

# Surface Water Drainage Design

Market Place - Dartford



**LUSTRE**  
CONSULTING

## Non-Technical Summary

---

What is Proposed?	It is understood that proposals involve the clearance of the site and construction of a mixed residential and commercial development. The planning description is for “Demolition of existing buildings at the corner of Market Place and Market Street and the erection of a replacement mixed use building comprising commercial (Class E) at ground floor and residential apartments (Class C3) above.”
What is the Problem?	This drainage design aims to address planning condition 5 of the planning permission for planning application DA/23/00207/VCON with Dartford Borough Council. The design follows the general principles of the approved Flood Risk Assessment by Herrington Consulting (February 2021, Issue 2 and October 2022 Issue 3).
What is the Result?	The proposed development has been designed to ensure the development is safe throughout its lifespan. The following have been used in the design scheme: <ul style="list-style-type: none"> <li>▶ Utilising blue and green roofs for all parts of the proposed buildings where this is possible;</li> <li>▶ Peak discharge rates from all roofs combined are limited to 1.5 l/s;</li> <li>▶ Design of green and blue roofs including storage calculations, standard construction details and maintenance schedule are provided within this design pack;</li> <li>▶ The green and blue roofs are to discharge to the existing surface water sewer crossing the site;</li> <li>▶ The hardstanding surfaces are not proposed to change and as such are to drain as per the existing situation.</li> </ul>
What are the Next Steps?	This report should be submitted to the local planning authority to discharge planning condition 5 of DA/23/00207/VCON with Dartford Borough Council. The following elements will need to be prepared once the project progress further: <ul style="list-style-type: none"> <li>▶ Full detailed design of the proposed drainage, including sewer diversions, pending foundation proposals;</li> <li>▶ Sewer diversion and connection applications with Thames Water.</li> </ul>

## Report Record

---

Project Name	Market Place - Dartford
Client	Rlr Goldsmith Limited
Report Type	Surface Water Drainage Design Pack
Report Ref	R217-FRA-01.0_4902
Issue Date	February 2024
Author	BB - MEng
Reviewer	Ariel Rapson BA (Hons)

## Report Revisions

---

Revision Ref	Date	Author	Details

## Contents

1.0	Introduction.....	4
2.0	Site Setting.....	8
3.0	Drainage Design Philosophy.....	9
4.0	Conclusions & Next Steps .....	12

## Figures

---

Figure 1	Site Location Plan .....	5
Figure 2	Proposed Development Plan .....	6

## Tables

---

Table 1	Site Details.....	5
---------	-------------------	---

## Appendices

---

APPENDIX A:	Policy & Guidance
APPENDIX B:	Thames Water Sewer Records
APPENDIX C:	CCTV Survey
APPENDIX D:	Drainage Layout
APPENDIX E:	Roof Storage Calculations
APPENDIX F:	Standard Green/Blue Roof Details
APPENDIX G:	Maintenance Guidance (ABG)

2<sup>nd</sup> Floor North Fitted Rigging House, The Historic Dockyard, Chatham, Kent, ME4 4TZ  
e: info@lustreconsulting.com t: 01634 757 705

[www.lustreconsulting.com](http://www.lustreconsulting.com)



## 1.0 Introduction

1.1 This report presents a surface water drainage design following the general principles of the approved Flood Risk Assessment by Herrington Consulting (February 2021, Issue 2 and October 2022 Issue 3). The drainage strategy identifies how the onsite surface water can be managed over its lifetime. This report has been prepared in line with best practice guidance and planning policy.

What is a SuDS Strategy?

1.2 A SuDS (Sustainable Drainage Systems) strategy is a surface water drainage strategy that incorporates sustainable drainage systems to achieve four key benefits known as the 'four pillars of SuDS design'. These include water quantity, water quality, amenity and biodiversity.

1.3 The National Planning Policy Framework (NPPF) declares in paragraph 167 that a development should only be allowed in areas at risk of flooding where the development can demonstrate that it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate. In addition, paragraph 169 of the National Planning Policy Framework states "Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits."

1.4 Lead Local Flood Authorities (LLFA) would require a SuDS strategy to be submitted for sites measuring 1 hectare or greater and/or for all major planning applications (10 dwellings or more). In addition, the LLFA are statutory consultees for any new major development consisting of 10 dwellings or more. The LLFA, which are county councils and unitary authorities, manage local flood risk issues such as risks of flooding from surface water, ground water and ordinary watercourses. The LLFA have a responsibility to ensure that SuDS schemes conform with the requirements of the National Planning Policy Framework (NPPF). Find out more about drainage reports [here](#).



## The Subject Site

Table 1 Site Details	
Address	1-5 Market Place & 1 Market Street, Dartford, Kent, DA1 1EX
Planning Authority	Dartford Borough Council

1.5 The site currently comprises of mixed commercial properties. The site is located within a mixed residential and commercial area. The site area is shown in Figure 1.

## The Proposed Development

1.6 It is understood that the site is proposed to be redeveloped to provide a mixed-use residential led scheme, as illustrated in Figure 2.

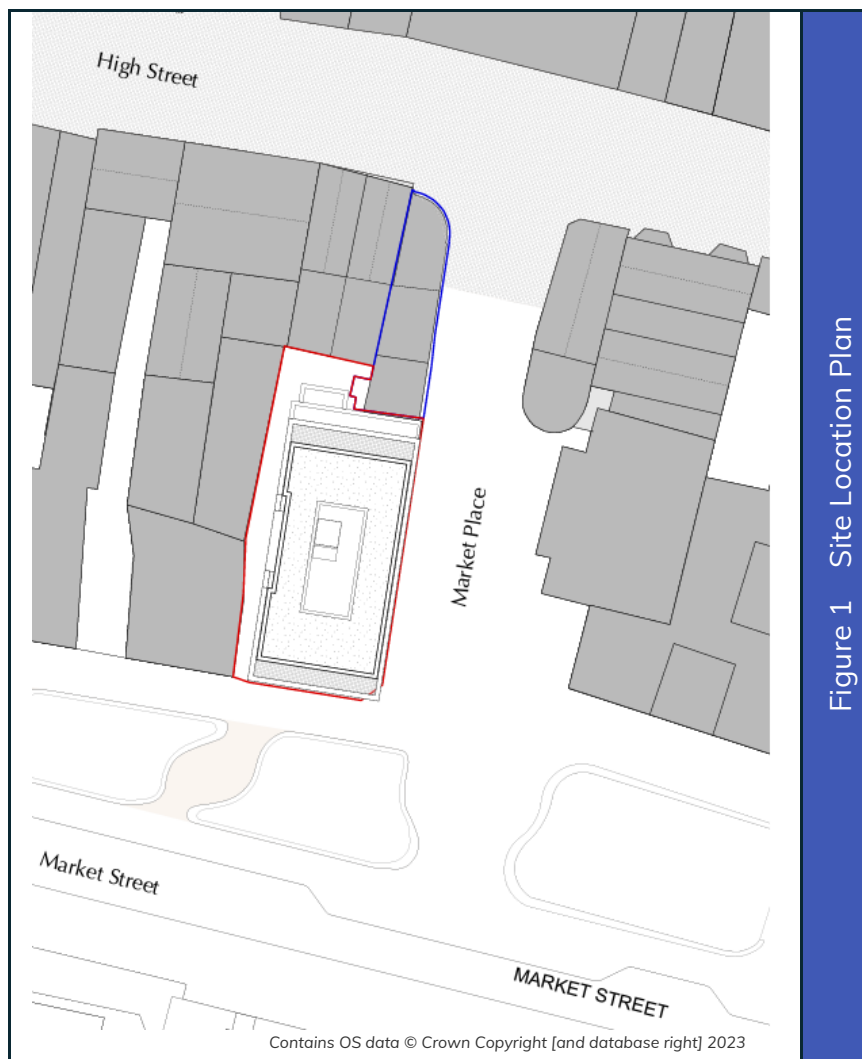


Figure 1 Site Location Plan



- 1.7 Proposals include construction of erection of a replacement mixed use building comprising commercial (Class E) at ground floor and residential apartments (Class C3) above.

### The Stakes & Objectives

- 1.8 To ensure a compliant site, this drainage strategy requires consideration of a range of national and local policies, guidance and data sources. For ease of reference, this includes the National Planning Policy Framework (NPPF) and National Climate Change Guidance.
- 1.9 Based on the requirements of both national and local level policy and guidance, this drainage strategy will seek to:
- ▶ Improve flood risk to the site and surrounding areas by reducing surface water runoff from the site.



- ▶ Improve the water quality, enhance and encourage biodiversity resulting in a more amenable space.

## Report Structure, Limitations & Changes

- 1.10 Chapter 2 of the report provides information relating to the site setting. Details on the site's drainage design are set out in Chapter 3. Chapter 4 presents the conclusions and recommendations.
- 1.11 This assessment has been undertaken in accordance with our Terms & Conditions. Full details on limitations and reliance are provided in those Terms. Third party information which has been reviewed and used to inform the assessments presented herein, including public records held by various regulatory authorities and environmental database data has been assumed to be true and accurate.
- 1.12 Should revisions in the development proposals result in a change of any assessment parameters detailed in this report, a re-assessment of the risk should be carried out.



## 2.0 Site Setting

- 2.1 This chapter details the topographical, geological and hydrological site setting as well as any local drainage infrastructure identified.

### Topography

- 2.2 A site-specific topographical survey has not been undertaken at this stage; however, inspection of aerial height data (LiDAR) records show that the land levels of the site vary between 5.8m and 6.2m Above Ordnance Datum Newlyn (AODN). Ground levels on site are relatively flat.

### Drainage Infrastructure

- 2.3 A review of the public sewer asset plan from Thames Water records shows the area surrounding the site is served by a foul sewer network and a surface water sewer network. The asset plan from Thames Water is included in Appendix B.
- 2.4 The asset plan from Thames Water shows a 150mm public foul sewer is shown within Market Place running north. A public foul sewer is shown within the existing alleyway of the site. A public surface water sewer is shown within Market Street running east with upstream unknown pipes shown to connect from three directions.
- 2.5 A CCTV survey of the existing drainage on site has been undertaken and the plan of the survey is shown in Appendix C.
- 2.6 The CCTV demonstrates the presence of both a surface and a foul water sewer through the alleyway of the site. Given that both sewers are shown to cross the site (rather than originate from the site), it is deemed likely that they are both public sewers and any work on them (connections, diversions, build overs) or within close proximity to them would need to be agreed with Thames Water.



## 3.0 Drainage Design Philosophy

3.1 This report aims to address planning condition 5 of the planning permission for planning application DA/23/00207/VCON with Dartford Borough Council, which states.

*No development (other than demolition) shall begin until a detailed sustainable surface water drainage scheme for the site, including details of the green and blue roof system, has been submitted to (and approved in writing by) the local planning authority. The detailed drainage scheme shall be based upon the principles within the Flood Risk Assessment by Herrington Consulting (February 2021, Issue 2 and October 2022 Issue 3). The submission shall also demonstrate that the surface water generated by this development (for all rainfall durations and intensities up to and including the climate change adjusted critical 100 year storm) can be accommodated and disposed of without increase to flood risk on or off-site. The drainage scheme shall also demonstrate (with reference to published guidance):*

*- that silt and pollutants resulting from the site use can be adequately managed to ensure there is no pollution risk to receiving waters.*

*- appropriate operational, maintenance and access requirements for each drainage feature or SuDS component are adequately considered, including any proposed arrangements for future adoption by any public body or statutory undertaker. The drainage scheme shall be implemented in accordance with the approved details.*

3.2 This report is based on the principles within the Flood Risk Assessment by Herrington Consulting (February 2021, Issue 2 and October 2022 Issue 3), which also contains relevant background information and justification of the selected drainage strategy for the site. The report should be read in conjunction with the abovementioned FRA.

3.3 In line with the proposed drainage strategy within the FRA, the proposals include green and blue roof construction for the new roofs and terraces of the building, while all external hardstanding areas would not change and would drain as existing.

3.4 A layout plan of a detailed sustainable surface water drainage scheme for the site is provided in Appendix D of this report. The plan includes details of the green and blue roof.



Further standard details of the green and blue roofs can be found in Appendix F of this report.

## Runoff Rates and Required Storage

- 3.5 While the original FRA proposes a total discharge rate of 1 l/s, the current more detail design has had to consider that the building consists of multiple levels of roofs and terraces, which would make a total peak discharge rate of 1 l/s impractical. The total runoff rate from the new building on site is proposed to be 1.5 l/s, as a practical minimum considering all 5 levels of roofs proposed for the development.
- 3.6 The total attenuation volume provided within the blue roof structure of the proposed roofs would be 27.1m<sup>3</sup>. Calculations in Appendix E show that each roof can accommodate the runoff from the climate change adjusted critical 100 year storm.
- 3.7 The proposals will significantly reduce discharge rate into the system via the provision of green/blue roofs with restricted outflows. Existing runoff rates for the 100 year storm event are 35.3 l/s. A more detailed calculation of the existing rates is provided within the FRA submitted for planning and approved by the planning authority.

## Connections to existing Network and Sewer Diversions

- 3.8 The surface water runoff from the site is proposed to connect to the surface water sewer crossing the site. although not shown as a public sewer in Thames Water asset map, the surface water sewer crossing the site appears to serve other properties and is likely to be classed as a public sewer in reality. The connections are to be made following approval from Thames Water. It should be reiterated that the proposals will significantly reduce discharge rate into the system via the provision of green/blue roofs with restricted outflows.
- 3.9 A diversion of the surface water sewer crossing the site is required to accommodate the development. The proposed diversion layout is shown within the drainage layout in Appendix D.



## Water Quality

- 3.10 In line with CIRIA SuDS guidance, runoff from roofs of similar buildings, is generally deemed to pose low risk of silt pollution. As such, no treatment to the runoff is deemed necessary.

## Management and Maintenance

- 3.11 The proposals are for a privately maintained drainage system to the point of connection to the public sewer.
- 3.12 A general maintenance guidance from ABG is included in Appendix G of this report. A maintenance schedule for the green/blue roofs and the surface water pipework and chambers is provided below:

*Table 1: Indicative Maintenance Schedule (\* green/blue roofs maintenance should be agreed with the selected manufacturer)*

PROPOSED SCHEDULE OF MAINTENANCE FOR BELOW GROUND DRAINAGE				
Item	Visual Inspection	Cleanse / De-sludge / Clear	CCTV Survey	Comments
Green/blue roofs*	<p>Following any significant storm event, the outlets should be visually inspected to ensure no blockage has occurred.</p> <p>Following any significant traffic or remedial works that take place on or around the roof, each of the outlets should be visually inspected to ensure all drainage holes are clear and free draining.</p>	<p>Quarterly each outlet, should be inspected and cleared of any build up or debris. All leaf litter mainly autumnal visit, should be removed from the roof surface. Debris must be removed from the roof and not simply flushed down rainwater pipes.</p> <p>Cut back tree limbs that overhang the roof to give at least a 1 metre clearance, this will significantly reduce any risk of any blockage to outlets.</p>	N/A	<p>It is also recommended during maintenance visits to visually inspect the waterproofing system at all upstands, to ensure it is firmly adhered to the detail that it is waterproofing.</p>
Surface Water Drainage System (pipework, chambers etc.)	5 years	10 years	10 years	Cleansing to be carried as necessary



## 4.0 Conclusions & Next Steps

4.1 The report has demonstrated how drainage can be managed onsite.

### SuDS Summary

4.2 This report is based on the principles within the Flood Risk Assessment by Herrington Consulting (February 2021, Issue 2 and October 2022 Issue 3), which also contains relevant background information and justification of the selected drainage strategy for the site. The report should be read in conjunction with the abovementioned FRA.

4.3 In line with the proposed drainage strategy within the FRA, the proposals include green and blue roof construction for the new roofs and terraces of the building, while all external hardstanding areas would not change and would drain as existing.

4.4 The proposed scheme takes into account the 100-year + 40% storm event, which helps reduce flood risk within the associated catchment.

### Planning Considerations & Next Steps

4.5 The following elements will need to be considered once the project progress further:

- ▶ Utilising blue and green roofs for all parts of the proposed buildings where this is possible;
- ▶ Peak discharge rates from all roofs combined are limited to 1.5 l/s;
- ▶ Design of green and blue roofs including storage calculations, standard construction details and maintenance schedule are provided within this design pack;
- ▶ The green and blue roofs are to discharge to the existing surface water sewer crossing the site;
- ▶ The hardstanding surfaces are not proposed to change and as such are to drain as per the existing situation;
- ▶ Sewer connection applications;
- ▶ Sewer diversion applications.





# APPENDIX A: Policy & Guidance



## National Planning Policy Framework

A sustainable drainage strategy will need to be submitted, when SuDS (Sustainable Drainage Systems) are required in accordance with the National Planning Policy Framework (NPPF). Lead Local Flood Authorities (LLFA) will require a SuDS strategy to be submitted for sites measuring 1 hectare or greater and/or for all major planning applications (10 dwellings or more).

Drainage policies are set out in the National Planning Policy Framework (NPPF) in paragraphs 167 and 169<sup>1</sup>.

In accordance with paragraph 167 “Development should only be allowed in areas at risk of flooding where, in the light of a site-specific flood risk assessment (and the sequential and exception test, as applicable) it can be demonstrated that:

- ▶ within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;
- ▶ the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;
- ▶ it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- ▶ any residual risk can be safely managed; and
- ▶ safe access and escape routes are included where appropriate, as part of an agreed emergency plan.”

Paragraph 169 of the NPPF states that “Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

---

<sup>1</sup> <https://www.gov.uk/guidance/national-planning-policy-framework/14-meeting-the-challenge-of-climate-change-flooding-and-coastal-change#planning-and-flood-risk>



- ▶ take account of advice from the lead local flood authority;
- ▶ have appropriate proposed minimum operational standards;
- ▶ have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- ▶ where possible, provide multifunctional benefits.”

## National Climate Change Guidance

The NPPF technical guidance for climate change provides guidance for preparing drainage strategies. This ensures the impacts of climate change can be fully understood and incorporated into the design of future developments.

### River flow allowances

Peak river allowances show the anticipated changes to peak flow by management catchment. Within Flood Zones 2 or 3, the following criteria should be followed:

- ▶ essential infrastructure – use the higher central allowance
- ▶ highly vulnerable – use central allowance (development should not be permitted in flood zone 3a)
- ▶ more vulnerable – use the central allowance
- ▶ less vulnerable – use the central allowance
- ▶ water compatible – use the central allowance

*Roding, Beam and Ingrebourne Management Catchment Peak River Flow Allowances*

	Central	Higher	Upper
2020s	15%	20%	31%
2050s	14%	21%	38%
2080s	26%	36%	64%

### Rainfall intensity



The NPPF technical guidance for climate change was updated in May 2022 to provide peak rainfall allowances based upon management catchments. Peak rainfall allowances are provided for 1% annual exceedance probability (AEP) events and for 3.3% AEP events, and 2 epochs rather than 3.

For flood risk assessments and strategic flood risk assessments the following should be followed based on the development’s lifetime. Note residential development should have a minimum lifetime of 100 years.

- ▶ Development with a lifetime beyond 2100 (includes development proposed in applications or local plan allocations): Assess the upper end allowances for both the 1% and 3.3% AEP events for the 2070s epoch (2061 to 2125). Design your development so that for the upper end allowance in the 1% AEP event there is no increase in flood risk elsewhere and ensure the development will be safe from surface water flooding
- ▶ Development with a lifetime of between 2061 and 2100: Use the same approach as for development with a lifetime beyond 2100, but use the central allowance for the 2070s epoch (2061 to 2125).
- ▶ Development with a lifetime up to 2060: Use the same approach as for development with a lifetime beyond 2100, but use the central allowance for the 2050s epoch (2022 to 2060).

Note if the development has a lifetime beyond 2061 and the allowance for the 2050s epoch is higher than that for the 2070s epoch use the higher of the two allowances.

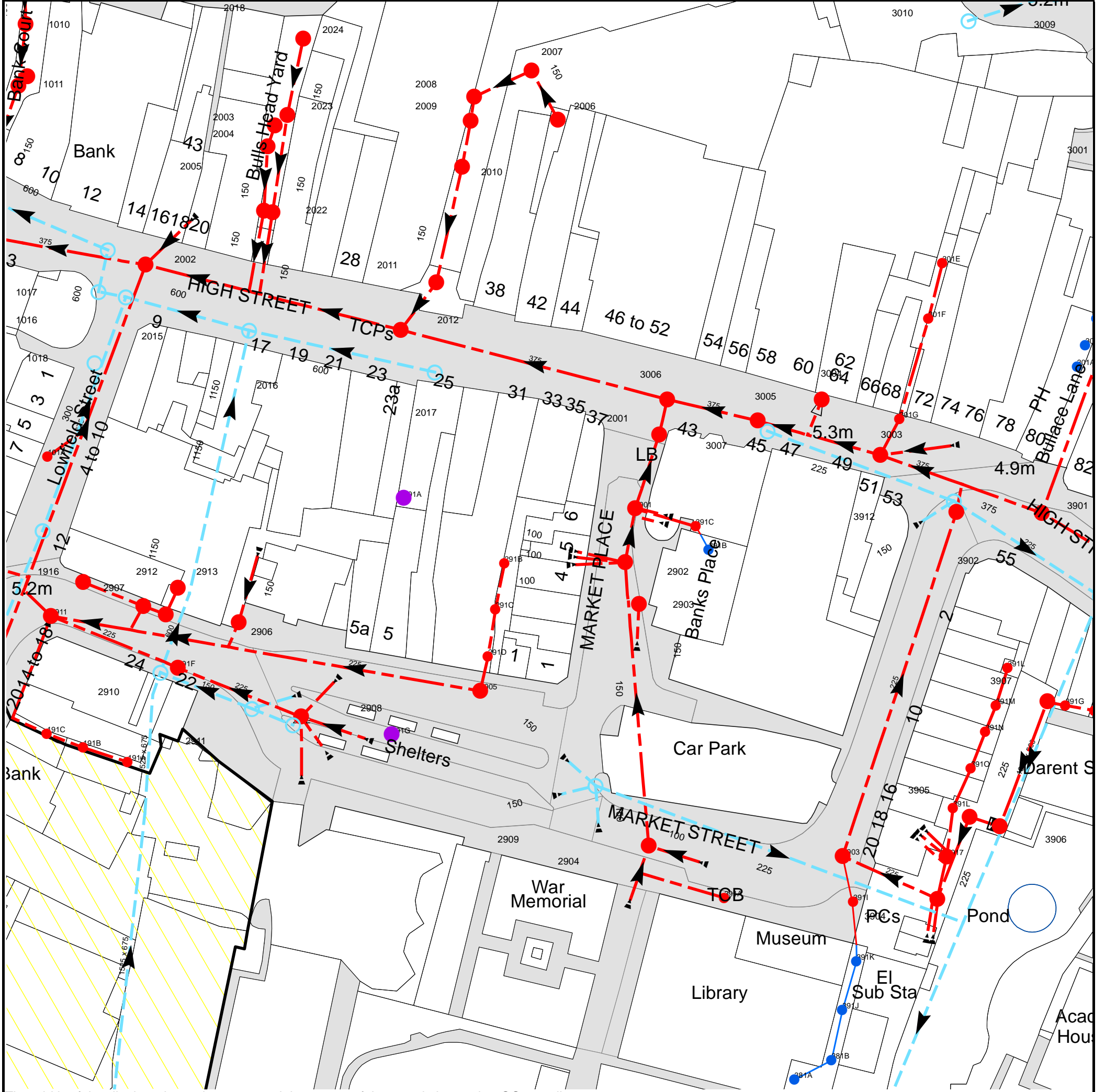
*Roding, Beam and Ingrebourne Management Catchment peak rainfall allowance*

AEP Epoch	3.3%		1%	
	2050s	2070s	2050s	2070s
Central	20%	20%	20%	25%
Upper end	35%	35%	40%	40%



# APPENDIX B: Thames Water Sewer Records

Asset Location Search Sewer Map - ALS/ALS Standard/2020 4208160



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 554280,173990

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



# APPENDIX C: CCTV Survey

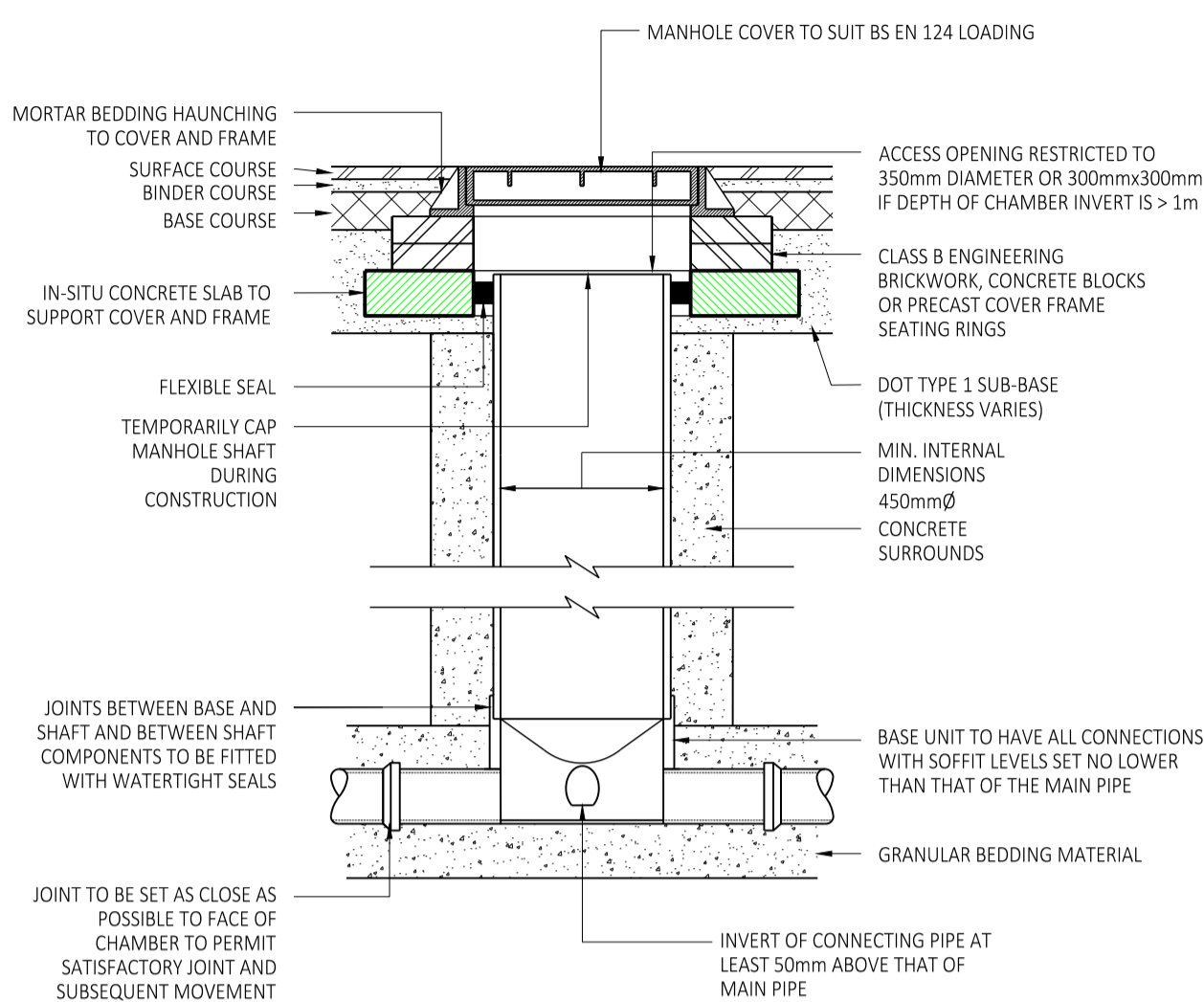




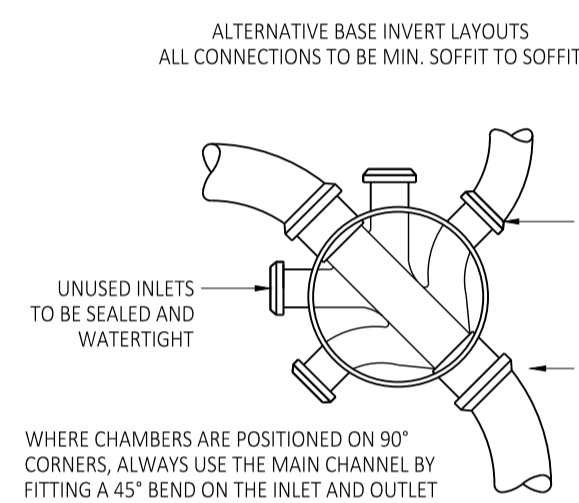




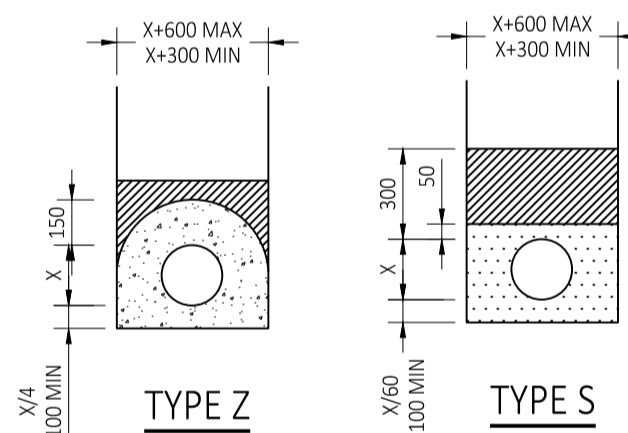
# APPENDIX D: Drainage Layout



NOMINAL DIAMETER (mm)	EFFECTIVE LENGTH OF ROCKER PIPE (m)
150 TO 600	0.6
>600 TO 750	1.0
>750	1.2



### TYPE 3 ACCESS CHAMBER - FLEXIBLE MATERIAL (MAX. DEPTH 3m, NON-ENTRY) (1:20)

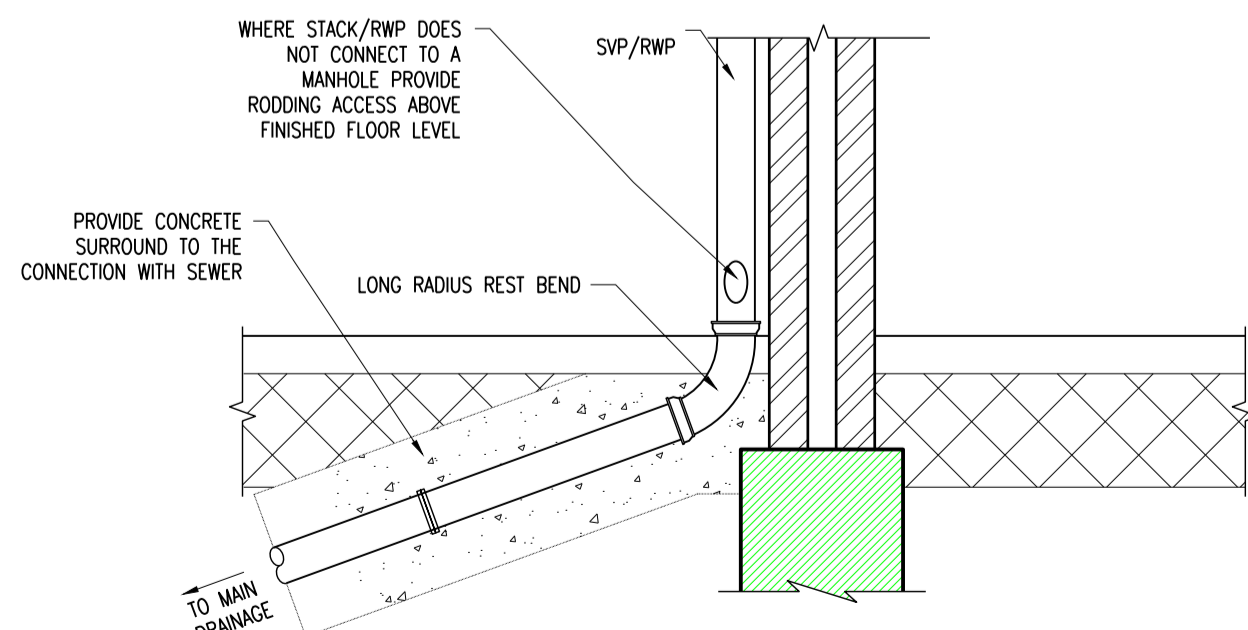


- GRANULAR MATERIAL TO SHW CLAUSE 503.3(i)
- GEN 1 CONCRETE UNLESS SULPHATES PRESENT
- SELECTED TYPE 8 GRANULAR BACKFILL MATERIAL TO SHW CLAUSE 503.3(v)

### TRENCH AND BEDDING DETAILS

IN TRAFFICKED AREAS:  
TYPE S WHERE COVER >900mm  
TYPE Z WHERE COVER <900mm

IN NON-TRAFFICKED AREAS:  
TYPE S WHERE COVER >600mm  
TYPE Z WHERE COVER <600mm



### SVP/RWP CONNECTION (1:20)

### DESIGN PHILOSOPHY

THIS DESIGN AIMS TO ADDRESS CONDITION 05 OF THE PLANNING PERMISSION FOR PLANNING APPLICATION DA/23/00207/VCON WITH DARTFORD BOROUGH COUNCIL.

THE PROPOSALS ARE TO UTILISE GREEN AND BLUE ROOFS FOR THE DEVELOPMENT WHILE ALLOWING THE EXISTING HARDSTANDING SURFACE TO DRAIN AS EXISTING BECAUSE NO CHANGES ARE PROPOSED FOR THESE AREAS.

AS THE DEVELOPMENT CONSISTS OF MULTIPLE LEVELS OF ROOFS/TERRACES, THE PROPOSED BLUE AND GREEN ROOF SYSTEMS HAVE BEEN DESIGNED SEPARATELY.

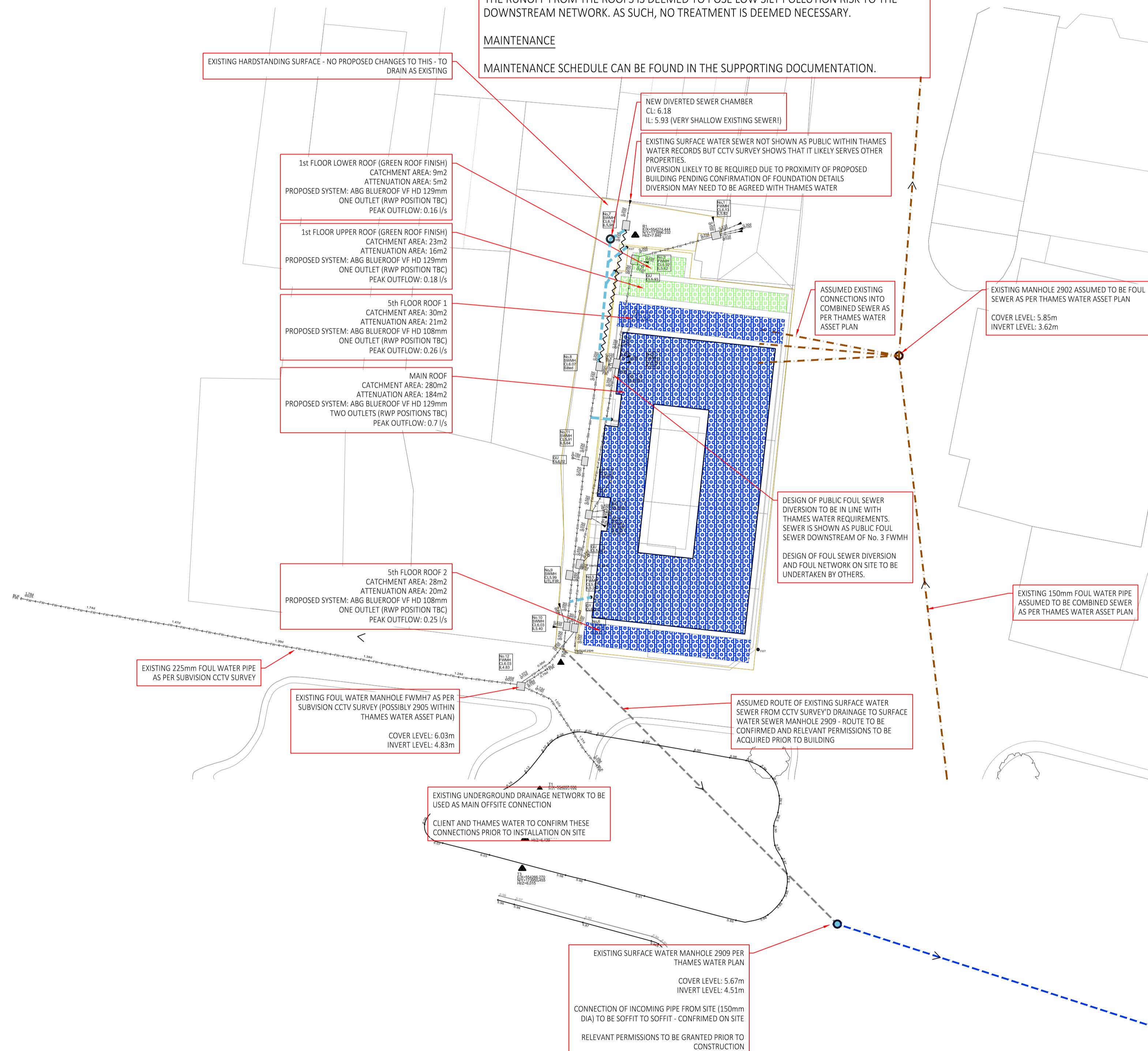
THE PRACTICAL MINIMUM OUTFLOW RATE FOR EACH BLUE/GREEN ROOF HAS BEEN SELECTED. THE TOTAL PEAK OUTFLOW RATE FROM ALL PROPOSED BLUE/GREEN ROOFS IS 1.55 l/s. CALCULATIONS CAN BE FOUND IN THE SUPPORTING DOCUMENTATION.

### WATER QUALITY

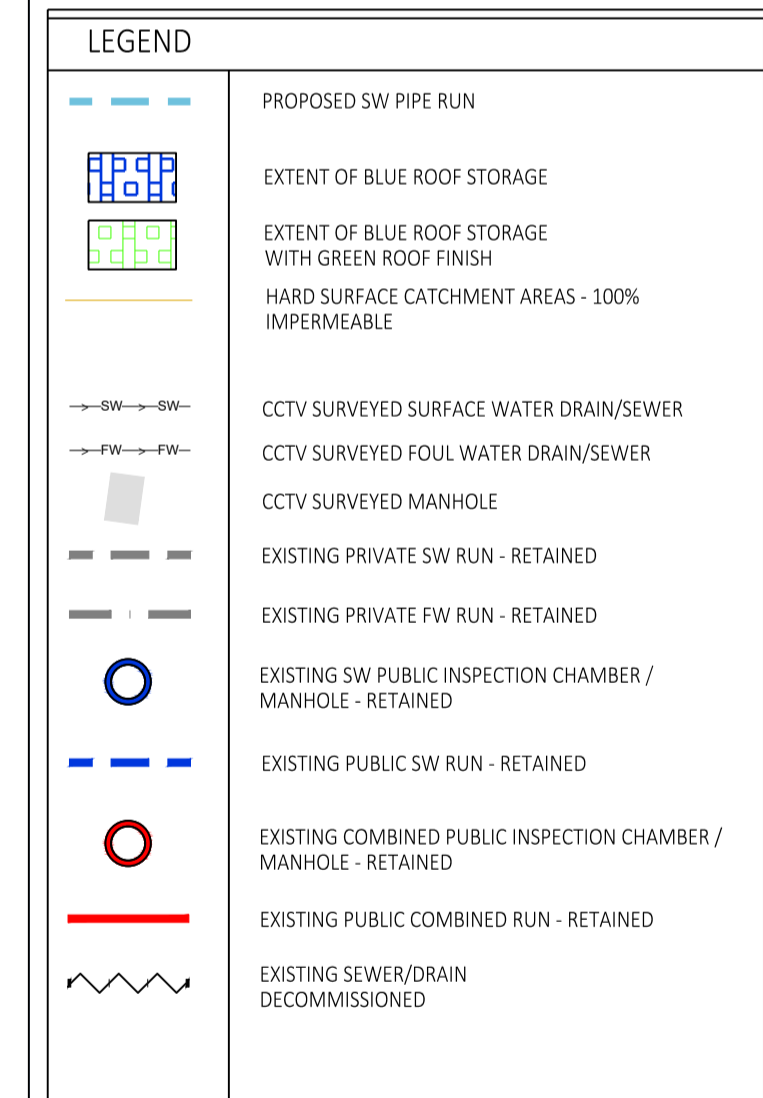
THE RUNOFF FROM THE ROOFS IS DEEMED TO POSE LOW SILT POLLUTION RISK TO THE DOWNSTREAM NETWORK. AS SUCH, NO TREATMENT IS DEEMED NECESSARY.

### MAINTENANCE

MAINTENANCE SCHEDULE CAN BE FOUND IN THE SUPPORTING DOCUMENTATION.



- GENERAL
  - THIS DRAWING IS NOT TO BE SCALED, WORK TO FIGURED DIMENSIONS ONLY, CONFIRMED ON SITE.
  - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS, DETAILED SPECIFICATIONS WHERE APPLICABLE AND ALL ASSOCIATED DRAWINGS IN THIS SERIES.
  - ANY DISCREPANCY ON THIS DRAWING IS TO BE REPORTED IMMEDIATELY TO THE PARTNERSHIP FOR CLARIFICATION.
  - THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND FOR THE STABILITY OF THE WORKS IN PROGRESS.
  - CDM REGULATIONS 2015. ALL CURRENT DRAWINGS AND SPECIFICATIONS MUST BE READ IN CONJUNCTION WITH THE DESIGNER'S HAZARD RISK AND ENVIRONMENT ASSESSMENT RECORD. DESIGN HAS BEEN PRODUCED BASED ON INFORMATION PROVIDED BY THE CLIENT/PRINCIPLE DESIGNER AVAILABLE AT TIME OF ISSUE. CONTRACTOR TO REVIEW DRAWING AND SPECIFICATION IN CONTEXT WITH THE WIDER SITE AND SPECIFIC SITE INVESTIGATION, CONTAMINATION ASSESSMENT, ASBESTOS SURVEY, ENVIRONMENTAL SURVEY, UXO SURVEY AND ANY OTHER RELEVANT INFORMATION AND MANAGE RISKS RELATING TO THE WORKS OUTLINED IN THE DRAWINGS AND SPECIFICATION. PRINCIPLE CONTRACTOR TO MAKE DESIGNER AND CLIENT AWARE OF SITE SPECIFIC RISKS THAT MAY AFFECT THE DRAWING AND SPECIFICATION.
  - CDM REGULATIONS 2015. FOR GENERIC MAINTENANCE AND MANAGEMENT RISKS REFER TO CHAPTER 36 OF CIRIA 752 SUDS MANUAL. FOR PROPRIETARY SYSTEMS SEE MANUFACTURER'S MANAGEMENT AND MAINTENANCE DETAILS AND RISK ASSESSMENT WITH REGARDS TO MAINTENANCE OF PROPRIETARY SYSTEMS.
- CONSTRUCTION NOTE
  - THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.
  - THE MAIN CONTRACTOR IS RESPONSIBLE FOR ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.
  - ANY INFORMATION GIVEN REGARDING EXISTING UNDERGROUND SERVICES IS GIVEN IN GOOD FAITH AFTER CONSULTATION WITH THE RELEVANT AUTHORITY, HOWEVER ACCURACY IS NOT CERTAIN. THE MAIN CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL INFORMATION ON SITE PRIOR TO WORK COMMENCING AND TAKING DUE CARE AND ATTENTION WHILST UNDERTAKING THE WORKS.
  - THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.
  - ALL PRODUCTS SPECIFIED SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS. IF THERE ARE DISCREPANCIES BETWEEN THAT INFORMATION AND THE DETAILS ON ANY MERIDIAN DRAWINGS, THE MANUFACTURER'S INSTRUCTIONS MUST BE USED.
- BELOW GROUND DRAINAGE
  - UPVC/CL PIPES TO BS 4660 - 2000 AND PLASTIC INSPECTION CHAMBERS AND FITTINGS TO BS EN 13598-1:2020. CLAY PIPES TO BS EN 295-1:2013. CONCRETE MANHOLES AND INSPECTION CHAMBERS TO BS EN 1917:2002
  - ALL ADAPTABLE DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE App C - DESIGN AND CONSTRUCTION GUIDANCE AND THE RELEVANT COUNCIL DESIGN GUIDE.
  - ALL PRIVATE FOUL WATER SEWERS TO BE LAID AT 1 IN 40 AT THE HEAD OF PIPE RUNS AND 1 IN 80 ELSEWHERE UNLESS OTHERWISE STATED.
  - ALL PRIVATE FOUL SEWER PIPES TO BE 100mm DIAMETER FROM SOIL STACKS UNLESS OTHERWISE STATED ON THE DRAWING AND 150mm WHERE SERVING MORE THAN 9 PROPERTIES.
  - ALL PRIVATE SURFACE WATER SEWERS TO BE LAID AT 1 IN 100 UNLESS OTHERWISE STATED ON THE DRAWING.
  - ALL PRIVATE SURFACE WATER SEWER PIPES TO BE 100mm DIAMETER FROM DOWNPIPES AND 150mm DIAMETER ELSEWHERE UNLESS OTHERWISE STATED ON THE DRAWING.
  - ALLOW FOR RODDING ACCESS ABOVE GROUND WHERE RAINWATER DOWNPIPES OR SOIL STACKS DO NOT HAVE A DIRECT CONNECTION TO AN INSPECTION CHAMBER.
  - EXISTING SEWER PIPE TO BE RE-USED TO BE SURVEYED AND LEVELLED PRIOR TO COMMENCEMENT OF THE DRAINAGE WORKS AND REBURIED IF NECESSARY.
  - CONNECTIONS TO AN ADOPTED SEWER ONLY TO BE MADE FOLLOWING APPROVAL FROM THE RELEVANT ADOPTING AUTHORITY.
  - ALL DRAINS, SEWER PIPES AND MANHOLES TO BE CLEANED AND TESTED FOR WATER TIGHTNESS ON COMPLETION OF CONSTRUCTION.
- MANHOLE COVERS AND FRAMES
  - MANHOLE COVERS TO BE CLASS D400 IN HIGHWAYS, CLASS B125 IN FOOTWAYS AND VERGES, CLASS A15 IN NON-TRAFFICKED AREAS.
  - MANHOLE COVER AND FRAME TO BE BEDDED AND SURROUNDED IN 1:3 MORTAR.



P1	Initial design	BB	27/02/24
PO	For Information	AW	15/12/23
REV:	DESCRIPTION:	BY:	DATE:

STATUS: Preliminary

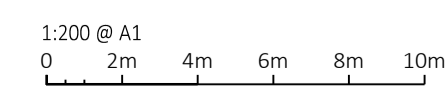
**MERIDIAN**  
CIVIL ENGINEERING CONSULTANCY

CLIENT: Market Street Darford Limited

SITE: 1-5 Market Place  
Darford, Kent, DA1 1EX

TITLE: Surface Water  
Overall Drainage Strategy

SCALE AT A1:	DATE:	DRAWN:	CHECKED:
1:200 @ A1	15/02/2024	SL	MN
PROJECT NO:	DRAWING NO:	REVISION:	
MC0391	CIV-01	P1	





# APPENDIX E: Roof Storage Calculations



# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	Market Street, Dartford, DA1 1EY - First Floor Lower		
Prepared for:	Meridian Civils		
Date:	26/02/2024		
ABG Project ID:	MS DART	Calculator version:	1.34
Prepared by:	Matt Gledhill, matthew.gledhill@abgltd.com		
Notes/description:	Green roof surface finish. Maintenance or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Document/Drawing references:

### Input Parameters - Rainfall Information (FEH22)

Return period:	100 years	As supplied by Client
Allowance for Climate Change:	40 %	As supplied by Client
OS grid reference selected for FEH data:	TQ 52500 73500	

### Input Parameters - Roof Information

Total catchment area:	9 m <sup>2</sup>	As supplied by Client
Attenuation area:	5 m <sup>2</sup>	As supplied by Client
Maximum allowable runoff:	0.17 l/s	As supplied by Client

### Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	0 hours and 50 minutes	0.16
30 mins	0 hours and 50 minutes	0.16
1 hour	0 hours and 40 minutes	0.14
2 hours	0 hours and 20 minutes	0.08
4 hours	0 hours and 0 minutes	0.01
6 hours	0 hours and 0 minutes	0.01
10 hours	0 hours and 0 minutes	0.01
24 hours	0 hours and 0 minutes	0.00
48 hours	0 hours and 0 minutes	0.00

**Total attenuation required: 0.3 m<sup>3</sup>**  
**Half empty time: 0 hours and 10 minutes.**

### Output - Recommended Blue Roof System

System Name:	ABG bluroof VF HD 129mm
Description:	The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also cross-referenced with the structural engineer's long-term deflection analysis. Additional 'tell-tale' parapet overflow outlets, may also be added by the architect.

Total attenuation capacity:	0.5 m <sup>3</sup>
Number of Blue Roof outlets:	1

- Notes:
1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
  2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
  3. The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
  4. This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
  5. Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

Blue Roof Estimate

## 1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

## 2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

## 3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant. The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

## 4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.

ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services

shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

## 5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.

ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.

iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands, proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated in this Agreement.

iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.

v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

## 6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

## 7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

## 8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the

reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base rate of the central bank of the country of the currency of payment along with any collection costs which may occur.

ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement. Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be entitled to exercise are hereby expressly excluded.

## 9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

## 10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

## 11. COMPLIANCE WITH LAWS

This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as part of the appointment process prior to ABG Geosynthetics commencing work.

# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	Market Street, Dartford, DA1 1EY - First Floor Upper		
Prepared for:	Meridian Civils		
Date:	26/02/2024		
ABG Project ID:	MS DART	Calculator version:	1.34
Prepared by:	Matt Gledhill, matthew.gledhill@abgltd.com		
Notes/description:	Green roof surface finish. Maintenance or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Document/Drawing references:

### Input Parameters - Rainfall Information (FEH22)

Return period:	100 years	As supplied by Client
Allowance for Climate Change:	40 %	As supplied by Client
OS grid reference selected for FEH data:	TQ 52500 73500	

### Input Parameters - Roof Information

Total catchment area:	23 m <sup>2</sup>	As supplied by Client
Attenuation area:	16 m <sup>2</sup>	As supplied by Client
Maximum allowable runoff:	0.18 l/s	As supplied by Client

### Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	2 hours and 10 minutes	0.16
30 mins	2 hours and 30 minutes	0.17
1 hour	2 hours and 40 minutes	0.18
2 hours	2 hours and 30 minutes	0.17
4 hours	1 hour and 50 minutes	0.13
6 hours	1 hour and 10 minutes	0.09
10 hours	0 hours and 10 minutes	0.03
24 hours	0 hours and 0 minutes	0.01
48 hours	0 hours and 0 minutes	0.00

**Total attenuation required: 1.2 m<sup>3</sup>**  
**Half empty time: 0 hours and 30 minutes.**

### Output - Recommended Blue Roof System

System Name:	ABG bluroof VF HD 129mm
Description:	The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also cross-referenced with the structural engineer's long-term deflection analysis. Additional 'tell-tale' parapet overflow outlets, may also be added by the architect.

Total attenuation capacity:	1.8 m <sup>3</sup>
Number of Blue Roof outlets:	1

- Notes:
- This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
  - Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
  - The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
  - This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
  - Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

Blue Roof Estimate

## 1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

## 2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

## 3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant. The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

## 4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.  
ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

## 5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.  
ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.  
iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands, proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated in this Agreement.  
iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.  
v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

## 6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

## 7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

## 8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base rate of the central bank of the country of the currency of payment along with any collection costs which may occur.  
ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement. Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be entitled to exercise are hereby expressly excluded.

## 9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

## 10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

## 11. COMPLIANCE WITH LAWS

This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as part of the appointment process prior to ABG Geosynthetics commencing work.

# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	Market Street, Dartford, DA1 1EY - 5th Floor Roof 1		
Prepared for:	Meridian Civils		
Date:	26/02/2024		
ABG Project ID:	MS DART	Calculator version:	1.34
Prepared by:	Matt Gledhill, matthew.gledhill@abgltd.com		
Notes/description:	Paved surface finish. Maintenance or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Document/Drawing references:

### Input Parameters - Rainfall Information (FEH22)

Return period:	100 years	As supplied by Client
Allowance for Climate Change:	40 %	As supplied by Client
OS grid reference selected for FEH data:	TQ 52500 73500	

### Input Parameters - Roof Information

Total catchment area:	30 m <sup>2</sup>	As supplied by Client
Attenuation area:	21 m <sup>2</sup>	As supplied by Client
Maximum allowable runoff:	0.26 l/s	As supplied by Client

### Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	2 hours and 0 minutes	0.23
30 mins	2 hours and 10 minutes	0.25
1 hour	2 hours and 10 minutes	0.26
2 hours	2 hours and 0 minutes	0.24
4 hours	1 hour and 20 minutes	0.17
6 hours	0 hours and 40 minutes	0.11
10 hours	0 hours and 0 minutes	0.03
24 hours	0 hours and 0 minutes	0.01
48 hours	0 hours and 0 minutes	0.01

**Total attenuation required: 1.5 m<sup>3</sup>**  
**Half empty time: 0 hours and 30 minutes.**

### Output - Recommended Blue Roof System

System Name:	ABG bluroof VF HD 108mm
Description:	Blue roof depth of 108mm. No. of control positions TBC by design team, and also cross-referenced with the structural engineer's long-term deflection analysis. Additional 'tell-tale' parapet overflow outlets, may also be added by the architect.

Total attenuation capacity:	2.0 m <sup>3</sup>
Number of Blue Roof outlets:	1

- Notes:
- This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
  - Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
  - The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
  - This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
  - Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

Blue Roof Estimate



## 1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

## 2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

## 3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant. The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

## 4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.  
ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

## 5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.  
ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.  
iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands, proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated in this Agreement.  
iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.  
v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

## 6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

## 7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

## 8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base rate of the central bank of the country of the currency of payment along with any collection costs which may occur.  
ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement. Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be entitled to exercise are hereby expressly excluded.

## 9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

## 10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

## 11. COMPLIANCE WITH LAWS

This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as part of the appointment process prior to ABG Geosynthetics commencing work.

# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	Market Street, Dartford, DA1 1EY - 5th Floor Roof 2		
Prepared for:	Meridian Civils		
Date:	26/02/2024		
ABG Project ID:	MS DART	Calculator version:	1.34
Prepared by:	Matt Gledhill, matthew.gledhill@abgltd.com		
Notes/description:	Paved surface finish. Maintenance or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		

Document/Drawing references:

### Input Parameters - Rainfall Information (FEH22)

Return period:	100 years	As supplied by Client
Allowance for Climate Change:	40 %	As supplied by Client
OS grid reference selected for FEH data:	TQ 52500 73500	

### Input Parameters - Roof Information

Total catchment area:	28 m <sup>2</sup>	As supplied by Client
Attenuation area:	20 m <sup>2</sup>	As supplied by Client
Maximum allowable runoff:	0.26 l/s	As supplied by Client

### Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	1 hour and 50 minutes	0.23
30 mins	2 hours and 0 minutes	0.25
1 hour	2 hours and 0 minutes	0.25
2 hours	1 hour and 50 minutes	0.23
4 hours	1 hour and 10 minutes	0.16
6 hours	0 hours and 30 minutes	0.10
10 hours	0 hours and 0 minutes	0.02
24 hours	0 hours and 0 minutes	0.01
48 hours	0 hours and 0 minutes	0.01

**Total attenuation required: 1.3 m<sup>3</sup>**  
**Half empty time: 0 hours and 30 minutes.**

### Output - Recommended Blue Roof System

System Name:	ABG bluroof VF HD 108mm
Description:	Blue roof depth of 108mm. No. of control positions TBC by design team, and also cross-referenced with the structural engineer's long-term deflection analysis. Additional 'tell-tale' parapet overflow outlets, may also be added by the architect.

Total attenuation capacity:	1.9 m <sup>3</sup>
Number of Blue Roof outlets:	1

- Notes:
- This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
  - Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
  - The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
  - This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
  - Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

Blue Roof Estimate

## 1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

## 2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

## 3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant. The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

## 4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.  
ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

## 5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.  
ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.  
iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands, proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated in this Agreement.  
iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.  
v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

## 6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

## 7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

## 8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base rate of the central bank of the country of the currency of payment along with any collection costs which may occur.  
ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement. Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be entitled to exercise are hereby expressly excluded.

## 9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

## 10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

## 11. COMPLIANCE WITH LAWS

This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as part of the appointment process prior to ABG Geosynthetics commencing work.

# BLUE ROOF ATTENUATION AND OUTFLOW SUMMARY

## PRIVATE & CONFIDENTIAL - NOT FOR DISTRIBUTION

Project Name:	Market Street, Dartford, DA1 1EY - Main Roof		
Prepared for:	Meridian Civils		
Date:	13/12/2023		
ABG Project ID:	MS DART	Calculator version:	1.34
Prepared by:	Matt Gledhill, matthew.gledhill@abgltd.com		
Notes/description:	Green roof surface finish. Potential for free-standing/ballasted, PV panels, lighter-weight plant units or planters to be installed on top of the 'blue roof' system (recommended). Appropriate support for larger plant units TBC with ABG, and structural and M&E engineers. Maintenance or pedestrian/amenity access only - TBC. Warm/inverted roof construction, with zero falls - TBC.		
Document/Drawing references:			

### Input Parameters - Rainfall Information (FEH22)

Return period:	100 years	As supplied by Client
Allowance for Climate Change:	40 %	As supplied by Client
OS grid reference selected for FEH data:	TQ 52500 73500	

### Input Parameters - Roof Information

Total catchment area:	280 m <sup>2</sup>	As supplied by Client
Attenuation area:	184 m <sup>2</sup>	As supplied by Client
Maximum allowable runoff:	0.7 l/s	As supplied by Client

### Output - Rainfall Calculation

Duration	Time to Empty	Restricted Outflow (l/s)
15 mins	8 hours and 20 minutes	0.5
30 mins	9 hours and 50 minutes	0.6
1 hour	11 hours and 10 minutes	0.6
2 hours	12 hours and 0 minutes	0.7
4 hours	12 hours and 10 minutes	0.7
6 hours	12 hours and 0 minutes	0.7
10 hours	10 hours and 40 minutes	0.6
24 hours	5 hours and 30 minutes	0.4
48 hours	0 hours and 10 minutes	0.1

**Total attenuation required: 20.4 m<sup>3</sup>**  
**Half empty time: 4 hours and 40 minutes.**

### Output - Recommended Blue Roof System

System Name:	ABG bluroof VF HD 129mm
Description:	The blue roof depth of 129mm, already includes for a 25mm deep, reservoir board. No. of control positions TBC by design team, and also cross-referenced with the structural engineer's long-term deflection analysis. Additional 'tell-tale' parapet overflow outlets, may also be added by the architect.

Total attenuation capacity:	20.9 m <sup>3</sup>
Number of Blue Roof outlets:	2

- Notes:
1. This document contains an estimate which has been prepared by ABG Ltd and is illustrative only and not a detailed design.
  2. Further details on the theories used in this estimate are available upon request from ABG. The values given for the performance of the system relate to testing, modelling and analysis of our systems obtained from laboratories and testing institutes. In line with our policy of continuous improvement the right is reserved to make changes to our systems without notice at any time.
  3. The estimate given in this report is based on the stated parameters as per the brief. If these parameters are not correct or have changed, ABG should be contacted to provide a revised estimate.
  4. This estimate is specific to the characteristics of ABG products/systems and is not applicable to other competitor products. The substitution of the whole or any component of this design for a material supplied from another source renders this estimate invalid.
  5. Final determination of the suitability of any information is the sole responsibility of the user. ABG will be pleased to discuss the use of this or any other product but responsibility for selection of a material and its application in any specific project remains with the user.

## 1. DEFINITIONS

'Consultant' means ABG Geosynthetics Ltd and its legal successors. 'Client' means the person, firm, company or organisation for whom the Consultant is performing the Services. 'Agreement' means the contract referred to in Clause 2. 'Services' means the services to be performed by the Consultant in accordance with the proposal from the Consultant. 'Project' means the project or works for which the Client has commissioned the Services.

## 2. GENERAL

Unless and until a formal agreement is entered into, the Client's acceptance of the proposal for Services from the Consultant or a request for some or all the Services to be performed by the Consultant, shall constitute a binding contract between the Client and the Consultant which contract will be subject to any terms and conditions contained or referred to in the aforementioned proposal and these terms and conditions. In the event of any conflict, the terms and conditions in the proposal shall prevail over these terms and conditions. The Agreement so formed shall supersede all previous understandings, commitments or agreements whether written or oral between the Client and the Consultant relating to the subject matter hereof. No person or entity shall have any rights in relation to this Agreement, whether as third parties or otherwise, save the parties to this Agreement. Should any term or condition of this Agreement be held to be unenforceable or invalid by the courts of any jurisdiction to which it is subject then such term or condition shall be disregarded and the remaining terms and conditions shall remain in full force and effect.

## 3. PERFORMANCE OF SERVICES AND SCOPE

The Consultant shall perform the Services using the degree of skill care and diligence to be expected from a consultant experienced in the provision of services of similar scope size and complexity. The Consultant shall use reasonable endeavours to complete the Services within the time or programme agreed but shall not be responsible for any delay beyond the reasonable control of the Consultant. The fee contained in the proposal is for the scope of services as defined therein. If not already contained in the proposal the Consultant and the Client shall agree as an initial activity an integrated project services programme to include the activities of all the parties to the Project relevant to the Services to be supplied by the Consultant. The aforesaid programme shall show the key dates for final information and the delivery of such to the Consultant so as to enable the Consultant to carry out the services in an efficient once through manner to achieve the programme delivery dates for the Services.

The Consultant provides various services including Design and Product use advice which is distinct from a Design Service. The Design Service may or may not attract a fee.

Where the Consultant's services are of an advisory nature and dependent upon the degree of information and release thereof by the Client then the Client agrees that any reliance placed on the services by the Client shall take due account of such constraints.

## 4. CONFIDENTIALITY AND INTELLECTUAL PROPERTY RIGHTS

i. The Consultant and the Client shall keep confidential all information pertaining to the Services.  
ii. Copyright for all reports, documents and the like produced by the Consultant in the performance of the Services shall remain vested with the Consultant but the Consultant shall grant an irrevocable royalty free license to the Client to use such reports, documents and the like for any purpose in connection with the Project.

## 5. LIABILITY

i. The Consultant shall be liable to pay compensation to the Client arising out of or in connection with this Agreement only if a breach of the duty of care in Clause 3 is established against the Consultant.  
ii. Notwithstanding any other term to the contrary in this Agreement or any related document and whether the cause of action for any claim arises under or in connection with the Agreement in contract or in tort, in negligence or for breach of statutory duty or otherwise the Consultant shall have no liability to the Client in respect of any claim for loss or damage arising from acts of war or terrorism or arising from flooding, burst water mains or failed drainage or arising from any incidence of toxic mould or asbestos but otherwise in relation to any cause of action as aforesaid the total liability of the Consultant in the aggregate for all claims shall be limited to a sum equivalent to ten (10) times the fee payable under this Agreement or £50,000, whichever is the lesser, or such other sum as may be expressly stated in the Consultant's proposal, and further but without prejudice to the aforesaid limit of liability any such liability of the Consultant shall be limited to such sum or sums as it would be just and equitable for the Consultant to pay having regard to the Consultant's responsibility for the same and on the basis that all other parties appointed or to be appointed by the Client to perform related services in connection with the Project shall be deemed to have provided undertakings on terms no less onerous than this Agreement and shall be deemed to have paid to the Client such contribution as it would be just and equitable for them to pay having regard to their responsibility for any loss or damage and providing that it shall be deemed that such other parties have not limited or excluded their liability to the Client for such loss or damage in any way which may be prejudicial to the Consultant's liability under this clause. Nothing in this clause shall operate to exclude or limit the Consultant's liability for death or personal injury.  
iii. The Client shall indemnify and keep indemnified the Consultant from and against all claims, demands, proceedings, damages, costs and expenses arising out of or in connection with this Agreement or the Project arising from acts of terrorism or arising otherwise in excess of the liability of the Consultant under this Agreement or which may be made in respect of events occurring after the expiry of the period of liability stated in this Agreement.  
iv. No action or proceedings under or in connection with this Agreement shall be commenced against the Consultant after the expiry of one year from completion of the Services.  
v. ABG Geosynthetics Ltd is not responsible for consequential, indirect or incidental losses.

## 6. INSURANCE

The Consultant shall arrange Professional Indemnity Insurance cover for the amount stated in Clause 5(ii). The Consultant will use all reasonable endeavours to maintain Professional Indemnity Insurance cover for the period stated in 5(iv) above, providing such insurance remains available to the Consultant at commercially reasonable rates.

## 7. CLIENT'S OBLIGATIONS

The Client shall supply, without charge and in such time so as not to delay or disrupt the performance of the Consultant in carrying out the Services, all necessary and relevant information, in his possession or available to him from his other agents or consultants and all necessary approvals or consents. Any deviation on any information from the proposal shall be confirmed in writing and any attendant consequential fees will be forwarded for approval by the Client before any changes are made. The Consultant shall not be liable for any consequential delays on site. Every reasonable effort will be made to mitigate against delays, however no liability for losses and costs will be accepted. The approval or consent by the Client to the Services shall not relieve the Consultant from any liability under this Agreement. All work undertaken by the Consultant must be ratified and signed off by the Client.

## 8. PAYMENT

i. The Client shall pay the Consultant for the Services in accordance with the proposal and this Agreement. If the Consultant performs any additional services or if the Services are delayed or disrupted for reasons beyond the reasonable control of the Consultant then the Consultant shall be entitled to such additional fees as are fair and reasonable in the circumstances. The Consultant may render an invoice at monthly intervals for services properly performed. The agreed invoice, or in the event of a dispute the undisputed element, shall be paid within 28 days of receipt of the invoice by the Client. Any invoice paid after this period will attract interest at 3% above the base rate of the central bank of the country of the currency of payment along with any collection costs which may occur.  
ii. The Client shall not withhold any payment of any sum or part of a sum due to the Consultant under this Agreement by reason of claims or alleged claims against the Consultant unless the amount to be withheld has been agreed between the Client and the Consultant as due to the Client or such sum arises from an award in adjudication, arbitration or litigation in favour of the Client and arises under or in connection with the Agreement. Save as aforesaid all rights of set off at common law, in equity or otherwise which the Client may otherwise be entitled to exercise are hereby expressly excluded.

## 9. TERMINATION

If a party is in breach of a material term of this Agreement and despite written notice from the other party fails to remedy such breach within 30 days or such other period as may be agreed between the parties, then the other party shall be entitled to terminate this Agreement forthwith. The Consultant may seek to recoup costs incurred for works completed prior to termination.

## 10. DISPUTE RESOLUTION

Any dispute between the parties that cannot be settled by mutual agreement shall be referred for final settlement to the arbitration of a person agreed between the parties or failing such agreement appointed upon the application of either party by the President of the Chartered Institute of Arbitrators and the said arbitration shall be carried out in accordance with the Construction Industry Model Arbitration Rules 1998 or such other version current at the time of the referral under this clause. Where the Agreement is subject to a governing law other than that of England and Wales then any dispute between the parties that cannot be settled by mutual agreement shall be finally settled by arbitration in accordance with the UNCITRAL Arbitration Rules by one arbitrator appointed in compliance with the said Rules. In either case such rules as appropriate are deemed to be incorporated into this Agreement by reference.

## 11. COMPLIANCE WITH LAWS

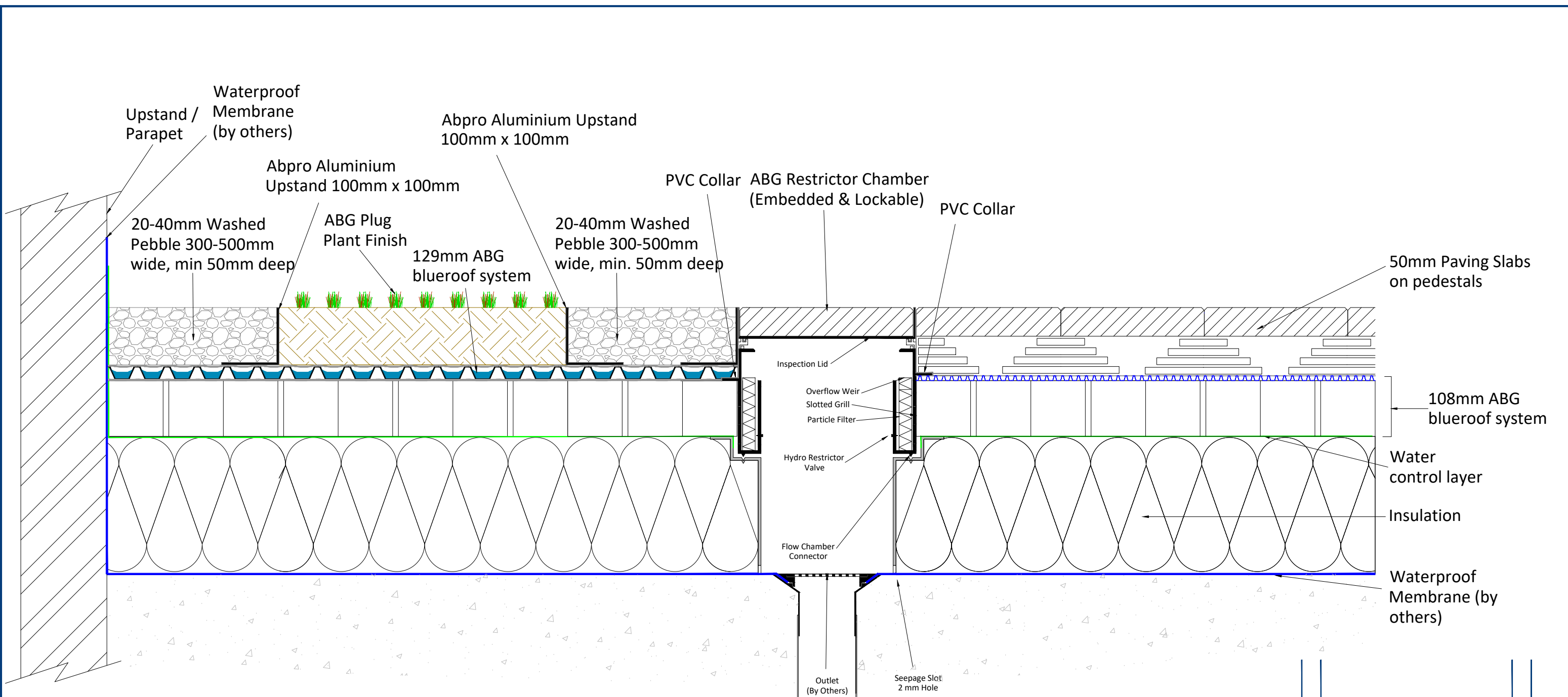
This Agreement shall be governed by and construed in accordance with the law of England and Wales unless stated otherwise in the proposal for services from the Consultant.

Changes to the above terms and conditions will only be considered if agreed in writing as part of the appointment process prior to ABG Geosynthetics commencing work.



# APPENDIX F: Standard Green/Blue Roof Details





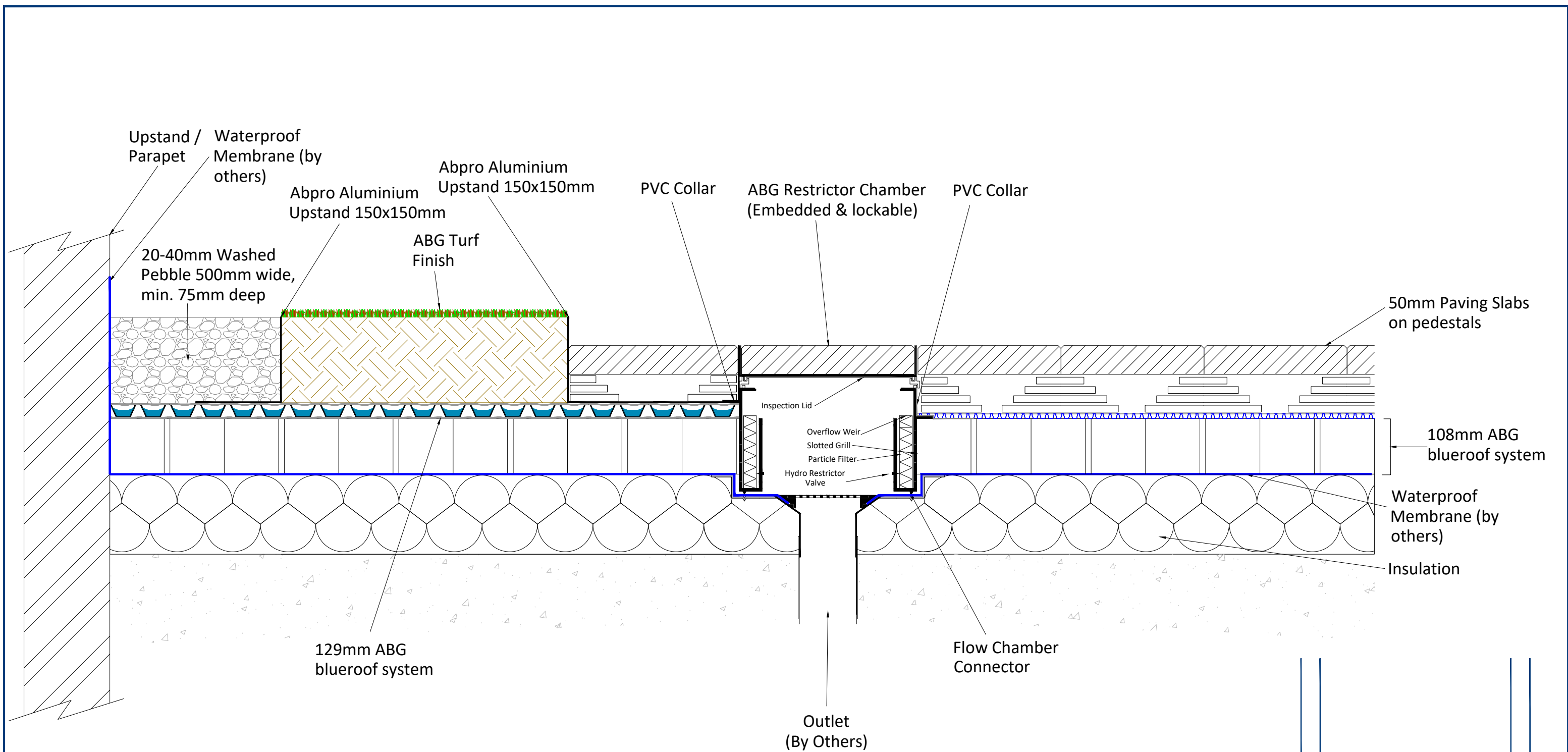
Rev.	Comments:	By:	Date:

Project:		
Blue Roof - Inverted		
Title:		
Restrictor Chamber & Green Roof / Paved Details		
Drawn by:	Date:	
RH	07/07/23	
Scale:	Drawing Ref:	Rev:
NTS	BRST02	1.04



ABG Ltd | E7 | Meltham Mills Road | Meltham | HD9 4DS | West Yorkshire | UK |  
 Tel: +44(0)1484 852096 | Fax: +44(0)1484 851562 | Email: geo@abgtd.com  
 www.abgtd.com

Retaining Walls | Erosion Control | Landfill  
 Tunnels | Green Roofs | Landscaping | Highways



Rev:	Comments:	By:	Date:
Project: Blue Roof - Warm			
Title: Restrictor Chamber & Hard / Soft Landscaping Detail			
Drawn by: RH	Date: 13/01/20		
Scale: NTS	Drawing Ref: BRST04	Rev: 1.03	



ABG Ltd | E7 | Meltham Mills Road | Meltham | HD9 4DS | West Yorkshire | UK |  
Tel: +44(0)1484 852096 | Fax: +44(0)1484 851562 | Email: geo@abg ltd.com  
www.abg ltd.com

Retaining Walls | Erosion Control | Landfill  
Tunnels | Green Roofs | Landscaping | Highways





# APPENDIX G: Maintenance Guidance (ABG)

# ABG bluroof - General Maintenance

All roofing systems and areas (regardless of whether a blue roof SuDS attenuation system is present or not) require a minimum of two inspections per year to ensure their ongoing performance. Also as part of a new development's planning requirements, an ongoing maintenance programme for any SuDS methods implemented must be submitted. In addition, an ongoing maintenance programme must be in place to maintain the ABG bluroof Warranty. ABG's in-house Contracts Division, ABG Installs, can provide rates on request for on-going blue roof maintenance: [installs@abgltd.com](mailto:installs@abgltd.com).

The specific roof surface finish will also require an appropriate maintenance regime to be carried out at the same time. For example, an intensive green roof will require regular maintenance in accordance with the chosen planting scheme and landscape design. An extensive green roof will generally require less maintenance, but includes removal of a season's growth and any unwanted/invasive species.

If ABG (via ABG Installs) has also installed the surface finishes, we can also provide this additional maintenance service. For details of general maintenance on the different types of surface finishes, please download our specific maintenance technical notes/information.

## ABG's bluroof Maintenance Service

Our service includes a full inspection and evaluation of the blue roof area and restrictor chambers.

A typical ABG/ABG Installs maintenance programme includes:

### Roof Evaluation:

- An expert from our ABG Installs team will perform a review of your blue roof area to determine what remedial work, if any, needs to be done

### Inspection:

- Of the ABG bluroof restrictor chambers, orifices and roof outlets; with removal of any debris or vegetation to enable water to flow freely to the rainwater outlet
- Of the ABG bluroof restrictor chamber particle filter boards, replacing as necessary
- Identification and reporting back of any general roof issues to the building owner, to include obvious maintenance requirements or defects that may require additional remedial work

### Note:

- Any additional roof or plant installations, roofing remedial work, or change of use must be discussed and approved by ABG's technical team before the installation/commencement of works.

## ABG Ltd

With over 14 years' experience in the design, manufacture and supply of blue roofs throughout the UK, ABG can offer unparalleled experience and expertise in blue roof maintenance.

To discuss your specific maintenance requirements, please call our Buildings Team on 01484 852096, or alternatively send the team an email at: [building@abgltd.com](mailto:building@abgltd.com).



# LUSTRE

CONSULTING

2<sup>nd</sup> Floor North, Fitted Rigging House,  
The Historic Dockyard, Chatham, Kent, ME4 4TZ  
e: [info@lustreconsulting.com](mailto:info@lustreconsulting.com) | t: 01634 757 705  
[www.lustreconsulting.com](http://www.lustreconsulting.com)