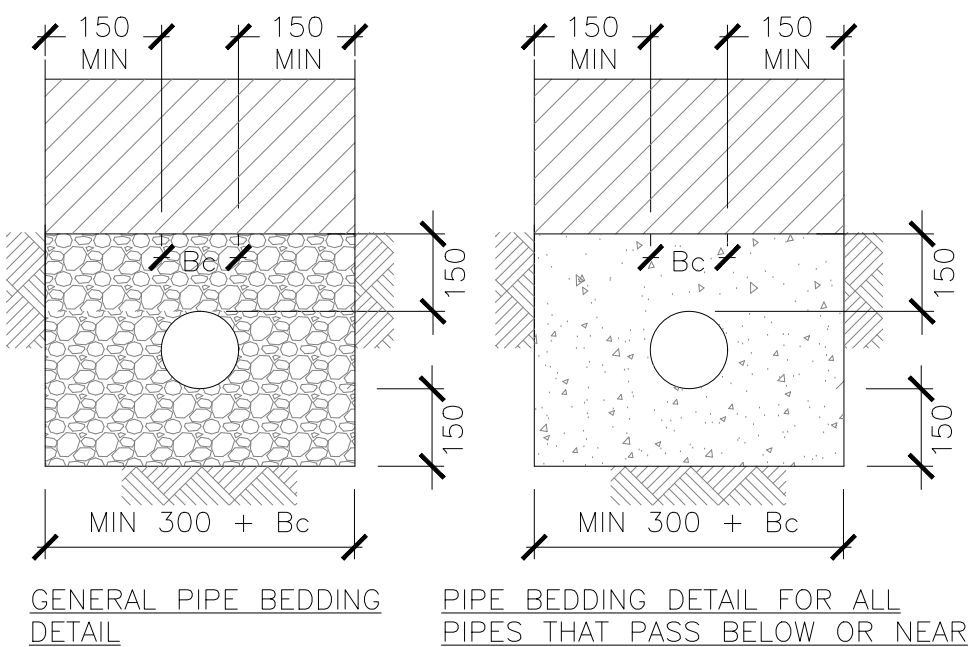


PIPE BEDDING  
SCALE 1:20

NOTES:  
CHAMBERS WITH OUTGOING PIPES GREATER THAN 500mm DIAMETER SHALL BE FITTED WITH GUARD BARS, SAFETY CHAINS OR OTHER SAFETY DEVICES. TOE HOLES TO BE PROVIDED IN BENCHING OF SEWERS GREATER THAN 450mm DIAMETER FOR ACCESS TO INVERT. WHERE INTERNAL HEIGHT EXCEEDS 1800mm MANHOLE MAY BE PROVIDED WITH REDUCING COVER AND SHAFT. SHAFT DIAMETER TO BE 600mm DIAMETER OR 900mm DIAMETER IF LONGER THAN 900mm.

| PIPE DIAMETER | ROCKER PIPE * LENGTH |
|---------------|----------------------|
| 150mm-450mm   | 500mm-750mm          |
| 475mm-750mm   | 750mm-1000mm         |
| OVER 750mm    | 1200mm               |

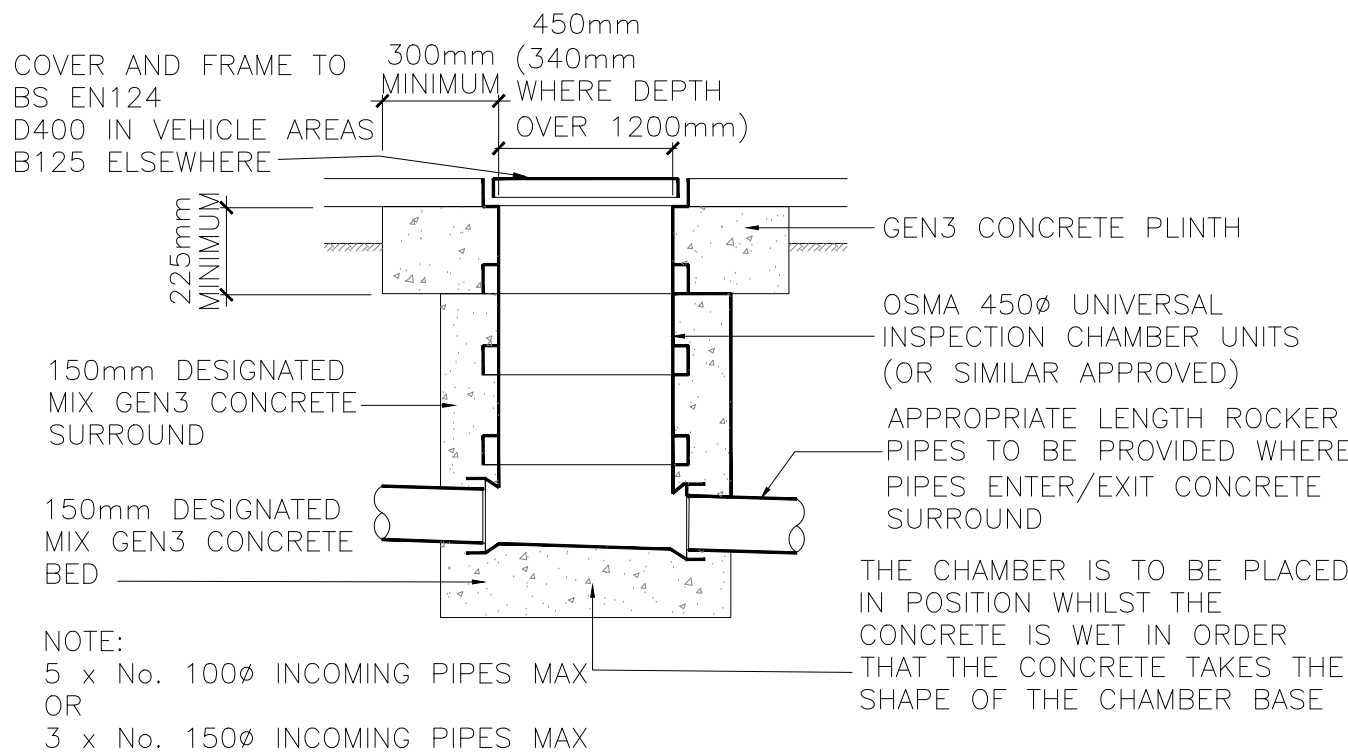
\* OR LINTEL AND COMPRESSIBLE SEALANT IN ACCORDANCE WITH CLAUSE 689 OF THE SPECIFICATION.



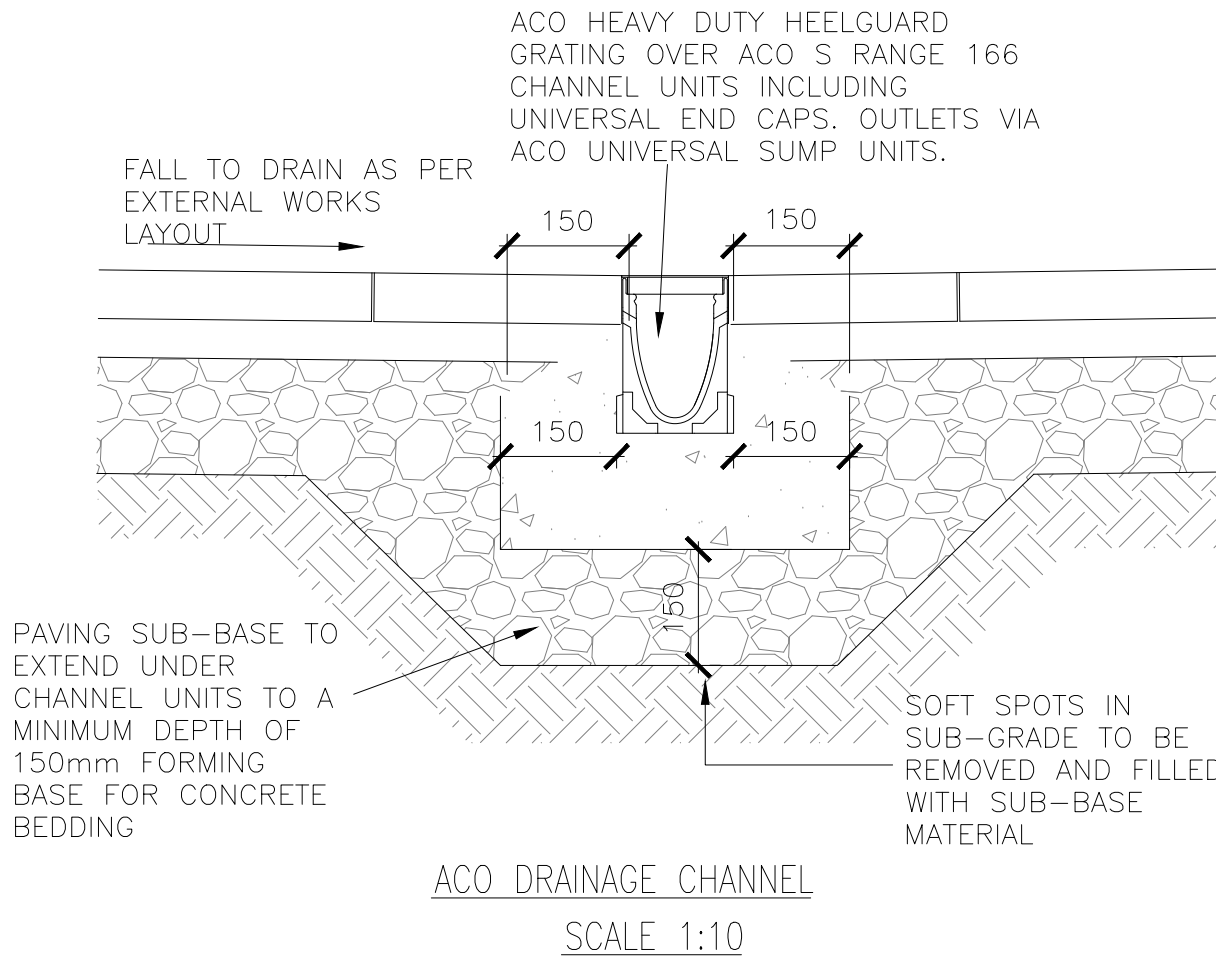
- SELECTED FILL: FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL, VEGETABLE MATTER.
- GRANULAR MATERIAL: TO CONFORM TO BS EN 1610 ANNEX B TABLE B.15 AND SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5mm UP TO A MAXIMUM SIZE OF 10mm FOR 100mm PIPES, 14mm FOR 150mm PIPES, 20mm FOR PIPES FROM 150mm UP TO 600mm DIAMETER AND 40mm FOR PIPES MORE THAN 600mm DIAMETER.
- GEN1 CONCRETE IN ACCORDANCE WITH BS 8500-1:2002.

NOTE:  
PIPES LESS THAN 1200mm BELOW ROADS AND LESS THAN 600mm BELOW OTHER EXTERNAL AREAS SHALL HAVE A 150mm GEN1 CONCRETE SURROUND. OTHER THAN PIPES CAST WITHIN PILECAPS ALL PIPES BELOW SUSPENDED SLAB SHALL HAVE GRANULAR SURROUND AS SHOWN.

PIPE BEDDING DETAIL  
SCALE 1:10



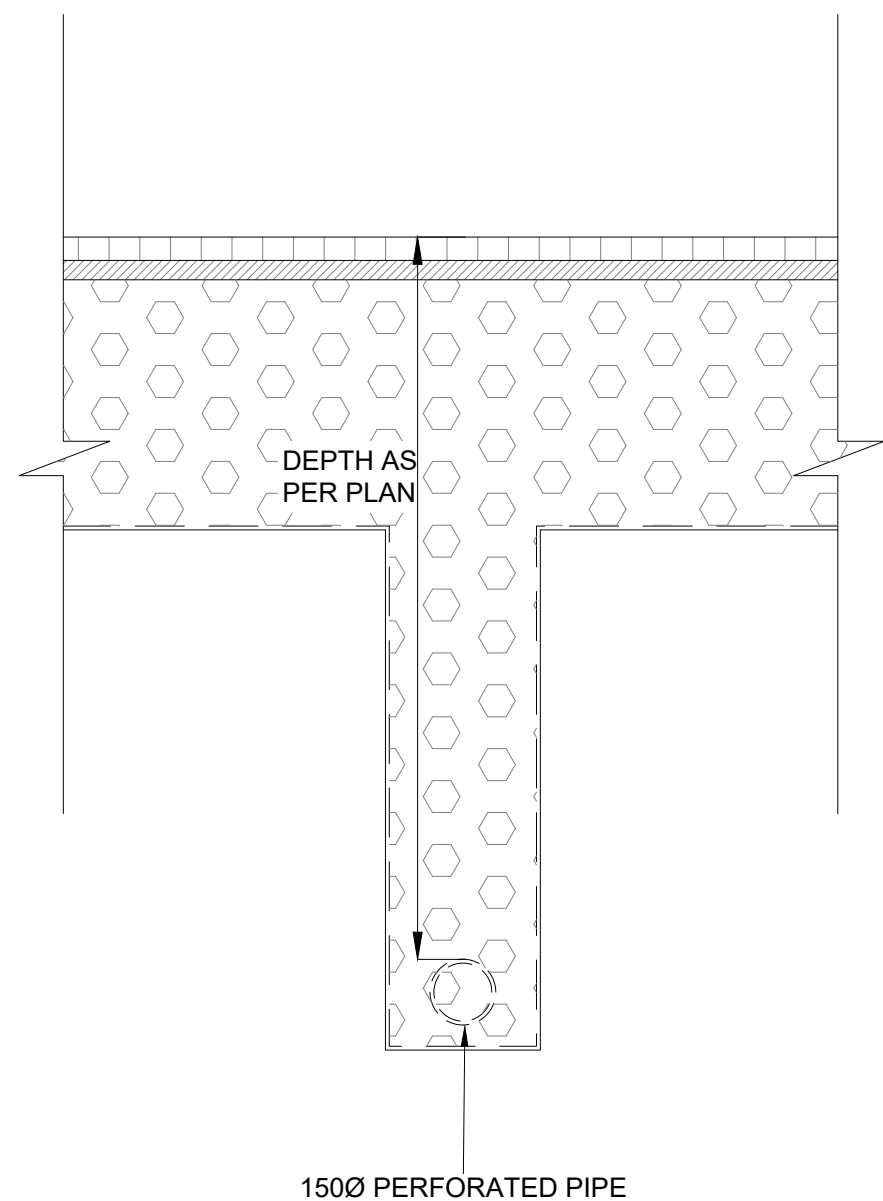
EXTERNAL POLYPROPYLENE INSPECTION CHAMBER (PPIC)  
MAXIMUM DEPTH TO INVERT OF CHAMBER TO BE 1200mm (3000mm FOR REDUCED ACCESS)  
CUT TO INTERMEDIATE SIZES  
SCALE 1:20



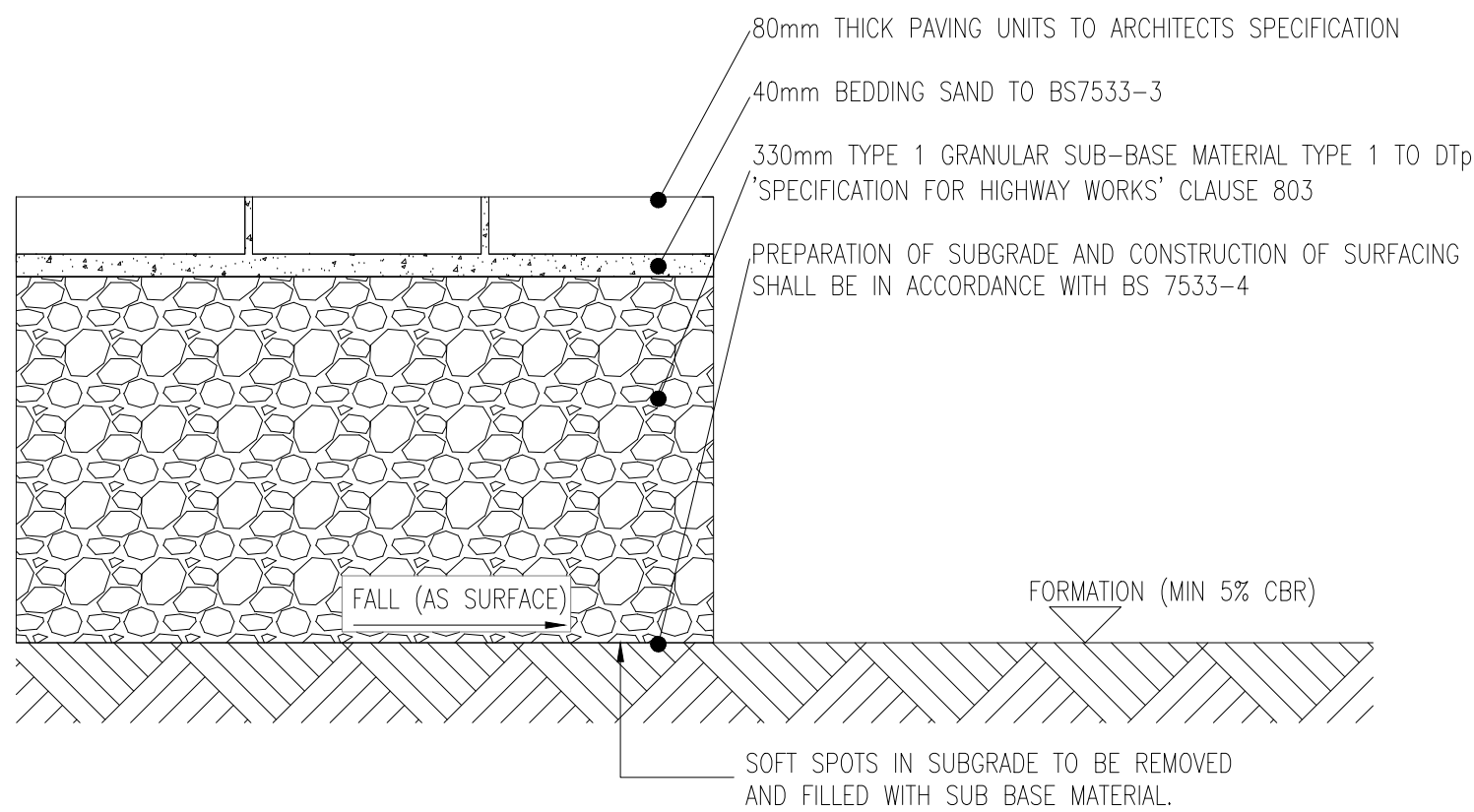
#### Notes

- This drawing is to be read in conjunction with all relevant series design drawings, specifications and documentation.
- Construction to be in accordance with all British and European standards and building regulations.
- All dimensions are in millimetres and levels in metres above local datum.
- Any discrepancies in the details shown are to be reported to the employer's representative/engineer prior to construction
- all existing services are to be located prior to the commencement of any works. the contractor must notify the engineer immediately of any conflict with the proposed works.
- For gravity sewers, all drainage and fittings are to be flexibly jointed UPVC to BSEN 1401-1 or clayware to BSEN 295 or concrete to BS5911 part 100
- Chamber walls 225 thick to be constructed in class B engineering bricks to SHW series 2400 in designation (i) mortar or in-situ strength class C16/20 concrete to clause 2602
- Chamber walls and cover slab to be constructed in precast concrete to BSEN 1917 and BS 5911-3.
- Concrete mixes indicated on this drawing are designated mixes in accordance with BS8500-1:2006. all concrete to be sulphate resistant
- Backfill to all trenches under carriageways to be type 1 sub-base material, elsewhere backfill to be in accordance with the specification, free draining readily compactable material, free from rubbish and organic matter, frozen soil clay lumps and large stones. to be compacted in layers not exceeding 150mm thick.
- A flexible joint shall be provided as close as is feasible to outside face of any structure into which a pipe is built, in accordance with the detail.
- The general specification of materials and workmanships for the construction of the access road, footpaths and other areas of hardstanding shall be the manual of contract documents for highway works, volume 1. specification of highway works (SHW) published by the stationary office.
- All pipes to be laid soffit to soffit unless noted otherwise.
- Manhole covers and frames shall comply with BSEN124 and shall be of a non-rocking design which does not rely on the use of cushion inserts. class D covers shall be used in carriageways, hard shoulders and parking areas used by all type of road vehicles. class C shall be used in footways, pedestrian areas and all comparable locations.

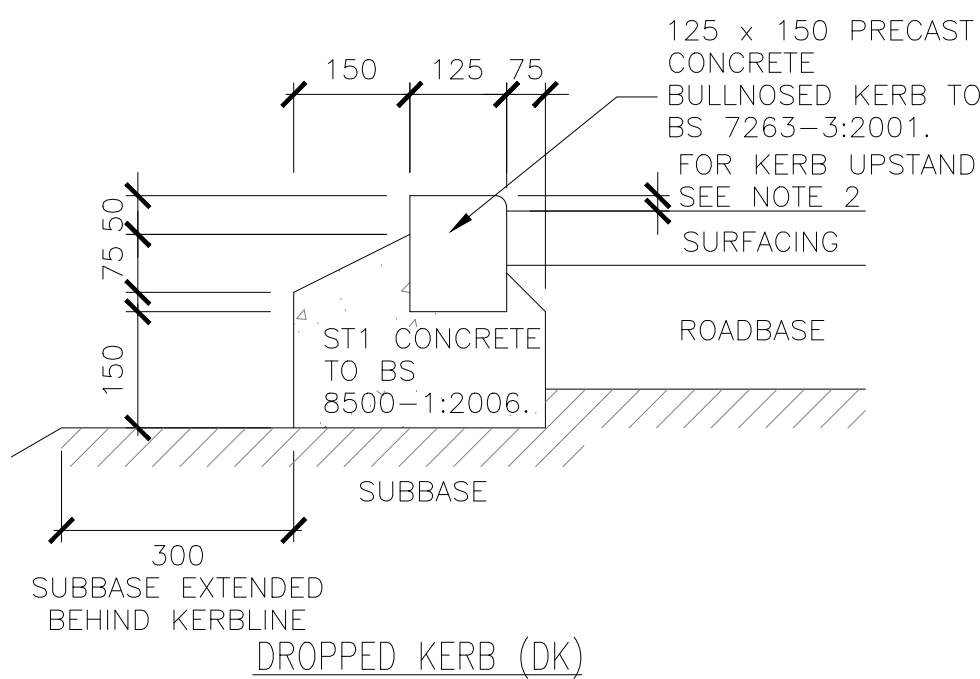
|                                                  |             |                                |                 |
|--------------------------------------------------|-------------|--------------------------------|-----------------|
|                                                  |             |                                |                 |
| A                                                | Tender      | AW<br>03/11/21                 | AW<br>03/11/21  |
| Rev                                              | Description | Drawn<br>Date                  | Checked<br>Date |
| Drawn By                                         | AW          | Checked By                     | AW              |
| Date                                             | 27.07.21    | Date                           | 27.07.21        |
| Base drawing scale As shown                      |             |                                |                 |
| Client                                           |             | NIGEL DUTTON                   |                 |
| Project                                          |             | ARTHUR ST BARWELL<br>LEICESTER |                 |
| Title                                            |             | CONSTRUCTION DETAILS 1 OF 2    |                 |
| arcelle Consulting                               |             |                                |                 |
| T: 0116 254 5058 E: info@arcelleconsulting.co.uk |             |                                |                 |
| Leicester Office                                 |             |                                |                 |
| 18 De Montfort Street Leicester LE1 7GL          |             |                                |                 |
| London Office                                    |             |                                |                 |
| 49 Constable House Adelaide Road London NW3 3QA  |             |                                |                 |
| Architect                                        |             |                                | Status          |
| -                                                |             |                                | Preliminary     |
| Drawing No.                                      |             |                                | Tender          |
| 2017-C02                                         |             |                                | Construction    |
| Revision                                         | A           |                                | As Built        |



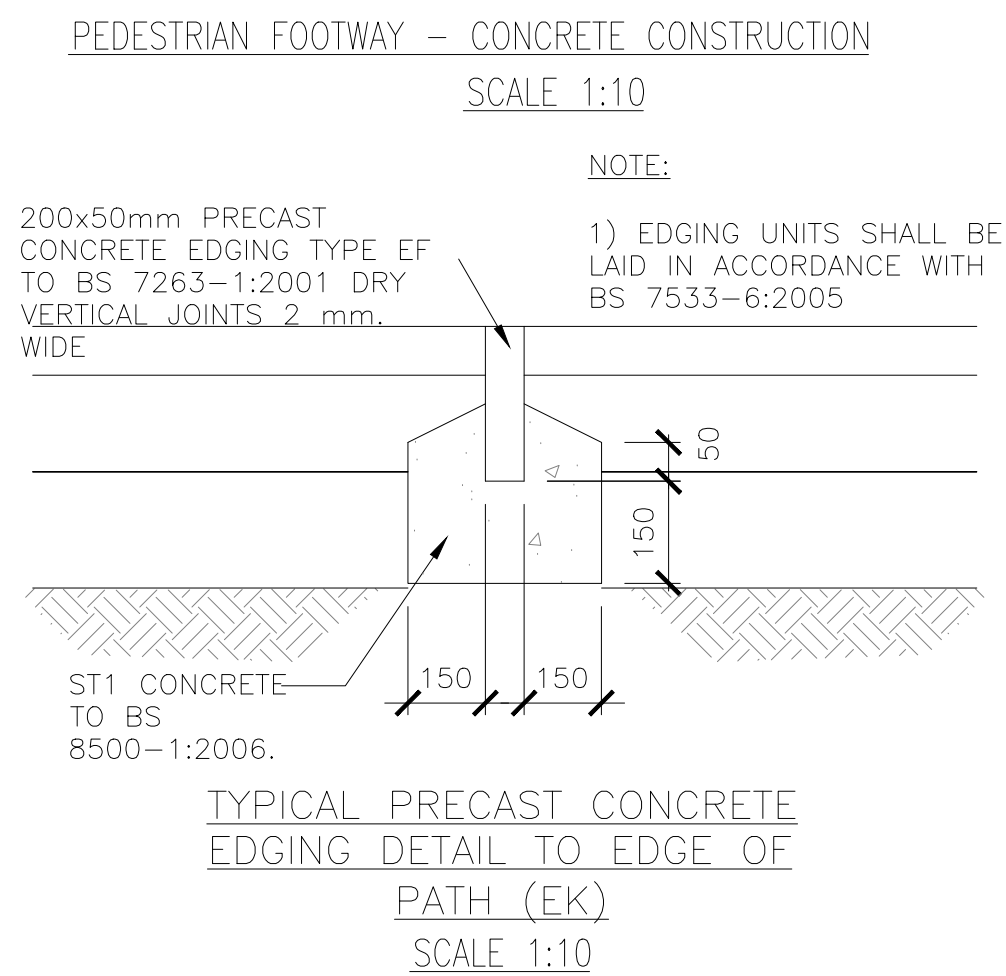
SECTION A-A



DRIVEWAY - BLOCK PAVING CONSTRUCTION  
SCALE 1:10



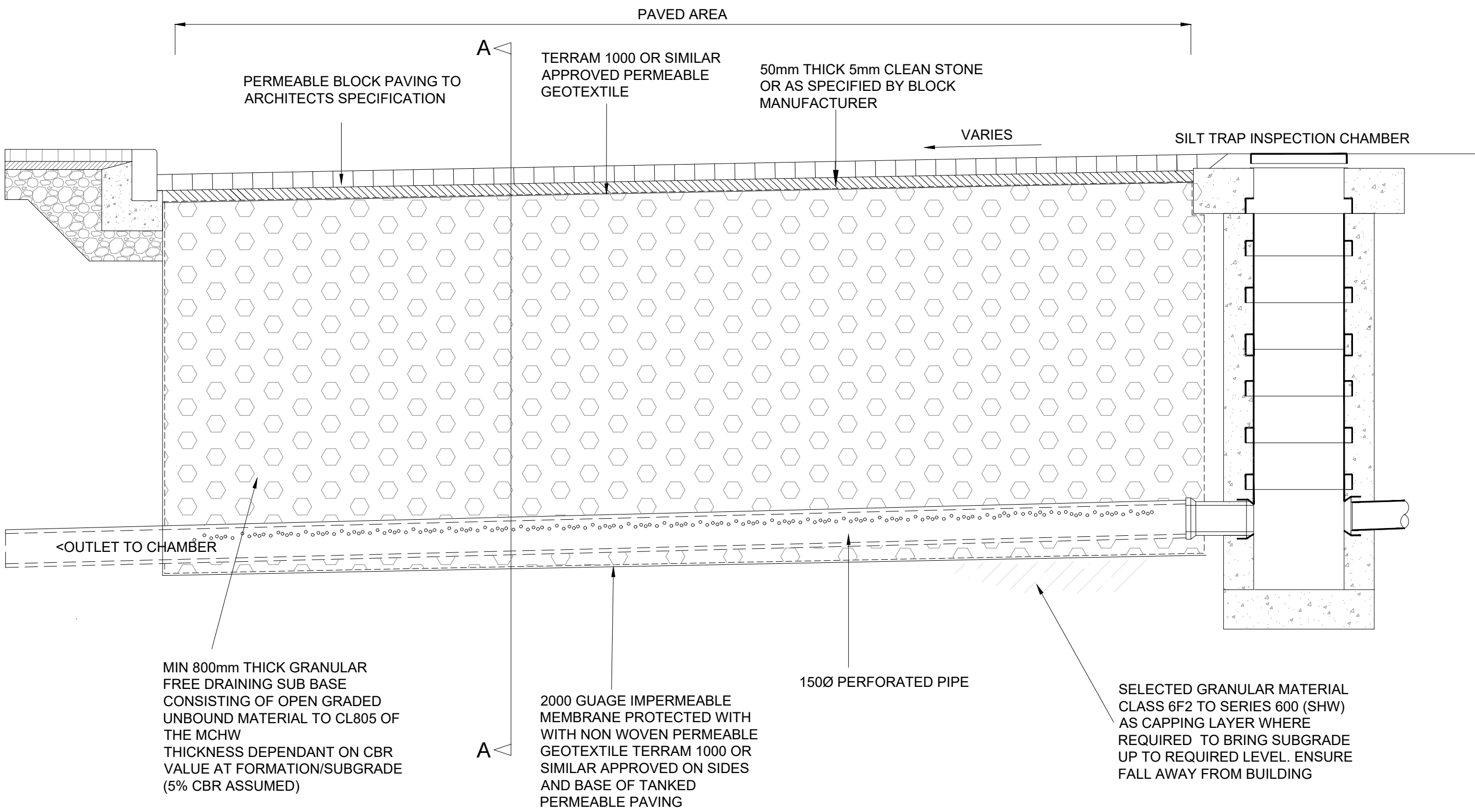
TYPICAL CONCRETE KERB DETAILS  
SCALE 1:10



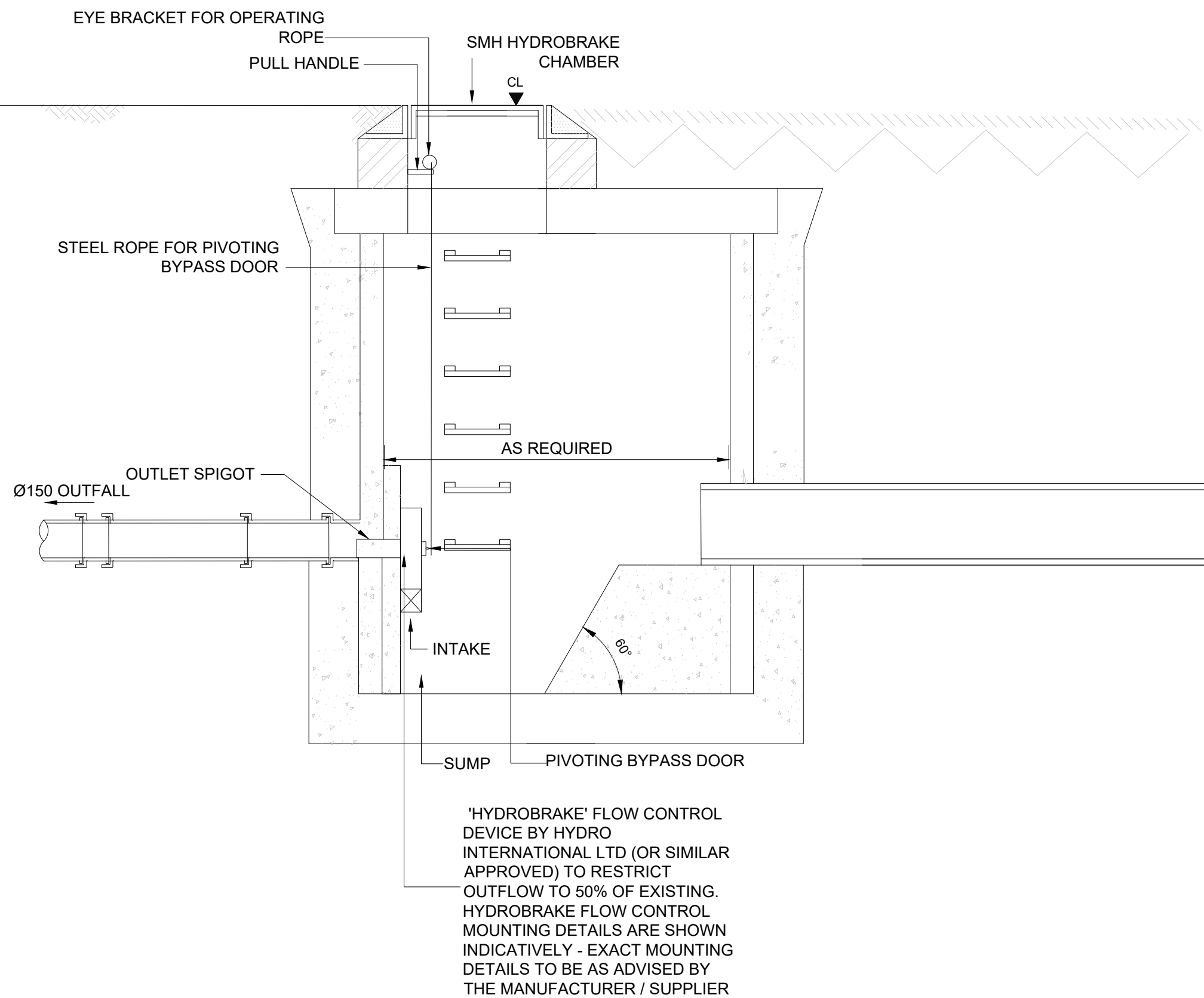
TYPICAL PRECAST CONCRETE  
EDGING DETAIL TO EDGE OF  
PATH (EK)  
SCALE 1:10

NOTES:

- WHERE FOOTWAY IS ADJACENT TO THE CARRIAGEWAY THE UPSTAND SHALL GENERALLY BE 125mm UNLESS SHOWN OTHERWISE (EXCEPT AT DROPPED CROSSINGS AND RAISED TABLES).
- AT DROPPED KERB VEHICULAR CROSSINGS USED BY PEDESTRIANS, OR CYCLISTS THE UPSTAND SHOULD BE 0-6mm.



TANKED PERMEABLE PAVING DETAIL WITH SILT TRAP MANHOLE  
SCALE 1:20

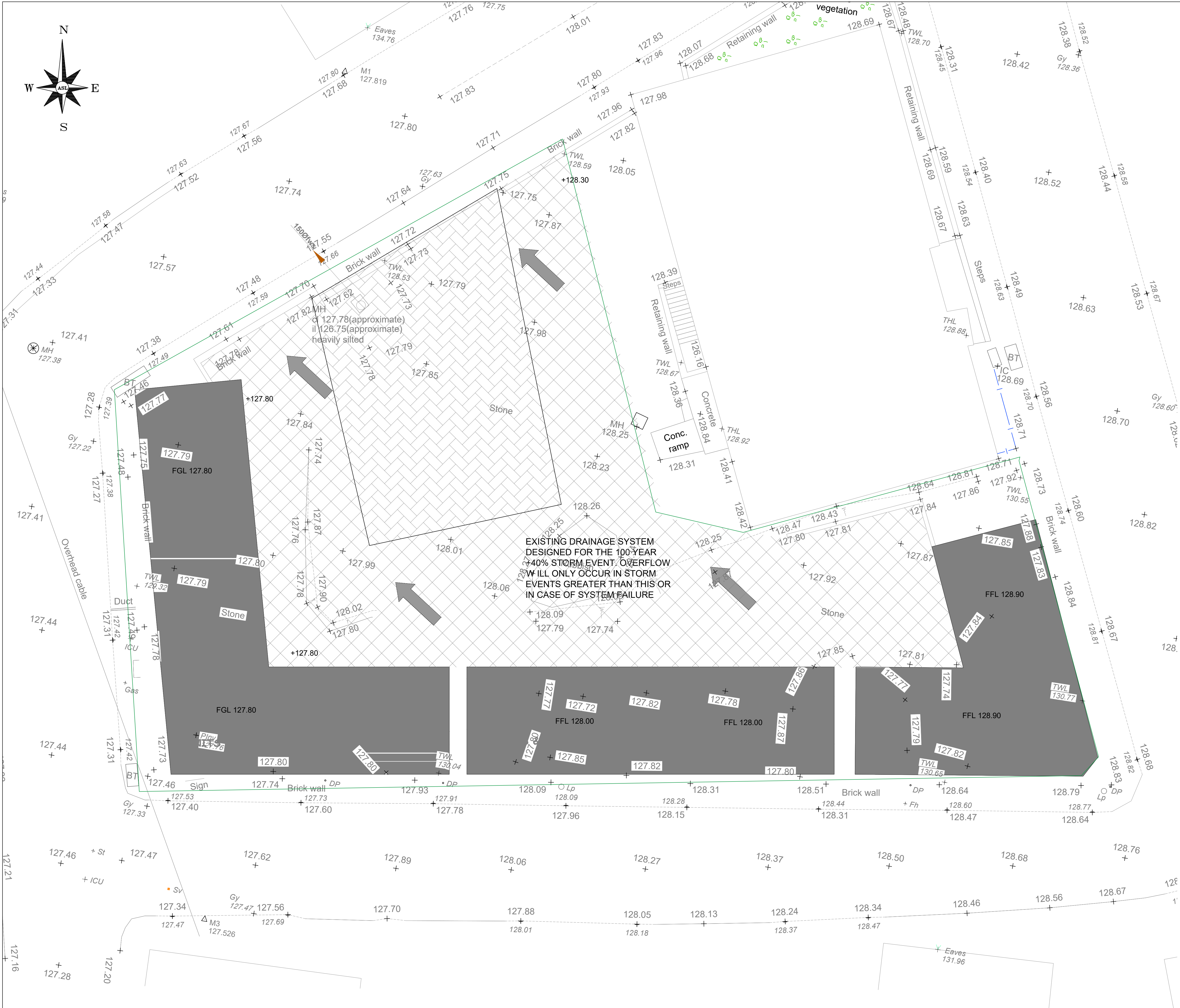


TYPICAL SECTION THROUGH STORM  
HYDROBRAKE FLOW CONTROL  
SCALE 1:20

Notes

- This drawing is to be read in conjunction with all relevant series design drawings, specifications and documentation.
- Construction to be in accordance with all British and European standards and building regulations.
- All dimensions are in millimetres and levels in metres above local datum.
- Any discrepancies in the details shown are to be reported to the employer's representative/engineer prior to construction
- all existing services are to be located prior to the commencement of any works. the contractor must notify the engineer immediately of any conflict with the proposed works.
- For gravity sewers, all drainage and fittings are to be flexibly jointed UPVC to BSEN 1401-1 or clayware to BSEN 295 or concrete to BS5911 part 100
- Chamber walls 225 thick to be constructed in class B engineering bricks to SHW series 2400 in designation (i) mortar or in-situ strength class C16/20 concrete to clause 2602
- Chamber walls and cover slab to be constructed in precast concrete to BSEN 1917 and BS 5911-3.
- Concrete mixes indicated on this drawing are designated mixes in accordance with BS8500-1:2006. all concrete to be sulphate resistant
- Backfill to all trenches under carriageways to be type 1 sub-base material, elsewhere backfill to be in accordance with the specification, free draining readily compactable material, free from rubbish and organic matter, frozen soil clay lumps and large stones. to be compacted in layers not exceeding 150mm thick.
- A flexible joint shall be provided as close as is feasible to outside face of any structure into which a pipe is built, in accordance with the detail.
- The general specification of materials and workmanships for the construction of the access road, footpaths and other areas of hardstanding shall be the manual of contract documents for highway works, volume 1. specification of highway works (SHW) published by the stationary office.
- All pipes to be laid soffit to soffit unless noted otherwise.
- Manhole covers and frames shall comply with BSEN124 and shall be of a non-rocking design which does not rely on the use of cushion inserts. class D covers shall be used in carriageways, hard shoulders and parking areas used by all type of road vehicles. class C shall be used in footways, pedestrian areas and all comparable locations.

|                                                                                                                                                                                                           |             |              |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|--------------|
|                                                                                                                                                                                                           |             |              |              |
| A                                                                                                                                                                                                         | Tender      | AW 03/11/21  | AW 03/11/21  |
| Rev                                                                                                                                                                                                       | Description | Drawn Date   | Checked Date |
| Drawn By                                                                                                                                                                                                  | AW          | Checked By   | AW           |
| Date                                                                                                                                                                                                      | 27.07.21    | Date         | 27.07.21     |
| Approved By                                                                                                                                                                                               | AW          | Date         | 27.07.21     |
| Base drawing scale As shown                                                                                                                                                                               |             |              |              |
| Client<br>NIGEL DUTTON                                                                                                                                                                                    |             |              |              |
| Project<br>ARTHUR ST BARWELL<br>LEICESTER                                                                                                                                                                 |             |              |              |
| Title<br>CONSTRUCTION DETAILS 2 OF 2                                                                                                                                                                      |             |              |              |
| arcelle Consulting<br>T: 0116 254 5058 E: info@arcelleconsulting.co.uk<br>Leicester Office<br>18 De Montfort Street Leicester LE1 7GL<br>London Office<br>49 Constable House Adelaide Road London NW3 3QA |             |              |              |
| Architect                                                                                                                                                                                                 |             | Status       |              |
| -                                                                                                                                                                                                         |             | Preliminary  |              |
| Drawing No.<br>2017-C03                                                                                                                                                                                   |             | Tender       |              |
| Revision                                                                                                                                                                                                  |             | Construction |              |
| A                                                                                                                                                                                                         |             | As Built     |              |



- Notes
- This drawing is for planning only and to be read in conjunction with all relevant series design drawings, specifications and documentation.
  - Location and levels of existing sewers are assumed only and should not be relied upon until confirmed by survey.
  - Dimensions must not be scaled from this drawing.
  - The contractor shall be responsible for the setting out of the works and the accuracy of all dimensions. He shall satisfy himself that the information given is correct and notify the relevant parties immediately of any discrepancies.
  - The building contractor is responsible for the design and coordination of all temporary works required on this project.
  - All services are to be located by the contractor and clearly marked prior to commencing work on site.
  - Construction to be in accordance with all British and European standards and building regulations.
  - All dimensions are in millimetres and levels in metres above local datum.
  - Any discrepancies in the details shown are to be reported to the employer's representative/engineer prior to construction.
  - The general specification of materials and workmanships for the construction of the access road, footpaths and other areas of hardstanding shall be the manual of contract documents for highway works, volume 1, specification of highway works (shw) published by the stationary office.
  - All surface water drainage is subject to detailed design and all RWP and FO shown are indicative only and subject to approval and setting out by the architect.
  - Unless noted otherwise, pipes to be:  
foul pipes under building Ø100@1:40,  
foul pipes external Ø100@1:80,  
surface water pipes Ø100@1:100

### STORMWATER CONCEPT LEGEND

- 18.30x** Proposed Level
- FFL 80.90** Finished floor level
- Overland flow

|             |             |             |              |
|-------------|-------------|-------------|--------------|
| B           | Tender      | AW 03/11/21 | AW 03/11/21  |
| A           | Preliminary | AW 03/08/21 | AW 03/08/21  |
| Rev         | Description | Drawn Date  | Checked Date |
| Drawn By    | AW          | Checked By  | AW           |
| Date        | 27.07.21    | Date        | 27.07.21     |
| Approved By | AW          | Date        | 27.07.21     |

Base drawing scale 1:100 at A1

Client **NIGEL DUTTON**

Project **ARTHUR ST BARWELL LEICESTER**

Title **OVERLAND FLOW PLAN**

**arcelle Consulting**  
T: 0116 254 5058 E: info@arcelleconsulting.co.uk  
Leicester Office  
18 De Montfort Street Leicester LE1 7GL  
London Office  
49 Constable House Adelaide Road London NW3 3QA

|             |          |              |             |
|-------------|----------|--------------|-------------|
| Architect   | -        | Status       | Preliminary |
| Drawing No. | 2017-C04 | Tender       | ●           |
| Revision    | B        | Construction |             |
|             |          | As Built     |             |

### Design Settings

|                                      |        |                                    |               |
|--------------------------------------|--------|------------------------------------|---------------|
| Rainfall Methodology                 | FEH-13 | Minimum Velocity (m/s)             | 1.00          |
| Return Period (years)                | 10     | Connection Type                    | Level Soffits |
| Additional Flow (%)                  | 0      | Minimum Backdrop Height (m)        | 0.200         |
| CV                                   | 0.750  | Preferred Cover Depth (m)          | 0.600         |
| Time of Entry (mins)                 | 5.00   | Include Intermediate Ground        | ✓             |
| Maximum Time of Concentration (mins) | 30.00  | Enforce best practice design rules | x             |
| Maximum Rainfall (mm/hr)             | 50.0   |                                    |               |

### Adoptable Manhole Type

| Max Width (mm) | Diameter (mm) | Max Width (mm) | Diameter (mm) |
|----------------|---------------|----------------|---------------|
| 374            | 1200          | 749            | 1500          |
| 499            | 1350          | 900            | 1800          |

&gt;900 Link+900 mm

| Max Depth (m) | Diameter (mm) | Max Depth (m) | Diameter (mm) |
|---------------|---------------|---------------|---------------|
| 1.500         | 1050          | 99.999        | 1200          |

### Circular Link Type

|         |          |                     |    |
|---------|----------|---------------------|----|
| Shape   | Circular | Auto Increment (mm) | 75 |
| Barrels | 1        | Follow Ground       | x  |

### Available Diameters (mm)

100 | 150

### Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|------|-----------|---------------|-----------------|---------------|-------------|--------------|-----------|
| 1    |           |               | 127.700         | 1200          | 50.000      | 50.000       | 1.100     |
| 2    |           |               | 127.780         | 1200          | 55.000      | 45.000       | 1.030     |
| 3    | 0.004     | 5.00          | 127.800         | 1200          | 55.000      | 40.000       | 1.000     |
| 4    | 0.030     | 5.00          | 128.050         | 450           | 60.000      | 30.000       | 1.250     |
| 5    | 0.030     | 5.00          | 128.600         | 450           | 80.000      | 25.000       | 1.300     |
| 6    | 0.010     | 5.00          | 128.000         | 450           | 60.000      | 25.000       | 0.950     |
| 7    | 0.005     | 5.00          | 127.800         | 450           | 50.000      | 25.000       | 0.750     |

### Links

| Name  | US Node | DS Node | Length (m) | ks (mm) / n | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) | T of C (mins) | Rain (mm/hr) |
|-------|---------|---------|------------|-------------|-----------|-----------|----------|-------------|----------|---------------|--------------|
| 1.003 | 2       | 1       | 7.071      | 0.600       | 126.750   | 126.600   | 0.150    | 47.1        | 225      | 5.57          | 50.0         |
| 1.002 | 3       | 2       | 5.000      | 0.600       | 126.800   | 126.750   | 0.050    | 100.0       | 225      | 5.51          | 50.0         |
| 1.001 | 4       | 3       | 11.180     | 0.600       | 126.850   | 126.800   | 0.050    | 223.6       | 225      | 5.44          | 50.0         |
| 1.000 | 5       | 4       | 20.616     | 0.600       | 127.300   | 126.850   | 0.450    | 45.8        | 150      | 5.23          | 50.0         |
| 3.000 | 6       | 4       | 5.000      | 0.600       | 127.050   | 126.800   | 0.250    | 20.0        | 150      | 5.04          | 50.0         |
| 2.000 | 7       | 4       | 11.180     | 0.600       | 127.050   | 126.800   | 0.250    | 44.7        | 150      | 5.12          | 50.0         |

| Name  | Vel (m/s) | Cap (l/s) | Flow (l/s) | US Depth (m) | DS Depth (m) | Σ Area (ha) | Σ Add Inflow (l/s) | Pro Depth (mm) | Pro Velocity (m/s) |
|-------|-----------|-----------|------------|--------------|--------------|-------------|--------------------|----------------|--------------------|
| 1.003 | 1.910     | 75.9      | 10.7       | 0.805        | 0.875        | 0.079       | 0.0                | 57             | 1.357              |
| 1.002 | 1.307     | 52.0      | 10.7       | 0.775        | 0.805        | 0.079       | 0.0                | 69             | 1.033              |
| 1.001 | 0.870     | 34.6      | 10.2       | 0.975        | 0.775        | 0.075       | 0.0                | 83             | 0.757              |
| 1.000 | 1.490     | 26.3      | 4.1        | 1.150        | 1.050        | 0.030       | 0.0                | 40             | 1.081              |
| 3.000 | 2.262     | 40.0      | 1.4        | 0.800        | 1.100        | 0.010       | 0.0                | 19             | 1.055              |
| 2.000 | 1.508     | 26.7      | 0.7        | 0.600        | 1.100        | 0.005       | 0.0                | 17             | 0.644              |

### Pipeline Schedule

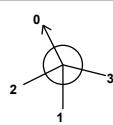
| Link  | Length (m) | Slope (1:X) | Dia (mm) | Link Type | US CL (m) | US IL (m) | US Depth (m) | DS CL (m) | DS IL (m) | DS Depth (m) |
|-------|------------|-------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|--------------|
| 1.003 | 7.071      | 47.1        | 225      | Circular  | 127.780   | 126.750   | 0.805        | 127.700   | 126.600   | 0.875        |
| 1.002 | 5.000      | 100.0       | 225      | Circular  | 127.800   | 126.800   | 0.775        | 127.780   | 126.750   | 0.805        |
| 1.001 | 11.180     | 223.6       | 225      | Circular  | 128.050   | 126.850   | 0.975        | 127.800   | 126.800   | 0.775        |
| 1.000 | 20.616     | 45.8        | 150      | Circular  | 128.600   | 127.300   | 1.150        | 128.050   | 126.850   | 1.050        |
| 3.000 | 5.000      | 20.0        | 150      | Circular  | 128.000   | 127.050   | 0.800        | 128.050   | 126.800   | 1.100        |
| 2.000 | 11.180     | 44.7        | 150      | Circular  | 127.800   | 127.050   | 0.600        | 128.050   | 126.800   | 1.100        |

| Link  | US Node | Dia (mm) | Node Type | MH Type   | DS Node | Dia (mm) | Node Type | MH Type   |
|-------|---------|----------|-----------|-----------|---------|----------|-----------|-----------|
| 1.003 | 2       | 1200     | Manhole   | Adoptable | 1       | 1200     | Manhole   | Adoptable |
| 1.002 | 3       | 1200     | Manhole   | Adoptable | 2       | 1200     | Manhole   | Adoptable |
| 1.001 | 4       | 450      | Manhole   | Adoptable | 3       | 1200     | Manhole   | Adoptable |
| 1.000 | 5       | 450      | Manhole   | Adoptable | 4       | 450      | Manhole   | Adoptable |
| 3.000 | 6       | 450      | Manhole   | Adoptable | 4       | 450      | Manhole   | Adoptable |
| 2.000 | 7       | 450      | Manhole   | Adoptable | 4       | 450      | Manhole   | Adoptable |

### Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m)  | Depth (m) | Dia (mm) | Connections                                                                         | Link  | IL (m)  | Dia (mm) |
|------|-------------|--------------|---------|-----------|----------|-------------------------------------------------------------------------------------|-------|---------|----------|
| 1    | 50.000      | 50.000       | 127.700 | 1.100     | 1200     |  | 1.003 | 126.600 | 225      |
| 2    | 55.000      | 45.000       | 127.780 | 1.030     | 1200     |  | 1.002 | 126.750 | 225      |
| 3    | 55.000      | 40.000       | 127.800 | 1.000     | 1200     |  | 1.001 | 126.800 | 225      |
|      |             |              |         |           |          |  | 1.002 | 126.800 | 225      |

### Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m)  | Depth (m) | Dia (mm) | Connections                                                                       | Link                                     | IL (m)                                   | Dia (mm)                 |
|------|-------------|--------------|---------|-----------|----------|-----------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|--------------------------|
| 4    | 60.000      | 30.000       | 128.050 | 1.250     | 450      |  | 1 3.000<br>2 2.000<br>3 1.000<br>0 1.001 | 126.800<br>126.800<br>126.850<br>126.850 | 150<br>150<br>150<br>225 |
| 5    | 80.000      | 25.000       | 128.600 | 1.300     | 450      |  | 0 1.000                                  | 127.300                                  | 150                      |
| 6    | 60.000      | 25.000       | 128.000 | 0.950     | 450      |  | 0 3.000                                  | 127.050                                  | 150                      |
| 7    | 50.000      | 25.000       | 127.800 | 0.750     | 450      |  | 0 2.000                                  | 127.050                                  | 150                      |

### Simulation Settings

|                      |                   |                            |        |
|----------------------|-------------------|----------------------------|--------|
| Rainfall Methodology | FSR               | Analysis Speed             | Normal |
| FSR Region           | England and Wales | Skip Steady State          | x      |
| M5-60 (mm)           | 20.000            | Drain Down Time (mins)     | 240    |
| Ratio-R              | 0.400             | Additional Storage (m³/ha) | 20.0   |
| Summer CV            | 0.750             | Check Discharge Rate(s)    | x      |
| Winter CV            | 0.840             | Check Discharge Volume     | x      |

### Storm Durations

|    |    |    |     |     |     |     |     |     |     |     |      |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 |
|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|
| 1                     | 0                     | 0                     | 0                     |
| 10                    | 0                     | 0                     | 0                     |
| 30                    | 0                     | 0                     | 0                     |
| 100                   | 0                     | 0                     | 0                     |
| 100                   | 40                    | 0                     | 0                     |

### Node 3 Online Hydro-Brake® Control

|                          |         |                         |                                |
|--------------------------|---------|-------------------------|--------------------------------|
| Flap Valve               | x       | Objective               | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓       | Sump Available          | ✓                              |
| Invert Level (m)         | 126.800 | Product Number          | CTL-SHE-0128-7500-1000-7500    |
| Design Depth (m)         | 1.000   | Min Outlet Diameter (m) | 0.150                          |
| Design Flow (l/s)        | 7.5     | Min Node Diameter (mm)  | 1200                           |

### Node 3 Depth/Area Storage Structure

|                             |         |               |      |                           |         |
|-----------------------------|---------|---------------|------|---------------------------|---------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 1.0  | Invert Level (m)          | 126.850 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity      | 0.30 | Time to half empty (mins) | 4       |

| Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) | Depth<br>(m) | Area<br>(m <sup>2</sup> ) | Inf Area<br>(m <sup>2</sup> ) |
|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|--------------|---------------------------|-------------------------------|
| 0.000        | 180.0                     | 0.0                           | 0.800        | 180.0                     | 0.0                           | 0.801        | 1.0                       | 0.0                           |

#### Other (defaults)

|                      |       |                       |       |                          |       |
|----------------------|-------|-----------------------|-------|--------------------------|-------|
| Entry Loss (manhole) | 0.250 | Entry Loss (junction) | 0.000 | Apply Recommended Losses | x     |
| Exit Loss (manhole)  | 0.250 | Exit Loss (junction)  | 0.000 | Flood Risk (m)           | 0.300 |

#### Rainfall

| Event                     | Peak<br>Intensity<br>(mm/hr) | Average<br>Intensity<br>(mm/hr) | Event                      | Peak<br>Intensity<br>(mm/hr) | Average<br>Intensity<br>(mm/hr) |
|---------------------------|------------------------------|---------------------------------|----------------------------|------------------------------|---------------------------------|
| 1 year 15 minute summer   | 109.521                      | 30.991                          | 10 year 720 minute winter  | 9.358                        | 3.732                           |
| 1 year 15 minute winter   | 76.857                       | 30.991                          | 10 year 960 minute summer  | 11.365                       | 2.993                           |
| 1 year 30 minute summer   | 71.439                       | 20.215                          | 10 year 960 minute winter  | 7.528                        | 2.993                           |
| 1 year 30 minute winter   | 50.133                       | 20.215                          | 10 year 1440 minute summer | 8.174                        | 2.191                           |
| 1 year 60 minute summer   | 48.435                       | 12.800                          | 10 year 1440 minute winter | 5.493                        | 2.191                           |
| 1 year 60 minute winter   | 32.179                       | 12.800                          | 30 year 15 minute summer   | 268.706                      | 76.035                          |
| 1 year 120 minute summer  | 30.053                       | 7.942                           | 30 year 15 minute winter   | 188.566                      | 76.035                          |
| 1 year 120 minute winter  | 19.966                       | 7.942                           | 30 year 30 minute summer   | 174.929                      | 49.499                          |
| 1 year 180 minute summer  | 23.233                       | 5.979                           | 30 year 30 minute winter   | 122.757                      | 49.499                          |
| 1 year 180 minute winter  | 15.102                       | 5.979                           | 30 year 60 minute summer   | 116.589                      | 30.811                          |
| 1 year 240 minute summer  | 18.475                       | 4.882                           | 30 year 60 minute winter   | 77.459                       | 30.811                          |
| 1 year 240 minute winter  | 12.274                       | 4.882                           | 30 year 120 minute summer  | 70.438                       | 18.615                          |
| 1 year 360 minute summer  | 14.169                       | 3.646                           | 30 year 120 minute winter  | 46.797                       | 18.615                          |
| 1 year 360 minute winter  | 9.210                        | 3.646                           | 30 year 180 minute summer  | 53.298                       | 13.715                          |
| 1 year 480 minute summer  | 11.185                       | 2.956                           | 30 year 180 minute winter  | 34.645                       | 13.715                          |
| 1 year 480 minute winter  | 7.431                        | 2.956                           | 30 year 240 minute summer  | 41.604                       | 10.995                          |
| 1 year 600 minute summer  | 9.182                        | 2.511                           | 30 year 240 minute winter  | 27.641                       | 10.995                          |
| 1 year 600 minute winter  | 6.274                        | 2.511                           | 30 year 360 minute summer  | 31.221                       | 8.034                           |
| 1 year 720 minute summer  | 8.203                        | 2.199                           | 30 year 360 minute winter  | 20.295                       | 8.034                           |
| 1 year 720 minute winter  | 5.513                        | 2.199                           | 30 year 480 minute summer  | 24.324                       | 6.428                           |
| 1 year 960 minute summer  | 6.768                        | 1.782                           | 30 year 480 minute winter  | 16.160                       | 6.428                           |
| 1 year 960 minute winter  | 4.483                        | 1.782                           | 30 year 600 minute summer  | 19.756                       | 5.404                           |
| 1 year 1440 minute summer | 4.949                        | 1.326                           | 30 year 600 minute winter  | 13.498                       | 5.404                           |
| 1 year 1440 minute winter | 3.326                        | 1.326                           | 30 year 720 minute summer  | 17.490                       | 4.687                           |
| 10 year 15 minute summer  | 211.819                      | 59.937                          | 30 year 720 minute winter  | 11.754                       | 4.687                           |
| 10 year 15 minute winter  | 148.645                      | 59.937                          | 30 year 960 minute summer  | 14.215                       | 3.743                           |
| 10 year 30 minute summer  | 136.831                      | 38.718                          | 30 year 960 minute winter  | 9.416                        | 3.743                           |
| 10 year 30 minute winter  | 96.022                       | 38.718                          | 30 year 1440 minute summer | 10.161                       | 2.723                           |
| 10 year 60 minute summer  | 90.826                       | 24.003                          | 30 year 1440 minute winter | 6.829                        | 2.723                           |
| 10 year 60 minute winter  | 60.342                       | 24.003                          | 100 year 15 minute summer  | 348.738                      | 98.681                          |
| 10 year 120 minute summer | 54.899                       | 14.508                          | 100 year 15 minute winter  | 244.728                      | 98.681                          |
| 10 year 120 minute winter | 36.474                       | 14.508                          | 100 year 30 minute summer  | 228.965                      | 64.789                          |
| 10 year 180 minute summer | 41.666                       | 10.722                          | 100 year 30 minute winter  | 160.677                      | 64.789                          |
| 10 year 180 minute winter | 27.084                       | 10.722                          | 100 year 60 minute summer  | 153.288                      | 40.510                          |
| 10 year 240 minute summer | 32.645                       | 8.627                           | 100 year 60 minute winter  | 101.841                      | 40.510                          |
| 10 year 240 minute winter | 21.689                       | 8.627                           | 100 year 120 minute summer | 92.562                       | 24.461                          |
| 10 year 360 minute summer | 24.632                       | 6.339                           | 100 year 120 minute winter | 61.496                       | 24.461                          |
| 10 year 360 minute winter | 16.012                       | 6.339                           | 100 year 180 minute summer | 69.806                       | 17.964                          |
| 10 year 480 minute summer | 19.260                       | 5.090                           | 100 year 180 minute winter | 45.376                       | 17.964                          |
| 10 year 480 minute winter | 12.796                       | 5.090                           | 100 year 240 minute summer | 54.269                       | 14.342                          |
| 10 year 600 minute summer | 15.690                       | 4.291                           | 100 year 240 minute winter | 36.055                       | 14.342                          |
| 10 year 600 minute winter | 10.720                       | 4.291                           | 100 year 360 minute summer | 40.484                       | 10.418                          |
| 10 year 720 minute summer | 13.925                       | 3.732                           | 100 year 360 minute winter | 26.315                       | 10.418                          |

### Rainfall

| Event                              | Peak<br>Intensity<br>(mm/hr) | Average<br>Intensity<br>(mm/hr) | Event                               | Peak<br>Intensity<br>(mm/hr) | Average<br>Intensity<br>(mm/hr) |
|------------------------------------|------------------------------|---------------------------------|-------------------------------------|------------------------------|---------------------------------|
| 100 year 480 minute summer         | 31.414                       | 8.302                           | 100 year +40% CC 120 minute winter  | 86.094                       | 34.246                          |
| 100 year 480 minute winter         | 20.871                       | 8.302                           | 100 year +40% CC 180 minute summer  | 97.729                       | 25.149                          |
| 100 year 600 minute summer         | 25.431                       | 6.956                           | 100 year +40% CC 180 minute winter  | 63.526                       | 25.149                          |
| 100 year 600 minute winter         | 17.376                       | 6.956                           | 100 year +40% CC 240 minute summer  | 75.977                       | 20.078                          |
| 100 year 720 minute summer         | 22.452                       | 6.017                           | 100 year +40% CC 240 minute winter  | 50.477                       | 20.078                          |
| 100 year 720 minute winter         | 15.089                       | 6.017                           | 100 year +40% CC 360 minute summer  | 56.677                       | 14.585                          |
| 100 year 960 minute summer         | 18.166                       | 4.784                           | 100 year +40% CC 360 minute winter  | 36.841                       | 14.585                          |
| 100 year 960 minute winter         | 12.033                       | 4.784                           | 100 year +40% CC 480 minute summer  | 43.979                       | 11.622                          |
| 100 year 1440 minute summer        | 12.896                       | 3.456                           | 100 year +40% CC 480 minute winter  | 29.219                       | 11.622                          |
| 100 year 1440 minute winter        | 8.667                        | 3.456                           | 100 year +40% CC 600 minute summer  | 35.604                       | 9.738                           |
| 100 year +40% CC 15 minute summer  | 488.233                      | 138.153                         | 100 year +40% CC 600 minute winter  | 24.327                       | 9.738                           |
| 100 year +40% CC 15 minute winter  | 342.620                      | 138.153                         | 100 year +40% CC 720 minute summer  | 31.433                       | 8.424                           |
| 100 year +40% CC 30 minute summer  | 320.551                      | 90.705                          | 100 year +40% CC 720 minute winter  | 21.125                       | 8.424                           |
| 100 year +40% CC 30 minute winter  | 224.948                      | 90.705                          | 100 year +40% CC 960 minute summer  | 25.432                       | 6.697                           |
| 100 year +40% CC 60 minute summer  | 214.603                      | 56.713                          | 100 year +40% CC 960 minute winter  | 16.847                       | 6.697                           |
| 100 year +40% CC 60 minute winter  | 142.577                      | 56.713                          | 100 year +40% CC 1440 minute summer | 18.055                       | 4.839                           |
| 100 year +40% CC 120 minute summer | 129.587                      | 34.246                          | 100 year +40% CC 1440 minute winter | 12.134                       | 4.839                           |

**Results for 1 year Critical Storm Duration. Lowest mass balance: 99.83%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|--------|
| 30 minute winter | 1       | 24          | 126.637   | 0.036     | 4.4          | 0.0000        | 0.0000     | OK     |
| 30 minute winter | 2       | 24          | 126.788   | 0.038     | 4.4          | 0.0433        | 0.0000     | OK     |
| 30 minute winter | 3       | 23          | 126.897   | 0.097     | 8.6          | 2.6717        | 0.0000     | OK     |
| 15 minute winter | 4       | 11          | 126.937   | 0.137     | 10.4         | 0.0876        | 0.0000     | OK     |
| 15 minute winter | 5       | 10          | 127.340   | 0.040     | 4.2          | 0.0251        | 0.0000     | OK     |
| 15 minute winter | 6       | 10          | 127.069   | 0.019     | 1.4          | 0.0071        | 0.0000     | OK     |
| 15 minute winter | 7       | 11          | 127.067   | 0.017     | 0.7          | 0.0049        | 0.0000     | OK     |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 30 minute winter            | 2       | 1.003        | 1       | 4.4           | 1.009          | 0.057    | 0.0305        | 6.6                |
| 30 minute winter            | 3       | Hydro-Brake® | 2       | 4.4           |                |          |               |                    |
| 15 minute winter            | 4       | 1.001        | 3       | 10.2          | 0.814          | 0.295    | 0.1551        |                    |
| 15 minute winter            | 5       | 1.000        | 4       | 4.2           | 0.587          | 0.158    | 0.1478        |                    |
| 15 minute winter            | 6       | 3.000        | 4       | 1.4           | 0.150          | 0.035    | 0.0454        |                    |
| 15 minute winter            | 7       | 2.000        | 4       | 0.7           | 0.077          | 0.026    | 0.1004        |                    |

**Results for 10 year Critical Storm Duration. Lowest mass balance: 99.83%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|--------|
| 30 minute winter | 1       | 24          | 126.646   | 0.046     | 7.0          | 0.0000        | 0.0000     | OK     |
| 30 minute winter | 2       | 24          | 126.799   | 0.049     | 7.0          | 0.0554        | 0.0000     | OK     |
| 30 minute winter | 3       | 24          | 126.955   | 0.154     | 16.2         | 5.8554        | 0.0000     | OK     |
| 15 minute winter | 4       | 11          | 126.980   | 0.180     | 20.4         | 0.1149        | 0.0000     | OK     |
| 15 minute winter | 5       | 10          | 127.357   | 0.057     | 8.2          | 0.0355        | 0.0000     | OK     |
| 15 minute winter | 6       | 10          | 127.077   | 0.026     | 2.7          | 0.0098        | 0.0000     | OK     |
| 15 minute winter | 7       | 10          | 127.073   | 0.023     | 1.4          | 0.0068        | 0.0000     | OK     |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 30 minute winter            | 2       | 1.003        | 1       | 7.0           | 1.149          | 0.092    | 0.0430        | 12.8               |
| 30 minute winter            | 3       | Hydro-Brake® | 2       | 7.0           |                |          |               |                    |
| 15 minute winter            | 4       | 1.001        | 3       | 19.9          | 1.017          | 0.574    | 0.2645        |                    |
| 15 minute winter            | 5       | 1.000        | 4       | 8.1           | 0.720          | 0.308    | 0.2284        |                    |
| 15 minute winter            | 6       | 3.000        | 4       | 2.7           | 0.227          | 0.067    | 0.0492        |                    |
| 15 minute winter            | 7       | 2.000        | 4       | 1.4           | 0.118          | 0.052    | 0.1081        |                    |

**Results for 30 year Critical Storm Duration. Lowest mass balance: 99.83%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|--------|
| 30 minute winter | 1       | 25          | 126.647   | 0.047     | 7.3          | 0.0000        | 0.0000     | OK     |
| 30 minute winter | 2       | 25          | 126.800   | 0.050     | 7.3          | 0.0566        | 0.0000     | OK     |
| 30 minute winter | 3       | 25          | 126.996   | 0.196     | 20.9         | 8.1412        | 0.0000     | OK     |
| 15 minute winter | 4       | 11          | 127.004   | 0.204     | 25.9         | 0.1301        | 0.0000     | OK     |
| 15 minute winter | 5       | 10          | 127.365   | 0.065     | 10.4         | 0.0405        | 0.0000     | OK     |
| 15 minute winter | 6       | 10          | 127.080   | 0.030     | 3.5          | 0.0111        | 0.0000     | OK     |
| 15 minute winter | 7       | 10          | 127.076   | 0.026     | 1.7          | 0.0075        | 0.0000     | OK     |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 30 minute winter            | 2       | 1.003        | 1       | 7.3           | 1.162          | 0.096    | 0.0443        | 16.3               |
| 30 minute winter            | 3       | Hydro-Brake® | 2       | 7.3           |                |          |               |                    |
| 15 minute winter            | 4       | 1.001        | 3       | 25.0          | 1.081          | 0.722    | 0.3382        |                    |
| 15 minute winter            | 5       | 1.000        | 4       | 10.3          | 0.773          | 0.392    | 0.2564        |                    |
| 15 minute winter            | 6       | 3.000        | 4       | 3.5           | 0.287          | 0.087    | 0.0503        |                    |
| 15 minute winter            | 7       | 2.000        | 4       | 1.7           | 0.142          | 0.063    | 0.1095        |                    |

**Results for 100 year Critical Storm Duration. Lowest mass balance: 99.83%**

| Node Event       | US<br>Node | Peak<br>(mins) | Level<br>(m) | Depth<br>(m) | Inflow<br>(l/s) | Node<br>Vol (m³) | Flood<br>(m³) | Status     |
|------------------|------------|----------------|--------------|--------------|-----------------|------------------|---------------|------------|
| 30 minute winter | 1          | 26             | 126.648      | 0.047        | 7.5             | 0.0000           | 0.0000        | OK         |
| 30 minute winter | 2          | 26             | 126.801      | 0.051        | 7.5             | 0.0574           | 0.0000        | OK         |
| 30 minute winter | 3          | 26             | 127.062      | 0.262        | 26.9            | 11.7649          | 0.0000        | SURCHARGED |
| 30 minute winter | 4          | 25             | 127.064      | 0.264        | 26.0            | 0.1686           | 0.0000        | OK         |
| 15 minute winter | 5          | 10             | 127.376      | 0.076        | 13.5            | 0.0470           | 0.0000        | OK         |
| 15 minute winter | 6          | 10             | 127.084      | 0.034        | 4.5             | 0.0126           | 0.0000        | OK         |
| 15 minute winter | 7          | 10             | 127.079      | 0.029        | 2.2             | 0.0085           | 0.0000        | OK         |

| Link Event<br>(Upstream Depth) | US<br>Node | Link         | DS<br>Node | Outflow<br>(l/s) | Velocity<br>(m/s) | Flow/Cap | Link<br>Vol (m³) | Discharge<br>Vol (m³) |
|--------------------------------|------------|--------------|------------|------------------|-------------------|----------|------------------|-----------------------|
| 30 minute winter               | 2          | 1.003        | 1          | 7.5              | 1.170             | 0.098    | 0.0452           | 21.3                  |
| 30 minute winter               | 3          | Hydro-Brake® | 2          | 7.5              |                   |          |                  |                       |
| 30 minute winter               | 4          | 1.001        | 3          | 25.5             | 0.881             | 0.737    | 0.4404           |                       |
| 15 minute winter               | 5          | 1.000        | 4          | 13.4             | 0.884             | 0.509    | 0.2734           |                       |
| 15 minute winter               | 6          | 3.000        | 4          | 4.5              | 0.361             | 0.112    | 0.0515           |                       |
| 15 minute winter               | 7          | 2.000        | 4          | 2.2              | 0.181             | 0.082    | 0.1118           |                       |

**Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.83%**

| Node Event       | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status     |
|------------------|---------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 60 minute summer | 1       | 58          | 126.648   | 0.048     | 7.5          | 0.0000        | 0.0000     | OK         |
| 60 minute winter | 2       | 36          | 126.801   | 0.051     | 7.5          | 0.0575        | 0.0000     | OK         |
| 30 minute winter | 3       | 29          | 127.184   | 0.384     | 36.6         | 18.5422       | 0.0000     | SURCHARGED |
| 30 minute winter | 4       | 28          | 127.187   | 0.387     | 36.3         | 0.2474        | 0.0000     | SURCHARGED |
| 15 minute winter | 5       | 10          | 127.399   | 0.099     | 18.9         | 0.0613        | 0.0000     | OK         |
| 30 minute winter | 6       | 28          | 127.187   | 0.137     | 4.9          | 0.0508        | 0.0000     | OK         |
| 30 minute winter | 7       | 28          | 127.187   | 0.137     | 2.4          | 0.0401        | 0.0000     | OK         |

| Link Event (Upstream Depth) | US Node | Link         | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|---------|--------------|---------|---------------|----------------|----------|---------------|--------------------|
| 60 minute winter            | 2       | 1.003        | 1       | 7.5           | 1.171          | 0.099    | 0.0453        | 37.7               |
| 30 minute winter            | 3       | Hydro-Brake® | 2       | 7.5           |                |          |               |                    |
| 30 minute winter            | 4       | 1.001        | 3       | 34.7          | 0.926          | 1.002    | 0.4446        |                    |
| 15 minute winter            | 5       | 1.000        | 4       | 18.5          | 1.130          | 0.704    | 0.3082        |                    |
| 30 minute winter            | 6       | 3.000        | 4       | 4.9           | 0.390          | 0.122    | 0.0863        |                    |
| 30 minute winter            | 7       | 2.000        | 4       | 2.4           | 0.194          | 0.088    | 0.1928        |                    |

## WONDERFUL ON TAP



Severn Trent Water Ltd  
Leicester Water Centre  
Gorse Hill  
Anstey  
Leicester  
LE17 7GU

Tel: 0345 266 7930  
[www.stwater.co.uk](http://www.stwater.co.uk)

Email:  
[Network.Solutions@SevernTrent.co.uk](mailto:Network.Solutions@SevernTrent.co.uk)

Our ref: 1021485

Arcelle Consulting,  
18 DeMontfort Street,  
Leicester,  
LE1 7GL.

FAO: Andrew Wallace

8<sup>th</sup> November 2021

Dear Mr Wallace,

**Proposed Residential Development (14 Flats) at: Former Island House, Arthur Street, Barwell, Leicestershire, LE9 8GN.**

**X: 444619 / Y: 296974**

I refer to your Development Enquiry Request submitted in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

**Public Sewers in Site – Required Protection**

There are no public sewers within the proposed development area. Please be aware however that there is a public 225mm foul water sewer running close to the site's western boundary on King Street. This sewer will need an easement of 6m (3m each side) about the pipe's centerline where no planting of trees or building shall be permitted.

*Please Note: On 1st October 2011 many private sewers were transferred into the ownership of Severn Trent Water as public sewers, where two or more properties in separate ownership are served by those sewers. Most of these former private sewers will not be shown on the public sewer records, therefore a full site survey should be carried out prior to any layout design or construction works to identify where these sewers may be and to avoid later delays and possible added costs.*

**Foul Water Drainage**

The site is likely to have an existing connection, it might be possible to utilise the existing connection if this is in a convenient location and in good condition. It is therefore advised to undertake a detailed

connectivity survey to determine what direction the existing drains are taking flows from the existing premises.

It is proposed to utilize the site's onsite private drainage and to connect onto the existing public 225mm foul water sewer north of the development on Kingsfield Road.

I can confirm that gravity foul flows for the proposed development as a replacement of the existing site should not have an adverse hydraulic impact on the receiving network within the site. A connection is therefore acceptable to this sewer at a new or existing manhole subject to formal 106 approval.

**Please Note: For brownfield developments, STW's preference is that all proposed foul discharges from the site reflect the existing drainage discharge routes where possible.**

### **Surface Water Drainage**

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

If these are found to be unsuitable, satisfactory evidence will need to be submitted. The evidence should be either percolation test results or by the submission of a statement from the SI consultant (extract or a supplementary letter).

**Please Note: - STW will need to be satisfied that all SUDs options have been exhausted before discharge to public sewer. Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA.**

It is noted that surface water is proposed to connect into the existing foul network north of the site in Kingsfield Road. STW are under

increasing pressure not to accept SW flows to foul network as this is not a sustainable option.

In this instance, we cannot allow a surface water connection to the foul network. Our sewer records attached with this response show public surface water sewers within the vicinity of the site which should be explored. It is also advised to undertake surveys to establish any nearby highway drainage.

Any flows exceeding the proposed rates would need to be appropriately attenuated on site and discharged at a controlled rate. Please submit surface water drainage proposals based on these comments for review when available.

### **New Connections**

For any new connections including the use, reuse and indirect to the public sewerage system, the developer will need to submit Section 106 application. Our Developer Services department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600, email [new.connections@severntrent.co.uk](mailto:new.connections@severntrent.co.uk) or download from [www.stwater.co.uk](http://www.stwater.co.uk)

Please quote the above reference number in any future correspondence (including e-mails) with STW Limited. Please send **all correspondence** to the [network.solutions@severntrent.co.uk](mailto:network.solutions@severntrent.co.uk) email inbox address, a response will be made within 15 days.

If you require a VAT receipt for the application fee please email [MISCINCOME.NC@SEVERNTRENT.CO.UK](mailto:MISCINCOME.NC@SEVERNTRENT.CO.UK) quoting the above Reference Number.

Please note that Developer Enquiry responses are only valid for 6 months from the date of this letter.

Yours sincerely,

A handwritten signature in grey ink, appearing to be "M. Smith".

WONDERFUL ON TAP



Emma Nowak.  
**Senior Evaluation Technician**  
**Network Solutions**  
**Developer Services**

## **Appendix B: Topographic Survey**



## **Appendix C: SuDS Maintenance Report**

**Project:** Drainage and SUDS  
Design, ARTHUR STREET,  
BARWELL

**Project No:** 2017-C-R02

**Date:** May 2023

| Revision | Date     | Author | Checker |
|----------|----------|--------|---------|
| -        | 18.05.23 | AW     | CA      |

## Arcelle Consulting

T: 0116 254 6694 E: [info@arcelleconsulting.co.uk](mailto:info@arcelleconsulting.co.uk) W: [www.arcelleconsulting.co.uk](http://www.arcelleconsulting.co.uk)

### Leicester Office

103 London Road Leicester LE2 0PF

### London Office

49 Constable House Adelaide Road London NW3 3QA

## **1.0 General**

- 1.1** Sustainable Drainage Systems (SuDS) are an environmentally friendly approach to managing rainfall. SuDS techniques use landscape features to deal with surface water with the aim to:
- 1.1.1 Control the flow, volume and frequency of water leaving a development.
  - 1.1.2 Prevent pollution by intercepting silt and cleaning runoff from hard surfaces.
  - 1.1.3 Provide attractive surroundings for the community.
- 1.2** The surface water drainage strategy for this development utilises permeable paving as the main SUDS feature. The following sections provides a brief description of these features and outlines the maintenance programme that should be adopted.

## **2.0 Cleaning of the Drainage System**

- 2.1** Drainage systems should be inspected at regular intervals and where necessary, thoroughly cleaned out at the same time. Any defects discovered should be made good.
- 2.2** The following operations should be carried out during the periodic cleaning of a drainage system:-

| <b>Product Type</b>                                  | <b>Period</b>                      | <b>Responsibility</b>         | <b>Maintenance Methods</b>                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------|------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Silt Trap</i></b>                              | As necessary and before wet season | Owner/<br>Maintenance Company | <ul style="list-style-type: none"> <li>• Sediment and debris that accumulated during summer needs to be removed before the wet season.</li> <li>• Inspect and clean out routinely prior to inlet pipework to minimise debris reaching the tank.</li> <li>• Conduct inspections more frequently during the wet season for the area where sediment or trash accumulates more often. Clean and repair as needed.</li> </ul> |
| <b><i>Standard Manholes/ Inspection Chambers</i></b> | As necessary                       | Owner/<br>Maintenance Company | <ul style="list-style-type: none"> <li>• Remove and clean any soil and vegetation that covers the manhole cover to prevent blockage of the drainage system at the manhole.</li> <li>• Renew/replace any damaged/missing bolts and damaged/missing manhole covers.</li> </ul>                                                                                                                                             |

| Product Type                    | Period                                                                              | Responsibility                                                       | Maintenance Methods                                                                                                                                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Drainage Pipes</b>           | Six monthly interval                                                                | Owner/ Maintenance Company                                           | <ul style="list-style-type: none"> <li>Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.</li> </ul>                                                                            |
| <b>Hydrobrake (If Required)</b> | Monthly for 3 months                                                                | Owner/ Maintenance Company                                           | <ul style="list-style-type: none"> <li>Inspect and identify any areas that are not operating correctly. If required, take remedial action.</li> </ul>                                                                                                                                           |
|                                 | Monthly                                                                             | Owner/ Maintenance Company                                           | <ul style="list-style-type: none"> <li>Debris removal from catchment surface (where may cause risks to performance).</li> </ul>                                                                                                                                                                 |
|                                 | Annually                                                                            | Owner/ Maintenance Company                                           | <ul style="list-style-type: none"> <li>Remove sediment from pre-treatment structures.</li> </ul>                                                                                                                                                                                                |
|                                 | Annually and after large storms                                                     | Owner/ Maintenance Company                                           | <ul style="list-style-type: none"> <li>Inspection/check all inlets and outlets to ensure that they are in good condition and operating as designed.</li> </ul>                                                                                                                                  |
| <b>Permeable Paving</b>         | As required                                                                         | Site Owner for private areas. Maintenance Company for communal areas | <ul style="list-style-type: none"> <li>Inspect the paving after any precipitation to ensure no displacement of any organic matter onto the surface of the pavement.</li> </ul>                                                                                                                  |
|                                 | Six monthly (Ideally, this activity to be carried out in spring and autumn seasons) | Site Owner for private areas. Maintenance Company for communal areas | <ul style="list-style-type: none"> <li>Agitate (e.g. brush, vacuum, etc.) the block paving to ensure no vegetation of any sort is allowed to grow and develop in the joints (where may affect performance).</li> </ul>                                                                          |
|                                 | Winter season                                                                       | Site Owner for private areas. Maintenance Company for communal areas | <ul style="list-style-type: none"> <li>De-icing may be used without causing significant detrimental effects towards the permeable pavement's performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.</li> </ul> |

### **3.0 *Sketches and Plans***

- 3.1** The locations of the above features can be found by examining Drawing 2017-C01