

MILL GREEN, SCROPTON

PHASE 1 DRAINAGE DESIGN REVISIONS



CLE30250/05/01

29 August 2019

DRAINAGE DESIGN REVISIONS

Document status

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Martin Spiers



11/09/2019

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1 INTRODUCTION

RPS has been commissioned by Mill Green Developments Limited to update the drainage design for the Mill Green, Scropton site to account for

- Changes in the proposals for the eastern part of the site, “Phase 2”
- Changes to proposals for the drainage of the western part of the site, “Phase 1”

Reference should be made to the original drainage statement (Clear Environmental Consultants Ltd report reference CLE10132/005/01 dated January 2015); the updated Flood Risk Assessment (RPS report reference CLE30199\05\01 dated December 2018); and the Flood Evacuation Plan (Clear Environmental Consultants Ltd report reference CL550/05/02 dated January 2011)

This report covers the revised drainage proposals for Phase 1.

1.1 Planning Conditions

1.1.1 Planning History

A number of planning applications have been submitted relating to the site, and for clarity these are summarised below:

Application reference	Details	Status
9/2019/0491	The erection of 6 detached dwellings with detached garages and associated works	Decision pending
9/2018/1047	The variation of condition 1 & 12 of planning permission ref: 9/2018/0592 in relation to plot 1 (garden wall) and landscaping	Decision pending
9/2018/0592	The variation of condition 1 of planning permission ref: 9/2017/1164 for the erection of six dwellings, to amend the design of plot 3	Removal/Variation of Conditions Granted
9/2017/1164	The variation of condition 1 of planning permission ref: 9/2017/0309 for the erection of six dwellings, to amend the design to plot 3	Removal/Variation of Conditions Granted
9/2017/0309	The variation of condition of planning permission ref: 9/2016/0003 (relating to the erection of six dwellings with improvements to site access and to Brook Lane/ Leathersley Lane junction)	Removal/Variation of Conditions Granted
9/2016/000	The removal of condition 6 of planning permission 9/2013/0342 (relating to the erection of six dwellings with improvements to site access and to Brook Lane/ Leathersley Lane junction)	Removal/Variation of Conditions Granted
9/2013/0342	The erection of six dwellings with improvements to site access and to Brook Lane/ Leathersley Lane junction	Full Permission Refused Granted on appeal

1.2 Development details

Phase 1 of the development lies in the western part of the site, bordered by the River Dove to the south, an un-named tributary to the west, and existing housing to the north-west.

Three new dwellings have already been constructed under the original planning approval (Plots 1, 2 and 4), and it is understood that development of Plot 3 is likely to be a self-build.

Ground levels around the constructed dwellings have been raised slightly, where necessary, to accommodate a finished floor level of 57.74mAOD to prevent flooding and damage to property during the 1 in 100 year + climate change event from the River Dove.

1.3 Design philosophy

Surface water drainage design has been undertaken in accordance with the following documents and guidance:

- Draft National Standards and Specified Criteria for Sustainable Drainage. defra, June 2014
- Building Regulations Approved Document H, HM Government, 2010 and 2015
- Sewers for Adoption, 7th Edition – WRC, August 2012
- National Planning Policy Framework and Planning Practice Guidance- Department for Communities and Local Government, March 2012
- National Standards for Sustainable Drainage Systems. Designing, constructing, operating and maintaining drainage for surface runoff. – defra, December 2011
- C753 The SuDS manual – CIRIA, 2015

Previous soakage tests undertaken by the developer have shown that the site is suitable for the use of infiltration drainage, and therefore surface water will be disposed of to the ground.

2 DRAINAGE DESIGN CHANGES

The drainage design changes within Phase 1 relate to access track drainage and the exceedance flow pathway in the vicinity of Plot 1, and to access track drainage to the west of this across the remainder of the Phase 1 site.

2.1 Access track drainage at Plots 1 and 2

The original design included a roadside swale along the southern side of the swale at Plot 1. This collected runoff from the access track and provided attenuation to allow this to be infiltrated into the ground.

This section of swale has been relocated to the north side of the access track and reduced in size based on the reduced consequences of failure.

To ensure flows reach the swale, the track will be regraded to fall to the north. This requires changes in ground levels along the track in the region of $\pm 50\text{mm}$.

Should the swale be overtopped in an extreme rainfall event, flows will run to the north of the access track and enter the culverted watercourse which runs beneath the access track near to the western edge of the site.

The area of track drained to this section of swale is 541m^2 and, to provide capacity for the 1:100 year + 20% storm event, a swale with base width 0.4m and cross sectional area 0.020m^2 is required. A depth of 0.1m and a top width of 1m exceeds this requirement.

2.2 Plot 1 Exceedance Pathway

Examination of the pre-development topographic survey showed that a low spot existed in the ground between the access track and the River Dove, approximately at the boundary between Plot 1 and Plot 2. It was originally intended to retain this to allow excess flow from the swale, in an extreme event, to overflow and enter the River Dove to the south.

Changes in ground levels along the track mean that this exceedance pathway would not now function. The exceedance pathway for flows from the swale is described in section 2.1 above.

The garden wall of Plot 1 also serves as a barrier, directing runoff from the road away from the property itself, as shown in Photo 1 below.

2.3 Access track drainage in the remainder of Phase 1

Runoff from the section of access track running from the level crossing approximately southwards will flow down the track itself. This, along with runoff from the section of track east of that discussed above and west of the boundary with Phase 2, can be managed by an infiltration swale along the southern side of the access track.

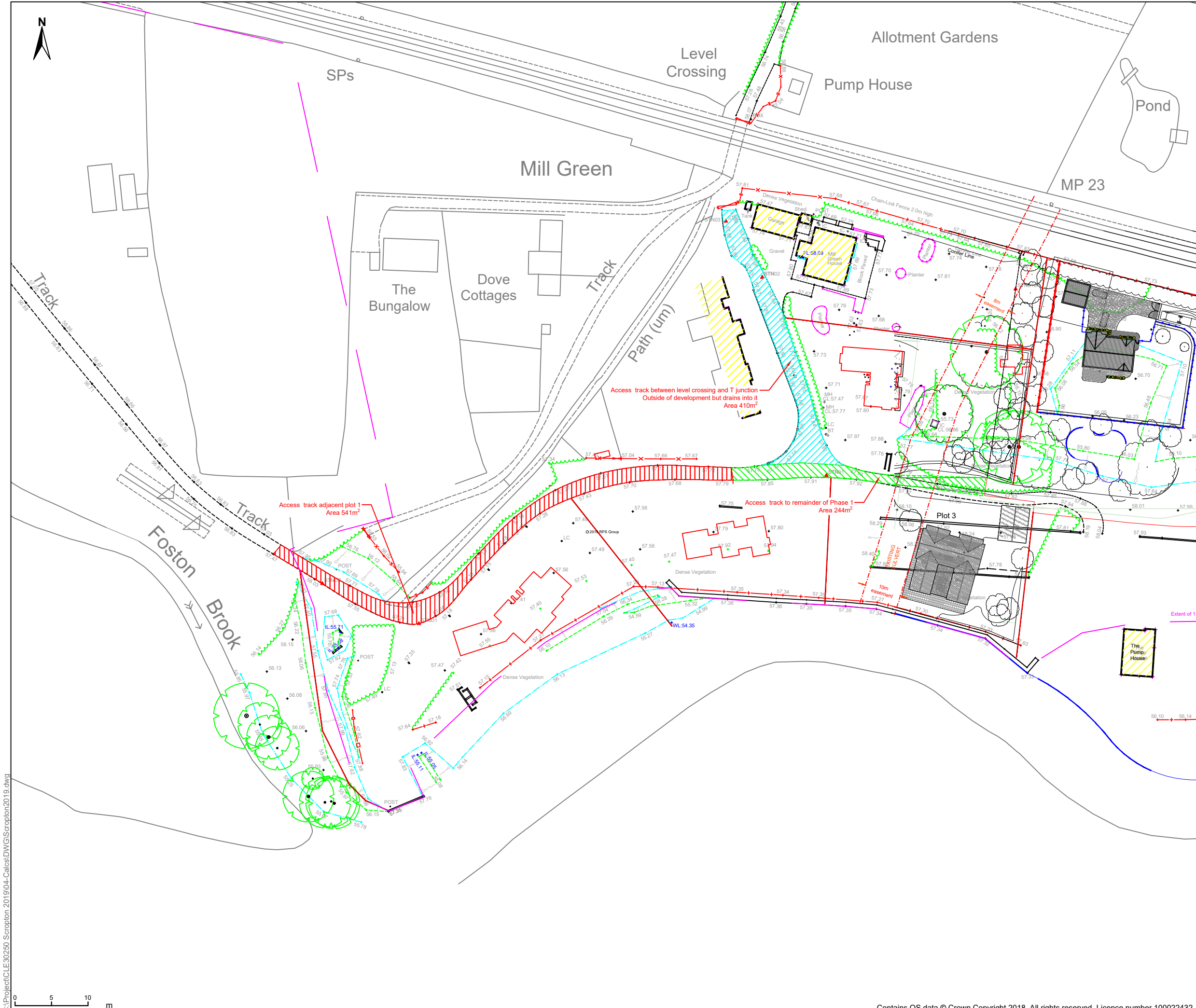
The area of track drained to this section of swale is 654m^2 and, to provide capacity for the 1:100 year + 20% storm event, a swale with base width 0.6m and cross sectional area 0.059m^2 is required. This equates to a depth of 0.1m and a top width of 0.9m.



Photo 1: Garden wall at Plot 1

Appendix A

Design calculations



Notes
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Legend

B	Minor changes	Sept 19	MAS	
Rev	Description	Date	Initial	Checked

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Client **Mill Green Developments Ltd**

Project **Mill Green Scropton**

Title **Contributing areas - Phase 1**

Status **Draft** Drawn By **MAS** PM/Checked by **.**

Job Ref **CLE30246** Scale @ A1 **1:500** Date Created **Jul 2019**

Figure Number **CLE30247/05/102** Rev **B**

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Client: Wayne Roper

Project: Mill Green Scropton

Location: Scropton

Catchment: Access track drainage at Plots 1 and 2

Catchment Details:

Buildings	0 m²	x 100 %
Dense surfacing	541 m²	x 90 %
Effective Area	486.9 m²	

Storage Details:

Length	108 m
Width	0.4 m
Depth	0.1 m
Porosity	100 %
Area Increase	0 %

Rainfall Details - FEH Method:

Return Period	100 years
Climate Change Factor	20 %

Summer Storm Profile

Duration	Intensity		Required storage(m³)
	mm	mm/h	
5 min	18.3	219.2	1.112
10 min	26.5	159.3	0.000
15 min	33.0	132.1	0.000
30 min	43.4	86.9	0.000
45 min	50.0	66.6	0.000
60 min	54.6	54.6	0.000
2 hours	68.2	34.1	0.000
6 hours	86.9	14.5	0.000
24 hours	101.9	4.2	0.000

Outflow Details:

Infiltration rate	6.04 m/hr
Infiltration by CIRIA 3D method	
Safety Factor against flooding	3

Result:

Outcome	Pass
Critical Storm Duration	2 min
Hmax	0.05 m
Required Volume	2.145 m³
Time to half empty	0.6 min

Client: Wayne Roper

Project: Mill Green Scropton

Location: Scropton

Catchment: Access track drainage in the remainder of Phase 1

Catchment Details:

Buildings	0 m²	x 95 %
Dense surfacing	654 m²	x 100 %
Effective Area	654 m²	

Storage Details:

Length	70 m
Width	0.6 m
Depth	0.1 m
Porosity	100 %
Area Increase	0 %

Rainfall Details - FEH Method:

Return Period	100 years
Climate Change Factor	20 %

Summer Storm Profile

Duration	Intensity		Required storage(m³)
	mm	mm/h	
5 min	18.3	219.2	3.744
10 min	26.5	159.3	1.959
15 min	33.0	132.1	0.224
30 min	43.4	86.9	0.000
45 min	50.0	66.6	0.000
60 min	54.6	54.6	0.000
2 hours	68.2	34.1	0.000
6 hours	86.9	14.5	0.000
24 hours	101.9	4.2	0.000

Outflow Details:

Infiltration rate	6.04 m/hr
Infiltration by CIRIA 3D method	
Safety Factor against flooding	3

Result:

Outcome	Pass
Critical Storm Duration	3 min
Hmax	0.098 m
Required Volume	4.107 m³
Time to half empty	1.2 min

Project:	Mill Green Scropton - Phase 1	Code:	CLE30246
Originator:	M A Spiers	Date:	10/09/2019
Checked by:		Date:	
Title:	Access track runoff drainage	Sheet:	1 of 1

Access track drainage at Plots 1 and 2

From StormFlow, requirements for a rectangular infiltration feature are:

Width = 0.4 m and Cross sectional area 0.02 m²

A trapezoid with base width 0.4 m

and side slope 1: 3

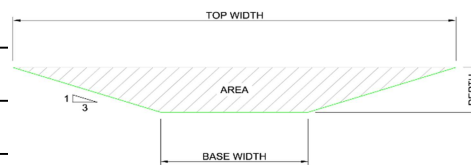
requires depth 0.1 m

Then

Top width 1 m Mean width 0.7 m

Area 0.07 m²

OK



Similarly,

Access track drainage in the remainder of Phase 1

Width = 0.6 m and Cross sectional area 0.059 m²

A trapezoid with base width 0.3 m

and side slope 1: 3

requires depth 0.1 m

Then

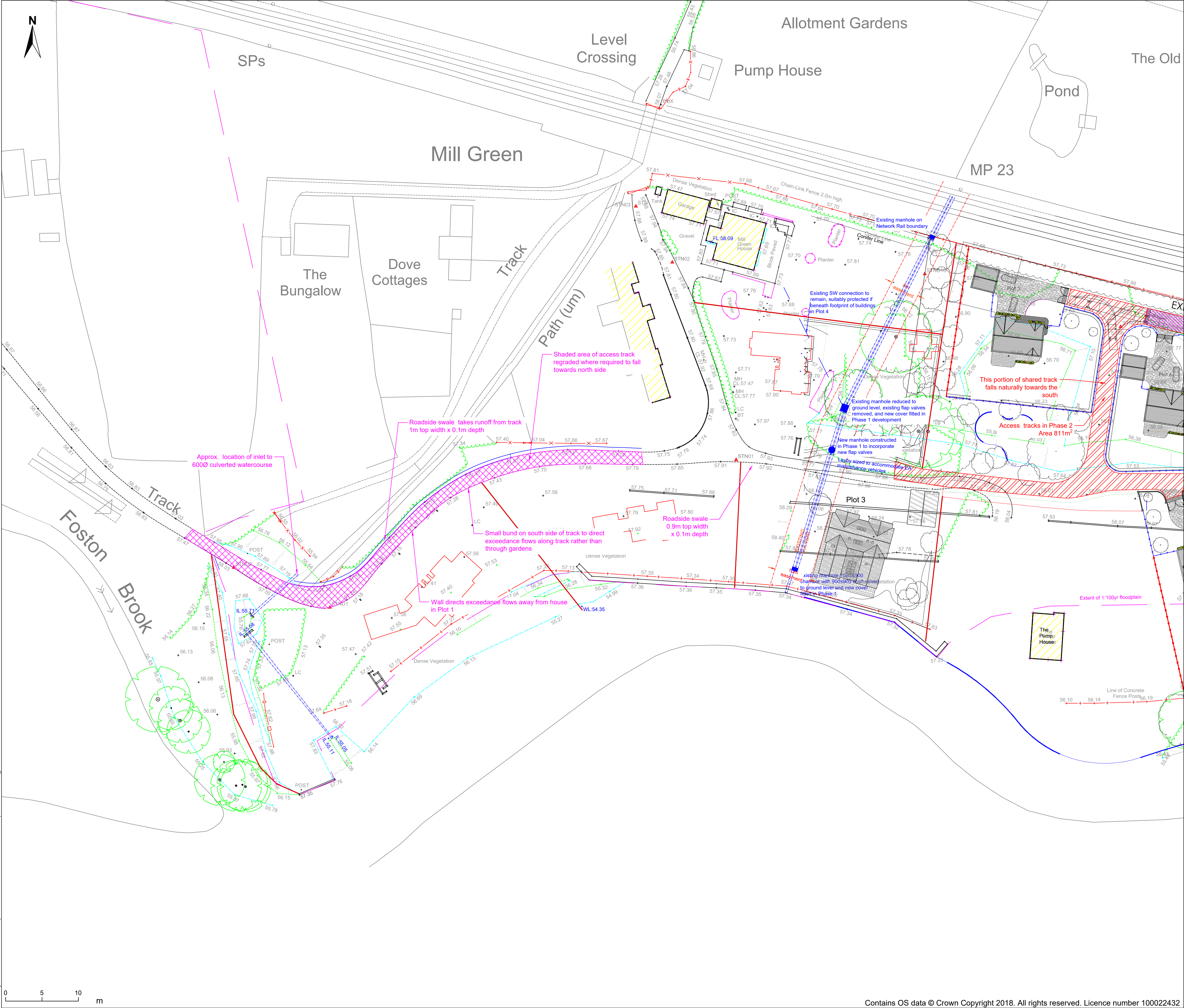
Top width 0.9 m Mean width 0.6 m

Area 0.06 m²

OK

Appendix B

Drawings



Legend

B	Minor changes	Sept 19	MAS	
Rev	Description	Date	Initial	Checked

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Client Mill Green Developments Ltd

Project Mill Green Scropton

Title Drainage - Plan - Phase 1

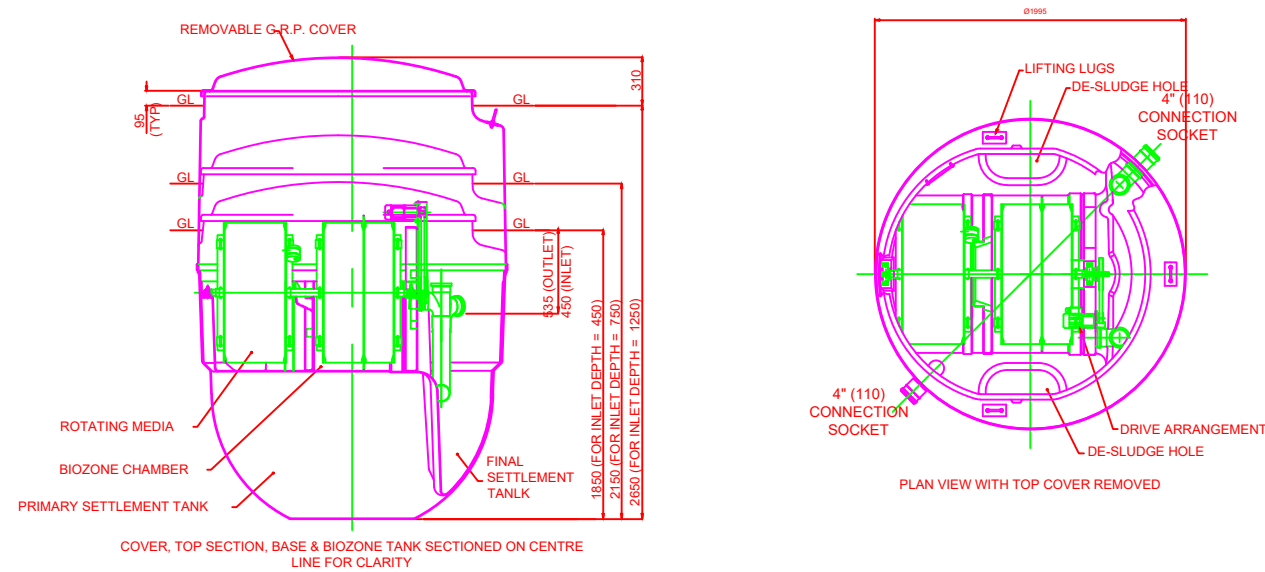
Status Draft Drawn By MAS PM/Checked by .

Job Ref CLE30246 Scale @ A1 1:500 Date Created Sep 2019

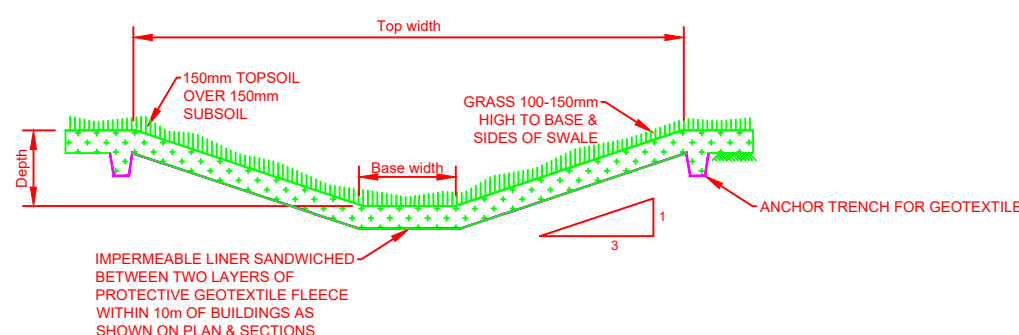
Figure Number CLE30247/05/101 Rev B

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DETAILS FOR KLARGESTER BA-X UNITS



TYPICAL DETAIL FOR CONVEYANCE SWALE

Nominal diameter (mm)	Maximum effective length (m)
100 - 500	0.8
601 - 750	1.0
Over 750	1.25

Table 1 - Standard rocker pipe lengths

	Class	Diagram
Flow fully surrounded by granular material with compression fraction not greater than 0.2	S	
Flow laid on flat layer of granular material with compression fraction not greater than 0.2	F	
C20/F1 concrete bed and surround. Compressive filler at joints.	Z	

Table 3 - Standard Bedding Details



SELECTED FILL
SELECTED FILL SHALL CONSIST OF UNIFORM SOIL FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, RUBBISH, ORGANIC MATTER AND FROZEN SOIL.
SIDEFILL TO BE SELECTED FILL AS ABOVE BUT THE SOIL IS TO BE FREE FROM STONES LARGER THAN 15mm

- NOTES
- UNITS TO BE LOCATED MIN. 10m FROM HABITABLE BUILDINGS
 - POWER TO BE PROVIDED THROUGH ARMoured CABLE FROM THE PROPERTY
 - LOCATION FOR CONTROL PANEL TO BE DETERMINED ON SITE
 - UNITS TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS & RECOMMENDATIONS
 - UNITS TO SIT ON MIN. 150mm THICK MASS CONCRETE BASE AND HAVE MIN. 150mm MASS CONCRETE SURROUND
 - UNITS TO BE SURROUNDED WITH MINIMUM 1m OF PAVING

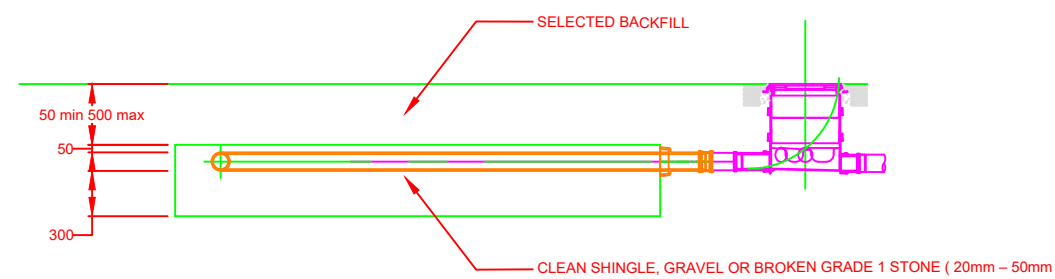
MATERIAL SPECIFICATION

Geotextile protection fleece to be non-woven needle-punched polypropylene
Permeable geomembrane to be minimum 125g/m² non-woven geotextile with minimum permeability 75m/s
Impermeable geomembrane to be minimum 1mm thick polypropylene impermeable membrane suitable for waterproofing to structures and for water containment. Laps between sheets to be as manufacturer's recommendations.

NOTES

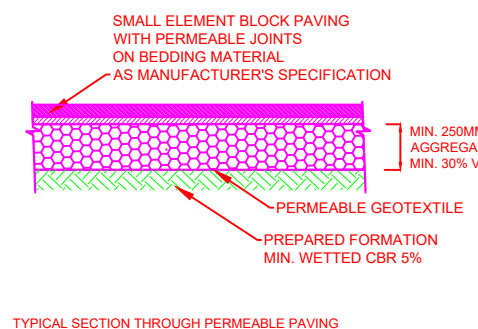
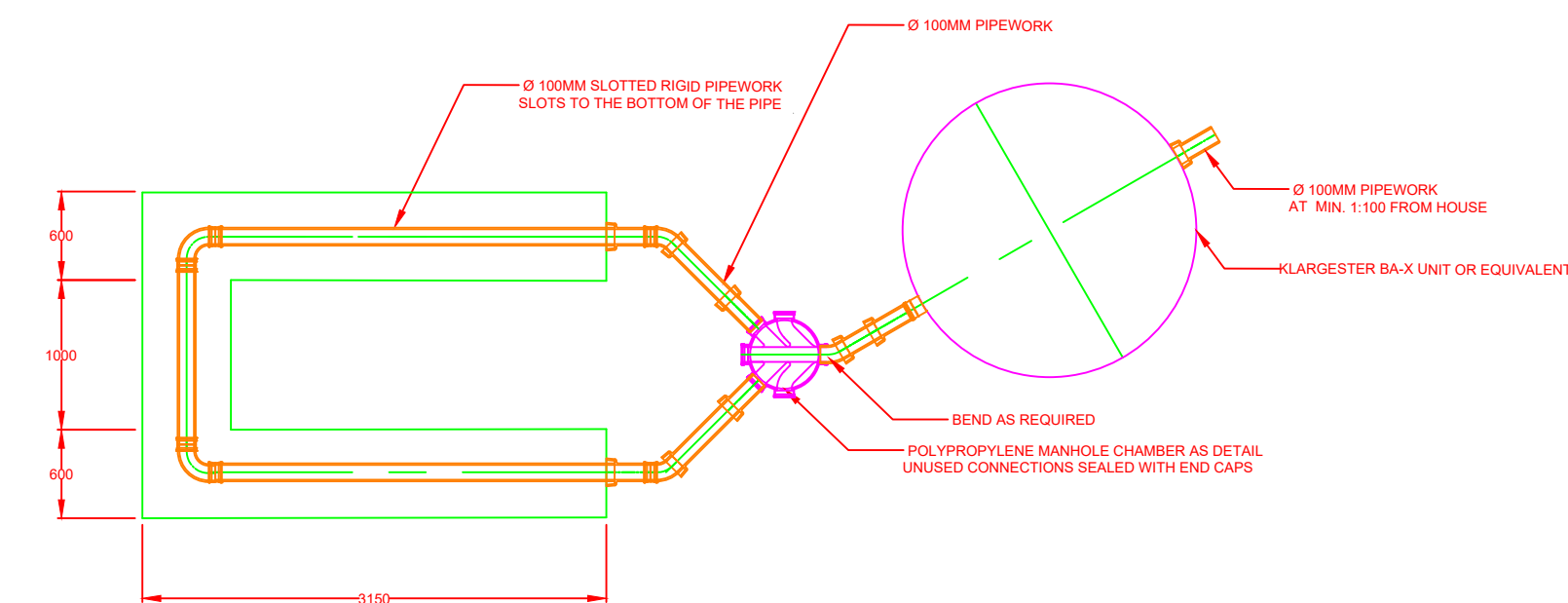
- All dimensions to be confirmed on site, do not scale, if in doubt, ask
- This drawing is to be read in conjunction with all relevant architects, engineers and specialist drawings.
- All work to be carried out in accordance with the latest edition of building regulations, local codes, and local authority regulations.
- All drainage works to be carried out in accordance with sewers for adoption 7th edition.
- Reinforced concrete shall have sulphate resistant portland cement to be 4027
- Pipe strengths (unless noted otherwise)
- Clay to have crushing strength min. 45kN/m²
- Concrete to be class 150
- Pipes to be structural welded stamped with "wa 4-35-01"
- Manhole covers & frames to be to be EN124, min 600x 600mm clear opening unless otherwise specified, non-rocking design without cushion inserts, load class 4500
- Gully grates and frames to be to BS EN295, non-rocking design with captive hinges and be kilnmarked, load class 4500
- Sewers to be laid in class "A" bedding (150mm granular bed & surround) unless noted otherwise, where depth to top of sewer is less than 1.2m in highways or 0.9m in verges then a concrete slab should be provided above the granular bed & surround
- Selected backfill material shall consist of uniform soil, free from stones larger than 40mm, tree roots, organic matter and frozen soil, alternatively class F1 capping layer shall be used
- General backfill material to be selected as dug material free from material exceeding 75mm in size and any deleterious material
- General backfill shall be placed in layers not exceeding 150mm thick, each layer to be well compacted to form a suitable trench backfill, alternatively class F1 material can be used
- All dimensions indicated are minimum unless otherwise stated
- All drainage work to commence at the downstream end and proceed upstream
- Locations of proposed foul and surface water connections from buildings shown on this drawing are not finalised
- Stub pipes at manholes to be as short as practical, outside joint to be max 300mm from outside of manhole, and surrounded in concrete as per type 2 bedding detail
- Rocker pipes to be maximum 600mm long
- Manhole surround to be min 150mm thick concrete
- Bodily units to be Klargestar box or similar equivalent high performance domestic sewage treatment plants
- Bodily units to be laid in accordance with the manufacturers recommendations
- Bodily locations to be min. 10m from any habitable building and within 10m of a hard standing area suitable for a vacuum tanker
- Seawalls to have 450mm base width and side slope 1 in 3, see drawing CLE1012505/103 for details
- Seawalls to be locally fixed within 5m of buildings, see drawing CLE1012505/103 for details
- Areas shown honeycomb hatched to be permeable paving with 300mm deep granular subbase. Subbase to have min. 35% voids, see drawing CLE1012505/103 for details
- Minimum finished floor level of 4m AOD to apply to all new habitable buildings
- Proposed slopes to be "broiler post and wire mesh" type with hexagonal mesh to BS1722 part 2. Rabbit proof netting to be affixed and dug into the ground min. 150mm
- For details of alterations to existing manholes in Plot 4, refer drawing CLE1012505/06

HDPE INSPECTION CHAMBER WITH STANDARD COVER

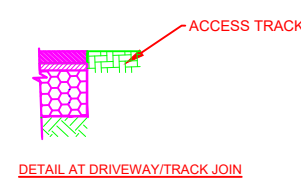


- NOTES
- DIMENSIONS SHOWN ARE MINIMUM
 - PIPEWORK WITHIN DRAINAGE FIELD TO BE LAID FLAT AND PERPENDICULAR TO SLOPE OF GROUND

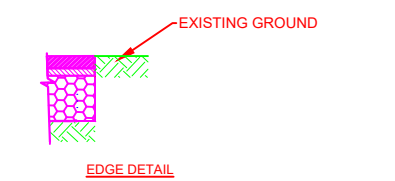
DETAILS FOR DRAINAGE FIELDS



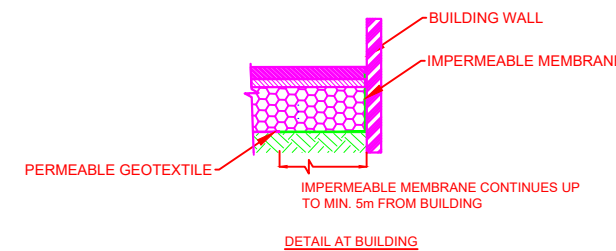
TYPICAL SECTION THROUGH PERMEABLE PAVING



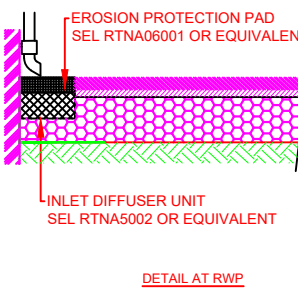
DETAIL AT DRIVEWAY/TRACK JOIN



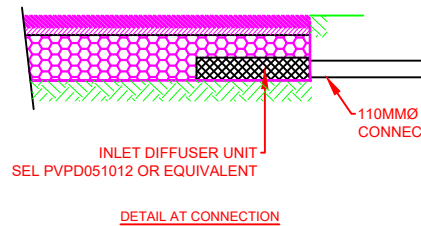
EDGE DETAIL



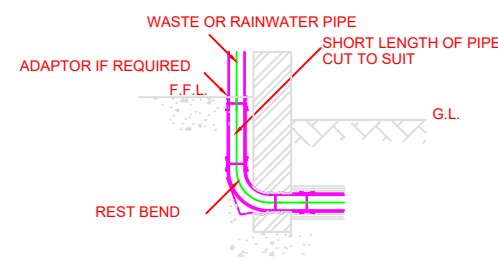
DETAIL AT BUILDING



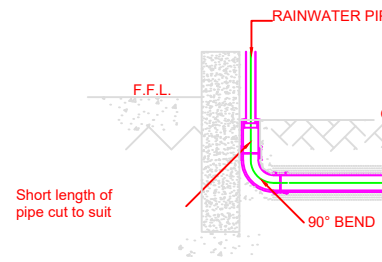
DETAIL AT MANHOLE



DETAIL AT CONNECTION



TYPICAL DETAIL FOR CONNECTION FROM INTERNAL PIPE



TYPICAL DETAIL FOR CONNECTION FROM EXTERNAL PIPE

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Legend

B	Standard bedding & manhole details added	Sept 19	MAS	
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Project Mill Green Scropton

Title Drainage - Details

Status Drawn By PM/Checked by
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Job Ref Scale @ A1 Date Created
CLE30246 1:50 Jul 2019

Figure Number Rev
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