SURFACE WATER DRAINAGE ASSESSMENT & OUTLINE SUDS STRATEGY

BASEMENT FLAT
39 PRIORY ROAD
CAMDEN

LBH4627SUDS

FEBRUARY 2022

LBHGEO

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2.0	11th Feb 2022	Update for for revised scheme		SRLB

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FOREWORD-GUIDANCE NOTES

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THIRD PARTY INFORMATION

The report may present an opinion based upon information received from third parties. However, no liability can be accepted for any inaccuracies or omissions in that information.

1. INTRODUCTION

1.1 BACKGROUND

It is proposed to extend the basement flat at No. 39 Priory Road. This rear extension will form a new living / dining room area opening onto a basement level patio with stepped access up to the rear garden. In addition, a basement lightwell is to be excavated at the front of the property and improved basement access provided on the flank elevation.

A planning application for an earlier scheme was submitted to London Borough of Camden and planning permission was granted on 23rd April 2021 (Planning Ref. 2020/0715/P).

1.2 BRIEF

LBHGEO have been appointed to prepare a Surface Water Drainage Assessment & Outline SuDS Strategy to support a new planning application to be submitted to the London Borough of Camden.

1.3 SUDS GUIDANCE

The government advice is that developers should seek opportunities to reduce the overall level of flood risk through the appropriate application of sustainable drainage systems.

Sustainable drainage systems are designed to control surface water run off close to where it falls and mimic natural drainage as closely as possible. They provide opportunities to:

- reduce the causes and impacts of flooding;
- remove pollutants from urban runoff at source;
- combine water management with green space with benefits for amenity, recreation and wildlife.

The aim is to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

1. into the ground (infiltration);
2. to a surface water body;
3. to a surface water sewer, highway drain, or another drainage system;
4. to a combined sewer.

The London Borough of Camden requires drainage solutions to incorporate SuDS principles as laid out in the Non-Statutory Technical Standards[1] for Sustainable Drainage Systems and the London Plan[2].

For redevelopment sites where there is a net increase in impermeable area, development must include at least one ‘source control’ SuDS measure. Examples of potential Source Control measures include:

- blue/green roof
- rainwater harvesting

[1] DEFRA March 2015 Non-Statutory Technical Standards (NSTS) for sustainable drainage systems
[2] London Plan Chapter Five - London’s Responses to Climate Change Policy 5.1.3 Sustainable Drainage

- bio-retention
- rain garden
- permeable paving

Underground storage/attenuation tanks are not encouraged and are to be used only as a last resort.

The Camden Local plan provides guidance for water and flooding under Policy CC3, where the council will seek to ensure a development reduces the risk of flooding where possible and will require a development to utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield runoff rate where feasible.

Additionally, the Water and Flooding Camden Planning Guidance (CPG) (March 2019) states the following:

> *"A drainage report is required for all major applications, basement development, and vulnerable development in areas identified as at risk of flooding (details of what this should include can be found in paragraph 8.67 of the Local Plan). The Council will expect plans and application documents to describe how water will be managed within the development, including an explanation of the proposed SuDS, the reasons why certain SuDS have been ruled out and detailed information on materials and landscaping.*
>
> *The Council will expect developments to achieve a greenfield surface water run-off rate where feasible once SuDS have been installed.*
>
> *Greenfield run-off rates are defined as the run off rates from a site in its natural state prior to any development. Developers will be expected to show to the Council's satisfaction how all opportunities to reduce site run-off have been included"*

1.4 REPORT STRUCTURE

This report describes the site characteristics and the proposed development, following which consideration is then given to the feasibility of different SuDS techniques for this site, in line with the SuDS hierarchy.

An analysis is then presented of surface water runoff and of the attenuation volume that will be required to achieve the required reduction in the predicted runoff rates, taking into account increased rainfall rates due to anticipated climatic change.

A SuDS strategy is then developed including information about the proposed SuDS types, with an aim to reduce the drainage discharge rates as far as can be reasonably achieved in the proposed post-development scenario.

The report is accompanied by detailed calculations and a summary sustainable drainage pro-forma.

2. THE SITE

2.1 SITE LOCATION

The site is located at the junction of Priory Road and Abbot's Place in South Hampstead, within the Priory Road Conservation Area, and may be approximately located by the postcode NW6 4NN or by National Grid Reference 525585, 183920.

2.2 TOPOGRAPHICAL SETTING

The site lies on the lower southern slopes of Hampstead Hill on land that falls gently to the south.

Tributaries of the River Westbourne run to the west and east of the site. At its closest, the course of the river runs some 125m to the northeast of the site.

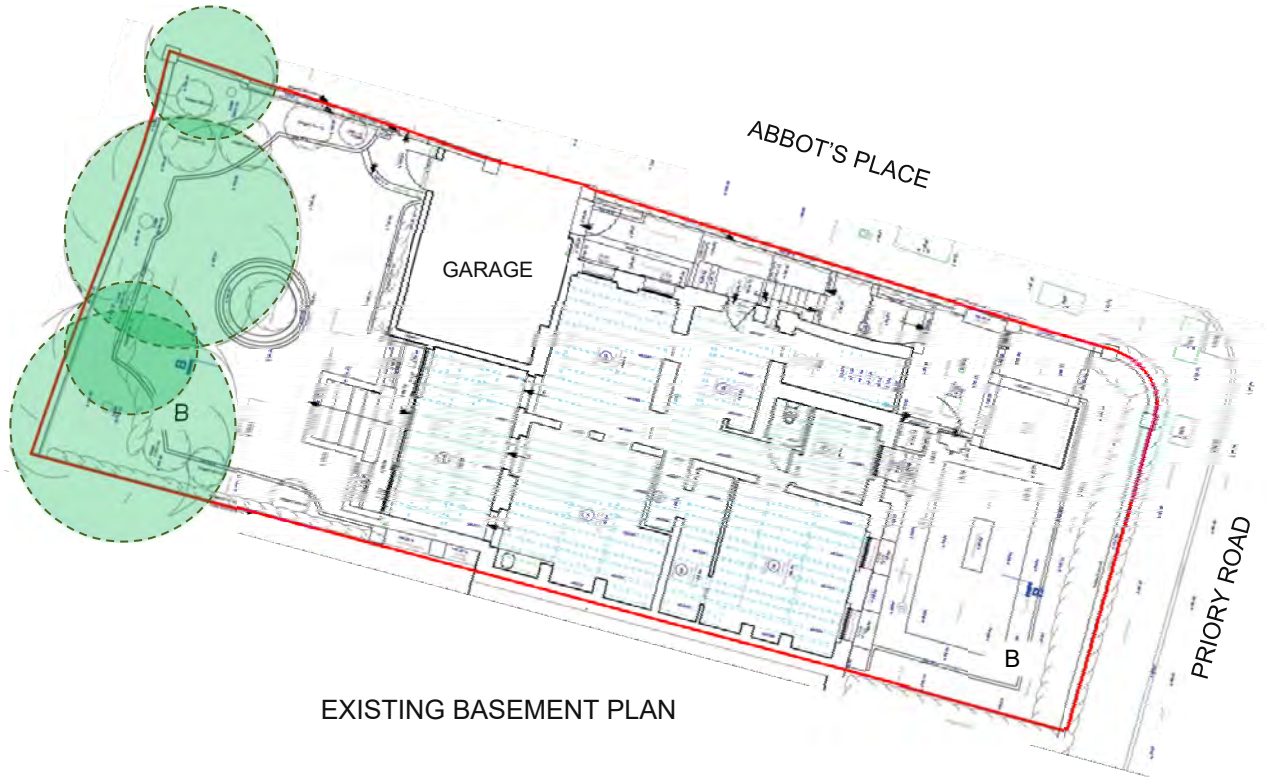
2.3 GROUND CONDITIONS

A ground investigation undertaken in December 2020 confirmed that the site is directly underlain by the London Clay Formation, which is essentially impermeable.

2.4 SITE DESCRIPTION

The site is occupied by a four storey Victorian semi-detached villa. The basement property has a side entrance from Abbot's Place as well as garden areas to the front and rear, both bordered by tall hedgerows.

The building is understood to be divided into four residential units, each occupying a floor level. A garage, accessible from Abbot's Place, is present at ground level, while a conservatory extension is present at basement level with stepped access up to the rear garden. This extension supports a partial roof terrace used by the ground floor flat.



EXISTING BASEMENT PLAN

The majority of the rear garden area comprises a hard-surfaced patio with landscaped borders, including four mature trees (two cypress, two lime) at the far rear of the site. A fifth tree, adjacent to Abbot's Place, was recently felled.

EXISTING REAR PATIO / GARDEN

2.5 EXISTING SURFACE WATER DRAINAGE

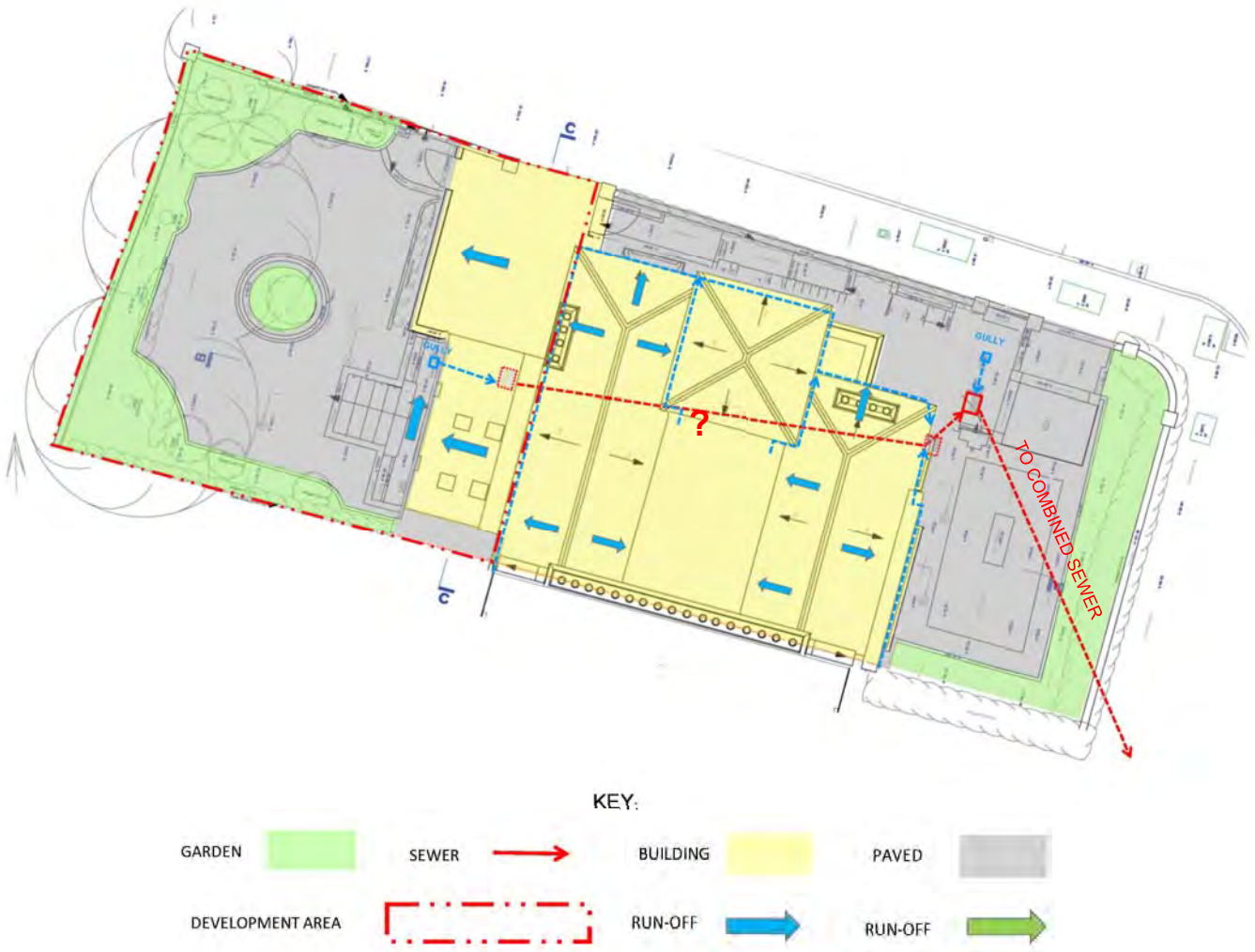
The property is mostly hard-surfaced and the surface water runoff collected on site is directed to a single manhole at the front, and then towards a 305mm diameter local combined sewer running southwards below Priory Road.

Drainage from the roof of the main building roof is routed (at eaves level) around to the front and to a manhole located in a small lightwell at the front of the property,

The runoff from the garage is directed into a raised bed bordering the extension to the rear.

The runoff from the existing basement conservatory and the low level rear patio is directed towards a gully, which then connects with an internal manhole located below the conservatory, before being directed towards the manhole at the front of the site via a drain below the existing building.

The hard-surfaced areas of the rear garden appear to drain towards either landscaped borders or the central planter.


C
C
GULLY
?
TO COMBINED SEWER
KEY:
GARDEN
SEWER
BUILDING
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DEVELOPMENT AREA
RUN-OFF
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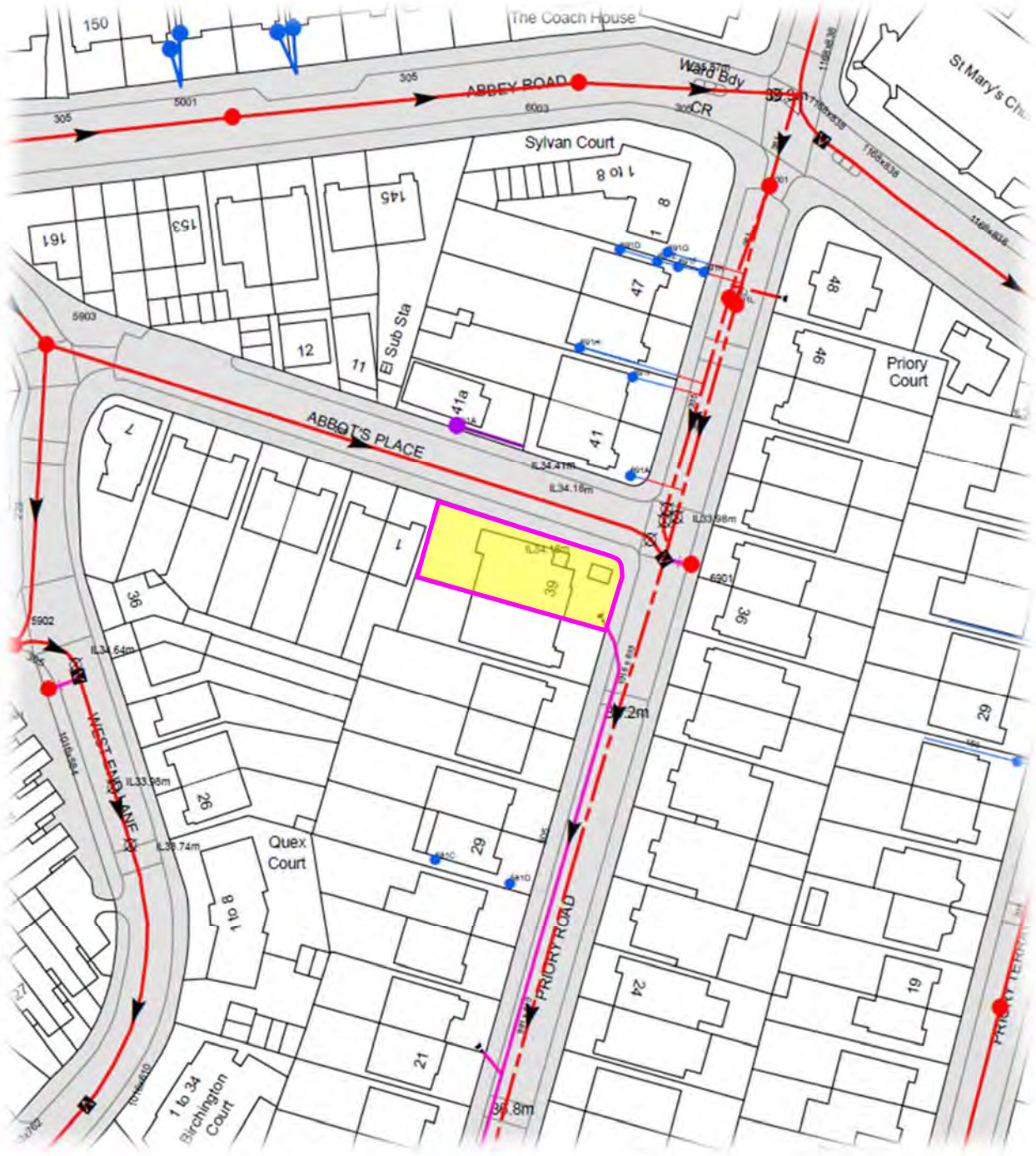


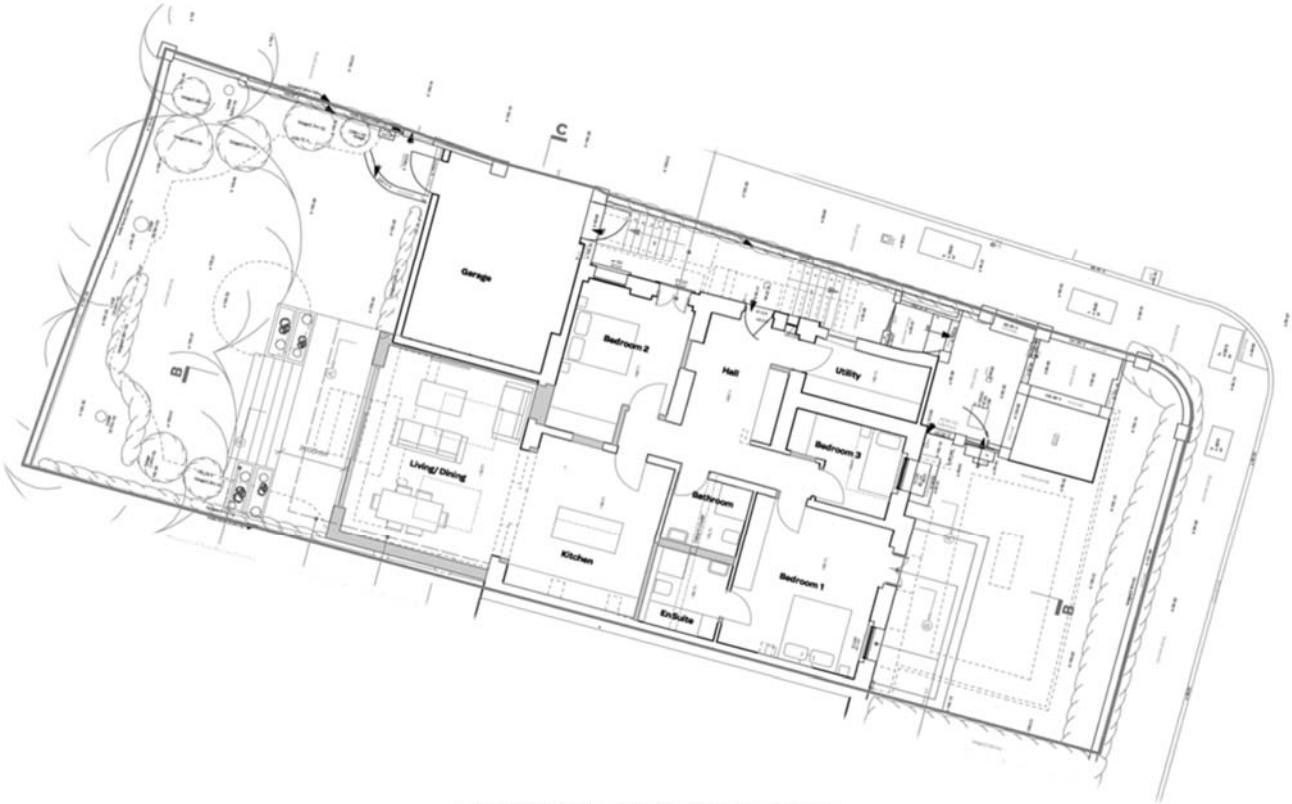
THAMES WATER SEWER NETWORK

3. PROPOSED DEVELOPMENT

It is proposed to construct a new basement extension to replace the existing basement level conservatory together with a new basement level patio, which will extend further into the rear garden and provide a stepped access the garden.

At the front of the property, a new lightwell is proposed to be constructed, extending approx. 2m from the elevation and excavated to the existing basement level. The basement access on the northern side of the property will be widened and extended to allow stepped access down from the garage.

It is understood the external areas at the rear garden / patio and the front garden will remain relatively unchanged in comparison to the existing layout.



PROPOSED BASEMENT PLAN

SCHEDULE OF ESTIMATED AREAS										
	EXISTING					PROPOSED				
		Cv	%		%	Proposed	Cv	%		%
BUILDING	40sqm	0.77	23.5%	**%IMP**	**67.6%**	50sqm	0.77	29.4%	**%IMP**	**67.6%**
REAR PATIOS	75sqm	0.77	44.1%			65sqm	0.77	38.2%		
GARDENS	55sqm	0.4	32.4%	**%PER**	**32.4%**	55sqm	0.4	32.4%	**%PER**	**32.4%**
DRAINED AREA	170sqm		100.0%		100.0%	170sqm		100.0%		100.0%

4. SURFACE WATER MANAGEMENT

4.1 SURFACE WATER MANAGEMENT (SWM) OBJECTIVES

The drainage strategy follows the guidance set out in the 2015 CIRIA C753 SuDS Manual; the principle of SuDS design is that surface water runoff is managed for maximum benefit.

4.2 SUDS DISCHARGE HIERACHY

The surface water runoff should be managed using the following techniques, in order of priority:

SuDS Drainage Hierarchy	Suitable for the site? (Y/N)	Comment
Store rainwater for later use	Y	There is limited space for rainwater harvesting. A small water butt could be included.
Use infiltration techniques	N	The London Clay is unsuitable for soakaway infiltration.
Attenuate rainwater in ponds or open water features for gradual release	N	There is insufficient space to introduce open water garden features at this site.
Attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	There may be limited scope for some attenuation storage within a cellular storage tank underl part of the rear garden if this does not impact on the existing tree roots.
Discharge rainwater direct to a watercourse	N	There is no available watercourse.
Discharge rainwater to a surface water sewer/drain	N	There is no surface water sewer serving the site.
Discharge rainwater to the combined sewer	Y	The site discharges to the combined sewer beneath Priory Road.

The objective is to control the quantity of runoff to support the management of flood risk and maintain and protect the natural water cycle. The hierarchy seeks to ensure that surface water runoff is controlled as near to its source as possible to mimic natural drainage systems and retain water on or near to the site.

Before disposal of surface water to the public sewer is considered, all other options set out in the above hierarchy need to be exhausted.

4.3 FEASIBLE SUDS COMPONENTS

SUDS Component	Description	Suitable for the site? (Y/N)	Comment
Rainwater harvesting	Collection of rainwater runoff from roofs or impermeable areas for reuse.	Y	A small water butt could potentially be included.
Green roofs	Vegetated areas installed on the top of buildings provide visual and ecological benefits in addition to surface water runoff reduction and enhanced building performance.	N	Although the new extension provides a flat roof area suitable for planting, this roof will replace the existing balcony terrace belonging to the ground floor flat and may not be available for planting.
Blue roofs	Roof design intended to store water providing attenuation storage.	N	The envisaged roof construction is not suitable for supporting the weight of attenuation storage.
Infiltration systems	Infiltration can contribute to reducing runoff rates and volumes while supporting base flow and groundwater recharge processes.	N	The London Clay is not suitable for infiltration.
Proprietary treatment systems	Proprietary treatment systems are manufactured products which remove specified pollutants from surface water runoff.	N	Not required.
Filter strips/drains	Filter strips are gently sloping strips of grass that provide treatment of runoff from adjacent impermeable areas. Filter drains are gravel or stone filled trenches which provide temporary subsurface storage for attenuation conveyance and filtration of surface water runoff.	N	There is insufficient space.
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat, and attenuate surface water runoff.	N	There is insufficient space.
Bioretention systems	Rain gardens or shallow landscaped depressions that may reduce surface water runoff rates and volumes and/or treat pollution using engineered soils and vegetation.	N	There is insufficient space for anything other than possibly some very small features within the rear garden.

Trees	Trees aid surface water management through transpiration, inception, infiltration and phytoremediation.	Y	There are existing mature trees in the rear garden and it may be possible to direct some portion of the surface water drainage towards these.
Pervious Pavements	Pervious pavements facilitate the infiltration of surface water into a subsurface structure where filtration, adsorption, biodegradation or sedimentation may also provide treatment of the runoff.	Y	There may be scope for permeable paving beneath parts of the rear garden
Attenuation storage tanks	Attenuation storage tanks provide below-ground void space for the temporary storage of surface water before infiltration, controlled release or use.	Y	There may be limited scope for some attenuation storage within a cellular storage tank under part of the rear garden if this does not impact on the existing tree roots.
Detention basins	Attenuation storage in the form of dry landscaped depressions.	N	Not possible.
Ponds and wetlands	Permanent water filled ponds or wetlands that provide attenuation storage or treatment of surface water runoff.	N	There is insufficient space.

4.4 BENEFITS

The types of benefits that may be achieved by utilising SuDS are categorised by the design objectives outlined in the following section.

4.4.1 WATER QUANTITY

The proportions of hard surfacing and soft landscaping on site will change only minimally, which will in turn have a minimal effect on the overall rainfall runoff.

There is possibly limited scope to reduce runoff rates and volumes through the inclusion of cellular attenuation storage.

There may additionally be some limited opportunity to introduce rainwater harvesting.

The aim will be to achieve as close to Greenfield runoff rates as is possible.

4.4.2 WATER QUALITY

The water quality design objective is to manage the quality of runoff to prevent pollution, supporting the management of water quality in the receiving surface waters and groundwater and design system resilience to cope with future change.

There in only clean water collection envisaged at this property, with no vehicular areas.

4.4.3 AMENITY

The amenity design objective is to create and sustain better places for people and there is no doubt that preservation and enhancement of the garden and planting will help to achieve this.

4.4.4 BIODIVERSITY

The biodiversity design objective is to create and sustain better places for nature by implementing the following criteria for the site:

- Support and protect natural local habitats and species
- Contribute to the delivery of local biodiversity objectives
- Contribute to habitat connectivity
- Create diverse, self-sustaining and resilient ecosystems.

The preservation and enhancement of the garden and planting will provide biodiversity value.

4.5 SUDS CONSTRUCTION

The runoff from the proposed extension roof and the rear part of the building will be directed towards the drainage system through new gullies and downpipes.

Given the limited scale of the development and the site it may not be possible to meet the full policy objective in terms of formally providing 100% attenuation to greenfield rates at this property.

Although given the clay subsoil significant infiltration cannot be designed for there may be some opportunity to direct surface water drainage toward the mature trees at the rear boundary, possibly in combination with some underground attenuation beneath the rear patio. The concern will be to avoid damage to the existing tree roots.

Any surface water at basement level will need to be collected by a sump and pumped up to enter the drainage system.

4.6 MAINTENANCE

There is a need to introduce arrangements for on-going SuDS maintenance over the lifetime of the development.

Cellular storage will require some regular inspection and maintenance to clear any accumulated sediment or debris which may reduce the storage capacity as well as to ensure the inlets and outlets are clear and do not impede the water flow.

Maintenance activities can be broadly categorised as:

- Regular maintenance consists of inspections and basic tasks carried out to a frequent schedule (more frequently than once per year) including inspections, silt, litter or debris removal and vegetation management.

Regular maintenance inspections are to be undertaken at least monthly (and following significant storm events) during the first year of operation of all SuDS components to ensure the system is functioning as designed.

- Occasional maintenance comprises tasks that are required on a much less frequent and predictable basis (e.g. annual checks)

- Remedial maintenance describes the intermittent tasks that may be required to rectify faults associated with the system such as inlet and outlet repairs, infiltration surface rehabilitation, replacement of blocked filter materials/fabrics, system rehabilitation immediately following a pollution event.

The maintenance activities envisaged for the proposed SuDS components at the site are detailed in the table below:

Suds Component	Maintenance Category	Maintenance activity details and proposed frequency
Underground attenuation storage tanks	Regular	Below are proposed to be carried out at least monthly: • Inspect all components for proper operation • Inspect and check outfall flow controls. • Inspect drain inlets and outlets to ensure proper flow • Check the outer areas near the tanks for any signs of leaks
	Occasional / Remedial following inspection	Below are proposed to be carried out at least annually: • Brush and clear sand joints and inlets of any vegetation or moss. • Remove sediment from silt traps • Access the inspection chambers and check for internal obstructions or debris to be removed

5. INITIAL DESIGN CONSIDERATIONS

An analysis has been undertaken of the pre- and post- development surface water runoff rates and volumes over a range of storm intensities and durations.

5.1 GREENFIELD RUNOFF RATE

The Greenfield runoff rates from the site have been calculated using the UK SuDS online tool and the Institute of Hydrology (IoH) 124 methodology.

Greenfield Rates:	
Qbar:	0.07 l/sec
1 in 1	0.06l/sec
1 in 30	0.17 l/sec
1 in 100	0.23 l/sec
1 in 200	0.27 l/sec

5.2 EXISTING RUNOFF RATE

The indicated drained area considered comprises approximately 170m^2 of which approx. 68% is impermeably surfaced.

The existing peak storm runoff for the 1% (1 in 100 year) annual probability 15 min rainfall event on the site is estimated to be 4.0 l/sec. The calculation was based on the Wallingford Procedure and the resulting runoff was calculated using the Modified Rational Method with an M5-60 of 20mm, an 'r' value of 0.42 and a critical rainfall intensity of 99.3 mm/hr.

The rainfall runoff volume for the 1% (1 in 100 year) annual probability, 6 hour duration storm from the existing site is estimated to be 9.1 m^3.

6. PROPOSED SURFACE WATER DRAINAGE SCHEME

In ideal SuDS circumstances the runoff from the entire site would be directed towards attenuation storage, before final discharge to the combined sewer.

However, in this case, it is not possible to gain access to the roof and therefore the main roof drainage arrangement cannot be reconfigured.

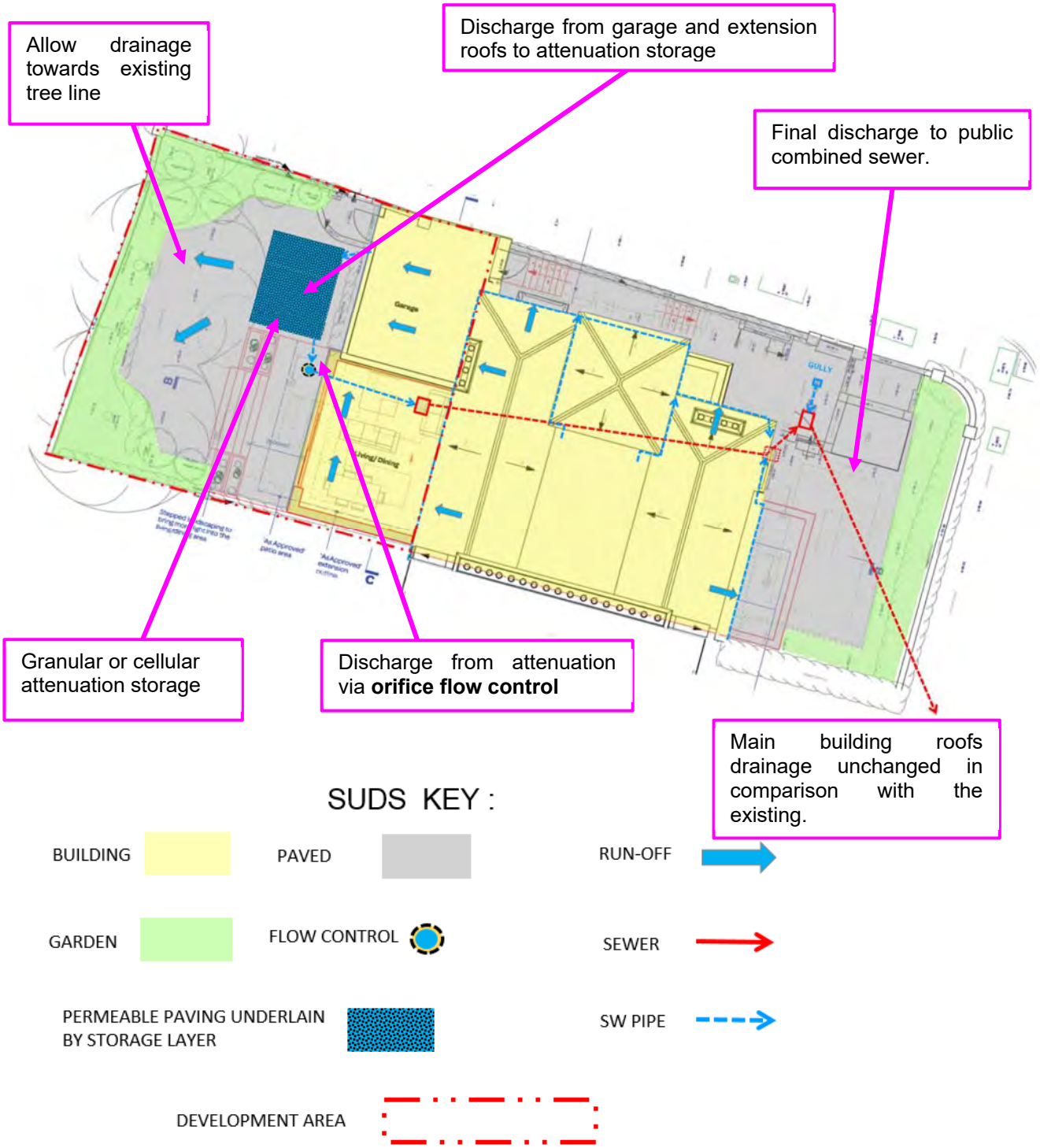
Rainfall incident on the proposed rear extension will be directed towards attenuation storage provided beneath the rear garden, sized to the extent that it can be safely constructed without impairment to the existing trees and vegetation.

Calculations based upon limiting off-site discharge to the estimated equivalent greenfield rates for the indicted drained area indicate that some **8.1m^3** of attenuation storage would theoretically be required to accommodate the 1 in 100 year rainfall event, taking in consideration an allowance for a 40% increased volume due to climate change.

The attenuated flow will be directed towards the manhole at the front of the property and then on to the combined sewer beneath Priory Road.

Not shown on plan:

- Possible small rain garden features in rear garden?
- Possible Rainwater Butt?



7. CONCLUSION

This assessment has demonstrated that the developer has sought opportunities to reduce the overall level of flood risk through the appropriate application of sustainable drainage systems.

This assessment demonstrates that there is limited scope for SuDS features that can restrain runoff for the affected area in accordance with Policy CC3 of the Camden Local Plan, in order to mitigate the risk of future surface water flooding, taking into account potential climate change.

APPENDIX

SUSTAINABLE DRAINAGE PRO-FORMA

PRELIMINARY DRAINAGE CALCULATIONS

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	39 PRIORY ROAD
	Address & post code	NW3 5HB
	OS Grid ref. (Easting, Northing)	E 525585
		N 183920
	LPA reference (if applicable)	
	Brief description of proposed work	Construction of a new rear basement extension as well as a front basement level lightwell.
	Total site Area for Attenuation	170 m^2
	Total existing impervious area	115 m^2
	Total proposed impervious area	115 m^2
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	No
	Existing drainage connection type and location	Combined Sewer beneath Priory Road
	Designer Name	S R L B
	Designer Position	Principal
	Designer Company	LBHGEO

LBHGEO

2. Proposed Discharge Arrangements

2a. Infiltration Feasibility

Superficial geology classification	N/A
Bedrock geology classification	London Clay
Site infiltration rate	1.E-09 m/s
Depth to groundwater level	No groundwater table present
Is infiltration feasible?	No

2b. Drainage Hierarchy

	Feasible (Y/N)	*Proposed (Y/N)*
1 store rainwater for later use	Y	Y
2 use infiltration techniques, such as porous surfaces in non-clay areas	N	N
3 attenuate rainwater in ponds or open water features for gradual release	N	N
4 attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Y
5 discharge rainwater direct to a watercourse	N	N
6 discharge rainwater to a surface water sewer/drain	N	N
7 discharge rainwater to the combined sewer.	Y	Y

2c. Proposed Discharge Details

Proposed discharge location	Combined Sewer beneath Priory Road
Has the owner/regulator of the discharge location been consulted?	No - as there will be a reduction in the volume and rate of water entering the TW sewer

3. Drainage Strategy

3a. Discharge Rates & Required Storage

	Greenfield (GF) runoff rate (l/s)	*Existing discharge rate (l/s)*	*Required storage for GF rate (m^3)*	*Proposed discharge rate (l/s)*
Qbar	0.07			
1 in 1	0.06	1.27	1.80	0.06
1 in 30	0.17	3.10	4.07	0.17
1 in 100	0.23	3.97	5.34	0.23
1 in 100 + CC			8.14	0.23
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Orifice		

3c. Proposed SuDS Measures

	Catchment area (m^2)	*Plan area (m^2)*	*Storage vol. (m^3)*
Rainwater harvesting	0		0
Infiltration systems	0		0
Green roofs	0	0	0
Blue roofs	0	0	0
Filter strips	0	0	0
Filter drains	0	0	0
Bioretention / tree pits	0	0	0
Pervious pavements	0	0	0
Swales	0	0	0
Basins/ponds	0	0	0
Attenuation tanks	115		8.1
Total	115	0	8.1

4. Supporting Information	4a. Discharge & Drainage Strategy	*Page/section of drainage report*
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Appendix to the SuDS Assessment
	Drainage hierarchy (2b)	Section 4
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Discharge is to be via existing manhole and existing sewer connection - there will be no new connection and a reduction in the volume and rate of water entering the TW sewer
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Appendix to the SuDS Assessment
	Proposed SuDS measures & specifications (3b)	Section 6
	4b. Other Supporting Details	*Page/section of drainage report*
	Detailed Development Layout	P12
	Detailed drainage design drawings, including exceedance flow routes	P21
	Detailed landscaping plans	P12
	Maintenance strategy	Section 4.6
	Demonstration of how the proposed SuDS measures improve:	SuDS Assessment report
	a) water quality of the runoff?	Section 4.4
	b) biodiversity?	
	c) amenity?	

GREENFIELD RUNOFF

Catchment Area:	170sqm	0.017ha
PO Code :	NW3 5HB	
Hydrological Region:	6	*From Wallingford on-line tool*
SAAR:	650mm	*From Wallingford on-line tool*
SOIL type:	4	*From Wallingford on-line tool*
SPR:	0.47	*Derived as follows:*

SOIL	*Sand*	*Clayey Sand*	*Sandy Clay*	*Clay*	*Rock*
	1	*2*	*3*	*4*	*5*
SPR	*0.1*	*0.3*	*0.37*	*0.47*	*0.53*

From Wallingford on-line tool using IH 124 Method

Qbar: 213.4 *Calculated from SPR and SAAR*

Greenfield Peak Run-off Rate:		*Growth curve Factor*
1 in 1	*181.4 l/sec*	*0.85*
1 in 30	*512.2 l/sec*	*2.40*
1 in 100	*680.7 l/sec*	*3.19*
1 in 200	*798.1 l/sec*	*3.74*

Qbar:	**0.07 l/sec**
Greenfield Peak Run-off Rate:	
1 in 1	**0.06 l/sec**
1 in 30	**0.17 l/sec**
1 in 100	**0.23 l/sec**
1 in 200	**0.27 l/sec**

National Non-Statutory Guidance:
For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.

For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.

Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

SuDs CALCULATIONS	
Project: 39 PRIORY ROAD	
GREENFIELD RUNOFF	
Sheet 1 of 7	
Project Reference: LBH 4627	
Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

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RAINFALL PEAK INTENSITY (i)

M5-60 : 20 *From Wallingford Fig A1*

r: 0.42 *From Wallingford Fig A2*

D Duration		Z1	M5-D
5min	5min	0.38	7.6mm
10min	10min	0.55	11.0mm
15min	15min	0.65	13.0mm
30min	30min	0.75	15.0mm
1hr	60min	1.00	20.0mm
2hr	120min	1.20	24.0mm
4hr	240min	1.40	28.0mm
6hr	360min	1.60	32.0mm
10hr	600min	1.70	34.0mm
24hr	1440min	2.20	44.0mm
48hr	2880min	2.50	50.0mm

Z2

D Duration		M5-D	M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	7.6mm	0.62	0.79	0.89	0.97	1.02	1.19	1.36	1.43	1.79
10min	10min	11.0mm	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.49	1.91
15min	15min	13.0mm	0.61	0.79	0.90	0.97	1.03	1.22	1.41	1.49	1.91
30min	30min	15.0mm	0.62	0.81	0.90	0.97	1.03	1.24	1.44	1.53	1.99
1hr	60min	20.0mm	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.54	2.03
2hr	120min	24.0mm	0.64	0.81	0.90	0.97	1.03	1.24	1.45	1.54	2.03
4hr	240min	28.0mm	0.66	0.82	0.91	0.97	1.03	1.24	1.44	1.53	2.01
6hr	360min	32.0mm	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.51	1.97
10hr	600min	34.0mm	0.68	0.83	0.91	0.97	1.03	1.22	1.42	1.51	1.97
24hr	1440min	44.0mm	0.70	0.84	0.92	0.97	1.02	1.19	1.38	1.47	1.89
48hr	2880min	50.0mm	0.72	0.85	0.93	0.98	1.02	1.17	1.34	1.42	1.81

MT-D

D Duration		M5-D	M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	7.6mm	4.7mm	6.0mm	6.8mm	7.4mm	7.8mm	9.0mm	10.3mm	10.8mm	13.6mm
10min	10min	11.0mm	6.7mm	8.7mm	9.9mm	10.7mm	11.3mm	13.4mm	15.5mm	16.4mm	21.0mm
15min	15min	13.0mm	7.9mm	10.3mm	11.7mm	12.6mm	13.4mm	15.9mm	18.3mm	19.4mm	24.8mm
30min	30min	15.0mm	9.3mm	12.2mm	13.5mm	14.6mm	15.5mm	18.6mm	21.6mm	22.9mm	29.9mm
1hr	60min	20.0mm	12.8mm	16.2mm	18.0mm	19.4mm	20.6mm	24.8mm	29.0mm	30.9mm	40.6mm
2hr	120min	24.0mm	15.4mm	19.4mm	21.6mm	23.3mm	24.7mm	29.8mm	34.8mm	37.0mm	48.7mm
4hr	240min	28.0mm	18.5mm	23.0mm	25.5mm	27.2mm	28.8mm	34.7mm	40.3mm	42.9mm	56.3mm
6hr	360min	32.0mm	21.8mm	26.6mm	29.1mm	31.0mm	33.0mm	39.0mm	45.4mm	48.4mm	63.0mm
10hr	600min	34.0mm	23.1mm	28.2mm	30.9mm	33.0mm	35.0mm	41.5mm	48.3mm	51.5mm	67.0mm
24hr	1440min	44.0mm	30.8mm	37.0mm	40.5mm	42.7mm	44.9mm	52.4mm	60.7mm	64.5mm	83.2mm
48hr	2880min	50.0mm	36.0mm	42.5mm	46.5mm	49.0mm	51.0mm	58.5mm	67.0mm	71.0mm	90.5mm

Intensity i

D Duration			M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	56.5mm/hr	72.0mm/hr	81.2mm/hr	88.5mm/hr	93.0mm/hr	108.5mm/hr	124.0mm/hr	130.1mm/hr	163.2mm/hr
10min	10min	0.17hr	40.3mm/hr	52.1mm/hr	59.4mm/hr	64.0mm/hr	68.0mm/hr	80.5mm/hr	93.1mm/hr	98.3mm/hr	126.1mm/hr
15min	15min	0.25hr	31.7mm/hr	41.1mm/hr	46.8mm/hr	50.4mm/hr	53.6mm/hr	63.4mm/hr	73.3mm/hr	77.5mm/hr	99.3mm/hr
30min	30min	0.50hr	18.6mm/hr	24.3mm/hr	27.0mm/hr	29.1mm/hr	30.9mm/hr	37.2mm/hr	43.2mm/hr	45.8mm/hr	59.7mm/hr
1hr	60min	1.00hr	12.8mm/hr	16.2mm/hr	18.0mm/hr	19.4mm/hr	20.6mm/hr	24.8mm/hr	29.0mm/hr	30.9mm/hr	40.6mm/hr
2hr	120min	2.00hr	7.7mm/hr	9.7mm/hr	10.8mm/hr	11.6mm/hr	12.4mm/hr	14.9mm/hr	17.4mm/hr	18.5mm/hr	24.4mm/hr
4hr	240min	4.00hr	4.6mm/hr	5.7mm/hr	6.4mm/hr	6.8mm/hr	7.2mm/hr	8.7mm/hr	10.1mm/hr	10.7mm/hr	14.1mm/hr
6hr	360min	6.00hr	3.6mm/hr	4.4mm/hr	4.9mm/hr	5.2mm/hr	5.5mm/hr	6.5mm/hr	7.6mm/hr	8.1mm/hr	10.5mm/hr
10hr	600min	10.00hr	2.3mm/hr	2.8mm/hr	3.1mm/hr	3.3mm/hr	3.5mm/hr	4.1mm/hr	4.8mm/hr	5.1mm/hr	6.7mm/hr
24hr	1440min	24.00hr	1.3mm/hr	1.5mm/hr	1.7mm/hr	1.8mm/hr	1.9mm/hr	2.2mm/hr	2.5mm/hr	2.7mm/hr	3.5mm/hr
48hr	2880min	48.00hr	0.6mm/hr	0.8mm/hr	0.8mm/hr	0.9mm/hr	0.9mm/hr	1.1mm/hr	1.3mm/hr	1.3mm/hr	1.7mm/hr
48hr	2880min	48.00hr	0.8mm/hr	0.9mm/hr	1.0mm/hr	1.0mm/hr	1.1mm/hr	1.2mm/hr	1.4mm/hr	1.5mm/hr	1.9mm/hr

SuDs CALCULATIONS	
Project: 39 PRIORY ROAD	
RAINFALL PEAK INTENSITY	
Sheet 2 of 7	
Project Reference: LBH 4627	
Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

LBHGEO

GREENFIELD PEAK RUNOFF

Hydrological Region: 6 *From Wallingford on-line tool* **Qbar: 0.07 l/sec**

Run-Off Q

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
10min	10min	0.17hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
15min	15min	0.25hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
30min	30min	0.50hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
1hr	60min	1.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
2hr	120min	2.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
4hr	240min	4.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
6hr	360min	6.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
10hr	600min	10.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
24hr	1440min	24.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec
48hr	2880min	48.00hr	0.06 l/sec	0.06 l/sec	0.07 l/sec	0.08 l/sec	0.09 l/sec	0.12 l/sec	0.14 l/sec	0.17 l/sec	0.23 l/sec

Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.1 m3	0.1 m3
10min	10min	0.17hr	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3
15min	15min	0.25hr	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3
30min	30min	0.50hr	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.4 m3
1hr	60min	1.00hr	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.3 m3	0.4 m3	0.5 m3	0.6 m3	0.8 m3
2hr	120min	2.00hr	0.4 m3	0.5 m3	0.5 m3	0.6 m3	0.7 m3	0.8 m3	1.0 m3	1.3 m3	1.7 m3
4hr	240min	4.00hr	0.9 m3	0.9 m3	1.1 m3	1.2 m3	1.3 m3	1.7 m3	2.1 m3	2.5 m3	3.3 m3
6hr	360min	6.00hr	1.3 m3	1.4 m3	1.6 m3	1.8 m3	2.0 m3	2.5 m3	3.1 m3	3.8 m3	5.0 m3
10hr	600min	10.00hr	2.2 m3	2.3 m3	2.6 m3	3.0 m3	3.3 m3	4.2 m3	5.1 m3	6.3 m3	8.3 m3
24hr	1440min	24.00hr	5.3 m3	5.5 m3	6.4 m3	7.2 m3	8.0 m3	10.2 m3	12.3 m3	15.0 m3	20.0 m3
48hr	2880min	48.00hr	10.7 m3	11.0 m3	12.7 m3	14.4 m3	16.0 m3	20.3 m3	24.7 m3	30.1 m3	40.0 m3

SuDs CALCULATIONS	
Project: 39 PRIORY ROAD	
GREENFIELD PEAK RUNOFF	
Sheet 3 of 7	
Project Reference: LBH 4627	
Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

LBHGEO

EXISTING PEAK RUNOFF

C_V:	0.65	*Volumetric Run-Off Coefficient*
C_R:	1.3	*Routing Coefficient*

Run-Off Q

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	2.3 l/sec	2.9 l/sec	3.2 l/sec	3.5 l/sec	3.7 l/sec	4.3 l/sec	5.0 l/sec	5.2 l/sec	6.5 l/sec
10min	10min	0.17hr	1.6 l/sec	2.1 l/sec	2.4 l/sec	2.6 l/sec	2.7 l/sec	3.2 l/sec	3.7 l/sec	3.9 l/sec	5.0 l/sec
15min	15min	0.25hr	1.3 l/sec	1.6 l/sec	1.9 l/sec	2.0 l/sec	2.1 l/sec	2.5 l/sec	2.9 l/sec	3.1 l/sec	4.0 l/sec
30min	30min	0.50hr	0.7 l/sec	1.0 l/sec	1.1 l/sec	1.2 l/sec	1.2 l/sec	1.5 l/sec	1.7 l/sec	1.8 l/sec	2.4 l/sec
1hr	60min	1.00hr	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.8 l/sec	0.8 l/sec	1.0 l/sec	1.2 l/sec	1.2 l/sec	1.6 l/sec
2hr	120min	2.00hr	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.7 l/sec	1.0 l/sec
4hr	240min	4.00hr	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.6 l/sec
6hr	360min	6.00hr	0.1 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec
10hr	600min	10.00hr	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec
24hr	1440min	24.00hr	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec
48hr	2880min	48.00hr	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec

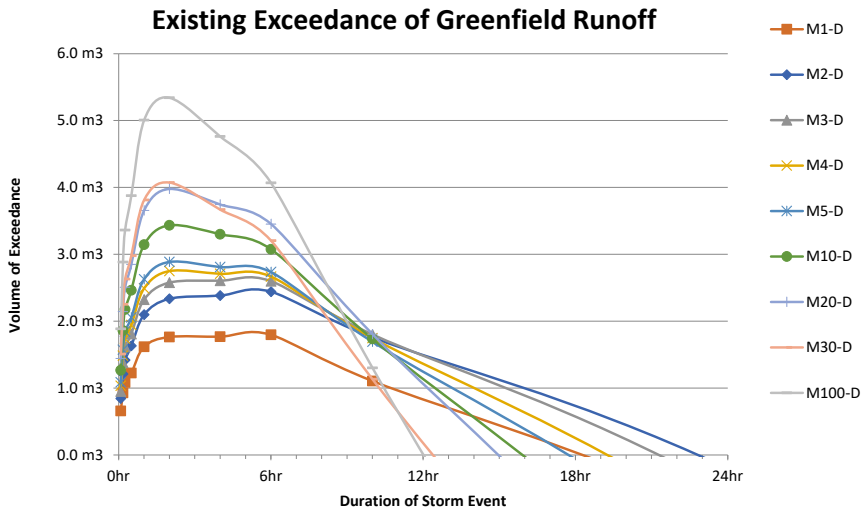
Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.7 m3	0.9 m3	1.0 m3	1.1 m3	1.1 m3	1.3 m3	1.5 m3	1.6 m3	2.0 m3
10min	10min	0.17hr	1.0 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.9 m3	2.2 m3	2.4 m3	3.0 m3
15min	15min	0.25hr	1.1 m3	1.5 m3	1.7 m3	1.8 m3	1.9 m3	2.3 m3	2.6 m3	2.8 m3	3.6 m3
30min	30min	0.50hr	1.3 m3	1.7 m3	1.9 m3	2.1 m3	2.2 m3	2.7 m3	3.1 m3	3.3 m3	4.3 m3
1hr	60min	1.00hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	3.0 m3	3.6 m3	4.2 m3	4.4 m3	5.8 m3
2hr	120min	2.00hr	2.2 m3	2.8 m3	3.1 m3	3.3 m3	3.6 m3	4.3 m3	5.0 m3	5.3 m3	7.0 m3
4hr	240min	4.00hr	2.7 m3	3.3 m3	3.7 m3	3.9 m3	4.1 m3	5.0 m3	5.8 m3	6.2 m3	8.1 m3
6hr	360min	6.00hr	3.1 m3	3.8 m3	4.2 m3	4.5 m3	4.7 m3	5.6 m3	6.5 m3	7.0 m3	9.1 m3
10hr	600min	10.00hr	3.3 m3	4.1 m3	4.5 m3	4.7 m3	5.0 m3	6.0 m3	6.9 m3	7.4 m3	9.6 m3
24hr	1440min	24.00hr	4.4 m3	5.3 m3	5.8 m3	6.1 m3	6.5 m3	7.5 m3	8.7 m3	9.3 m3	12.0 m3
48hr	2880min	48.00hr	5.2 m3	6.1 m3	6.7 m3	7.0 m3	7.3 m3	8.4 m3	9.6 m3	10.2 m3	13.0 m3

Exceedance of Greenfield Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.7 m3	0.8 m3	1.0 m3	1.0 m3	1.1 m3	1.3 m3	1.4 m3	1.5 m3	1.9 m3
10min	10min	0.17hr	0.9 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.9 m3	2.1 m3	2.3 m3	2.9 m3
15min	15min	0.25hr	1.1 m3	1.4 m3	1.6 m3	1.7 m3	1.8 m3	2.2 m3	2.5 m3	2.6 m3	3.4 m3
30min	30min	0.50hr	1.2 m3	1.6 m3	1.8 m3	1.9 m3	2.1 m3	2.5 m3	2.8 m3	3.0 m3	3.9 m3
1hr	60min	1.00hr	1.6 m3	2.1 m3	2.3 m3	2.5 m3	2.6 m3	3.1 m3	3.7 m3	3.8 m3	5.0 m3
2hr	120min	2.00hr	1.8 m3	2.3 m3	2.6 m3	2.7 m3	2.9 m3	3.4 m3	4.0 m3	4.1 m3	5.3 m3
4hr	240min	4.00hr	1.8 m3	2.4 m3	2.6 m3	2.7 m3	2.8 m3	3.3 m3	3.7 m3	3.7 m3	4.8 m3
6hr	360min	6.00hr	1.8 m3	2.4 m3	2.6 m3	2.7 m3	2.7 m3	3.1 m3	3.5 m3	3.2 m3	4.1 m3
10hr	600min	10.00hr	1.1 m3	1.8 m3	1.8 m3	1.7 m3	1.7 m3	1.7 m3	1.8 m3	1.1 m3	1.3 m3
24hr	1440min	24.00hr	-0.9 m3	-0.2 m3	-0.5 m3	-1.0 m3	-1.6 m3	-2.6 m3	-3.6 m3	-5.8 m3	-8.0 m3
48hr	2880min	48.00hr	-5.5 m3	-4.9 m3	-6.0 m3	-7.3 m3	-8.7 m3	-11.9 m3	-15.0 m3	-19.9 m3	-27.0 m3

			C_V:
Catchment Area:	170sqm	100%	
Permeable:	55sqm	32%	0.40
Impermeable:	115sqm	68%	0.77
			0.65



SuDs CALCULATIONS	
Project: 39 PRIORY ROAD	
EXISTING PEAK RUNOFF	
Sheet 4 of 7	
Project Reference: LBH 4627	
Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

LBHGEO

POST- DEVELOPMENT PEAK RUNOFF

C_V:	0.65	*Volumetric Run-Off Coefficient*	Climate Change Allowance:	0%
C_R:	1.3	*Routing Coefficient*		

Run-Off Q

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	2.3 l/sec	2.9 l/sec	3.2 l/sec	3.5 l/sec	3.7 l/sec	4.3 l/sec	5.0 l/sec	5.2 l/sec	6.5 l/sec
10min	10min	0.17hr	1.6 l/sec	2.1 l/sec	2.4 l/sec	2.6 l/sec	2.7 l/sec	3.2 l/sec	3.7 l/sec	3.9 l/sec	5.0 l/sec
15min	15min	0.25hr	1.3 l/sec	1.6 l/sec	1.9 l/sec	2.0 l/sec	2.1 l/sec	2.5 l/sec	2.9 l/sec	3.1 l/sec	4.0 l/sec
30min	30min	0.50hr	0.7 l/sec	1.0 l/sec	1.1 l/sec	1.2 l/sec	1.2 l/sec	1.5 l/sec	1.7 l/sec	1.8 l/sec	2.4 l/sec
1hr	60min	1.00hr	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.8 l/sec	0.8 l/sec	1.0 l/sec	1.2 l/sec	1.2 l/sec	1.6 l/sec
2hr	120min	2.00hr	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.7 l/sec	1.0 l/sec
4hr	240min	4.00hr	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.6 l/sec
6hr	360min	6.00hr	0.1 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec
10hr	600min	10.00hr	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec
24hr	1440min	24.00hr	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec
48hr	2880min	48.00hr	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.0 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec

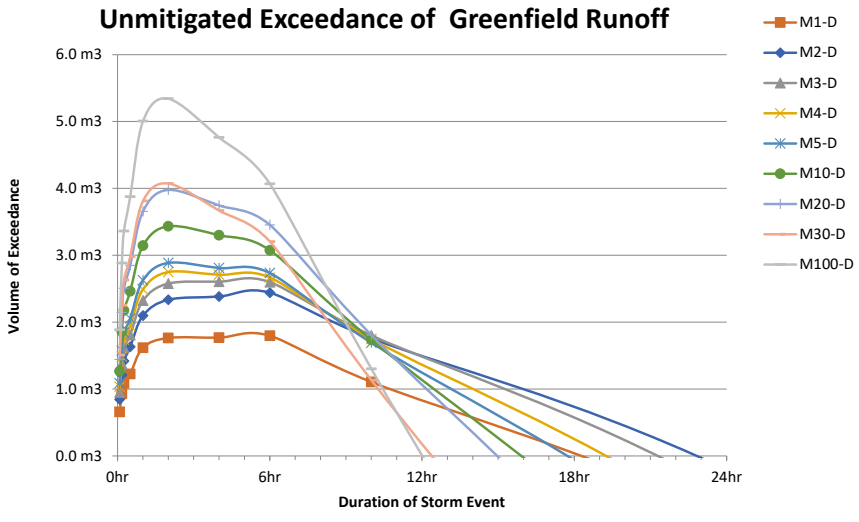
Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.7 m3	0.9 m3	1.0 m3	1.1 m3	1.1 m3	1.3 m3	1.5 m3	1.6 m3	2.0 m3
10min	10min	0.17hr	1.0 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.9 m3	2.2 m3	2.4 m3	3.0 m3
15min	15min	0.25hr	1.1 m3	1.5 m3	1.7 m3	1.8 m3	1.9 m3	2.3 m3	2.6 m3	2.8 m3	3.6 m3
30min	30min	0.50hr	1.3 m3	1.7 m3	1.9 m3	2.1 m3	2.2 m3	2.7 m3	3.1 m3	3.3 m3	4.3 m3
1hr	60min	1.00hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	3.0 m3	3.6 m3	4.2 m3	4.4 m3	5.8 m3
2hr	120min	2.00hr	2.2 m3	2.8 m3	3.1 m3	3.3 m3	3.6 m3	4.3 m3	5.0 m3	5.3 m3	7.0 m3
4hr	240min	4.00hr	2.7 m3	3.3 m3	3.7 m3	3.9 m3	4.1 m3	5.0 m3	5.8 m3	6.2 m3	8.1 m3
6hr	360min	6.00hr	3.1 m3	3.8 m3	4.2 m3	4.5 m3	4.7 m3	5.6 m3	6.5 m3	7.0 m3	9.1 m3
10hr	600min	10.00hr	3.3 m3	4.1 m3	4.5 m3	4.7 m3	5.0 m3	6.0 m3	6.9 m3	7.4 m3	9.6 m3
24hr	1440min	24.00hr	4.4 m3	5.3 m3	5.8 m3	6.1 m3	6.5 m3	7.5 m3	8.7 m3	9.3 m3	12.0 m3
48hr	2880min	48.00hr	5.2 m3	6.1 m3	6.7 m3	7.0 m3	7.3 m3	8.4 m3	9.6 m3	10.2 m3	13.0 m3

Exceedance of Greenfield Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.7 m3	0.8 m3	1.0 m3	1.0 m3	1.1 m3	1.3 m3	1.4 m3	1.5 m3	1.9 m3
10min	10min	0.17hr	0.9 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.9 m3	2.1 m3	2.3 m3	2.9 m3
15min	15min	0.25hr	1.1 m3	1.4 m3	1.6 m3	1.7 m3	1.8 m3	2.2 m3	2.5 m3	2.6 m3	3.4 m3
30min	30min	0.50hr	1.2 m3	1.6 m3	1.8 m3	1.9 m3	2.1 m3	2.5 m3	2.8 m3	3.0 m3	3.9 m3
1hr	60min	1.00hr	1.6 m3	2.1 m3	2.3 m3	2.5 m3	2.6 m3	3.1 m3	3.7 m3	3.8 m3	5.0 m3
2hr	120min	2.00hr	1.8 m3	2.3 m3	2.6 m3	2.7 m3	2.9 m3	3.4 m3	4.0 m3	4.1 m3	5.3 m3
4hr	240min	4.00hr	1.8 m3	2.4 m3	2.6 m3	2.7 m3	2.8 m3	3.3 m3	3.7 m3	3.7 m3	4.8 m3
6hr	360min	6.00hr	1.8 m3	2.4 m3	2.6 m3	2.7 m3	2.7 m3	3.1 m3	3.5 m3	3.2 m3	4.1 m3
10hr	600min	10.00hr	1.1 m3	1.8 m3	1.8 m3	1.7 m3	1.7 m3	1.7 m3	1.8 m3	1.1 m3	1.3 m3
24hr	1440min	24.00hr	-0.9 m3	-0.2 m3	-0.5 m3	-1.0 m3	-1.6 m3	-2.6 m3	-3.6 m3	-5.8 m3	-8.0 m3
48hr	2880min	48.00hr	-5.5 m3	-4.9 m3	-6.0 m3	-7.3 m3	-8.7 m3	-11.9 m3	-15.0 m3	-19.9 m3	-27.0 m3
			1.8 m3							**4.1 m3**	**5.3 m3**

			C_V:
Catchment Area:	170sqm	100%	
Permeable Garden	55sqm	32%	0.40
Impermeable:	115sqm	68%	0.77
			0.65



SuDs CALCULATIONS	
Project: 39 PRIORY ROAD	
POST-DEV. PEAK RUNOFF	
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Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

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POST- DEVELOPMENT PEAK RUNOFF + CC

C_V: 0.65 *Volumetric Run-Off Coefficient* Climate Change Allowance: 40%

C_R: 1.3 *Routing Coefficient*

Run-Off Q

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	3.2 l/sec	4.0 l/sec	4.5 l/sec	4.9 l/sec	5.2 l/sec	6.1 l/sec	6.9 l/sec	7.3 l/sec	9.1 l/sec
10min	10min	0.17hr	2.3 l/sec	2.9 l/sec	3.3 l/sec	3.6 l/sec	3.8 l/sec	4.5 l/sec	5.2 l/sec	5.5 l/sec	7.1 l/sec
15min	15min	0.25hr	1.8 l/sec	2.3 l/sec	2.6 l/sec	2.8 l/sec	3.0 l/sec	3.5 l/sec	4.1 l/sec	4.3 l/sec	5.6 l/sec
30min	30min	0.50hr	1.0 l/sec	1.4 l/sec	1.5 l/sec	1.6 l/sec	1.7 l/sec	2.1 l/sec	2.4 l/sec	2.6 l/sec	3.3 l/sec
1hr	60min	1.00hr	0.7 l/sec	0.9 l/sec	1.0 l/sec	1.1 l/sec	1.2 l/sec	1.4 l/sec	1.6 l/sec	1.7 l/sec	2.3 l/sec
2hr	120min	2.00hr	0.4 l/sec	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.7 l/sec	0.8 l/sec	1.0 l/sec	1.0 l/sec	1.4 l/sec
4hr	240min	4.00hr	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.6 l/sec	0.6 l/sec	0.8 l/sec
6hr	360min	6.00hr	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.6 l/sec
10hr	600min	10.00hr	0.1 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec
24hr	1440min	24.00hr	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.2 l/sec	0.2 l/sec
48hr	2880min	48.00hr	0.0 l/sec	0.0 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec

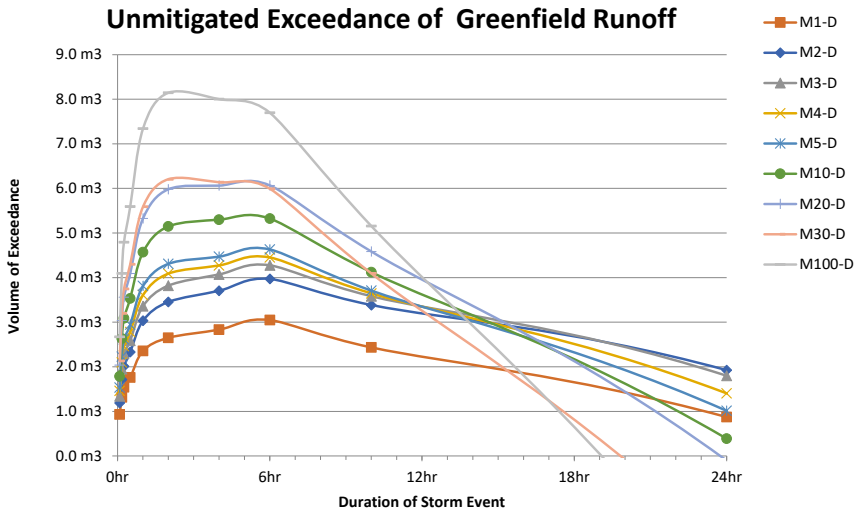
Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.9 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.8 m3	2.1 m3	2.2 m3	2.7 m3
10min	10min	0.17hr	1.4 m3	1.7 m3	2.0 m3	2.1 m3	2.3 m3	2.7 m3	3.1 m3	3.3 m3	4.2 m3
15min	15min	0.25hr	1.6 m3	2.1 m3	2.4 m3	2.5 m3	2.7 m3	3.2 m3	3.7 m3	3.9 m3	5.0 m3
30min	30min	0.50hr	1.9 m3	2.4 m3	2.7 m3	2.9 m3	3.1 m3	3.7 m3	4.3 m3	4.6 m3	6.0 m3
1hr	60min	1.00hr	2.6 m3	3.3 m3	3.6 m3	3.9 m3	4.1 m3	5.0 m3	5.8 m3	6.2 m3	8.2 m3
2hr	120min	2.00hr	3.1 m3	3.9 m3	4.3 m3	4.7 m3	5.0 m3	6.0 m3	7.0 m3	7.5 m3	9.8 m3
4hr	240min	4.00hr	3.7 m3	4.6 m3	5.1 m3	5.5 m3	5.8 m3	7.0 m3	8.1 m3	8.6 m3	11.3 m3
6hr	360min	6.00hr	4.4 m3	5.3 m3	5.9 m3	6.3 m3	6.6 m3	7.9 m3	9.1 m3	9.8 m3	12.7 m3
10hr	600min	10.00hr	4.7 m3	5.7 m3	6.2 m3	6.6 m3	7.1 m3	8.4 m3	9.7 m3	10.4 m3	13.5 m3
24hr	1440min	24.00hr	6.2 m3	7.4 m3	8.2 m3	8.6 m3	9.0 m3	10.5 m3	12.2 m3	13.0 m3	16.7 m3
48hr	2880min	48.00hr	7.2 m3	8.6 m3	9.4 m3	9.9 m3	10.3 m3	11.8 m3	13.5 m3	14.3 m3	18.2 m3

Exceedance of Greenfield Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.9 m3	1.2 m3	1.3 m3	1.5 m3	1.5 m3	1.8 m3	2.0 m3	2.1 m3	2.7 m3
10min	10min	0.17hr	1.3 m3	1.7 m3	1.9 m3	2.1 m3	2.2 m3	2.6 m3	3.0 m3	3.2 m3	4.1 m3
15min	15min	0.25hr	1.5 m3	2.0 m3	2.3 m3	2.5 m3	2.6 m3	3.1 m3	3.6 m3	3.7 m3	4.8 m3
30min	30min	0.50hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	2.9 m3	3.5 m3	4.1 m3	4.3 m3	5.6 m3
1hr	60min	1.00hr	2.4 m3	3.0 m3	3.4 m3	3.6 m3	3.8 m3	4.6 m3	5.3 m3	5.6 m3	7.3 m3
2hr	120min	2.00hr	2.6 m3	3.5 m3	3.8 m3	4.1 m3	4.3 m3	5.1 m3	6.0 m3	6.2 m3	8.1 m3
4hr	240min	4.00hr	2.8 m3	3.7 m3	4.1 m3	4.3 m3	4.5 m3	5.3 m3	6.1 m3	6.1 m3	8.0 m3
6hr	360min	6.00hr	3.0 m3	4.0 m3	4.3 m3	4.5 m3	4.6 m3	5.3 m3	6.1 m3	6.0 m3	7.7 m3
10hr	600min	10.00hr	2.4 m3	3.4 m3	3.6 m3	3.6 m3	3.7 m3	4.1 m3	4.6 m3	4.1 m3	5.2 m3
24hr	1440min	24.00hr	0.9 m3	1.9 m3	1.8 m3	1.4 m3	1.0 m3	0.4 m3	-0.1 m3	-2.1 m3	-3.3 m3
48hr	2880min	48.00hr	-3.4 m3	-2.5 m3	-3.3 m3	-4.5 m3	-5.8 m3	-8.5 m3	-11.2 m3	-15.8 m3	-21.8 m3
											8.1 m3

			C_V:
Catchment Area:	170sqm	100%	
Permeable Garden	55sqm	32%	0.40
Impermeable:	115sqm	68%	0.77
			0.65



SuDs CALCULATIONS	
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POST-DEV. PEAK RUNOFF+CC	
Sheet 6 of 7	
Project Reference: LBH 4627	
Date: 11/02/2022	Rev: 2
Client: Mr Alfredo Michelucci	

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POST- DEVELOPMENT & SOURCE MITIGATION PEAK RUN-OFF + CC STORAGE

Proposed Discharge Rates: Greenfield x 1

INFLOW

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.9 m3	1.2 m3	1.4 m3	1.5 m3	1.6 m3	1.8 m3	2.1 m3	2.2 m3	2.7 m3
10min	10min	0.17hr	1.4 m3	1.7 m3	2.0 m3	2.1 m3	2.3 m3	2.7 m3	3.1 m3	3.3 m3	4.2 m3
15min	15min	0.25hr	1.6 m3	2.1 m3	2.4 m3	2.5 m3	2.7 m3	3.2 m3	3.7 m3	3.9 m3	5.0 m3
30min	30min	0.50hr	1.9 m3	2.4 m3	2.7 m3	2.9 m3	3.1 m3	3.7 m3	4.3 m3	4.6 m3	6.0 m3
1hr	60min	1.00hr	2.6 m3	3.3 m3	3.6 m3	3.9 m3	4.1 m3	5.0 m3	5.8 m3	6.2 m3	8.2 m3
2hr	120min	2.00hr	3.1 m3	3.9 m3	4.3 m3	4.7 m3	5.0 m3	6.0 m3	7.0 m3	7.5 m3	9.8 m3
4hr	240min	4.00hr	3.7 m3	4.6 m3	5.1 m3	5.5 m3	5.8 m3	7.0 m3	8.1 m3	8.6 m3	11.3 m3
6hr	360min	6.00hr	4.4 m3	5.3 m3	5.9 m3	6.3 m3	6.6 m3	7.9 m3	9.1 m3	9.8 m3	12.7 m3
10hr	600min	10.00hr	4.7 m3	5.7 m3	6.2 m3	6.6 m3	7.1 m3	8.4 m3	9.7 m3	10.4 m3	13.5 m3
24hr	1440min	24.00hr	6.2 m3	7.4 m3	8.2 m3	8.6 m3	9.0 m3	10.5 m3	12.2 m3	13.0 m3	16.7 m3
48hr	2880min	48.00hr	7.2 m3	8.6 m3	9.4 m3	9.9 m3	10.3 m3	11.8 m3	13.5 m3	14.3 m3	18.2 m3

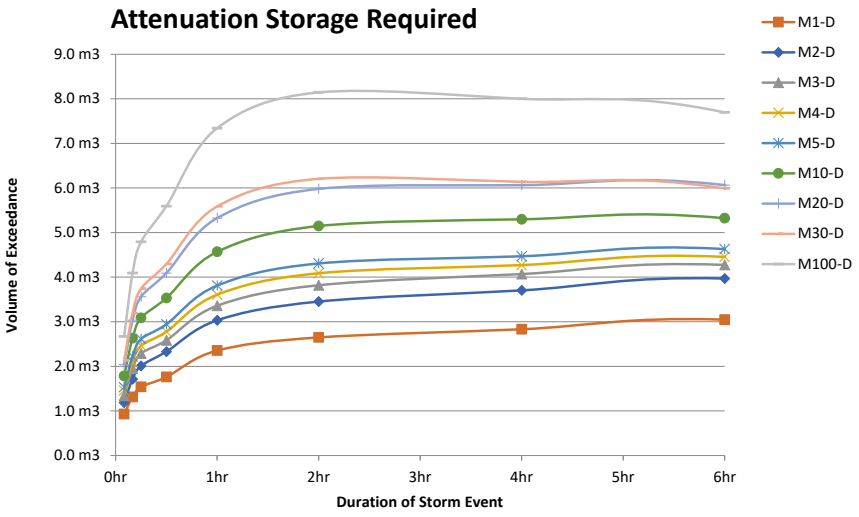
OUTFLOW

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.1 m3	0.1 m3
10min	10min	0.17hr	0.0 m3	0.0 m3	0.0 m3	0.0 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3
15min	15min	0.25hr	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3
30min	30min	0.50hr	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.4 m3
1hr	60min	1.00hr	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.3 m3	0.4 m3	0.5 m3	0.6 m3	0.8 m3
2hr	120min	2.00hr	0.4 m3	0.5 m3	0.5 m3	0.6 m3	0.7 m3	0.8 m3	1.0 m3	1.3 m3	1.7 m3
4hr	240min	4.00hr	0.9 m3	0.9 m3	1.1 m3	1.2 m3	1.3 m3	1.7 m3	2.1 m3	2.5 m3	3.3 m3
6hr	360min	6.00hr	1.3 m3	1.4 m3	1.6 m3	1.8 m3	2.0 m3	2.5 m3	3.1 m3	3.8 m3	5.0 m3
10hr	600min	10.00hr	2.2 m3	2.3 m3	2.6 m3	3.0 m3	3.3 m3	4.2 m3	5.1 m3	6.3 m3	8.3 m3
24hr	1440min	24.00hr	5.3 m3	5.5 m3	6.4 m3	7.2 m3	8.0 m3	10.2 m3	12.3 m3	15.0 m3	20.0 m3
48hr	2880min	48.00hr	10.7 m3	11.0 m3	12.7 m3	14.4 m3	16.0 m3	20.3 m3	24.7 m3	30.1 m3	40.0 m3

ATTENUATION STORAGE REQUIRED TO MEET PROPOSED DISCHARGE RATE

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	0.9 m3	1.2 m3	1.3 m3	1.5 m3	1.5 m3	1.8 m3	2.0 m3	2.1 m3	2.7 m3
10min	10min	0.17hr	1.3 m3	1.7 m3	1.9 m3	2.1 m3	2.2 m3	2.6 m3	3.0 m3	3.2 m3	4.1 m3
15min	15min	0.25hr	1.5 m3	2.0 m3	2.3 m3	2.5 m3	2.6 m3	3.1 m3	3.6 m3	3.7 m3	4.8 m3
30min	30min	0.50hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	2.9 m3	3.5 m3	4.1 m3	4.3 m3	5.6 m3
1hr	60min	1.00hr	2.4 m3	3.0 m3	3.4 m3	3.6 m3	3.8 m3	4.6 m3	5.3 m3	5.6 m3	7.3 m3
2hr	120min	2.00hr	2.6 m3	3.5 m3	3.8 m3	4.1 m3	4.3 m3	5.1 m3	6.0 m3	6.2 m3	8.1 m3
4hr	240min	4.00hr	2.8 m3	3.7 m3	4.1 m3	4.3 m3	4.5 m3	5.3 m3	6.1 m3	6.1 m3	8.0 m3
6hr	360min	6.00hr	3.0 m3	4.0 m3	4.3 m3	4.5 m3	4.6 m3	5.3 m3	6.1 m3	6.0 m3	7.7 m3
10hr	600min	10.00hr	2.4 m3	3.4 m3	3.6 m3	3.6 m3	3.7 m3	4.1 m3	4.6 m3	4.1 m3	5.2 m3
24hr	1440min	24.00hr	0.9 m3	1.9 m3	1.8 m3	1.4 m3	1.0 m3	0.4 m3	-0.1 m3	-2.1 m3	-3.3 m3
48hr	2880min	48.00hr	-3.4 m3	-2.5 m3	-3.3 m3	-4.5 m3	-5.8 m3	-8.5 m3	-11.2 m3	-15.8 m3	-21.8 m3

ATTENUATION STORAGE REQUIRED:	3.0 m3	4.0 m3	4.3 m3	4.5 m3	4.6 m3	5.3 m3	6.1 m3	6.2 m3	**8.1 m3**



SuDs CALCULATIONS	
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STORAGE REQUIREMENTS	
Sheet 7 of 7	
Project Reference: LBH 4627	
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