

Drainage Strategy Report

Site: Deben Farm, Landyke Lane, Scalford, Melton Mowbray

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Project No: 21-186 – Report C01



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Executive Summary

This Drainage Assessment reviews the existing drainage arrangement at the application site and proposes a surface water drainage strategy in line with Local Authority and Lead Local Flood Authority guidance.

The site is currently occupied by a number of farm buildings, with the proposals to convert these and build a number of new residential dwellings resulting in a total of 5 houses and associated external works.

Surface Water Drainage

The proposed strategy presented in detail in this report aims to reduce surface water discharge to 50% of the existing 1 year storm event discharge rate in accordance with best practice. Attenuation will be provided in permeable paving subbase and discharge will be to the existing drainage ditch at the front of the site. The system has been designed for all storm events up to and including the 1 in 100-year storm plus 40% allowance for climate change.

An additional 10% allowance for urban creep has been included in the sizing of infiltration system.

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 surface water drainage strategy is entirely based on-site.

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 development site into a Biodisc treatment system for each dwelling which discharges into the drainage ditch at the street frontage.

All drainage outlets are to subject to approval from the local authority

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1 INTRODUCTION

- 1.1.1 Dragon Structural was commissioned to undertake a Drainage Assessment for the proposed development of land located at Deben Farm, Landyke Lane, Salford, Melton Mowbray, Leicestershire, LE14 4SY.
- 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 site is currently occupied by a number of farm buildings, with the proposals to convert these and build a number of new residential dwellings resulting in a total of 5 houses and associated external works.
- 1.1.4 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 detail for planning approval for this particular proposal.
- SuDS: Designs, Maintenance Plans & Calculations - for SuDS proposed, the LLFA require product specifications or design drawings, all supporting calculations and a maintenance plan.

2 Site Description

2.1.1 The site is approximately 8580 square metres in size and located at Deben Farm, Landyke Lane, Scalford, Melton Mowbray, Leicestershire, LE14 4SY

2.1.2 The site location information is as follows:

Location: LE14 4SY

2.2 *Topography*

Site Topography

2.2.1 An onsite topographic survey has been carried out and is provided in Appendix B.

2.2.2 The site is generally rectangular in shape and falls from the rear to the front (Deben Lane).

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 likely ground conditions and possible infiltration structures.

3.1.3 Bgs Maps indicate that the local Geology is as follows:

Dyrham Formation - Siltstone And Mudstone, Interbedded. Sedimentary Bedrock formed approximately 183 to 191 million years ago in the Jurassic Period. Local environment previously dominated by shallow seas.

Oadby Member (lias-rich) - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions (U).

3.1.4 As the ground conditions indicate impermeable ground, soakaways are unlikely to be a possibility. As well as this, initial soakaway tests have indicated little to no infiltration and soakaways have not been considered for this site.

Discharge to Surface Water Body

3.1.5 There is a drainage ditch at the site frontage that discharges to the nearby waterway that is to be used for drainage.

Discharge to Surface Water Sewer/Combined Sewer

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

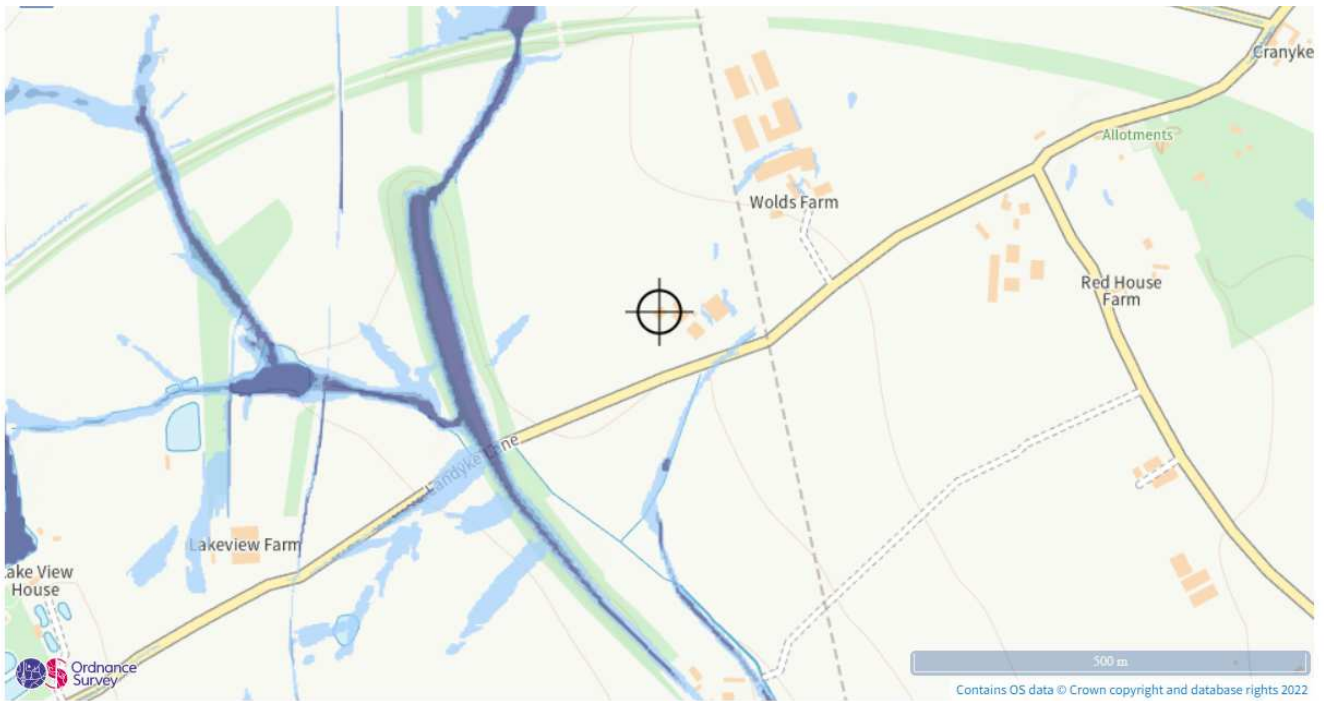
3.1.7 There are no sewers in the area.

3.2 ***Surface water flooding***

3.2.1 Surface water flooding occurs when the rainwater does not drain away through the normal drainage system or infiltrate the ground, but instead lies on or flows over the ground.

3.2.2 The EA produced a Risk of Flooding from Surface Water Map in December 2013. The maps were produced using 'direct rainfall' modelling. Although they consider local drainage capacity, non-surface water influences such as rivers, seas or groundwater are not considered. The map is based on LIDAR topographic data which is not suitable for site specific assessment and therefore, where available, topographic survey data should be used to provide a more accurate understanding of potential flow paths.

3.2.3 As can be seen below, there is minimal risk of surface water flooding to the site. While a small amount of low risk flooding is shown, levels will be designed to fall away from buildings and so there is minimal risk of flooding to the buildings.



Extent of flooding from surface water

● High ● Medium ● Low ○ Very low ⊕ Location you selected

Figure 1: EA Flood Risk from Surface Water Map

3.3 Sustainable Drainage Systems (SuDS)

3.3.1 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

Component	Recommendation
Green (living) roofs	<p>Whilst the use of green roofs provides additional environmental benefits such as enhanced aesthetics and ecology, its exposure to wind and 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 proposed roof is pitched and is unsuitable for installation of a green roof.</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>

Component	Recommendation
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.</p>
Infiltration Devices	<p>Infiltration devices are not suitable for this 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 constructed with tanked 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 Site Areas

4.1.1 The existing and proposed areas are summarised below.

Table 2: Site Areas

Parameter	Existing (m ²)	Existing (%)	Proposed (m ²)	Proposed (%)
Impermeable area	2690	31	2960	34
Permeable area	5890	69	5620	66
Total area	8580	100	8580	100

4.1.2 It is assumed that the surface water runoff from the site either drains into an existing drainage system or is currently infiltrated into the ground.

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. A 10% allowance for urban creep has been included within the calculations.

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 Greenfield Run-Off Rates

4.3.1 The greenfield run off rates have been calculated using the Wallingford method. Calculations are provided in Appendix C and summarised in the table below.

4.4 Existing Run-Off Rates

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

4.4.2 The total site area is 8580 square metres and is 31% impermeable, resulting in an impermeable area of 2690 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

2690/1000 x 50 x 2.78 = **37.4 l/s**

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

2690/1000 x 125 x 2.78 = **93.5 l/s**

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

$$2690/1000 \times 185 \times 2.78 = 138.3 \text{ l/s}$$

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

Table 3: Existing Run-off Rates

Parameter	Greenfield Discharge (l/s)	Existing Discharge (l/s)	Proposed Discharge (l/s)
QBAR	3.74	NA	NA
1 year	3.11	37.4	18.7
30 year	7.49	93.5	18.7
100 year	9.62	138.3	18.7
100 year +40%	NA	NA	18.7

4.4.4 Site discharge should be as close to the greenfield rates as possible. However as the greenfield rates are low, it is proposed to limit flow to less than 50% of the existing 1 year flow and thus flow is limited to 18.7l/s for all storm events.

4.5 **Attenuation**

4.5.1 It is proposed to discharge to the existing drainage ditch at a discharge rate of 18.7 litres/second.

4.5.2 A design drawing and calculations of the required attenuation is provided in Appendix C. The total attenuation volume is approximately 100 cubic metres for the 100 year +40% storm event.

4.5.3 The drainage ditch owner will be contacted for approval of the discharge if required. See Appendix C for calculations and discharge location.

4.6 **Exceedance Flooding and Overland Flow**

4.6.1 The area is not subject to overland flow routes or surface water flooding as discussed in section 5 above.

4.6.2 The drainage system has been designed to cater for the 1 in 100 year + 40% climate change storm. ie in this storm event all surface water will be collected on site and slowly released. Thus, the overland flow route will only be in use in the event of drainage network failure, storms in excess of the 1 in 100 year + 40% climate change storm or flows from offsite flowing through the site.

4.6.3 Due to the site levels falling to the street, all overland flow will move towards the sewers and existing overland flow path in the street. See overland flow plan in Appendix C.

4.7 **Consents, Offsite Works and Diversions**

4.7.1 The proposed surface water drainage strategy is accommodated almost entirely on-site, with the only off site works being the piped connection to the existing drainage ditch.

4.8 Maintenance

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

4.9 Foul Drainage

- 4.9.1 It is proposed to discharge the foul drainage from the development site into a Biodisc treatment system for each dwelling which discharges into the drainage ditch at the street frontage.

5 Drainage during construction

5.1 Construction Run-off Management

5.1.1 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).

5.1.2 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.

5.2 Management of Construction (Including Drainage)

5.2.1 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.

5.2.2 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.

5.3 Temporary Drainage During Construction

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

5.3.2 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.

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

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

5.3.5 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.

5.3.6 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.

5.3.7 Any necessary surface stabilisation measures are to be applied immediately on all disturbed areas where construction work is either delayed or incomplete.

5.3.8 Maintenance inspections are to be performed weekly, and maintenance repairs to be made immediately after periods of rainfall.

5.4 ***Protection of Drainage Infrastructure during Construction***

- 5.4.1 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

Notes:
 Copyright retained in accordance with the copyright design and patents act 1988. Dimensions must not be scaled from this drawing. The contractor is to check and verify all building and site dimensions before work is commenced. The Contractor is to check and verify with all Statutory Authorities and Employer the local and condition of any underground or overhead services or confirm that none exist prior to work commencing on site.

CDM Regulations 2015:
 Denotes a significant hazard or difficult to manage procedure. Please refer to 'Designer Risk Assessment' for further information regarding mitigation of hazards.

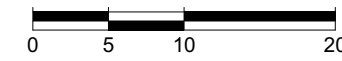
CDM Regulations, require all projects to:
 - Have workers with the correct skills, knowledge, training and experience.
 - Contractors providing appropriate supervision, instruction and information.
 - A written Construction Phase Plan.
 Swain Architecture are appointed as 'Designer' only, unless appointed by the client in writing to confirm Swain Architecture's role as 'Principal Designer'.



-  Existing Trees
-  Proposed Trees
-  Hedgerow
-  Existing Grass/Vegetation
-  Proposed Planting/Grass/Vegetation
-  Paving/Patio Areas
-  Proposed Access Roads/Driveways

See Landscaping plan for details of hardstanding/planting etc.

Proposed Site Plan 1:500



Scale Bar 1:500

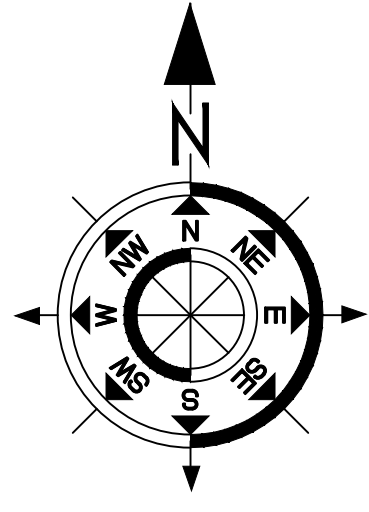
Rev	Description	Date
A	Bin Storage	Sept 21

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Client: Willett Homes Developments LLP	Date: July 2021
Project: Deben Farm, Landyke Lane, Scalford	Paper Size: A2
Drawing: Proposed Site Plan	Scale: 1:500
Number: 20.205.S03.101	Drawn By: ER
	Checked By:

Appendix B: Topographic Survey



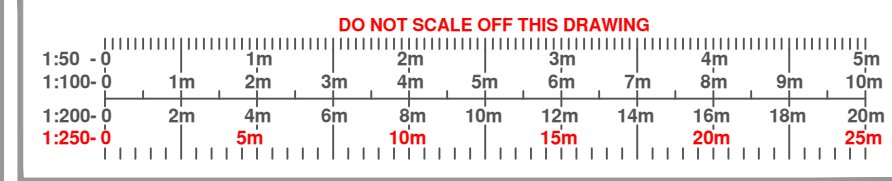
Topographical Survey Abbreviations

AC	AIR CONDITIONING UNIT	LP	LAMP POST
B	BOLLARD	MKR	MARKER POST
BB	BELISHA BEACON	MH	MANHOLE
BED	BED LEVEL	OHC	OVERHEAD CABLE
BH	BOREHOLE (WITH No.)	PM	PARKING METER
BS	BUS STOP	P	POST
BT	BRITISH TELECOM COVER	RE	RODDING EYE
CATV	CABLE TELEVISION COVER	RS	ROAD SIGN
CC	CONTROL CABINET	RWL	RETAINING WALL
CL	COVER LEVEL (MANHOLE)	SA	SOAK AWAY
COL	COLUMN	SCAM	SECURITY CAMERA
CP	CATCH PIT	SG	STRIP GULLY
DP	RAIN WATER DOWN PIPE	SP	SIGN POST
EC	ELECTRIC CABLE	SV	STOP VALVE
EL	ELECTRIC COVER	TAP	WATER TAP
EP	ELECTRIC POLE	TGB	TELEPHONE CALL BACK
ER	EARTH ROD	THL	THRESHOLD LEVEL
FFL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHT
FH	FIRE HYDRANT	TOF	TOP OF FENCE LEVEL
FLT	FLOODLIGHT	TOW	TOP OF WALL LEVEL
G	GULLY	TP	TELEGRAPH POLE
GP	GATE POST	TPF	TRIAL PIT (WITH No)
GV	GAS VALVE	VP	VENT PIPE
IC	INSPECTION CHAMBER	WLV	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
KO	KERB OUTLET	WO	WASH OUT
LB	LITTER BIN		

	BUILDINGS
	OPEN SIDED BUILDINGS
	TREE SPREAD & DIA. TO SCALE

Technical Notes:

- All survey levels and co-ordinates are related to OS Datum using the GPS Active Network. The Grid is orientated to Grid North with a Scale Factor of 1.00.
- All Boundaries surveyed are physical features. Please bear in mind that these may not represent the legally conveyed ownership.
- Trees are drawn to scale showing the average canopy spread and are approximate only. Where heights are shown they have been taken from ground level and are an estimate only.
- All underground features have been measured from the surface, therefore pipe sizes, depths etc are only an estimate or assumption. If dimensions are critical information must be checked and verified prior to work commencing.
- Whilst every effort has been made to locate all physical features during the survey no responsibility can be taken where features are obscured or hidden at the time of survey. This is especially important where high volumes of plant or vehicles are present on site.
- Off site features may have been measured remotely and as such may not show the full detail of the feature due to limited access or obstructions with line of sight.
- All critical dimensions including levels should be checked prior to construction. Any errors or discrepancies should be reported immediately.
- All measurements have been taken from ground level only.
- Do not scale from this drawing.



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Client: **Mr S Willett**

Project: **Deben Farm
Landyke Lane
Scalford**

Drawing Title: **Topographical Survey**

Rev	Description	Surveyed	Approved	Date

Surveyor: VM/SB	Checked By: AJS	Approved By: AJS	Date of Survey: 06/07/19	Date of Issue: 17/07/19
Drawing Status: Final	Scale: 1:250	Paper Size: A1	Sheet No: 1 of 1	
Project No: RBS - 19/1627	Drawing No: RBS - 19/1627/001	Revision: -		



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Appendix C: Drainage Drawings and Calculations

Print

Close Report



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

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

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

Default Edited

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

Default Edited

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

Notes

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

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

(2) Are flow rates < 5.0 l/s?

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates	Default	Edited
Q _{BAR} (l/s):	<input type="text" value="3.74"/>	<input type="text" value="3.74"/>
1 in 1 year (l/s):	<input type="text" value="3.11"/>	<input type="text" value="3.11"/>
1 in 30 years (l/s):	<input type="text" value="7.49"/>	<input type="text" value="7.49"/>
1 in 100 year (l/s):	<input type="text" value="9.62"/>	<input type="text" value="9.62"/>
1 in 200 years (l/s):	<input type="text" value="11.38"/>	<input type="text" value="11.38"/>

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

ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR
 NOTE: CONTRACTOR TO NOTE THE LIKELY PRESENCE OF MULTIPLE EXISTING SERVICES.
 ALL SERVICES TO BE CONFIRMED PRIOR TO CONSTRUCTION AND DIVERTED AS NECESSARY

- NOTES
- THIS DRAWING IS FOR PLANNING ONLY AND 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.
 - 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 NEW PAVING AND EDGING KERBS SHOWN INDICATIVE ONLY AND SUBJECT TO LANDSCAPE ARCHITECT DESIGN.
 - ALL RWP AND FO SHOWN ARE INDICATIVE ONLY AND SUBJECT TO APPROVAL AND SETTING OUT BY THE ARCHITECT.
 - NODE NUMBERS REFER TO DRAINAGE MODEL WITHIN REPORT
 - REFER TO TBL DRAINAGE SURVEY REF 9675 FOR EXISTING DRAINAGE SYSTEM DETAILS
 - UNLESS NOTED OTHERWISE, PIPES TO BE:
 FOUL PIPES UNDER BUILDING @100@1:40,
 FOUL PIPES EXTERNAL @100@1:80,
 SURFACE WATER PIPES @100@1:100



DRAINAGE CONCEPT LEGEND

- - - - - **>@100@1:100** Stormwater Pipe - Diameter and fall
- - - - - **>@150@1:100** Perforated Pipe - Diameter and fall
- **SMH**
Ø1200
CL 80.90
IL 80.00 Manhole type - SMH Surface Water
Diameter
Cover Level
Invert Level
- **SWIC**
Ø450 Polypropylene Inspection Chamber (PPIC)
- **RWP** Rain Water Pipe
- - - - - **>@150@1:100** Foul Pipe - Diameter and fall
- **FWIC**
Ø450 Polypropylene Inspection Chamber (PPIC)
- **FO** Foul Outlet - ground floor
- **CMH**
Ø1200
CL 80.90
IL 80.00 Manhole type - CMH Combined manhole
Diameter
Cover Level
Invert Level
- Permeable Paving

EXTERNAL WORKS KEY

- 18.30+** Proposed Level
- FFL 80.90** Finished floor level

Rev	Description	Eng	Draft	Date

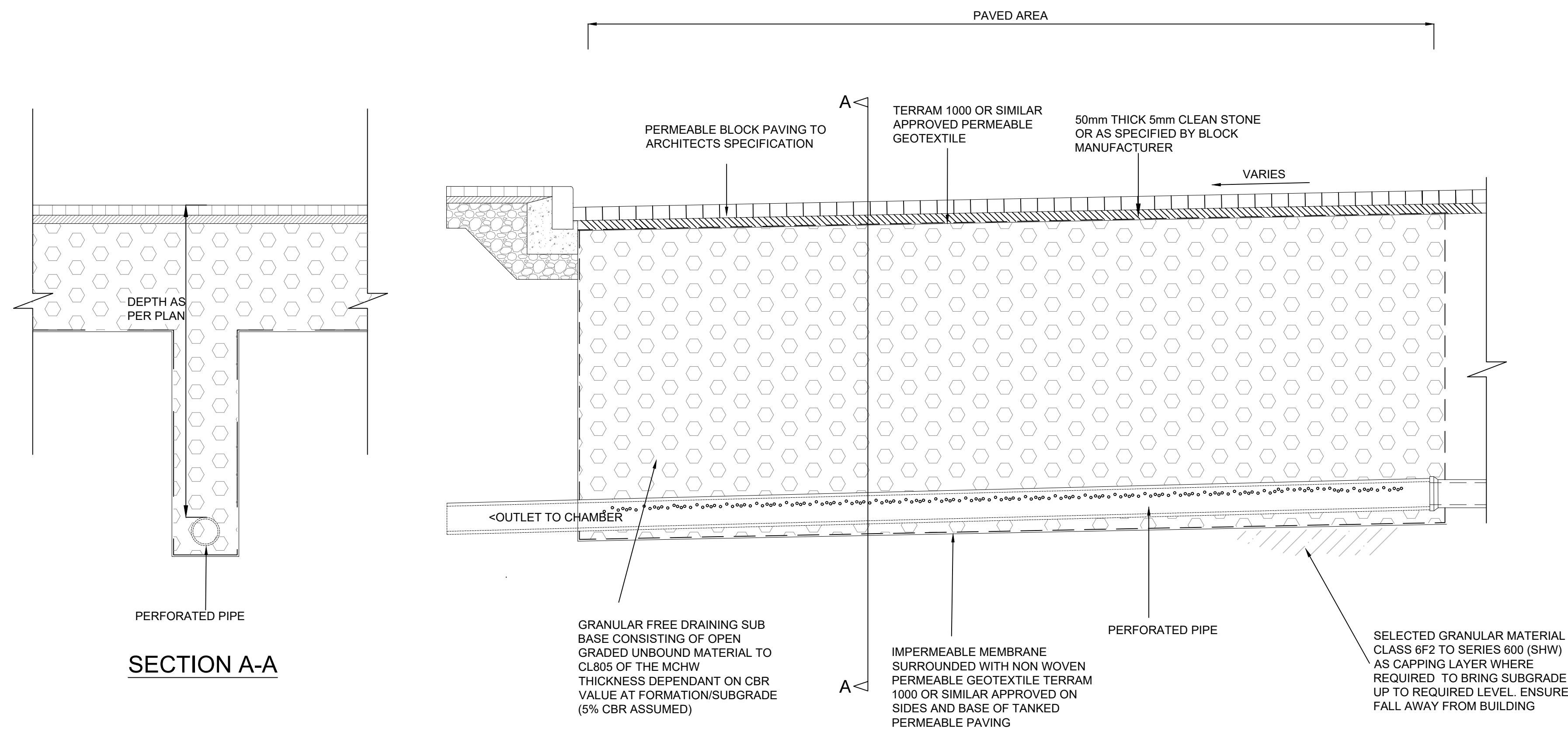


Project
DEBEN FARM, LANDYKE LANE

Title
PROPOSED DRAINAGE PLAN

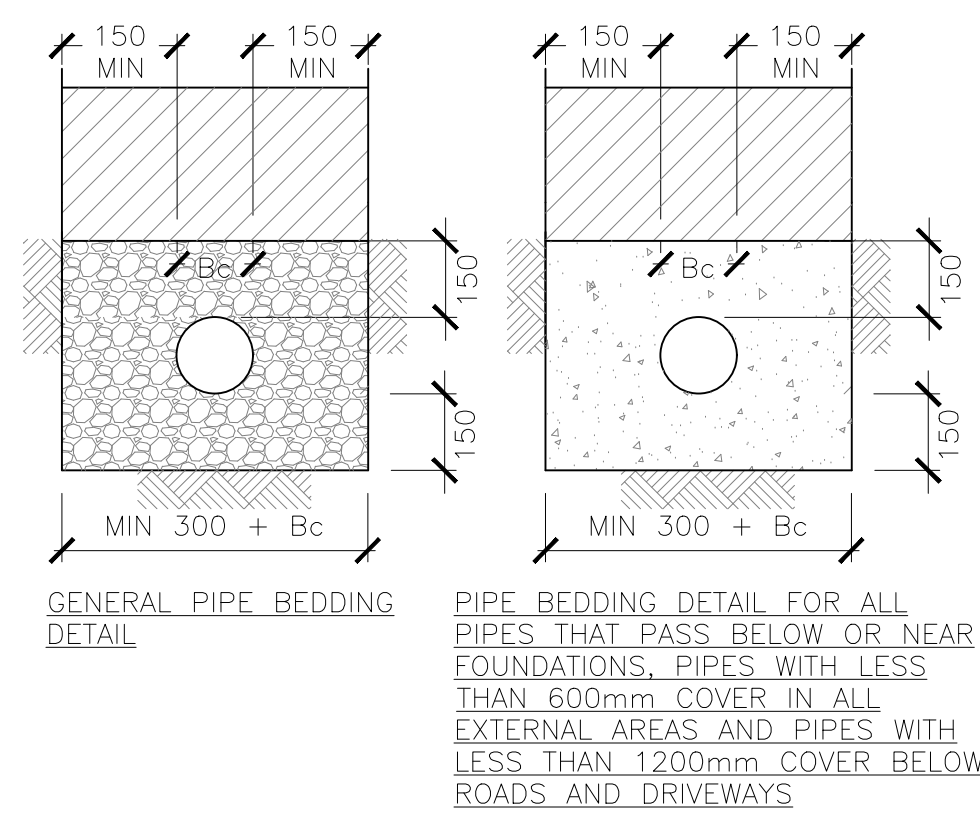
Scale: A1 1:250	Drawn CR	Authorised AW
Job No 21-186	Drawing No C01	Revision -

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SERIES DESIGN DRAWINGS, SPECIFICATIONS AND DOCUMENTATION.
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- 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 BS EN 1401-1 OR CLAYWARE TO BS EN295 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 BS EN 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 COMPACTIBLE 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 BS EN124 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.

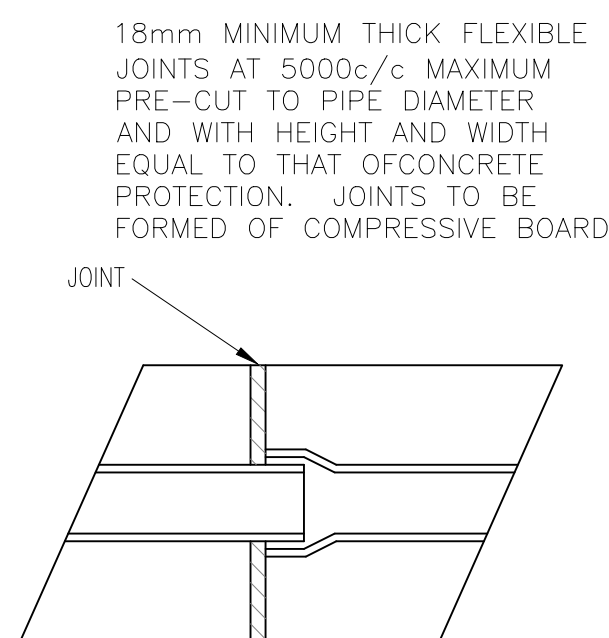


TANKED PERMEABLE PAVING DETAIL

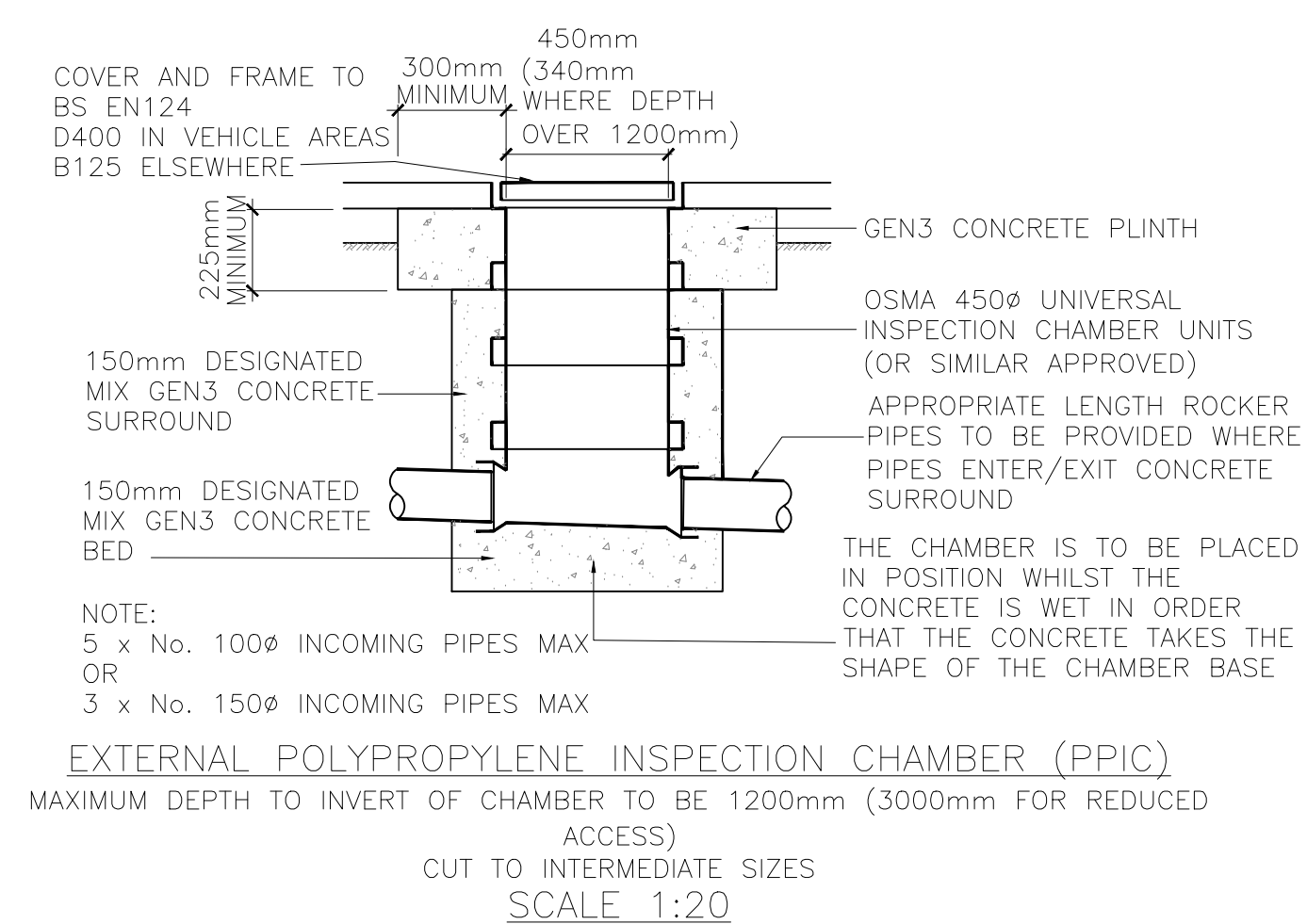
SCALE 1:20



PIPE BEDDING DETAIL
SCALE 1:10



FLEXIBLE JOINTS IN CONCRETE PROTECTION
SCALE 1:10



Rev	Description	Eng	Draft	Date



Project
DEBEN FARM, LANDYKE LANE

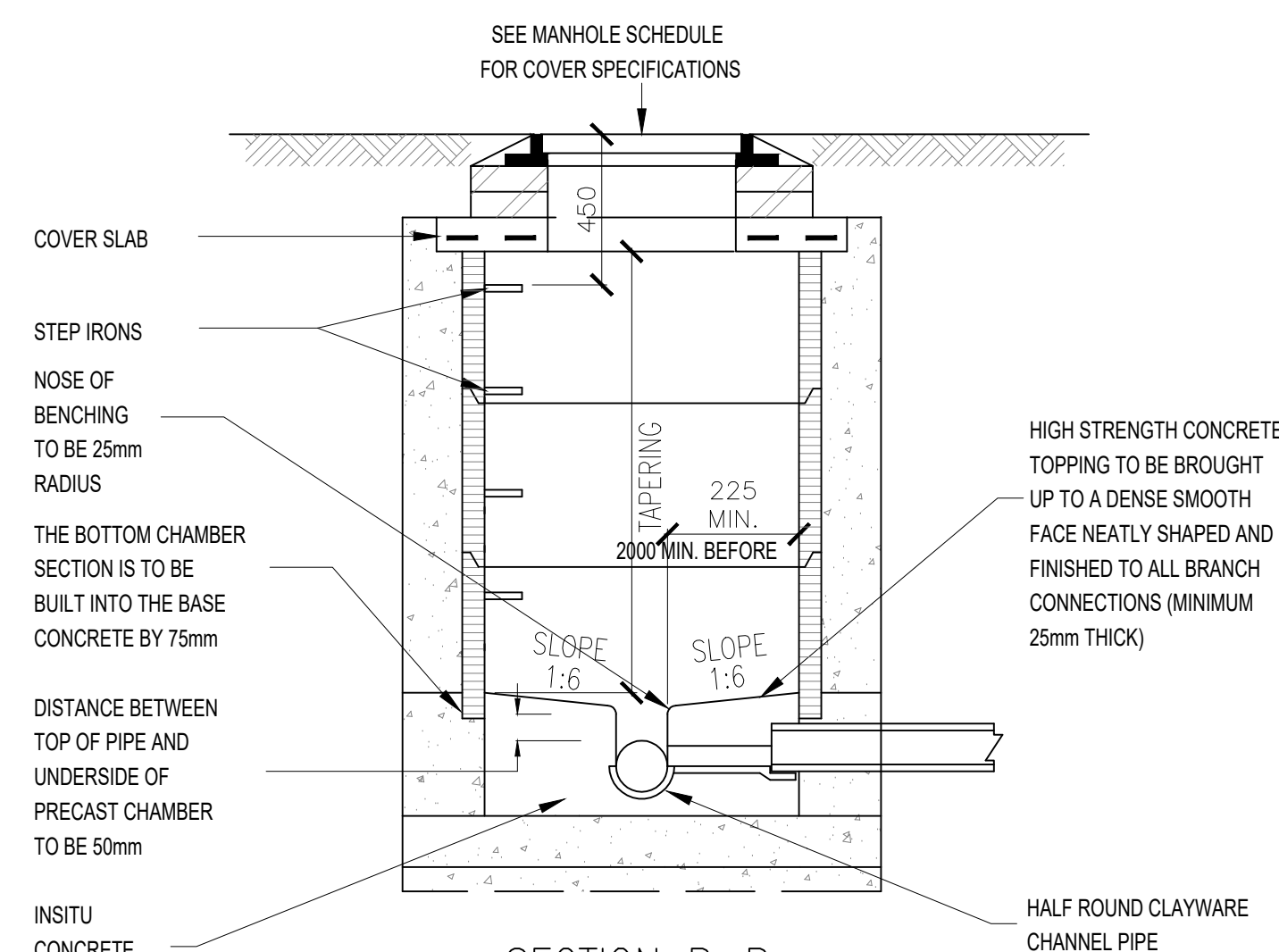
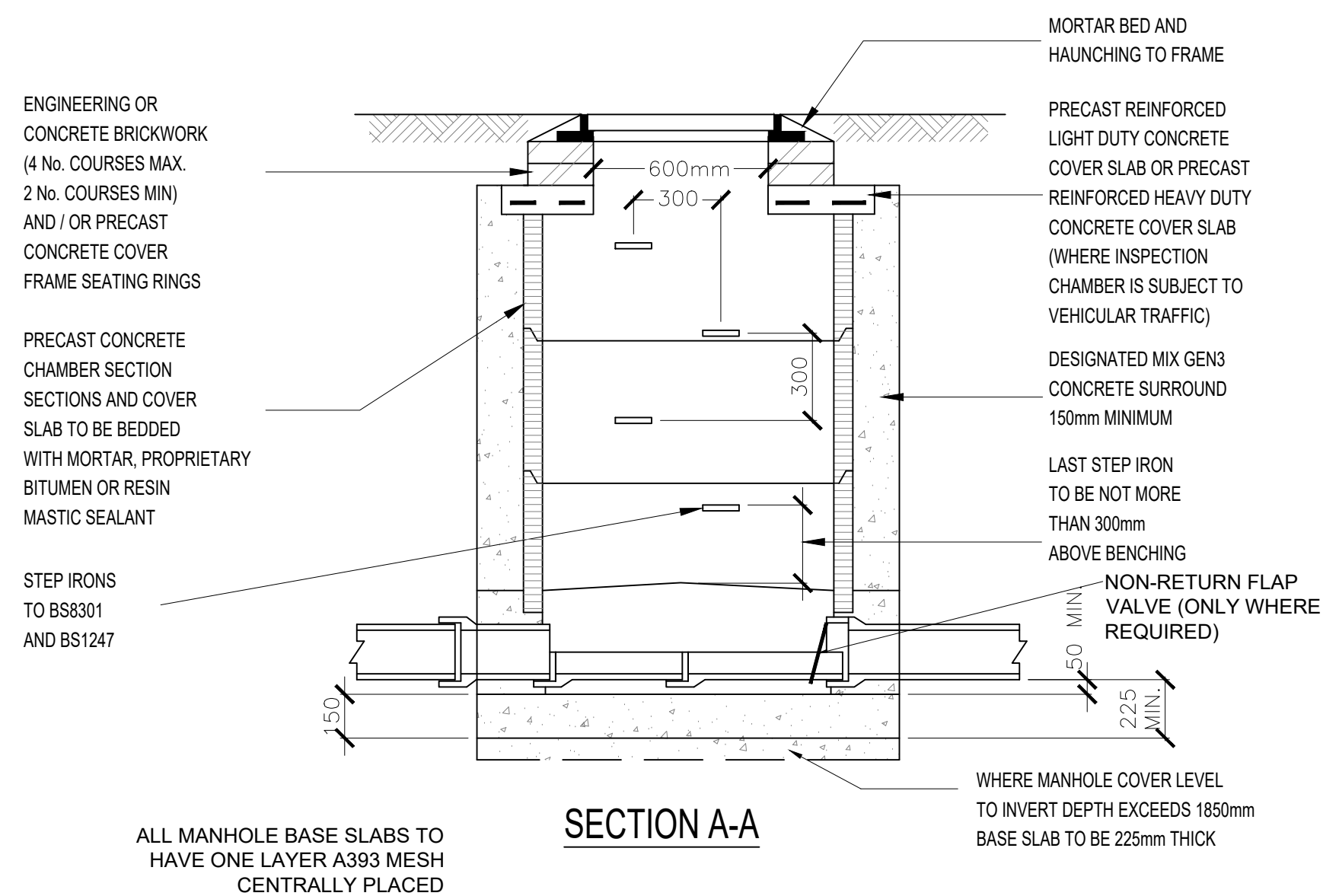
Title
CONSTRUCTION DETAILS

Scale	AS SHOWN	Drawn	CR	Authorised	AW
Job No	21-186	Drawing No	C02	Revision	-

ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR

NOTES

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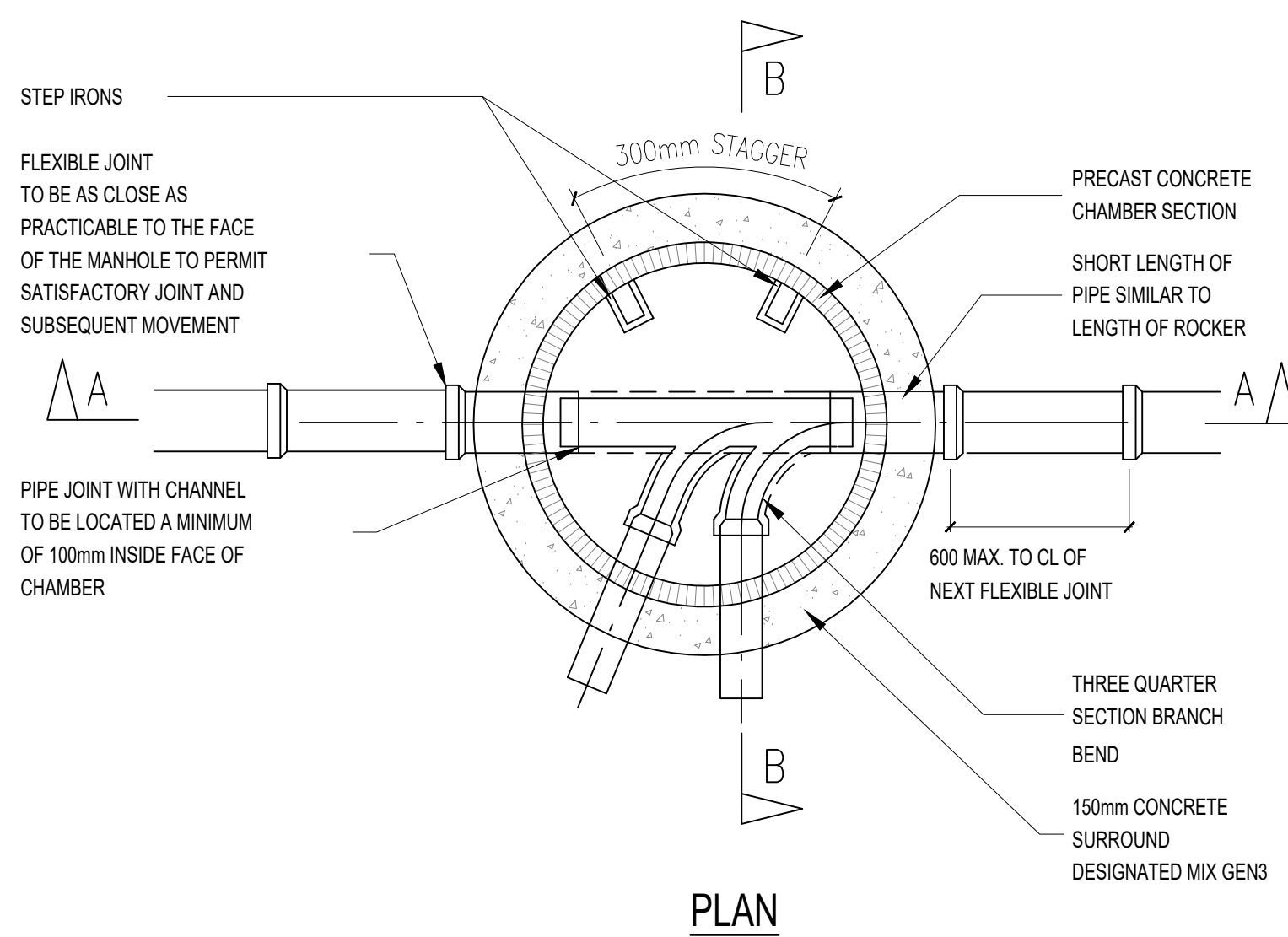
PRECAST CONCRETE MANHOLE TYPE B (PCC) IN EXTERNAL AREAS DETAIL

SCALE 1:20

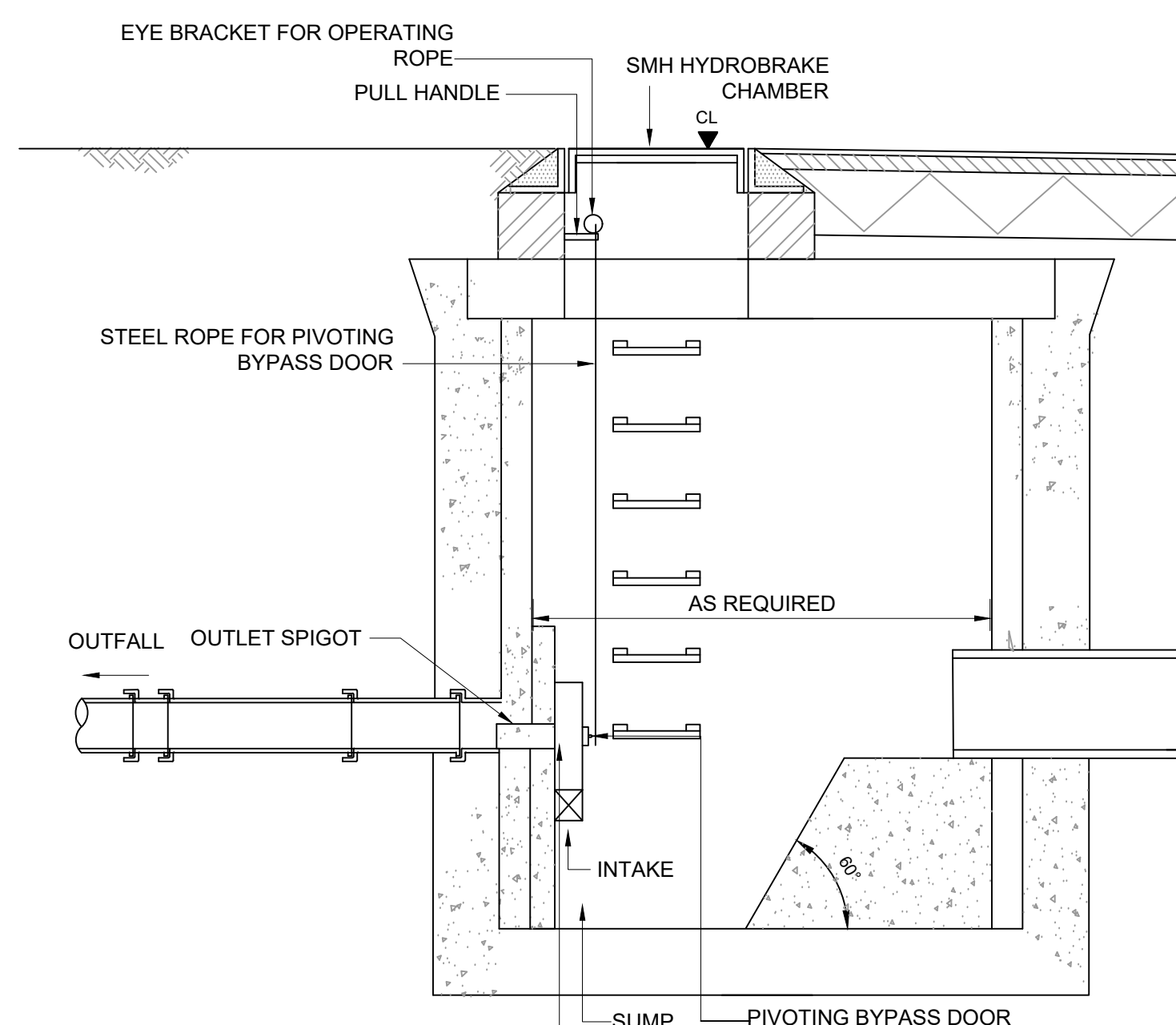
NOTES:
CHAMBERS WITH OUTGOING PIPES GREATER THAN 500mm DIAMETER SHALL BE FITTED WITH GUARD BARS, SAFETY CHAINS OR OTHER SAFETY DEVICES. TOE HOLES TO BE PROVIDED IN BENCHING OF SEWERS GREATER THAN 450mm DIAMETER FOR ACCESS TO INVERT. WHERE INTERNAL HEIGHT EXCEEDS 1800mm MANHOLE MAY BE PROVIDED WITH REDUCING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



PLAN



HYDROBRAKE OUTLET DETAIL

SCALE 1:20

Rev	Description	Eng	Draft	Date



Project
DEBEN FARM, LANDYKE LANE

Title
CONSTRUCTION DETAILS 2

Scale: A1 AS SHOWN Drawn: CR Authorised: AW


Job No: 21-186 Drawing No: C03 Revision: -

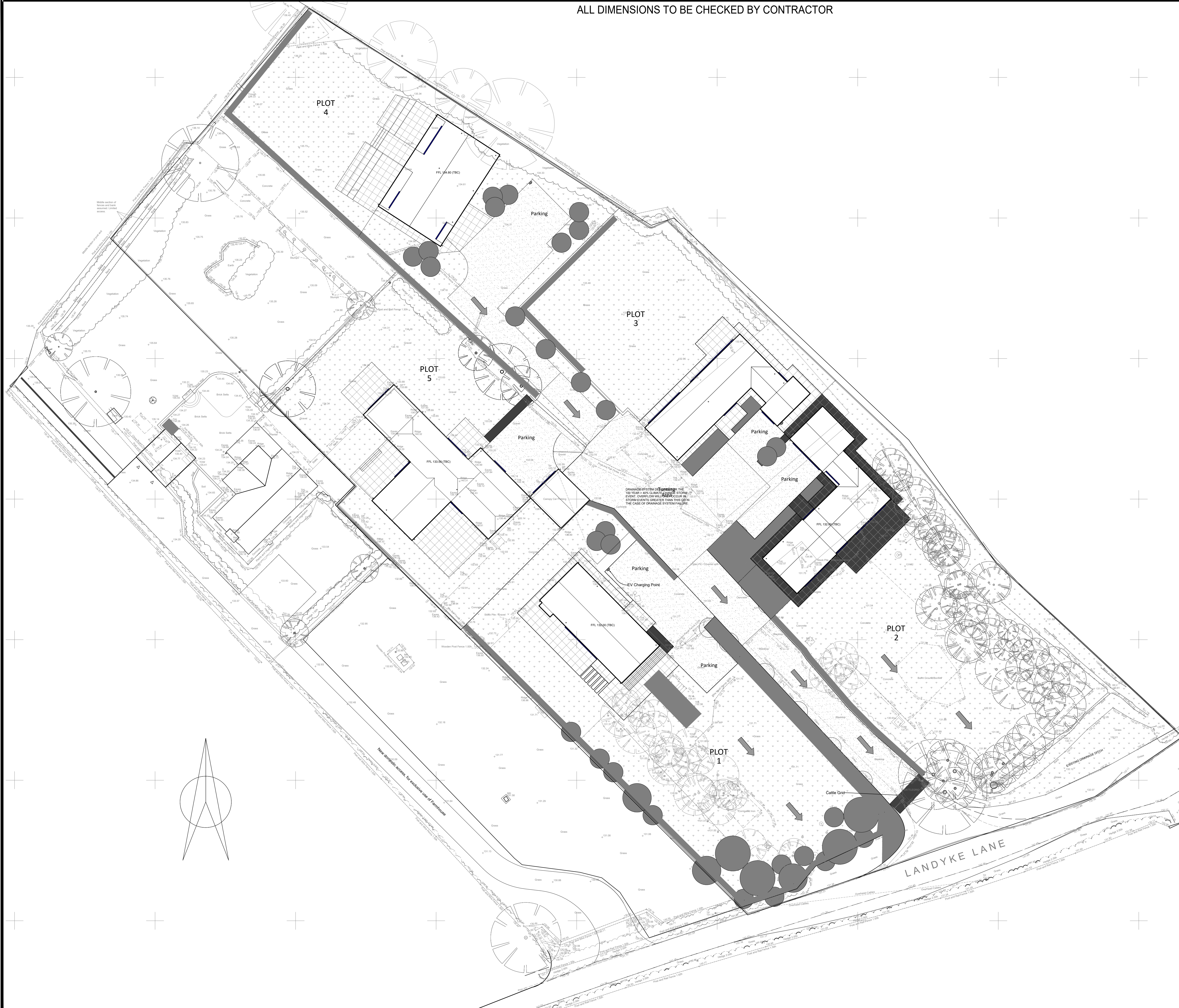
ALL DIMENSIONS TO BE CHECKED BY CONTRACTOR

NOTES

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2. CONSTRUCTION TO BE IN ACCORDANCE WITH ALL BRITISH AND EUROPEAN STANDARDS AND BUILDING REGULATIONS.
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STORMWATER CONCEPT LEGEND

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



Rev	Description	Eng	Draft	Date



Project
DEBEN FARM, LANDYKE LANE

Title
OVERLAND FLOW

Scale : A1 1:50	Drawn CR	Authorised AW
Job No 21-186	Drawing No C04	Revision -

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	40	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	2.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1			131.000	450	50.000	50.000	0.850
2	0.160	2.00	131.730	1800	57.000	75.000	1.330
3	0.160	2.00	132.800	1200	60.000	95.000	1.500

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)
1.00	2	1	25.962	0.600	130.400	130.150	0.250	103.8	225	2.46	50.0
1.01	3	2	20.224	0.600	131.300	130.400	0.900	22.5	225	2.12	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)
1.00	1.282	51.0	60.7	1.105	0.625	0.320	0.0	225	1.306
1.01	2.772	110.2	30.4	1.275	1.105	0.160	0.0	80	2.375

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)
1.00	25.962	103.8	225	Circular	131.730	130.400	1.105	131.000	130.150	0.625
1.01	20.224	22.5	225	Circular	132.800	131.300	1.275	131.730	130.400	1.105

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.00	2	1800	Manhole	Adoptable	1	450	Manhole	Adoptable
1.01	3	1200	Manhole	Adoptable	2	1800	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	131.000	0.850	450	 1	1.00	130.150	225
2	57.000	75.000	131.730	1.330	1800	 1	1.01	130.400	225
						0	1.00	130.400	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
3	60.000	95.000	132.800	1.500	1200		0	1.01	131.300	225

Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	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 %)
2	0	0	0
10	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node 2 Online Hydro-Brake® Control

Flap Valve	x	Objective (HE)	Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	130.400	Product Number	CTL-SHE-0190-1870-1200-1870
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	18.7	Min Node Diameter (mm)	1500

Node 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	130.600
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Time to half empty (mins)	68

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	0.0	0.0	1.000	560.0	0.0	1.010	1.0	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	130.150	0.000	18.6	0.0000	0.0000	OK
15 minute winter	2	12	130.879	0.479	54.2	8.9042	0.0000	SURCHARGED
15 minute summer	3	9	131.381	0.080	30.4	0.2627	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	2	Hydro-Brake®	1	18.6				21.2
15 minute summer	3	1.01	2	30.5	0.982	0.277	0.5310	

Results for 10 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	130.150	0.000	18.6	0.0000	0.0000	OK
15 minute winter	2	14	131.090	0.690	98.1	23.5419	0.0000	SURCHARGED
15 minute summer	3	9	131.428	0.128	55.5	0.4183	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
15 minute winter	2	Hydro-Brake®	1	18.6				38.6
15 minute summer	3	1.01	2	54.8	1.546	0.498	0.6382	

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	130.150	0.000	18.6	0.0000	0.0000	OK
30 minute winter	2	28	131.230	0.830	89.6	37.4047	0.0000	SURCHARGED
15 minute summer	3	9	131.474	0.174	72.5	0.5692	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute winter	2	Hydro-Brake®	1	18.6				65.6
15 minute summer	3	1.01	2	71.1	1.836	0.645	0.7362	

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	130.150	0.000	18.6	0.0000	0.0000	OK
30 minute winter	2	29	131.392	0.992	119.6	57.5948	0.0000	SURCHARGED
15 minute summer	3	9	131.802	0.502	95.5	1.6395	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
30 minute winter	2	Hydro-Brake®	1	18.6				88.0
15 minute summer	3	1.01	2	85.4	2.148	0.775	0.8043	

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.32%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	1	1	130.150	0.000	18.6	0.0000	0.0000	OK
60 minute winter	2	50	131.696	1.296	104.3	91.2850	0.0000	FLOOD RISK
15 minute summer	3	9	132.471	1.171	133.5	3.8225	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)	Discharge Vol (m ³)
60 minute winter	2	Hydro-Brake®	1	19.4				154.2
15 minute summer	3	1.01	2	114.3	2.874	1.037	0.8043	

BioDisc® BA-BC

High Performance Package Sewage Treatment Plants
for Residential Applications



BioDisc® BA-BC

High Performance Package Treatment Plants for Residential Applications

For domestic dwellings without access to mains drainage, the Klargester BioDisc® provides a reliable, efficient and environmentally safe solution to your sewage disposal needs.

It is ideal for locations where discharge is to sub-surface irrigation, or to a suitable water course where approved by the Environment Agency, or appropriate regulating body and where a septic tank will not meet the required standards.

Certified to meet European Standard prEN 12566- Part 3

In 2005, the BioDisc® underwent 40 weeks of stringent testing to assess its treatment efficiency as part of Klargester's commitment to meet the new European Standard for small treatment plants.

After delivering exceptionally high levels of pollution removal (95%) under varying loads and conditions, the BioDisc® was awarded its Performance Certificate. The test report also highlighted:

- BioDisc operates without noise or odour
- Maintenance requirements are low with good access
- No technical or mechanical faults
- Low power consumption at 1.3kw/h - approx 10-14 pence per day*
- Low sludge build up and large storage capacity

Designed for Quality, Reliability and Peace of Mind

Klargester has pioneered the development of packaged treatment plant with many thousands of successful installations world-wide. BioDisc® is robustly constructed from corrosion free materials, designed and manufactured in accordance with BS 6297 and has been awarded British and Irish Board of Agrément Certification (for BA and BB sizes only). Klargester is an accredited company under BS EN ISO 9001:2000 quality management systems.

Unique Design

BioDisc® is the only packaged sewage treatment plant utilising Rotating Biological Contactor technology for small domestic applications. This process offers inherent cost and performance benefits.

Assured Performance

The Klargester BioDisc® is a high performance package treatment plant which, in normal domestic situations, will produce effluent qualities of better than 15mg/l BOD, 25mg/l SS and 15mg/l ammonia.

Low Running Costs

BioDisc® has the lowest running and maintenance costs of any packaged treatment plant in its class. The single home unit requires an annual de-sludge only, the motor rating is 50 watts and routine mechanical maintenance is minimal.

Low Lifetime Costs

Lowest running costs combined with the quality and durability of the equipment - particularly the drive motor which has a considerably longer service life than the pumps and blowers fitted to competitive units - all add up to a significantly lower lifetime cost for BioDisc®.

Process Stability

BioDisc® is recognised for its process performance. This is further enhanced by Klargester's unique Managed Flow System, which ensures optimum performance by smoothing peak flows and buffering biological loads over the whole working day.

Dispersal

Subject to relevant authorities consent, the plant discharge can be a watercourse or, provided the soil percolation test is satisfactory, to a ground soakaway.

Low Profile Covers

Access for service and maintenance is provided via a durable, unobtrusive cover at ground level.

Standard Invert Options

Three standard drain invert level options are available from stock to match the site topography and where applicable, minimise the excavation depth. BA and BB BioDisc® are available with an integral pump to move effluent from point of treatment if site level demands.

Hiab Off-loading

Klargester can provide on-site mechanical off-loading, if required.

Quick and Easy to Install

Supplied as a complete paletised unit with lifting and lowering fixings, the BioDisc® is ready for installation on a suitably prepared site. The unit should be stabilised in concrete and the back fill completed with concrete.

Full details are provided in our comprehensive installation instructions covering all site conditions, or we can provide an installation service through our network of Certified Installers.

Additional technical information sheets are available on the BioDisc® process, siting, installation, effluent disposal and other specific topics. Please contact Klargester for further information.

Nationwide Availability

Klargester products can be sourced from your local builders merchant or through local pollution control specialists.

12 Month Warranty

A full initial 12 month warranty covering all mechanical and electrical components against malfunction accompanies every BioDisc® installed and maintained in accordance with the manufacturer's instructions, provided the unit has not been subjected to damage or abuse.



* BA model BioDisc® - prices subject to local supplier.

Unit Size	BA	BB	BC
Population Equivalent	1 House, Max. 6	2 house, Max. 12	3/4 House, Max. 18
Overall Diameter (A) mm	1995	1995	2450
Standard Drain Invert Inlet (B) mm	750*	750*	600†
Standard Outlet (C) mm	835	835	685
Depth from Invert to Base (D) mm	1400	1400	1820
Pipework Diameter (mm)	110	110	110
Sludge Storage (approx)	12 months	6 months	7 months
Standard Power Supply	Single phase	Single phase	Single phase
Motor Rating	60W	60W	75W
Weight (tonnes) standard units	0.388	0.418	0.600

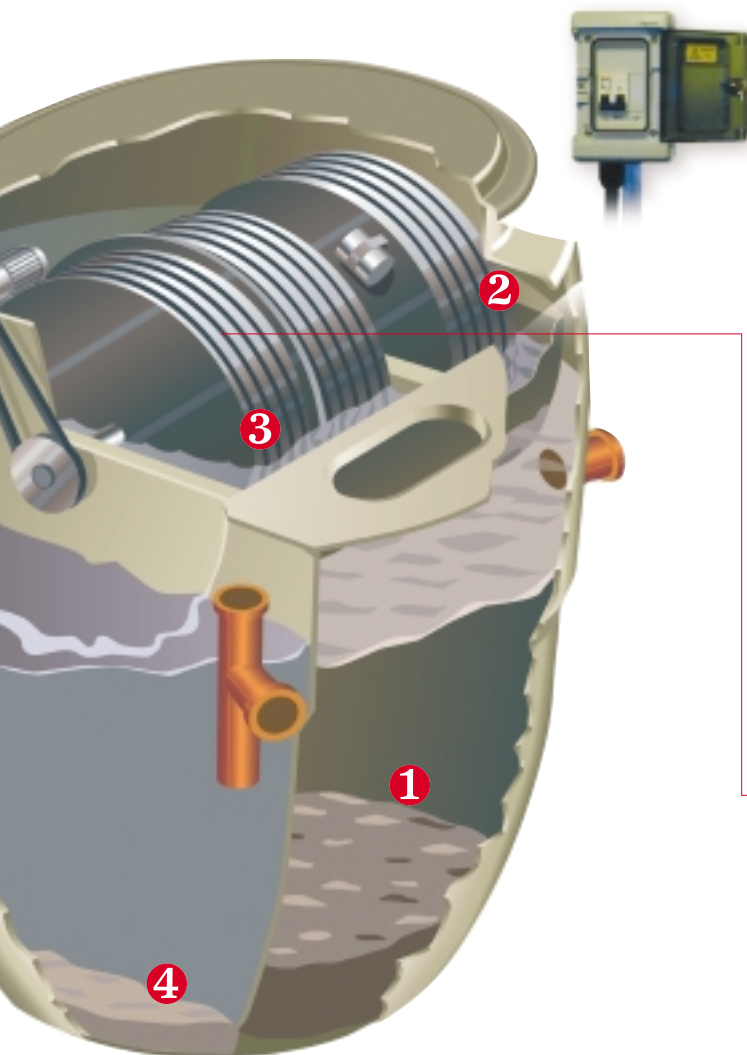
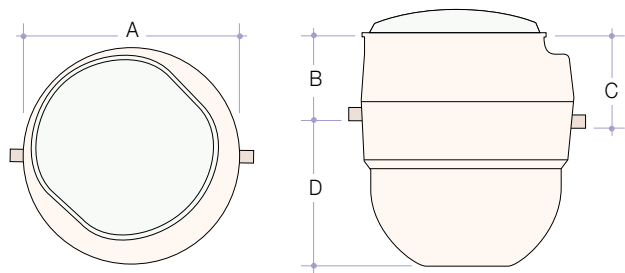
Applications which include waste disposal units will require special sizing.

Please consult Klargester.

* Optional invert depths of 450mm and 1250mm are available.

† Optional invert depth of 1100mm is available.

** Optional integral pump available in BA and BB models



How BioDisc® Works

Central to the operation of each BioDisc® is the Rotating Biological Contactor (RBC), which supports a biologically active film or Biomass on to which aerobic micro-organisms, naturally found in sewage, become established. Natural breakdown of sewage can then occur as described below.

The Breakdown Process

Waste water and sewage flows into the primary settlement zone **1** where solids are settled out and retained. This accumulated sludge should be drawn out periodically.

Partially clarified liquor containing fine suspended solids flows upwards into the first stage Biozone **2** for breaking down by micro-organisms on the RBC. Suspended solids return to the primary settlement zone and the liquor is transferred to the second stage Biozone **3** for further treatment.

Any solids remaining are settled out in the final settlement tank **4**. The quality of the resultant liquor allows discharge close to or into a water course.

Rotating Biological Contactor (RBC)

The RBC comprises banks of vacuum formed polypropylene media supported by a steel shaft. This is slowly rotated by a low energy consumption electric motor and drive assembly.

Note: BioDisc® is designed to deal with normal domestic sewage. If your application involves combined drainage or the sewage is likely to contain unusual substances, please consult Klargester.

Klargester Off-Mains Solutions

- BioDisc® Sewage Treatment Plants
- AirFlow Sewage Treatment Plants
- Sigma Sewage Treatment Plants
- Package Pump Systems
- Septic Tanks
- Cesspools
- Grease Traps
- Light Liquid Separators
- Silage Effluent Tanks
- Reed Beds
- Rainwater Harvesting



Certified Installers

Strategically located throughout the UK, Klargester Certified Installers are appointed following rigorous selection procedures which assess their installation expertise, reputation and financial status.

These performance criteria, together with their design skills and knowledge of Klargester products are also reviewed on an annual basis to ensure that the highest levels of professionalism are maintained.

Klargester Service

Klargester have a dedicated service division providing maintenance for waste water treatment products. Factory trained engineers are available for site visits as part of a planned maintenance contact or on an 'on-call' basis.

Unique Customer Care

Klargester offers a unique and comprehensive care package both before and after care. Throughout the UK, our team of service engineers is always on hand to ensure that Klargester products provide their owners with a long and cost-effective life. Call our Customer Care Department for further information.

Larger Applications

Klargester also manufactures a range of BioDisc® plant to cater for larger applications such as residential developments, caravan sites and hotels.

As specialists in waste water treatment we are able to provide solutions for many different applications. Please contact us for further information.

In keeping with Company policy of continuing research and development and in order to offer our clients the most advanced products, Klargester reserves the right to alter specifications and drawings without prior notice.



BRITISH WATER



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Appendix D: SuDS Maintenance Report

Drainage Maintenance Report

Site: Deben Farm, Landyke Lane, Scalford, Melton Mowbray

Prepared by: A Wallace

Date: 07-07-22

Project No: 21-186 – Report C02



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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 tanked permeable paving as the main SUDS feature. The following sections provides a brief description of this feature 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:-

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

Product Type	Period	Responsibility	Maintenance Methods
Drainage Pipes	Six monthly interval	Site Owner for private areas. Maintenance Company for communal areas	<ul style="list-style-type: none"> Inspect underground drainage pipes to ensure that the distribution pipework arrangement is operational and free from blockages. If required, take remedial action.
Permeable Paving	Monthly	Maintenance Company for communal areas	<ul style="list-style-type: none"> Debris removal from catchment surface (where may cause risks to performance).
	Annually	Maintenance Company for communal areas	<ul style="list-style-type: none"> Remove sediment from pre-treatment structures.
	As necessary	Maintenance Company for communal areas	<ul style="list-style-type: none"> Repair/rehabilitation of inlets, outlet, overflows.
	Annually and after large storms	Maintenance Company for communal areas	<ul style="list-style-type: none"> CCTV Inspection/check all inlets, outlets and overflows to ensure that they are in good condition and operating as designed.
Hydrobrake	Monthly for 3 months	Owner/ Maintenance Company	<ul style="list-style-type: none"> Inspect and identify any areas that are not operating correctly. If required, take remedial action.
	Monthly	Owner/ Maintenance Company	<ul style="list-style-type: none"> Debris removal from catchment surface (where may cause risks to performance).
	Annually	Owner/ Maintenance Company	<ul style="list-style-type: none"> Remove sediment from pre-treatment structures.
	Annually and after large storms	Owner/ Maintenance Company	<ul style="list-style-type: none"> Inspection/check all inlets and outlets to ensure that they are in good condition and operating as designed.

3.0 Sketches and Plans

3.1 The locations of the above features can be found by examining Drawing 21-186-C01