M & P Gadsden
Consulting Engineers Ltd

Drainage Strategy

Proposed Extension

at CGP, Mainsgate Road, Millom, Cumbria

On behalf of CGP Ltd

Document Reference	**CN 20198**
Version	**V1**
Date Released	**22nd January 2021**
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Checked:	**Michael Gadsden BSc (Hons), MSc** 

1. Introduction

M & P Gadsden Consulting Engineers Ltd have been appointed to undertake the necessary drainage design work in support of the planning application to erect a three story extension to the existing Ivory Building and resurfaced car parking area at CGP, Mainsgate Road, Millom, Cumbria.

The Non-Statutory Technical Standards for Sustainable Drainage Systems published in March 2015 has been used as a basis for the design along with best practice guidance from Ciria SuDS Manual (C753). A list of the appendices enclosed with this report are as follows:

- Appendix A - Drainage scheme drawings
- Appendix B – Maintenance Pack
- Appendix C – Runoff Calculations

2. Existing Drainage

The existing Ivory Building surface water drainage is gravity fed and discharges into the existing watercourse to the eastern boundary of the site in two locations. This ultimately discharges into Crook Pool downstream.

3. Surface Water Discharge Destination

Planning Policy guidance suggests the following hierarchy for surface water discharge: -

1. Into the ground (Infiltration)
2. To a surface water body;
3. To a surface water sewer;
4. To a combined sewer.

Groundsolve Ltd produced a Phase 2 Site Investigation Report (November 2016) in which they confirmed that groundwater was encountered during two borehole investigations at a depth of 2.20-2.30m. As a result of this, infiltration drainage has been discounted.

There is an existing watercourse circa 45m from the existing Ivory Building. The surface water from the proposed extension and resurfaced car parking area will discharge into the watercourse as per the drainage hierarchy at a controlled rate.

The car park area is to be served by porous asphalt with attenuation for the 100 year return period plus 40% climate change provided within the subbase layer. The formation level will be graded to convey water to perforated collector drains that will ultimately discharge into the existing watercourse in the south east corner of the site. The car park will be split into 3 sections with check dams and hydrobrakes to utilise the attenuation within the subbase layer efficiently.

The extension is to be served by trapped gulleys that will discharge directly into the subbase layer of the porous car parking area which will provide attenuation for upto and including the 100 year return period plus 40% climate change.

Discharge rates to be restricted to 1 in 1 year greenfield rate for the 1 year return period and Qbar for all return periods above this up to and including the 1 in 100 year plus 40% climate change event. An allowance for the remaining greenfield area has been made included within the design at a ratio of 0.3. The existing and proposed runoff rates can be seen in the table below.

	1 Year	30 Year	100 Year	100 Year +40% cc	Qbar
Existing	5.61	10.96	13.40	15.27	6.44
Proposed	2.7	6.30	6.40	6.40	N/A
% Improvement	51.87%	42.52%	52.24%	58.09%	N/A

See Appendix C for runoff rate calculations.

4. Technical Standards for SuDS

The Non-Statutory Technical Standards for Sustainable Drainage Systems has 14 points that have to be satisfied if they are applicable (S1 – S14).

- S1 – Uncontrolled surface water discharge - N/A
- S2 – Greenfield development runoff rate – N/A
- S3 – Brownfield development runoff rate – Attenuation designed for storms up to and including 1 in 100 year plus 40% climate change events. The runoff rate is to be restricted to 1 in 1 year greenfield rate for the 1 year return period and Qbar for all return periods above this up to and including the 1 in 100 year plus 40% climate change event. This will result in a significant reduction to the existing runoff rate from the site.

- S4 – Greenfield development volume control - N/A
- S5 – Brownfield development volume control - Attenuation designed for storms up to and including 1 in 100 year plus 40% climate change events. The runoff rate is to be restricted to 1 in 1 year greenfield rate for the 1 year return period and Qbar for all return periods above this up to and including the 1 in 100 year plus 40% climate change event. As a result flood risk will not be adversely affected.
- S6 – Volume control where S4 & S5 are not possible – N/A
- S7 – Flood risk within development (30 year storm) - the drainage system does not flood any part of the site during a 30 year storm condition. This is achieved using attenuation in the form of the stone layer beneath the porous car park.
- S8 – Flood risk within development (100 year storm) - no flooding will occur in any part of a building or utility plant during 100 year storm condition. This is achieved using attenuation in the form of the stone layer beneath the porous car park.
- S9 – Flood risk within development (exceedance routes) - the technical standards suggest "where practicable" exceedance routes for storms in excess of 100 years should be provided. In the event of a storm in excess of the designed return period, the flood would occur at manhole S6. Exceedance water would follow flow away from the buildings and towards the existing watercourse.
- S10 – Structural Integrity - all drainage works have been specified in accordance with Sewers For Adoption.
- S11 - Structural Integrity - all drainage works have been specified in accordance with Sewers For Adoption.
- S12 – Pumping - N/A
- S13 – Construction (connection) – N/A.
- S14 – Construction (damage) – N/A

5. Maintenance

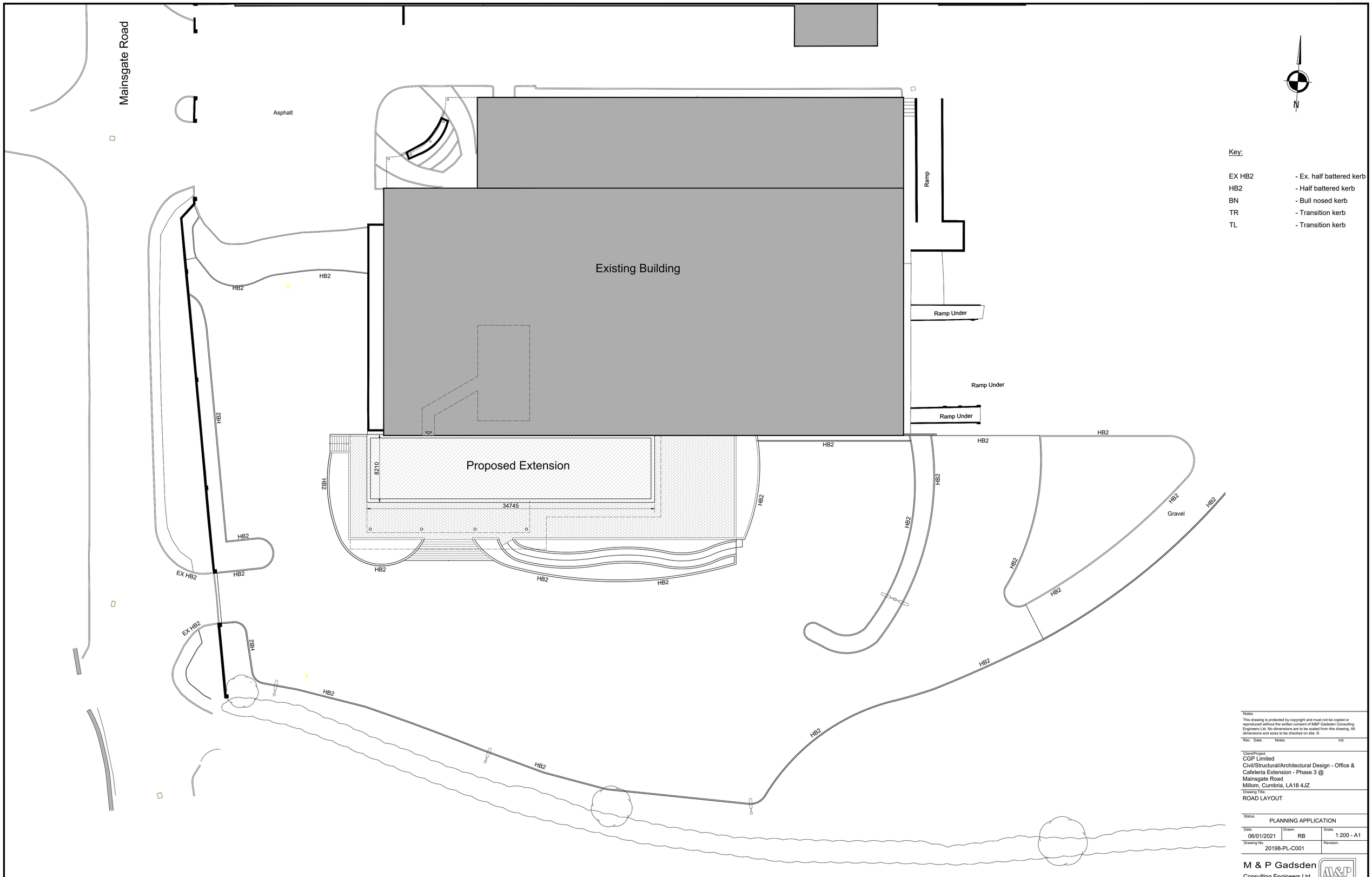
The maintenance of the drainage network serving the property and the car park will be the responsibility of the applicant. Maintenance will include removing debris, grass cuttings, litter and other items from gullies and manholes on a regular basis (or when required), to prevent blockages and allow water to enter the system. Maintenance of the porous car park and stone attenuation layer will include cleaning or replacing the stone and geotextile membrane surround if the performance deteriorates.

For further information on maintenance refer to the maintenance pack in Appendix B.

6. Conclusion

The proposed extension and resurfaced car parking area can be drained effectively in line with the Non-Statutory Technical Standards for Sustainable Drainage Systems guidance. It is our professional opinion that the site is suitable for development from a drainage perspective.

Appendix A



Key:

EX HB2	- Ex. half battered kerb
HB2	- Half battered kerb
BN	- Bull nosed kerb
TR	- Transition kerb
TL	- Transition kerb

Rev.	Date.	Notes.	Init.

Client/Project.
CGP Limited
Civil/Structural/Architectural Design - Office & Cafeteria Extension - Phase 3 @
Mainsgate Road
Millom, Cumbria, LA18 4JZ

Drawing Title.
ROAD LAYOUT

Status.
PLANNING APPLICATION

Date.	Drawn.	Scale.
06/01/2021	RB	1:200 - A1

Drawing No.	Revision.
20198-PL-C001	

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Mainsgate Road

Asphalt

Existing Building

Ramp

Ramp Under

Ramp Under

Ramp Under

Proposed Extension

8210

34745

Gravel

F4
CL
IL 5

Ex M
CL 5
IL 5

N

Key:

.*
- Existing level

** ***
- Proposed level

6.028
6.100

6.000
6.100

6.060
6.300

5.970
6.100

5.990
6.300

5.850
6.100

5.670
6.250

5.770
6.100

5.880
5.880

5.760
6.100

5.550
6.100

5.520
6.100

5.520
6.100

5.720
6.125

5.650
6.200

7.050
6.200

6.060
6.200

5.970
6.200

5.980
6.100

5.960
6.100

5.960
6.100

5.920
6.050

5.920
6.050

5.860
6.000

5.720
6.000

5.920
5.920

5.730
6.100

5.600
6.100

5.500
6.000

5.410
5.900

5.950
5.900

5.770
5.816

Notes.

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Drawing Title.
ROAD LEVELS

Status.
PLANNING APPLICATION

Date.	Drawn.	Scale.
06/01/2021	RB	1:200 - A1

Drawing No.	Revision.
20198-PL-C002	

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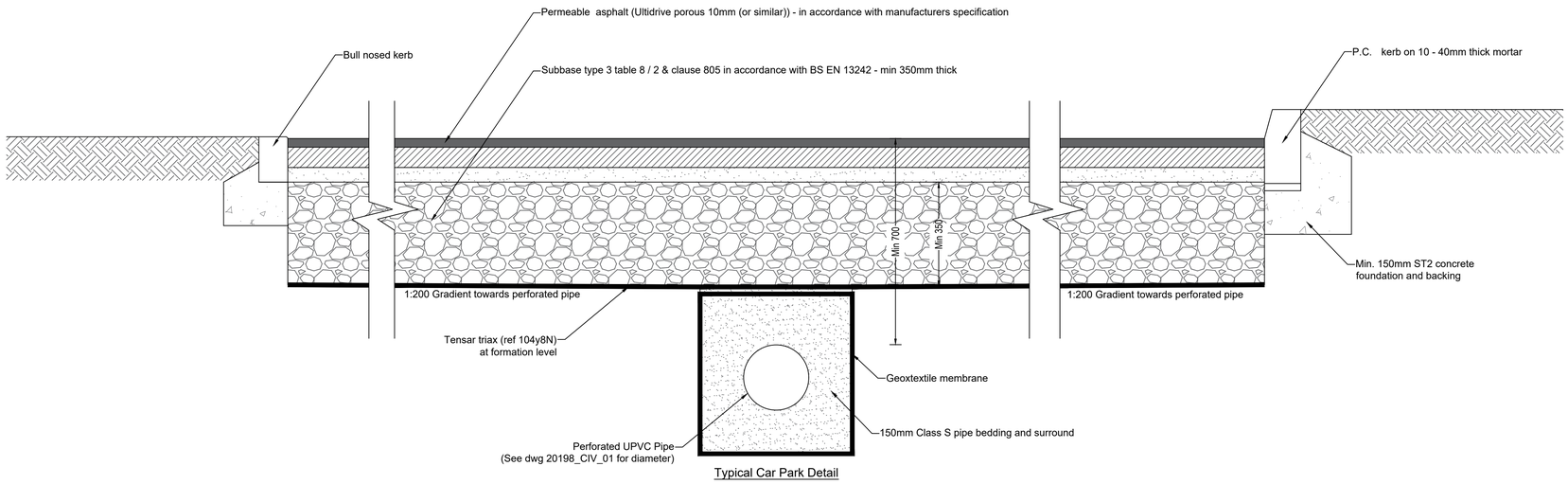
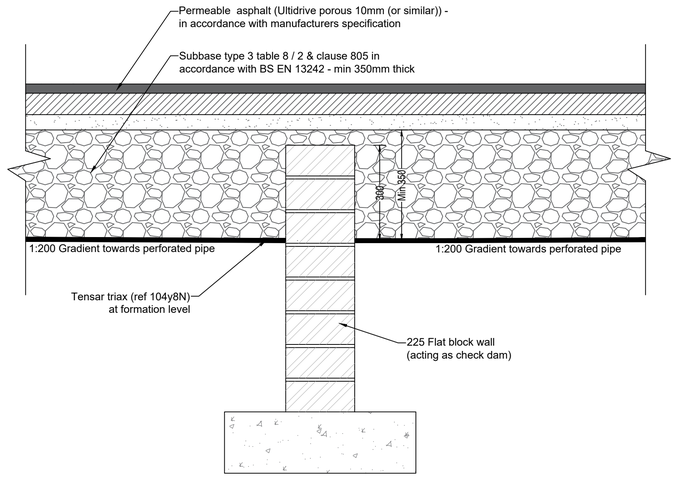
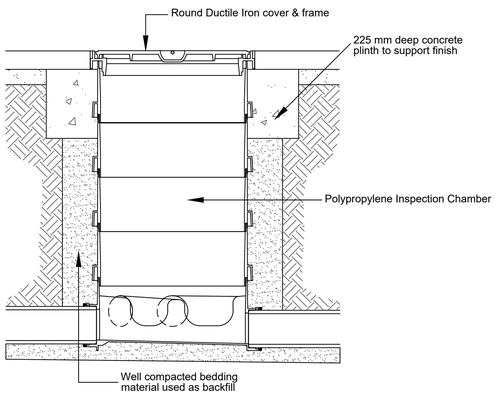


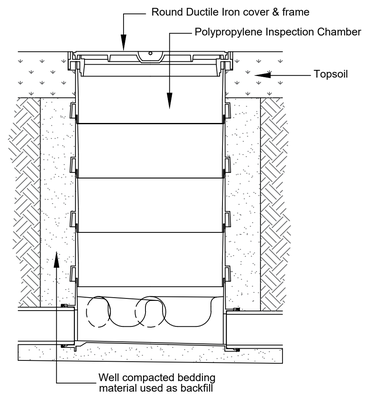
Typical Car Park Detail



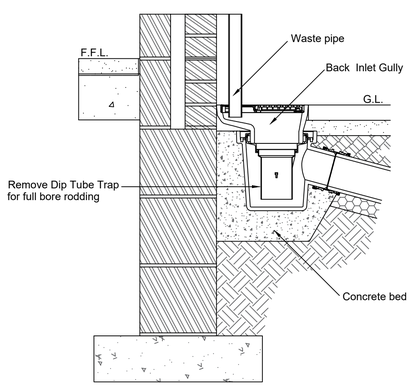
Typical Typical Check Dam Detail



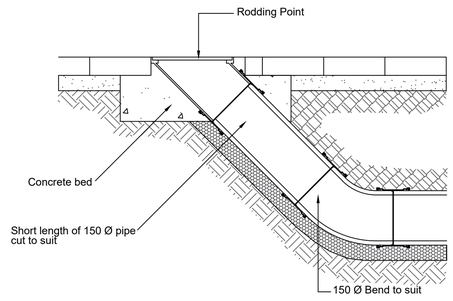
Typical Inspection Chamber
Sited in hard landscaped areas
with standard round cover



Typical Inspection Chamber
Sited in soft landscaped areas
with standard round cover



Typical Back Inlet Gulley Detail



Typical Rodding Eye Detail

General Notes:

All work undertaken in accordance with sewers for adoption 6th edition "A Design & Construction Guide For Developers"

Notes.

Rev.	Date.	Notes.	Init.

Client/Project.

CGP Limited
Civil/Structural/Architectural Design - Office & Cafeteria Extension - Phase 3 @
Mainsgate Road
Millom, Cumbria, LA18 4JZ

Drawing Title.

ROAD LEVELS

Status.

PLANNING APPLICATION

Date.	Drawn.	Scale.
06/01/2021	RB	1:200 - A1

Drawing No.	Revision.
20198-PL-C003	

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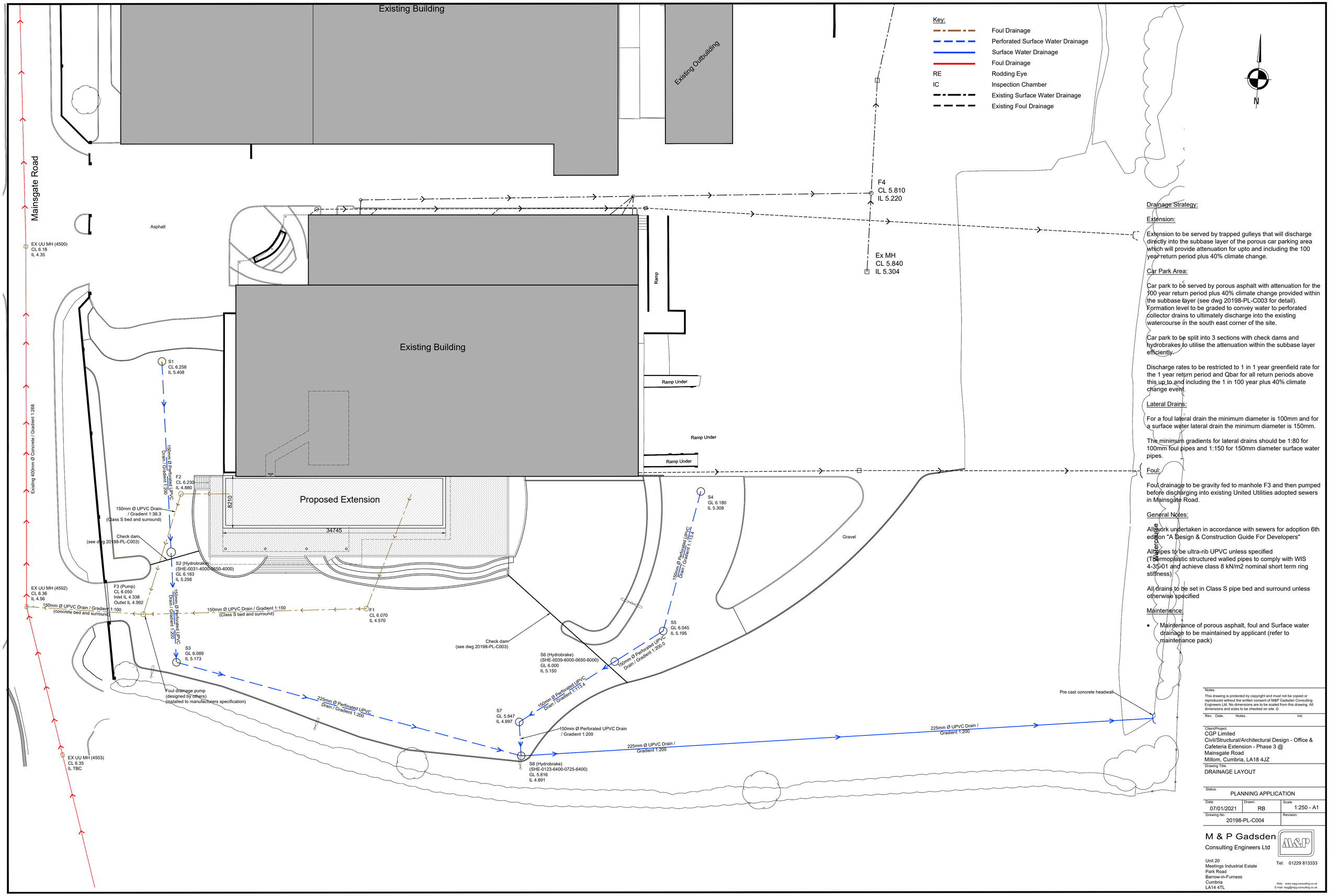

Drainage Strategy:

Extension:

Extension to be served by trapped gulleys that will discharge directly into the subbase layer of the porous car parking area which will provide attenuation for upto and including the 100 year return period plus 40% climate change.

Car Park Area:

Car park to be served by porous asphalt with attenuation for the 100 year return period plus 40% climate change provided within the subbase layer (see dwg 20198-PL-C003 for detail). Formation level to be graded to convey water to perforated collector drains to ultimately discharge into the existing watercourse in the south east corner of the site.

Car park to be split into 3 sections with check dams and hydrobrakes to utilise the attenuation within the subbase layer efficiently.

Discharge rates to be restricted to 1 in 1 year greenfield rate for the 1 year return period and Qbar for all return periods above this up to and including the 1 in 100 year plus 40% climate change event.

Lateral Drains:

For a foul lateral drain the minimum diameter is 100mm and for a surface water lateral drain the minimum diameter is 150mm.

The minimum gradients for lateral drains should be 1:80 for 100mm foul pipes and 1:150 for 150mm diameter surface water pipes.

Foul:

Foul drainage to be gravity fed to manhole F3 and then pumped before discharging into existing United Utilities adopted sewers in Mainsgate Road.

General Notes:

All work undertaken in accordance with sewers for adoption 6th edition "A Design & Construction Guide For Developers"

All pipes to be ultra-rib UPVC unless specified (Thermoplastic structured walled pipes to comply with WIS 4-35-01 and achieve class 8 kN/m2 nominal short term ring stiffness)

All drains to be set in Class S pipe bed and surround unless otherwise specified

Maintenance:

- Maintenance of porous asphalt, foul and Surface water drainage to be maintained by applicant (refer to maintenance pack)

Rev.	Date.	Notes.	Init.

Client/Project.
CGP Limited
Civil/Structural/Architectural Design - Office & Cafeteria Extension - Phase 3 @ Mainsgate Road
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Drawing Title.
DRAINAGE LAYOUT

Status.
PLANNING APPLICATION

Date.	Drawn.	Scale.
07/01/2021	RB	1:250 - A1

Drawing No. 20198-PL-C004

Revision.

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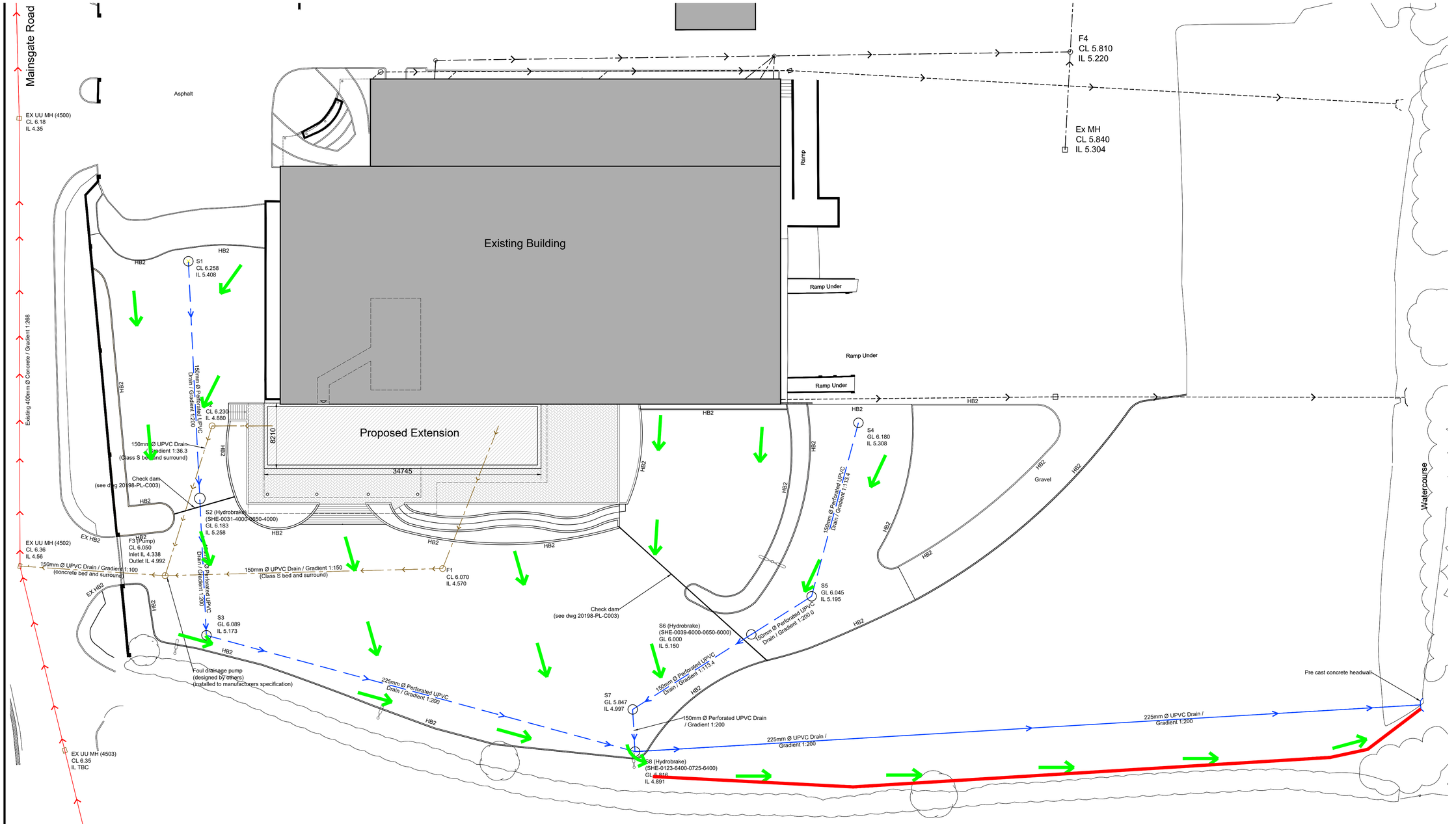

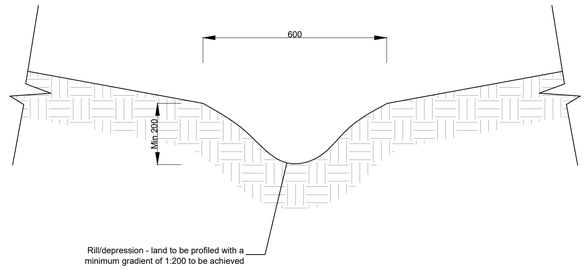

Typical Rill Detail
(Scale 1:10)

General Notes:

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Notes.

Rev.	Date.	Notes.	Init.

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CGP Limited
Civil/Structural/Architectural Design - Office & Cafeteria Extension - Phase 3 @
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Drawing Title.

EXCEEDANCE ROUTE

Status.

PLANNING APPLICATION

Date.	Drawn.	Scale.
07/01/2021	RB	1:250 - A1

Drawing No. 20198-PL-C005

Revision.

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Appendix B

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M & P Gadsden
Consulting Engineers Ltd

Sustainable Drainage Management Plan

Proposed Extension and Car Park Resurfacing at

CGP, Mainsgate Road, Millom, Cumbria

1.0 Introduction

Sustainable drainage systems or SuDS are an environmentally friendly approach to managing rainfall that uses the landscape. SuDS aim to: -

- Control the flow, volume and frequency of water leaving a development site
- Prevent pollution by intercepting silt and cleaning runoff from hard surfaces
- Provide attractive surroundings for the community
- Create opportunities for wildlife

2.0 SuDS at CGP, Mainsgate Road, Millom

The SuDS are designed to prevent flooding of the extension and car parking area and control the flow of water from the site. This site utilises infiltration techniques to disperse surface water with attenuation provided within the infiltration features.

The car parking area is constructed using porous asphalt with a stone layer below providing attenuation. The maintenance of the main car park will be the responsibility of the applicant.

The stone layer beneath the porous asphalt will also provide attenuation for the extension roof area and patio. The discharge from the stone layer will be controlled by a vortex flow control before ultimately discharging into the watercourse on site.

3.0 Managing the SuDS

The SuDS have been designed for easy maintenance to comprise: -

- Regular day to day care -litter collection, grass cutting and checking inlets and outlets where water enters or leaves a feature.
- Occasional tasks – managing pond vegetation and removing any silt build up.
- Remedial work – repairing damage as necessary.

The surface water drainage and SuDS requiring management and maintenance for this site are summarized in Table 1 below: -

Table 1 – Maintenance Schedule

	Maintenance Item	Action	Regularity
1	Monitoring Generally	Initial inspection of everything below to ensure the system is working effectively	After large storms and quarterly during first year
2	Permeable Pavements	Brushing/sweeping of surface area to clear litter, grass cuttings, leaves and other debris	Once per year after Autumn leaf fall and as required
3	Permeable Pavements	Removal of weeds using glyphosphate applied directly into weeds using an applicator	Annually and/or as required
4	Permeable Pavements	Remedial work to depressions. Replace asphalt	As required
5	Manholes, Geocellular Tanks, Pipes etc	Lift manhole covers, visual inspection. If debris/silt has built up arrange jetting. Arrange CCTV survey if performance deteriorates.	Annually and/or as required

6	Flow Control (Hydro-Brake)	Lift manhole cover, clear silt from silt trap, inspect Hydro-brake for blockages	Annually
7	Exceedance Rills	Remove litter, debris and silt build up along its length. Ensure vegetation is maintained and not affecting the performance.	Every six months
8	Outlets	Inspect and remove silt, litter and debris. Strim for 1m around	Monthly

Appendix C

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	
Site name:	CGP
Site location:	Millom

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site coordinates

Latitude:	54.20493° N
Longitude:	3.26628° W

Reference:	
Date:	2021-01-08 14:15

Methodology	IH124

Site characteristics

Total site area (ha)	0.84

Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	4	4
HOST class	---	---
SPR/SPRHOST	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm)	1040	1040
Hydrological region	10	10
Growth curve factor: 1 year	0.87	0.87
Growth curve factor: 30 year	1.7	1.7
Growth curve factor: 100 year	2.08	2.08

Notes:

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	6.44	6.44
1 in 1 year (l/s)	5.61	5.61
1 in 30 years (l/s)	10.96	10.96
1 in 100 years (l/s)	13.4	13.4