SURFACE WATER DRAINAGE ASSESSMENT & OUTLINE SUDS STRATEGY

27 MARESFIELD GARDENS
CAMDEN

LBHGEO

LBH4626suds January 2021

Document Control			
		Darcy Kitson-Boyce MEng (Hons) GMICE FGS FRGS	Seamus Lefroy-Brooks BSc(hons) MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC NQMS SQP DoWCoP QP RoGEP UK Registered Ground Engineering Adviser
1.0	20th Jan 2021		

LBHGEO Ltd.

12 Little Balmer

Buckingham

MK18 1TF

Tel: 01280 308160

email: enquiry@LBHGEO.co.uk

website: www.LBHGEO.co.uk

Company registered in England No. 4922494

CONTENTS

FOREWORD-GUIDANCE NOTES

GENERAL

This report has been prepared for a specific client and to meet a specific brief. The preparation of this report may have been affected by limitations of scope, resources or time scale required by the client. Should any part of this report be relied on by a third party, that party does so wholly at its own risk and LBHGEO disclaims any liability to such parties.

The observations and conclusions described in this report are based solely upon the agreed scope of work. LBHGEO has not performed any observations, investigations, studies or testing not specifically set out in the agreed scope of work and cannot accept any liability for the existence of any condition, the discovery of which would require performance of services beyond the agreed scope of work.

VALIDITY

Any use of or reliance upon the report in circumstances other than those for which it was commissioned shall be at the client's sole risk. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should therefore not be relied upon in such altered circumstances.

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 existing lower ground floor of 27 Maresfield Gardens rearwards into the garden. The garden is set at a higher level and will need to be excavated to permit the rear extension.

1.2 BRIEF

LBHGEO have been appointed to prepare a Surface Water Drainage Assessment & Outline SuDS Strategy to support a forthcoming 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 run-off 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
- bio-retention
- rain garden
- permeable paving

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

[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

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 run-off rate where feasible.

Additionally, the Camden Planning Guidance for Sustainability (CPG3) (July 2015, updated March 2018) states the following:

> *"All developments are expected to manage drainage and surface water on-site or as close to the site as possible, using Sustainable Drainage Systems (SUDS) and the hierarchy set out below.*
>
> *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 once SUDS have been installed. As a minimum, surface water run-off rates should be reduced by 50% across the development."*

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 run-off and of the attenuation volume that will be required to achieve the required reduction in the predicted run-off 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 on the western side of Maresfield Gardens in South Hampstead, approximately 200m to the northeast of the Finchley Road Station.

The site may be located approximately by postcode NW3 5SD or by National Grid Reference 526440, 184875.

LOCATION PLAN

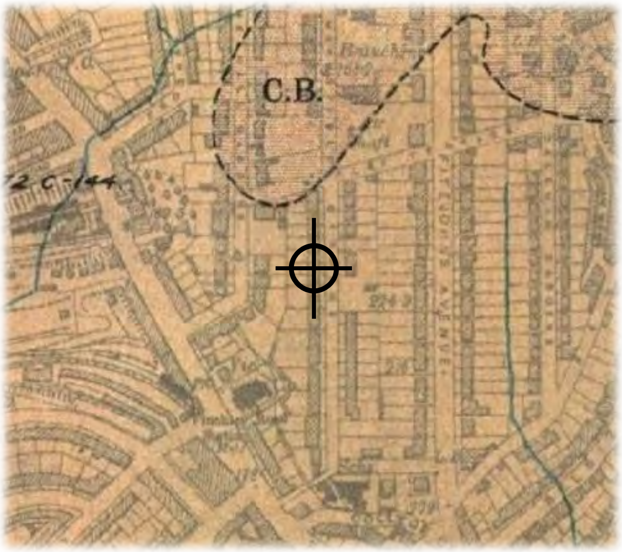
2.2 TOPOGRAPHICAL SETTING

The site lies on the south western slopes of the Hampstead Hill, with headwaters of the River Westbourne and the River Tyburn emerging to the west and east of the site respectively.

2.3 GROUND CONDITIONS

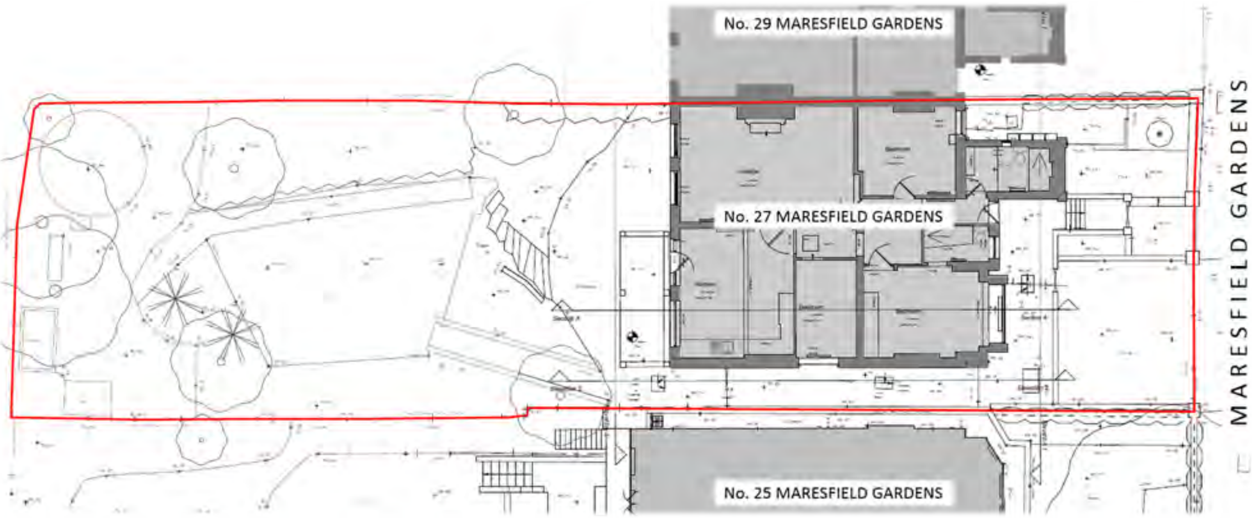
The site is directly underlain by the London Clay Formation, which is essentially impermeable.

A trial pit ground investigation, undertaken in January 2021, confirmed London Clay to be present beneath less than a metre of made ground.



2.4 SITE DESCRIPTION

The site is occupied by a four storey semi-detached Victorian building, with an elevated ground floor level set at approximately +71.8m OD, some 2.5m higher than street level (Approx. +69.3m OD). The lower ground floor is set some 0.6m lower than street level at approx. +68.7m OD.



EXISTING SITE PLAN

The ground floor is accessed from the street via a set of steps. A small front patio is set at the lower ground floor level and leads to a side passage between No. 27 and No. 25 Maresfield Gardens.

LOWER GROUND FLOOR LEVEL PATIO AT THE FRONT

A larger patio is present to the rear, beyond which the garden slopes up across a rockery to a lawn area set approximately 1.5m higher than the lower ground floor (approx. +70.2m OD).

REAR ELEVATION

A rear balcony is present at ground floor level, supported by three brick columns.

The rear garden comprises a lawn bordered by bushes, shrubs and a variety of trees at the far rear.

VIEW OF THE REAR GARDEN FROM THE PATIO

A crab apple tree is present approximately 5m from the rear elevation of the building close to the boundary with No. 29 Maresfield Gardens and a mature Cotoneaster acer is present in a similar position close to the boundary with No. 25 Maresfield Gardens. A young cherry tree is also present near the crab apple tree.

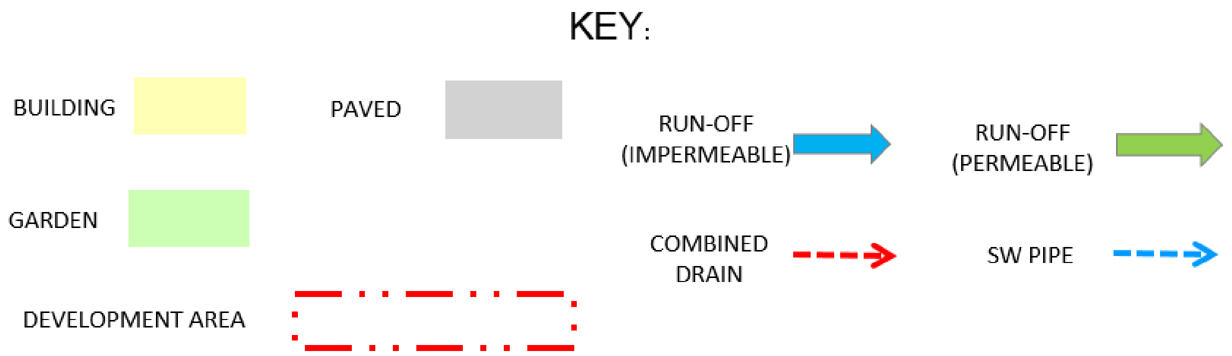
2.5 EXISTING SURFACE WATER DRAINAGE

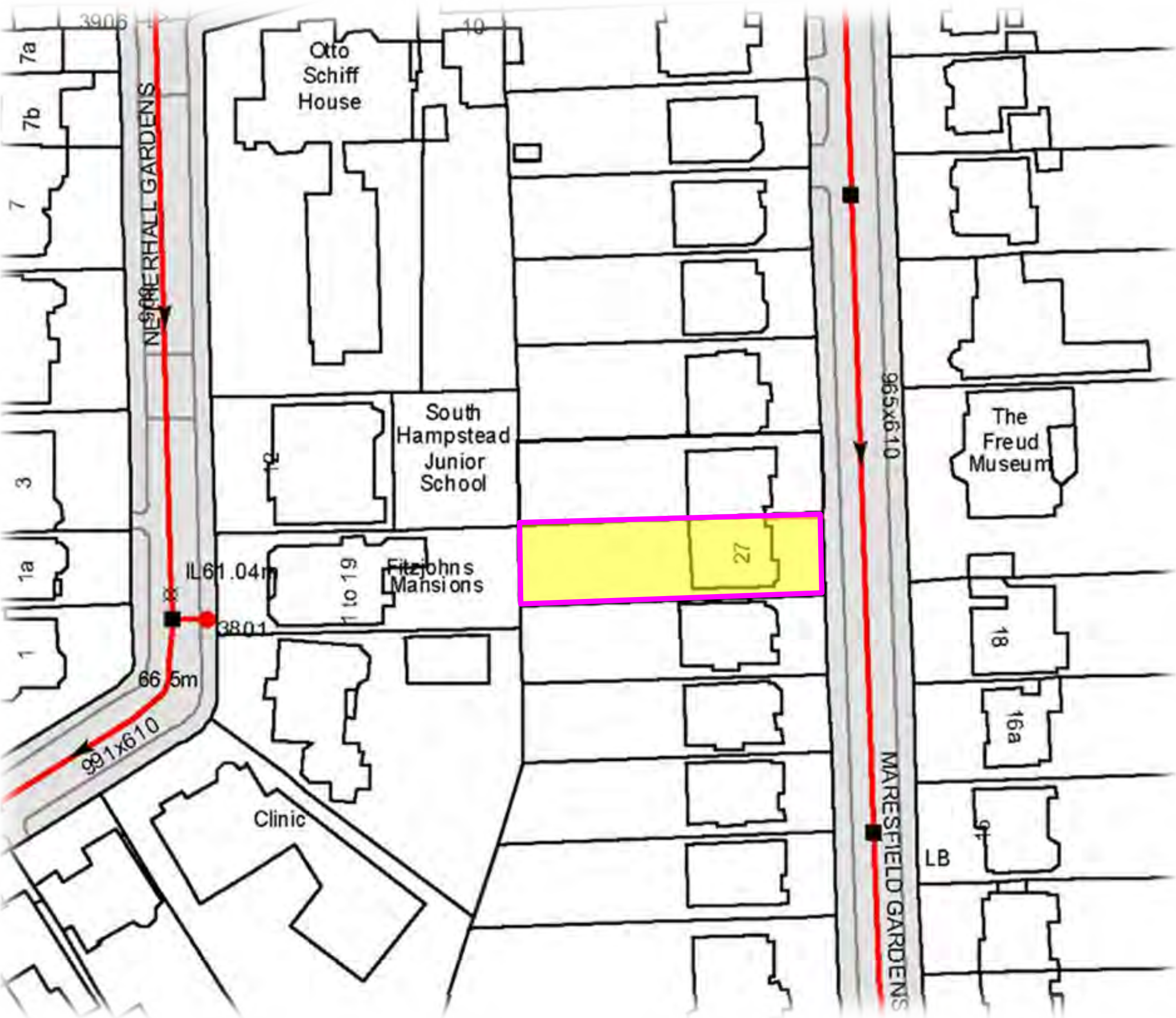
Approximately half of the site hard-surfaced and the surface water run-off collected on site is directed towards the combined sewer running southwards underneath Maresfield Gardens.

Rainfall incident on the roof is collected by the roof gutters and directed through downpipes towards the nearest manholes. The hard surfaced areas are served by a series of gullies which also connect to the nearest drainage manholes.

The runoff from the building and the hard surfaced areas is then directed towards the combined sewer beneath Maresfield Gardens.

EXISITING SURFACE WATER DRAINAGE LAYOUT





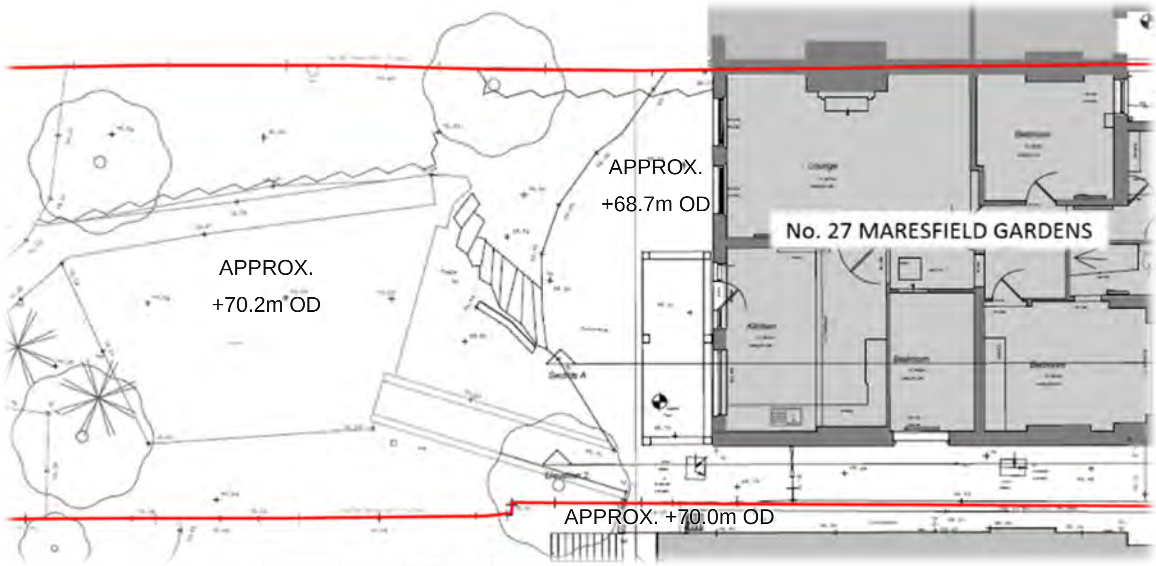
PUBLIC SEWER NETWORK IN THE VICINITY OF THE SITE

3. PROPOSED DEVELOPMENT

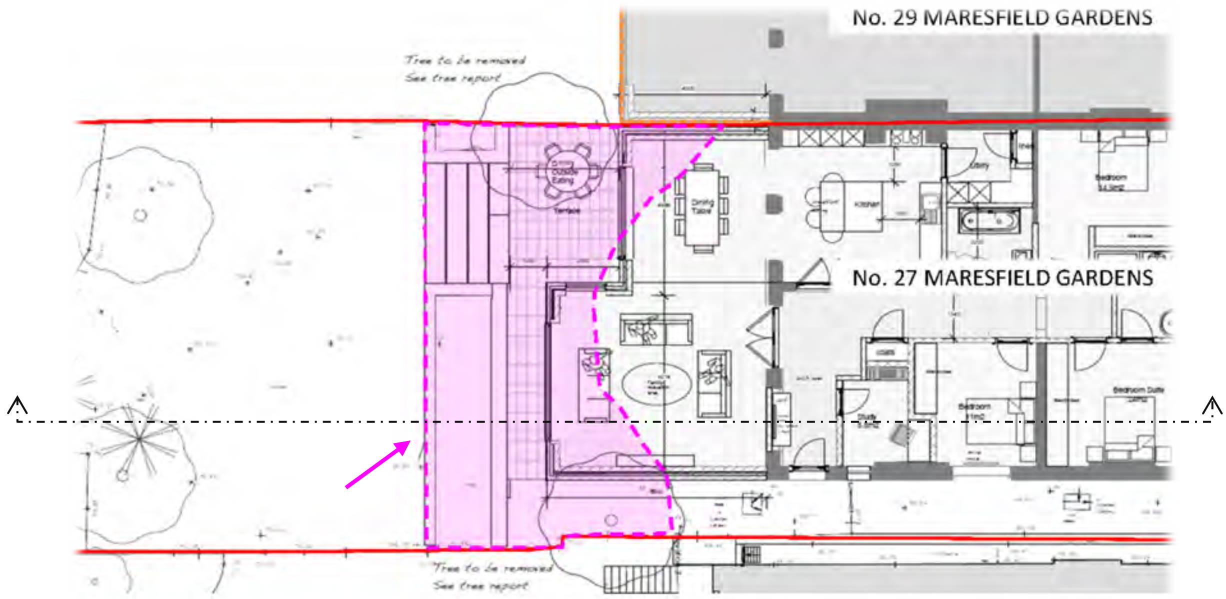
It is proposed to extend the existing lower ground floor rearwards by up to 6m rearwards. A small rear patio is to be created at the same level, together with stepped access up to the rear garden.

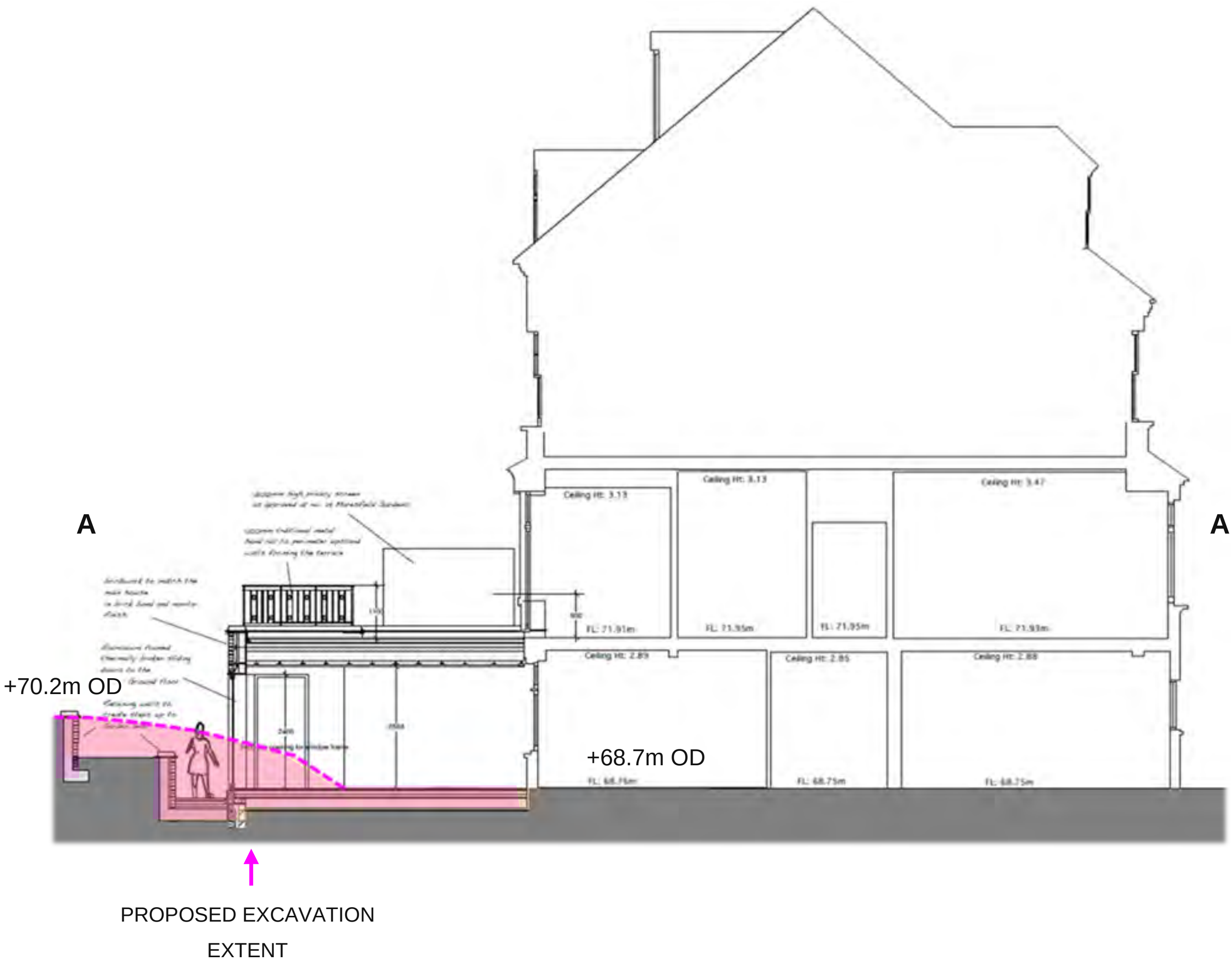
The development will necessitate excavation of the rear garden; the remainder of which will be supported by 1.5m high retaining walls.

Minimal excavation of the existing lower ground level will be required in order to cast a floor slab to match the existing Finished Floor Level (FFL).



EXISTING LOWER GROUND FLOOR AND GARDEN PLAN





PROPOSED SECTION DRAWING

SCHEDULE OF ESTIMATED AREAS										
	EXISTING					PROPOSED				
		Cv	%		%	Proposed	Cv	%		%
FRONT PATIO	87sqm	0.9	15.4%	%IMP	51.5%	87sqm	0.9	15.4%	%IMP	59.5%
BUILDING	152sqm	0.9	26.9%			200sqm	0.9	35.4%		
REAR PATIO	52sqm	0.9	9.2%			68sqm	0.9	12.0%		
GARDENS	274sqm	0.4	48.5%	**%PER**	**48.5%**	210sqm	0.4	37.2%	**%PER**	**40.5%**
TOTAL DEVELOPMENT AREA	565sqm		100.0%		100.0%	565sqm		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. Biodiversity

4.2 SUDS DISCHARGE HIERACHY

The surface water runoff should be managed using the following techniques, as outlined in order of priority by the following drainage hierarchy:

SuDS Drainage Hierarchy	Suitable for the site? (Y/N)	Comment
Store rainwater for later use	Y	There is scope for limited rainwater harvesting. Water butts 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 is scope for attenuation storage within a blue roof or in a cellular storage layer beneath the rear patio.
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 Maresfield Gardens.

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	Water butts 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.	Y	There may be limited scope for a green roof on part of the terrace above the new extension
Blue roofs	Roof design intended to store water providing attenuation storage.	Y	Attenuation storage may be provided by a blue roof above the proposed extension (beneath the proposed terrace)
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	Not possible.

Trees	Trees aid surface water management through transpiration, inception, infiltration and phytoremediation.	Y	There is scope for new trees to be planted within the retained rear garden.
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 is scope to introduce permeable paving as part of the proposed lower ground patio.
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	Shallow attenuation storage tanks are feasible below the proposed lower ground patio area.
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

There will be scope to reduce runoff rates and volumes as a result of the proposed development through the inclusion of attenuation storage below the new lower ground floor rear patio and as a blue roof above the proposed extension.

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.

The areas of pervious paving overlying the storage at the rear patio will offer scope for filtering of the surface water.

4.4.3 AMENITY

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

- Maximise multi-functionality
- Enhance visual character
- Deliver safe surface water management systems
- Support development resilience/adaptability to future change
- Maximise legibility
- Support community environmental learning

Any new planting, including the area between the rear garden and the proposed lower ground patio, will offer some amenity value.

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.

Similarly, the biodiversity objective for this site can be met through additional planting to help offset the loss of garden area.

4.5 SUDS CONSTRUCTION

It is proposed to provide sufficient attenuation storage at the rear of the site in order to reduce the overall discharge rate from the entire site.

Cellular, high porosity attenuation storage tanks installed beneath permeable paving as well as the storage provided by a blue roof are expected to provide an efficient solution for attenuation storage volume at the developed site. The two storage areas can be connected in series, with the blue roof providing attenuation for rainfall incident on the rear half of the main building roof, before discharging towards the rear patio.

The attenuated flow can then be discharged through an orifice flow control to the existing combined drainage run leading to the front of the property before discharging to the combined sewer beneath Maresfield Gardens.

4.6 MAINTENANCE

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

The SuDS features 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.

- 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.

5. INITIAL DESIGN CONSIDERATIONS

An analysis has been undertaken of the pre- and post- development surface water run-off 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:	0.25 l/sec
1 in 1	0.21 l/sec
1 in 30	0.56 l/sec
1 in 100	0.78 l/sec
1 in 200	0.92 l/sec

5.2 EXISTING RUNOFF RATE

The site comprises a total area of approximately 565m^2 of which approx. 51.5% is currently impermeably surfaced. No SuDS features are considered to be present at the existing site.

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 13.3 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 30.5 m^3.

6. PROPOSED SURFACE WATER DRAINAGE SCHEME

Attenuation storage is to be provided as a blue roof above proposed rear extension, as well as beneath the rear patio.

In normal circumstances the runoff from the entire site would be directed towards the proposed storage, before discharging to the combined sewer. However, in this case, it is not possible to re-direct the runoff from the front part of the roof of the main building within the scale of this development. Moreover, there is no proposed change to the front of the property.

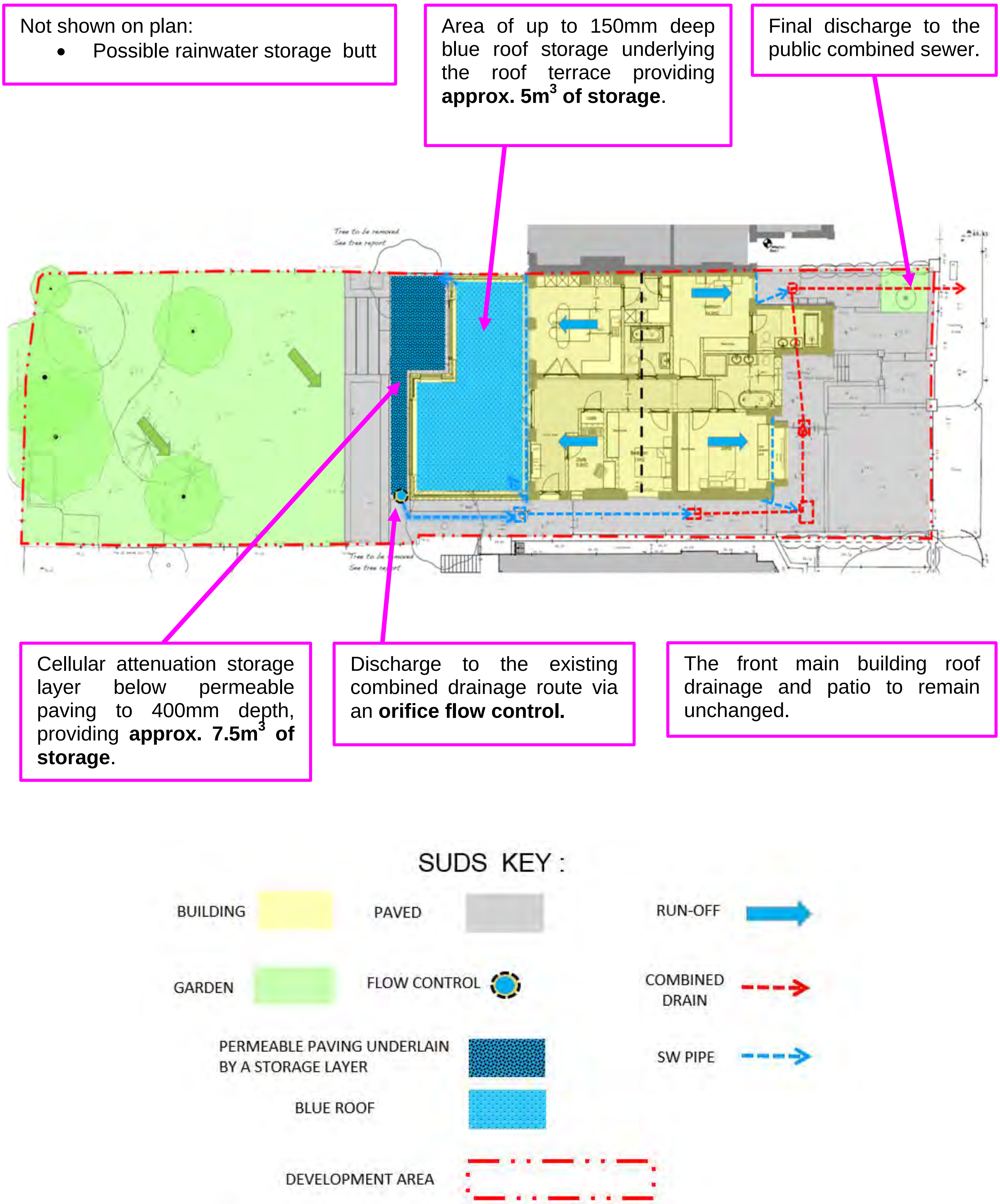
It is therefore proposed that, while the existing surface water drainage system for the front half of the building and the external areas will be maintained, all rainfall incident on the rear half of the original building, the proposed rear extension and the rear patio will be attenuated.

Nevertheless, the volume of storage to be provided is such that it would accommodate the theoretical storage calculations for achieving 50% betterment of the existing discharge, for the 1 in 100 year rainfall event in consideration of up to 40% climate change allowance, of the whole site.

These calculations indicate that some $12m^3$ of attenuation storage would be required; which could be provided by 400mm deep cellular storage underlying $18m^2$ of permeable paving within the new rear patio in combination with a 150mm deep blue roof storage beneath $35m^2$ of the new roof terrace.

Small rainwater harvesting butts can also be provided within the rear patio.

A schematic plan of these proposed SuDS features is presented overleaf.


Not shown on plan:
• Possible rainwater storage butt
Area of up to 150mm deep blue roof storage underlying the roof terrace providing approx. 5m3 of storage.
Final discharge to the public combined sewer.
Cellular attenuation storage layer below permeable paving to 400mm depth, providing approx. 7.5m3 of storage.
Discharge to the existing combined drainage route via an orifice flow control.
The front main building roof drainage and patio to remain unchanged.
SUDS KEY :
BUILDING
PAVED
RUN-OFF
GARDEN
FLOW CONTROL
COMBINED DRAIN
PERMEABLE PAVING UNDERLAIN BY A STORAGE LAYER
SW PIPE
BLUE ROOF
DEVELOPMENT AREA

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 scope for various SuDS features that can restrain run-off, in accordance with Policy CC3 of the Camden Local Plan, 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)	27 MARESFIELD ROAD
	Address & post code	NW3 5SD
	OS Grid ref. (Easting, Northing)	E 526440
		N 184875
	LPA reference (if applicable)	
	Brief description of proposed work	Construction of a new rear lower ground floor extension as well as an extended lower gorund floor level rear patio
	Total site Area for Attenuation	565 m^2
	Total existing impervious area	291 m^2
	Total proposed impervious area	355 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 Maresfield Gardens
	Designer Name	S R L B
	Designer Position	Principal
	Designer Company	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 Maresfield Gardens
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	0.25			
1 in 1	0.21	4.26	6.91	6.67
1 in 30	0.56	10.40	15.20	6.67
1 in 100	0.78	13.33	19.93	6.67
1 in 100 + CC			30.17	6.67
Climate change allowance used		40%		

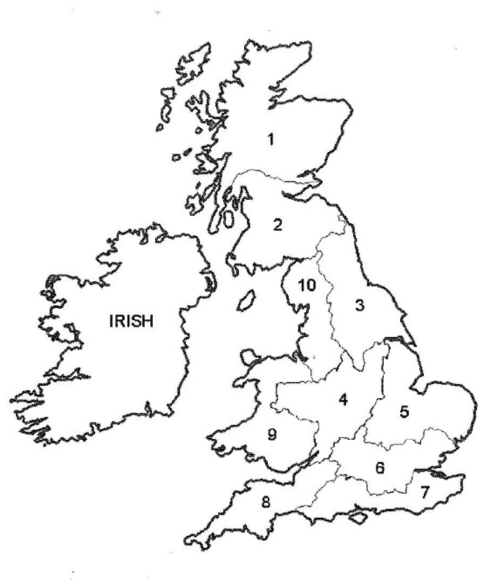
3b. Principal Method of Flow Control	Orifice

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	100	35	5
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	217		7
Total	317	35	12

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 & P13
	Detailed drainage design drawings, including exceedance flow routes	P21
	Detailed landscaping plans	P10
	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: 565sqm 0.057ha

PO Code : NW3 5SD

Hydrological Region: 6 *From Wallingford on-line tool*

SAAR: 640mm *From Wallingford on-line tool*

SOIL type: 4 *From Wallingford on-line tool*

SPR: 0.47 *Derived as follows:*

	Sand	Clayey Sand	Sandy Clay	Clay	Rock
SOIL	*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: 217.37 *Calculated from SPR and SAAR*

Greenfield Peak Run-off Rate:		*Growth curve Factor*
1 in 1	*184.8 l/sec*	*0.85*
1 in 30	*500.0 l/sec*	*2.30*
1 in 100	*693.4 l/sec*	*3.19*
1 in 200	*813.0 l/sec*	*3.74*

Qbar: 0.25 l/sec

Greenfield Peak Run-off Rate:	
1 in 1	**0.21 l/sec**
1 in 30	**0.56 l/sec**
1 in 100	**0.78 l/sec**
1 in 200	**0.92 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: 27 MARESFIELD ROAD	
GREENFIELD RUNOFF	
Sheet 1 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

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: 27 MARESFIELD ROAD	
RAINFALL PEAK INTENSITY	
Sheet 2 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

GREENFIELD PEAK RUNOFF

	Hydrological Region:	6		*From Wallingford on-line tool*			**Qbar:**	**0.25 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	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
10min	10min	0.17hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
15min	15min	0.25hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
30min	30min	0.50hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
1hr	60min	1.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
2hr	120min	2.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
4hr	240min	4.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
6hr	360min	6.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
10hr	600min	10.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
24hr	1440min	24.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 l/sec
48hr	2880min	48.00hr	0.21 l/sec	0.22 l/sec	0.25 l/sec	0.28 l/sec	0.31 l/sec	0.40 l/sec	0.48 l/sec	0.59 l/sec	0.78 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	0.1 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
10min	10min	0.17hr	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3	0.2 m3	0.3 m3	0.4 m3	0.5 m3
15min	15min	0.25hr	0.2 m3	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.4 m3	0.4 m3	0.5 m3	0.7 m3
30min	30min	0.50hr	0.4 m3	0.4 m3	0.4 m3	0.5 m3	0.6 m3	0.7 m3	0.9 m3	1.1 m3	1.4 m3
1hr	60min	1.00hr	0.8 m3	0.8 m3	0.9 m3	1.0 m3	1.1 m3	1.4 m3	1.7 m3	2.1 m3	2.8 m3
2hr	120min	2.00hr	1.5 m3	1.6 m3	1.8 m3	2.0 m3	2.3 m3	2.9 m3	3.5 m3	4.2 m3	5.6 m3
4hr	240min	4.00hr	3.0 m3	3.1 m3	3.6 m3	4.1 m3	4.5 m3	5.7 m3	7.0 m3	8.5 m3	11.3 m3
6hr	360min	6.00hr	4.5 m3	4.7 m3	5.4 m3	6.1 m3	6.8 m3	8.6 m3	10.4 m3	12.7 m3	16.9 m3
10hr	600min	10.00hr	7.5 m3	7.8 m3	9.0 m3	10.1 m3	11.3 m3	14.3 m3	17.4 m3	21.2 m3	28.2 m3
24hr	1440min	24.00hr	18.0 m3	18.7 m3	21.5 m3	24.3 m3	27.2 m3	34.4 m3	41.7 m3	50.9 m3	67.7 m3
48hr	2880min	48.00hr	36.1 m3	37.4 m3	43.0 m3	48.7 m3	54.3 m3	68.8 m3	83.5 m3	101.9 m3	135.4 m3

SuDs CALCULATIONS	
Project: 27 MARESFIELD ROAD	
GREENFIELD PEAK RUNOFF	
Sheet 3 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

EXISTING PEAK RUNOFF

C_V:	0.66	*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	7.6 l/sec	9.7 l/sec	10.9 l/sec	11.9 l/sec	12.5 l/sec	14.6 l/sec	16.7 l/sec	17.5 l/sec	21.9 l/sec
10min	10min	0.17hr	5.4 l/sec	7.0 l/sec	8.0 l/sec	8.6 l/sec	9.1 l/sec	10.8 l/sec	12.5 l/sec	13.2 l/sec	16.9 l/sec
15min	15min	0.25hr	4.3 l/sec	5.5 l/sec	6.3 l/sec	6.8 l/sec	7.2 l/sec	8.5 l/sec	9.8 l/sec	10.4 l/sec	13.3 l/sec
30min	30min	0.50hr	2.5 l/sec	3.3 l/sec	3.6 l/sec	3.9 l/sec	4.1 l/sec	5.0 l/sec	5.8 l/sec	6.1 l/sec	8.0 l/sec
1hr	60min	1.00hr	1.7 l/sec	2.2 l/sec	2.4 l/sec	2.6 l/sec	2.8 l/sec	3.3 l/sec	3.9 l/sec	4.1 l/sec	5.5 l/sec
2hr	120min	2.00hr	1.0 l/sec	1.3 l/sec	1.5 l/sec	1.6 l/sec	1.7 l/sec	2.0 l/sec	2.3 l/sec	2.5 l/sec	3.3 l/sec
4hr	240min	4.00hr	0.6 l/sec	0.8 l/sec	0.9 l/sec	0.9 l/sec	1.0 l/sec	1.2 l/sec	1.4 l/sec	1.4 l/sec	1.9 l/sec
6hr	360min	6.00hr	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.7 l/sec	0.7 l/sec	0.9 l/sec	1.0 l/sec	1.1 l/sec	1.4 l/sec
10hr	600min	10.00hr	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	0.7 l/sec	0.9 l/sec
24hr	1440min	24.00hr	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	0.5 l/sec
48hr	2880min	48.00hr	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

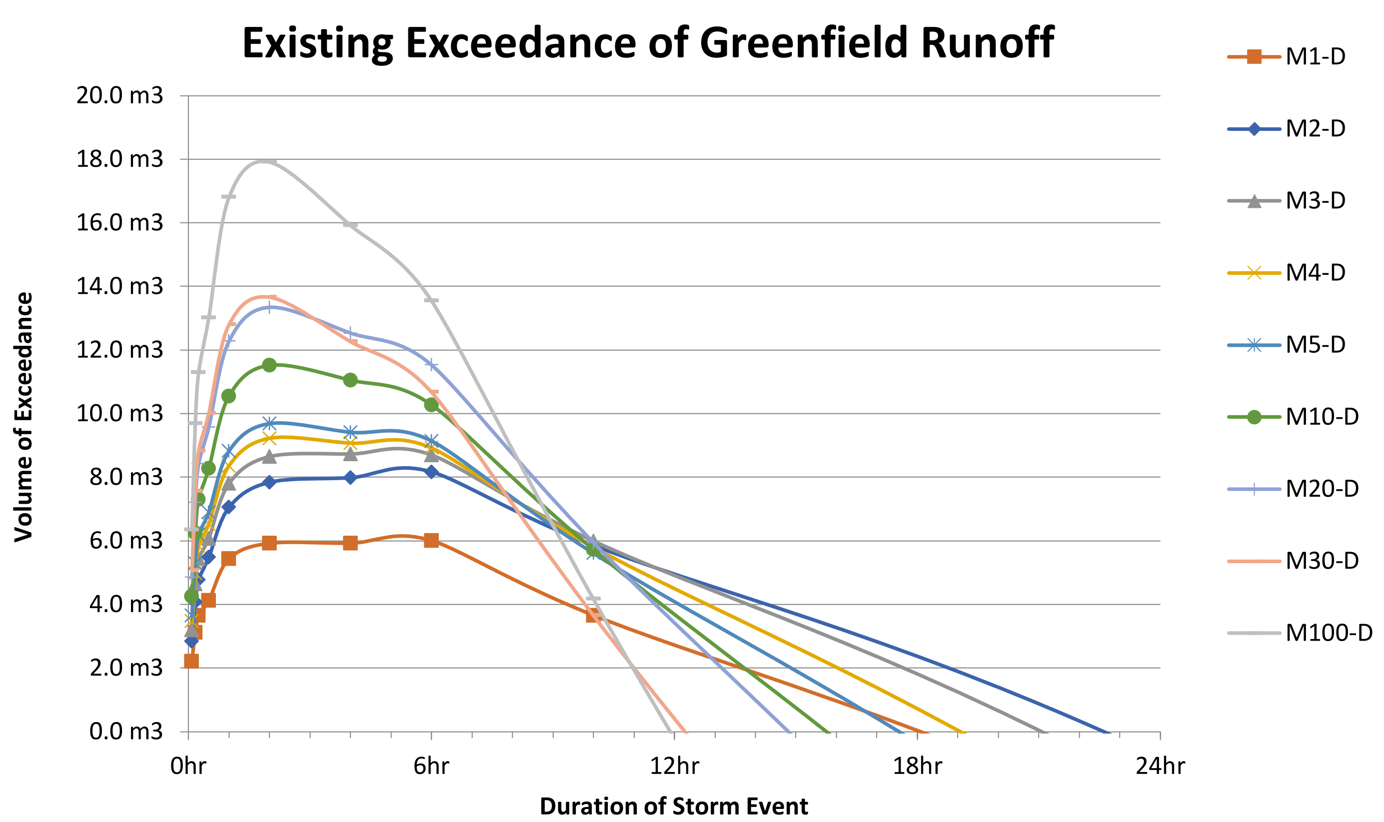
Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	2.3 m3	2.9 m3	3.3 m3	3.6 m3	3.7 m3	4.4 m3	5.0 m3	5.2 m3	6.6 m3
10min	10min	0.17hr	3.2 m3	4.2 m3	4.8 m3	5.2 m3	5.5 m3	6.5 m3	7.5 m3	7.9 m3	10.2 m3
15min	15min	0.25hr	3.8 m3	5.0 m3	5.7 m3	6.1 m3	6.5 m3	7.7 m3	8.9 m3	9.4 m3	12.0 m3
30min	30min	0.50hr	4.5 m3	5.9 m3	6.5 m3	7.0 m3	7.5 m3	9.0 m3	10.4 m3	11.1 m3	14.4 m3
1hr	60min	1.00hr	6.2 m3	7.8 m3	8.7 m3	9.4 m3	10.0 m3	12.0 m3	14.0 m3	14.9 m3	19.6 m3
2hr	120min	2.00hr	7.4 m3	9.4 m3	10.4 m3	11.3 m3	11.9 m3	14.4 m3	16.8 m3	17.9 m3	23.5 m3
4hr	240min	4.00hr	8.9 m3	11.1 m3	12.3 m3	13.1 m3	13.9 m3	16.8 m3	19.5 m3	20.8 m3	27.2 m3
6hr	360min	6.00hr	10.5 m3	12.8 m3	14.1 m3	15.0 m3	15.9 m3	18.9 m3	22.0 m3	23.4 m3	30.5 m3
10hr	600min	10.00hr	11.2 m3	13.6 m3	15.0 m3	15.9 m3	16.9 m3	20.0 m3	23.3 m3	24.9 m3	32.4 m3
24hr	1440min	24.00hr	14.9 m3	17.9 m3	19.6 m3	20.6 m3	21.7 m3	25.3 m3	29.3 m3	31.2 m3	40.2 m3
48hr	2880min	48.00hr	17.4 m3	20.5 m3	22.5 m3	23.7 m3	24.7 m3	28.3 m3	32.4 m3	34.3 m3	43.7 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	2.2 m3	2.8 m3	3.2 m3	3.5 m3	3.7 m3	4.3 m3	4.9 m3	5.1 m3	6.3 m3
10min	10min	0.17hr	3.1 m3	4.1 m3	4.6 m3	5.0 m3	5.3 m3	6.2 m3	7.2 m3	7.6 m3	9.7 m3
15min	15min	0.25hr	3.6 m3	4.8 m3	5.4 m3	5.8 m3	6.2 m3	7.3 m3	8.4 m3	8.8 m3	11.3 m3
30min	30min	0.50hr	4.1 m3	5.5 m3	6.1 m3	6.5 m3	6.9 m3	8.3 m3	9.6 m3	10.0 m3	13.0 m3
1hr	60min	1.00hr	5.4 m3	7.1 m3	7.8 m3	8.4 m3	8.8 m3	10.6 m3	12.3 m3	12.8 m3	16.8 m3
2hr	120min	2.00hr	5.9 m3	7.8 m3	8.6 m3	9.2 m3	9.7 m3	11.5 m3	13.3 m3	13.7 m3	17.9 m3
4hr	240min	4.00hr	5.9 m3	8.0 m3	8.7 m3	9.1 m3	9.4 m3	11.1 m3	12.5 m3	12.3 m3	15.9 m3
6hr	360min	6.00hr	6.0 m3	8.2 m3	8.7 m3	8.9 m3	9.1 m3	10.3 m3	11.5 m3	10.7 m3	13.5 m3
10hr	600min	10.00hr	3.7 m3	5.9 m3	6.0 m3	5.8 m3	5.6 m3	5.7 m3	5.9 m3	3.6 m3	4.2 m3
24hr	1440min	24.00hr	-3.2 m3	-0.8 m3	-1.9 m3	-3.7 m3	-5.5 m3	-9.1 m3	-12.4 m3	-19.7 m3	-27.5 m3
48hr	2880min	48.00hr	-18.7 m3	-16.8 m3	-20.5 m3	-25.0 m3	-29.7 m3	-40.5 m3	-51.1 m3	-67.6 m3	-91.7 m3

			C_V:
Catchment Area:	565sqm	100%	
Permeable:	274sqm	48%	0.40
Impermeable:	291sqm	52%	0.90
			0.66



SuDs CALCULATIONS	
Project: 27 MARESFIELD ROAD	
EXISTING PEAK RUNOFF	
Sheet 4 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

POST- DEVELOPMENT PEAK RUNOFF

C_V:	0.71	*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	8.2 l/sec	10.5 l/sec	11.8 l/sec	12.9 l/sec	13.6 l/sec	15.8 l/sec	18.1 l/sec	19.0 l/sec	23.8 l/sec
10min	10min	0.17hr	5.9 l/sec	7.6 l/sec	8.7 l/sec	9.3 l/sec	9.9 l/sec	11.7 l/sec	13.6 l/sec	14.3 l/sec	18.4 l/sec
15min	15min	0.25hr	4.6 l/sec	6.0 l/sec	6.8 l/sec	7.4 l/sec	7.8 l/sec	9.3 l/sec	10.7 l/sec	11.3 l/sec	14.5 l/sec
30min	30min	0.50hr	2.7 l/sec	3.5 l/sec	3.9 l/sec	4.2 l/sec	4.5 l/sec	5.4 l/sec	6.3 l/sec	6.7 l/sec	8.7 l/sec
1hr	60min	1.00hr	1.9 l/sec	2.4 l/sec	2.6 l/sec	2.8 l/sec	3.0 l/sec	3.6 l/sec	4.2 l/sec	4.5 l/sec	5.9 l/sec
2hr	120min	2.00hr	1.1 l/sec	1.4 l/sec	1.6 l/sec	1.7 l/sec	1.8 l/sec	2.2 l/sec	2.5 l/sec	2.7 l/sec	3.6 l/sec
4hr	240min	4.00hr	0.7 l/sec	0.8 l/sec	0.9 l/sec	1.0 l/sec	1.1 l/sec	1.3 l/sec	1.5 l/sec	1.6 l/sec	2.1 l/sec
6hr	360min	6.00hr	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.8 l/sec	0.8 l/sec	0.9 l/sec	1.1 l/sec	1.2 l/sec	1.5 l/sec
10hr	600min	10.00hr	0.3 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.8 l/sec	1.0 l/sec
24hr	1440min	24.00hr	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	0.4 l/sec	0.5 l/sec
48hr	2880min	48.00hr	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	0.2 l/sec	0.3 l/sec

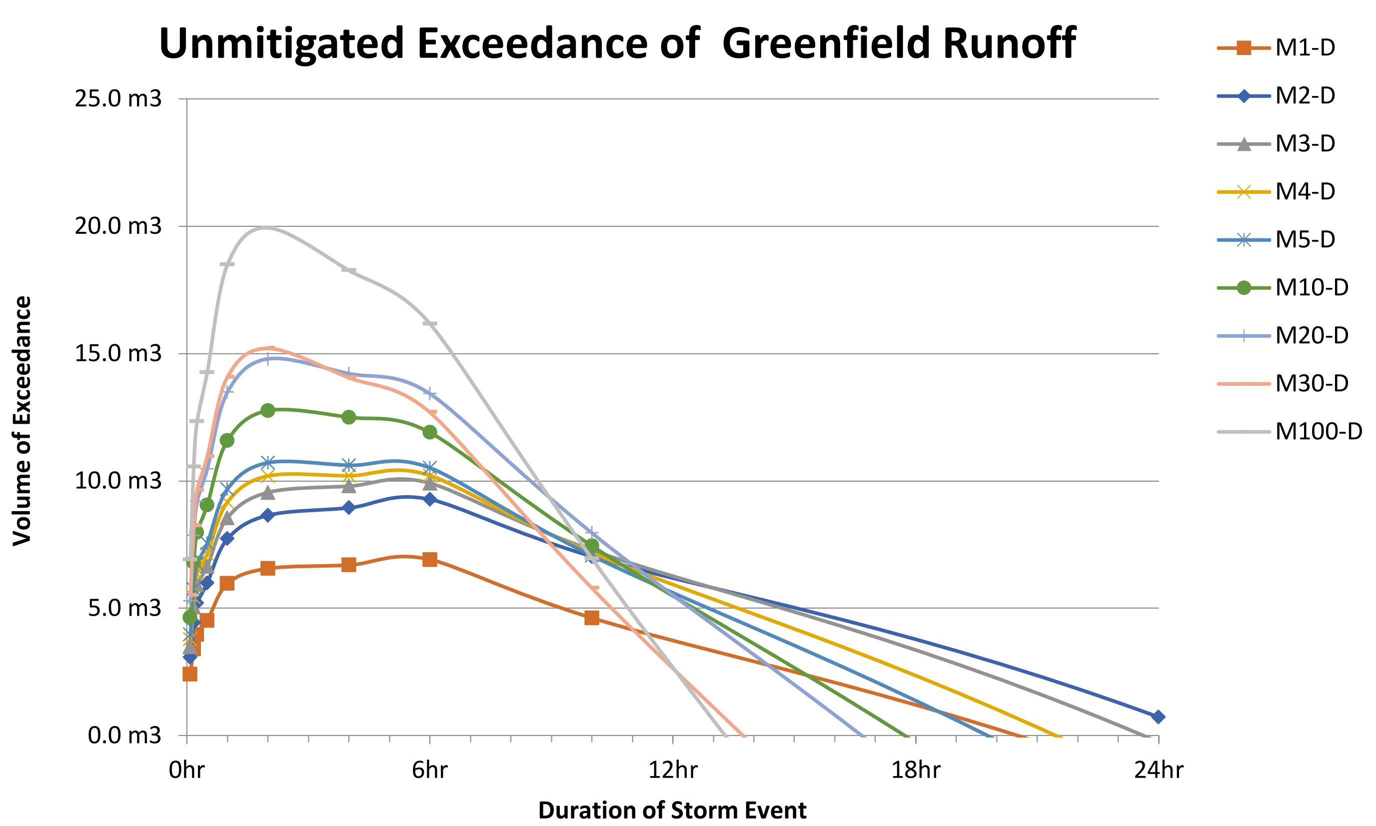
Run-Off Volume

	D Duration		**M1-D**	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	2.5 m3	3.2 m3	3.6 m3	3.9 m3	4.1 m3	4.7 m3	5.4 m3	5.7 m3	7.1 m3
10min	10min	0.17hr	3.5 m3	4.6 m3	5.2 m3	5.6 m3	5.9 m3	7.0 m3	8.1 m3	8.6 m3	11.0 m3
15min	15min	0.25hr	4.2 m3	5.4 m3	6.1 m3	6.6 m3	7.0 m3	8.3 m3	9.6 m3	10.2 m3	13.0 m3
30min	30min	0.50hr	4.9 m3	6.4 m3	7.1 m3	7.6 m3	8.1 m3	9.8 m3	11.3 m3	12.0 m3	15.7 m3
1hr	60min	1.00hr	6.7 m3	8.5 m3	9.4 m3	10.2 m3	10.8 m3	13.0 m3	15.2 m3	16.2 m3	21.3 m3
2hr	120min	2.00hr	8.1 m3	10.2 m3	11.3 m3	12.2 m3	13.0 m3	15.6 m3	18.3 m3	19.4 m3	25.6 m3
4hr	240min	4.00hr	9.7 m3	12.1 m3	13.4 m3	14.3 m3	15.1 m3	18.2 m3	21.2 m3	22.5 m3	29.5 m3
6hr	360min	6.00hr	11.4 m3	13.9 m3	15.3 m3	16.3 m3	17.3 m3	20.5 m3	23.9 m3	25.4 m3	33.1 m3
10hr	600min	10.00hr	12.1 m3	14.8 m3	16.2 m3	17.3 m3	18.4 m3	21.8 m3	25.3 m3	27.0 m3	35.2 m3
24hr	1440min	24.00hr	16.2 m3	19.4 m3	21.3 m3	22.4 m3	23.6 m3	27.5 m3	31.9 m3	33.9 m3	43.7 m3
48hr	2880min	48.00hr	18.9 m3	22.3 m3	24.4 m3	25.7 m3	26.8 m3	30.7 m3	35.2 m3	37.3 m3	47.5 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	2.4 m3	3.1 m3	3.5 m3	3.8 m3	4.0 m3	4.6 m3	5.3 m3	5.5 m3	6.9 m3
10min	10min	0.17hr	3.4 m3	4.4 m3	5.0 m3	5.4 m3	5.8 m3	6.8 m3	7.9 m3	8.3 m3	10.6 m3
15min	15min	0.25hr	4.0 m3	5.2 m3	5.9 m3	6.4 m3	6.7 m3	8.0 m3	9.2 m3	9.6 m3	12.3 m3
30min	30min	0.50hr	4.5 m3	6.0 m3	6.6 m3	7.1 m3	7.5 m3	9.0 m3	10.5 m3	11.0 m3	14.3 m3
1hr	60min	1.00hr	6.0 m3	7.7 m3	8.6 m3	9.2 m3	9.7 m3	11.6 m3	13.5 m3	14.1 m3	18.5 m3
2hr	120min	2.00hr	6.6 m3	8.6 m3	9.5 m3	10.2 m3	10.7 m3	12.8 m3	14.8 m3	15.2 m3	19.9 m3
4hr	240min	4.00hr	6.7 m3	8.9 m3	9.8 m3	10.2 m3	10.6 m3	12.5 m3	14.2 m3	14.0 m3	18.3 m3
6hr	360min	6.00hr	6.9 m3	9.3 m3	9.9 m3	10.2 m3	10.5 m3	11.9 m3	13.4 m3	12.7 m3	16.2 m3
10hr	600min	10.00hr	4.6 m3	7.0 m3	7.3 m3	7.2 m3	7.1 m3	7.5 m3	8.0 m3	5.8 m3	7.0 m3
24hr	1440min	24.00hr	-1.9 m3	0.7 m3	-0.3 m3	-1.9 m3	-3.6 m3	-6.9 m3	-9.9 m3	-17.1 m3	-24.0 m3
48hr	2880min	48.00hr	-17.2 m3	-15.0 m3	-18.6 m3	-22.9 m3	-27.6 m3	-38.0 m3	-48.3 m3	-64.6 m3	-87.9 m3
			6.9 m3							**15.2 m3**	**19.9 m3**

			C_V:
Catchment Area:	565sqm	100%	
Permeable Garden	210sqm	37%	0.40
Impermeable:	355sqm	63%	0.90
			0.71



SuDs CALCULATIONS	
Project: 27 MARESFIELD ROAD	
POST-DEV. PEAK RUNOFF	
Sheet 5 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

POST- DEVELOPMENT PEAK RUNOFF + CC

C_V:	0.71	*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	11.5 l/sec	14.7 l/sec	16.6 l/sec	18.1 l/sec	19.0 l/sec	22.2 l/sec	25.3 l/sec	26.6 l/sec	33.3 l/sec
10min	10min	0.17hr	8.2 l/sec	10.6 l/sec	12.1 l/sec	13.1 l/sec	13.9 l/sec	16.4 l/sec	19.0 l/sec	20.1 l/sec	25.7 l/sec
15min	15min	0.25hr	6.5 l/sec	8.4 l/sec	9.6 l/sec	10.3 l/sec	10.9 l/sec	13.0 l/sec	15.0 l/sec	15.8 l/sec	20.3 l/sec
30min	30min	0.50hr	3.8 l/sec	5.0 l/sec	5.5 l/sec	5.9 l/sec	6.3 l/sec	7.6 l/sec	8.8 l/sec	9.4 l/sec	12.2 l/sec
1hr	60min	1.00hr	2.6 l/sec	3.3 l/sec	3.7 l/sec	4.0 l/sec	4.2 l/sec	5.1 l/sec	5.9 l/sec	6.3 l/sec	8.3 l/sec
2hr	120min	2.00hr	1.6 l/sec	2.0 l/sec	2.2 l/sec	2.4 l/sec	2.5 l/sec	3.0 l/sec	3.6 l/sec	3.8 l/sec	5.0 l/sec
4hr	240min	4.00hr	0.9 l/sec	1.2 l/sec	1.3 l/sec	1.4 l/sec	1.5 l/sec	1.8 l/sec	2.1 l/sec	2.2 l/sec	2.9 l/sec
6hr	360min	6.00hr	0.7 l/sec	0.9 l/sec	1.0 l/sec	1.1 l/sec	1.1 l/sec	1.3 l/sec	1.5 l/sec	1.6 l/sec	2.1 l/sec
10hr	600min	10.00hr	0.5 l/sec	0.6 l/sec	0.6 l/sec	0.7 l/sec	0.7 l/sec	0.8 l/sec	1.0 l/sec	1.1 l/sec	1.4 l/sec
24hr	1440min	24.00hr	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.7 l/sec
48hr	2880min	48.00hr	0.2 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

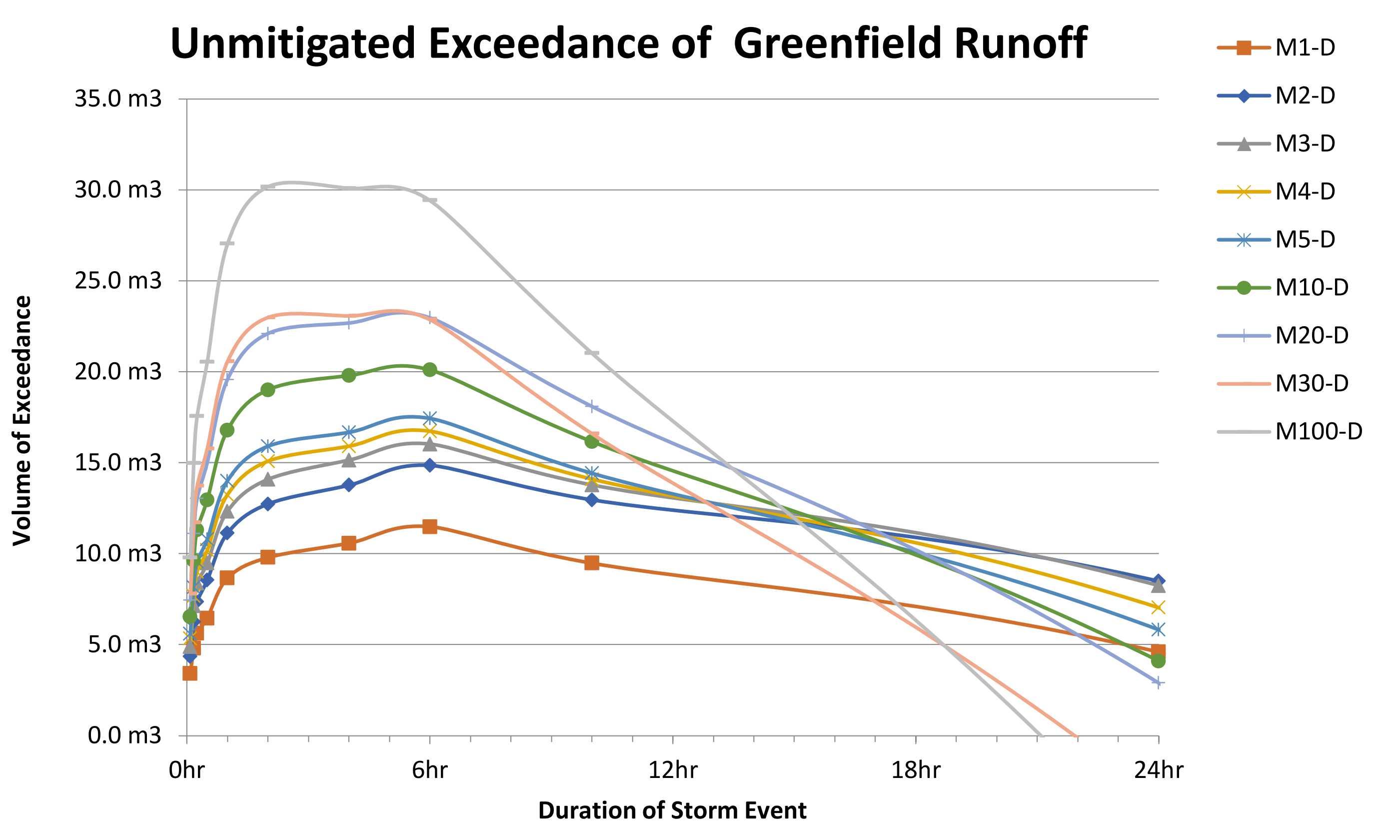
Run-Off Volume

	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	3.5 m3	4.4 m3	5.0 m3	5.4 m3	5.7 m3	6.6 m3	7.6 m3	8.0 m3	10.0 m3
10min	10min	0.17hr	4.9 m3	6.4 m3	7.3 m3	7.8 m3	8.3 m3	9.9 m3	11.4 m3	12.0 m3	15.4 m3
15min	15min	0.25hr	5.8 m3	7.5 m3	8.6 m3	9.3 m3	9.8 m3	11.7 m3	13.5 m3	14.2 m3	18.2 m3
30min	30min	0.50hr	6.8 m3	8.9 m3	9.9 m3	10.7 m3	11.4 m3	13.7 m3	15.9 m3	16.8 m3	21.9 m3
1hr	60min	1.00hr	9.4 m3	11.9 m3	13.2 m3	14.3 m3	15.1 m3	18.2 m3	21.3 m3	22.7 m3	29.8 m3
2hr	120min	2.00hr	11.3 m3	14.3 m3	15.9 m3	17.1 m3	18.2 m3	21.9 m3	25.6 m3	27.2 m3	35.8 m3
4hr	240min	4.00hr	13.6 m3	16.9 m3	18.7 m3	20.0 m3	21.2 m3	25.5 m3	29.6 m3	31.6 m3	41.4 m3
6hr	360min	6.00hr	16.0 m3	19.5 m3	21.4 m3	22.8 m3	24.2 m3	28.7 m3	33.4 m3	35.6 m3	46.3 m3
10hr	600min	10.00hr	17.0 m3	20.7 m3	22.7 m3	24.2 m3	25.7 m3	30.5 m3	35.5 m3	37.8 m3	49.2 m3
24hr	1440min	24.00hr	22.6 m3	27.2 m3	29.8 m3	31.4 m3	33.0 m3	38.5 m3	44.6 m3	47.4 m3	61.1 m3
48hr	2880min	48.00hr	26.5 m3	31.2 m3	34.2 m3	36.0 m3	37.5 m3	43.0 m3	49.2 m3	52.2 m3	66.5 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	3.4 m3	4.3 m3	4.9 m3	5.3 m3	5.6 m3	6.5 m3	7.5 m3	7.8 m3	9.8 m3
10min	10min	0.17hr	4.8 m3	6.3 m3	7.1 m3	7.7 m3	8.1 m3	9.6 m3	11.1 m3	11.7 m3	15.0 m3
15min	15min	0.25hr	5.6 m3	7.4 m3	8.4 m3	9.0 m3	9.6 m3	11.3 m3	13.0 m3	13.7 m3	17.5 m3
30min	30min	0.50hr	6.5 m3	8.5 m3	9.5 m3	10.2 m3	10.8 m3	13.0 m3	15.0 m3	15.8 m3	20.5 m3
1hr	60min	1.00hr	8.7 m3	11.1 m3	12.3 m3	13.2 m3	14.0 m3	16.8 m3	19.6 m3	20.6 m3	27.0 m3
2hr	120min	2.00hr	9.8 m3	12.7 m3	14.1 m3	15.1 m3	15.9 m3	19.0 m3	22.1 m3	23.0 m3	30.2 m3
4hr	240min	4.00hr	10.6 m3	13.8 m3	15.1 m3	15.9 m3	16.7 m3	19.8 m3	22.7 m3	23.1 m3	30.1 m3
6hr	360min	6.00hr	11.5 m3	14.9 m3	16.0 m3	16.7 m3	17.4 m3	20.1 m3	23.0 m3	22.9 m3	29.4 m3
10hr	600min	10.00hr	9.5 m3	13.0 m3	13.8 m3	14.1 m3	14.4 m3	16.2 m3	18.1 m3	16.6 m3	21.0 m3
24hr	1440min	24.00hr	4.6 m3	8.5 m3	8.2 m3	7.0 m3	5.8 m3	4.1 m3	2.9 m3	-3.5 m3	-6.6 m3
48hr	2880min	48.00hr	-9.6 m3	-6.1 m3	-8.8 m3	-12.7 m3	-16.8 m3	-25.8 m3	-34.2 m3	-49.7 m3	-68.9 m3
											30.2 m3

			C_V:
Catchment Area:	565sqm	100%	
Permeable Garden	210sqm	37%	0.40
Impermeable:	355sqm	63%	0.90
			0.71



SuDs CALCULATIONS	
Project: 27 MARESFIELD ROAD	
POST-DEV. PEAK RUNOFF+CC	
Sheet 6 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

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

Proposed Discharge Rates: Greenfield x 1

INFLOW

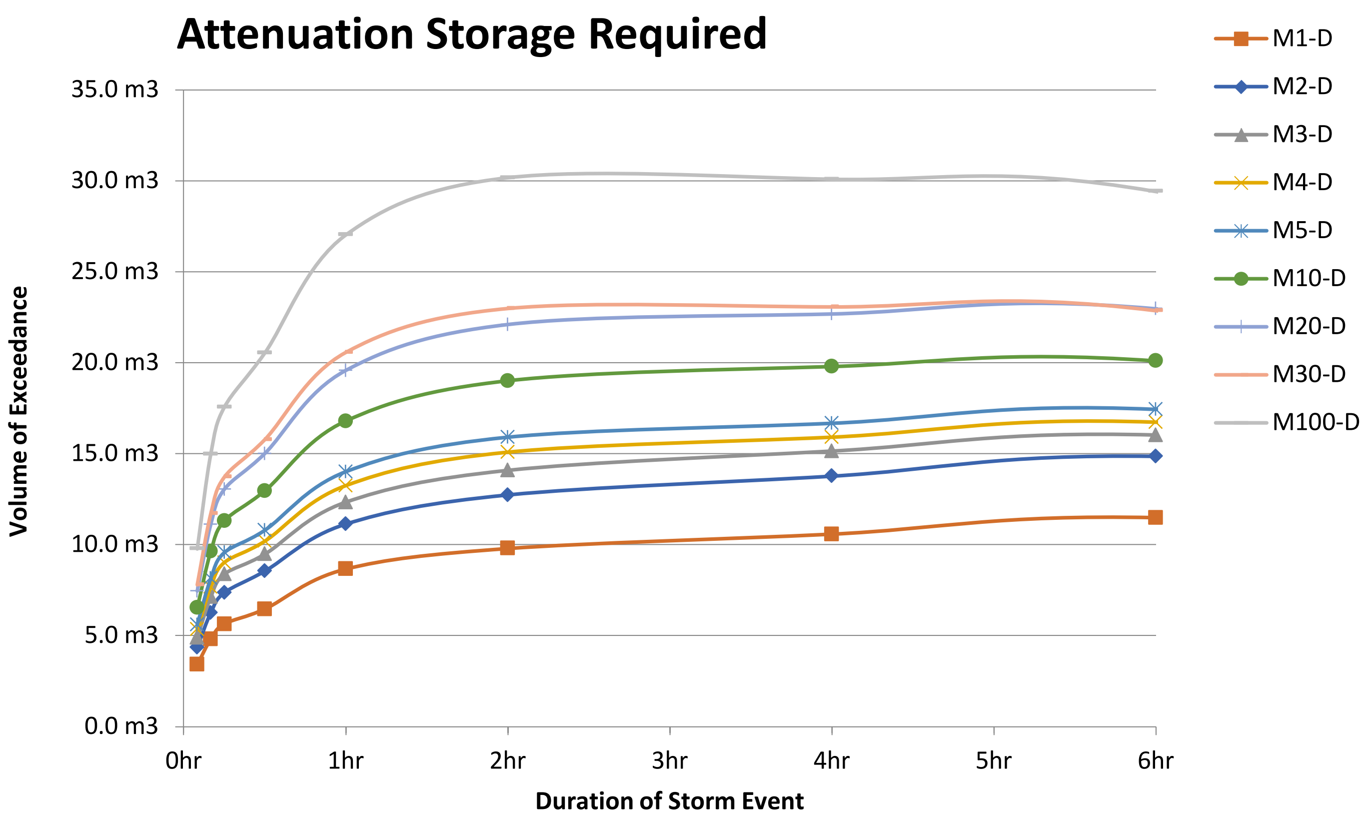
	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	3.5 m3	4.4 m3	5.0 m3	5.4 m3	5.7 m3	6.6 m3	7.6 m3	8.0 m3	10.0 m3
10min	10min	0.17hr	4.9 m3	6.4 m3	7.3 m3	7.8 m3	8.3 m3	9.9 m3	11.4 m3	12.0 m3	15.4 m3
15min	15min	0.25hr	5.8 m3	7.5 m3	8.6 m3	9.3 m3	9.8 m3	11.7 m3	13.5 m3	14.2 m3	18.2 m3
30min	30min	0.50hr	6.8 m3	8.9 m3	9.9 m3	10.7 m3	11.4 m3	13.7 m3	15.9 m3	16.8 m3	21.9 m3
1hr	60min	1.00hr	9.4 m3	11.9 m3	13.2 m3	14.3 m3	15.1 m3	18.2 m3	21.3 m3	22.7 m3	29.8 m3
2hr	120min	2.00hr	11.3 m3	14.3 m3	15.9 m3	17.1 m3	18.2 m3	21.9 m3	25.6 m3	27.2 m3	35.8 m3
4hr	240min	4.00hr	13.6 m3	16.9 m3	18.7 m3	20.0 m3	21.2 m3	25.5 m3	29.6 m3	31.6 m3	41.4 m3
6hr	360min	6.00hr	16.0 m3	19.5 m3	21.4 m3	22.8 m3	24.2 m3	28.7 m3	33.4 m3	35.6 m3	46.3 m3
10hr	600min	10.00hr	17.0 m3	20.7 m3	22.7 m3	24.2 m3	25.7 m3	30.5 m3	35.5 m3	37.8 m3	49.2 m3
24hr	1440min	24.00hr	22.6 m3	27.2 m3	29.8 m3	31.4 m3	33.0 m3	38.5 m3	44.6 m3	47.4 m3	61.1 m3
48hr	2880min	48.00hr	26.5 m3	31.2 m3	34.2 m3	36.0 m3	37.5 m3	43.0 m3	49.2 m3	52.2 m3	66.5 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	0.1 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
10min	10min	0.17hr	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3	0.2 m3	0.3 m3	0.4 m3	0.5 m3
15min	15min	0.25hr	0.2 m3	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.4 m3	0.4 m3	0.5 m3	0.7 m3
30min	30min	0.50hr	0.4 m3	0.4 m3	0.4 m3	0.5 m3	0.6 m3	0.7 m3	0.9 m3	1.1 m3	1.4 m3
1hr	60min	1.00hr	0.8 m3	0.8 m3	0.9 m3	1.0 m3	1.1 m3	1.4 m3	1.7 m3	2.1 m3	2.8 m3
2hr	120min	2.00hr	1.5 m3	1.6 m3	1.8 m3	2.0 m3	2.3 m3	2.9 m3	3.5 m3	4.2 m3	5.6 m3
4hr	240min	4.00hr	3.0 m3	3.1 m3	3.6 m3	4.1 m3	4.5 m3	5.7 m3	7.0 m3	8.5 m3	11.3 m3
6hr	360min	6.00hr	4.5 m3	4.7 m3	5.4 m3	6.1 m3	6.8 m3	8.6 m3	10.4 m3	12.7 m3	16.9 m3
10hr	600min	10.00hr	7.5 m3	7.8 m3	9.0 m3	10.1 m3	11.3 m3	14.3 m3	17.4 m3	21.2 m3	28.2 m3
24hr	1440min	24.00hr	18.0 m3	18.7 m3	21.5 m3	24.3 m3	27.2 m3	34.4 m3	41.7 m3	50.9 m3	67.7 m3
48hr	2880min	48.00hr	36.1 m3	37.4 m3	43.0 m3	48.7 m3	54.3 m3	68.8 m3	83.5 m3	101.9 m3	135.4 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	3.4 m3	4.3 m3	4.9 m3	5.3 m3	5.6 m3	6.5 m3	7.5 m3	7.8 m3	9.8 m3
10min	10min	0.17hr	4.8 m3	6.3 m3	7.1 m3	7.7 m3	8.1 m3	9.6 m3	11.1 m3	11.7 m3	15.0 m3
15min	15min	0.25hr	5.6 m3	7.4 m3	8.4 m3	9.0 m3	9.6 m3	11.3 m3	13.0 m3	13.7 m3	17.5 m3
30min	30min	0.50hr	6.5 m3	8.5 m3	9.5 m3	10.2 m3	10.8 m3	13.0 m3	15.0 m3	15.8 m3	20.5 m3
1hr	60min	1.00hr	8.7 m3	11.1 m3	12.3 m3	13.2 m3	14.0 m3	16.8 m3	19.6 m3	20.6 m3	27.0 m3
2hr	120min	2.00hr	9.8 m3	12.7 m3	14.1 m3	15.1 m3	15.9 m3	19.0 m3	22.1 m3	23.0 m3	30.2 m3
4hr	240min	4.00hr	10.6 m3	13.8 m3	15.1 m3	15.9 m3	16.7 m3	19.8 m3	22.7 m3	23.1 m3	30.1 m3
6hr	360min	6.00hr	11.5 m3	14.9 m3	16.0 m3	16.7 m3	17.4 m3	20.1 m3	23.0 m3	22.9 m3	29.4 m3
10hr	600min	10.00hr	9.5 m3	13.0 m3	13.8 m3	14.1 m3	14.4 m3	16.2 m3	18.1 m3	16.6 m3	21.0 m3
24hr	1440min	24.00hr	4.6 m3	8.5 m3	8.2 m3	7.0 m3	5.8 m3	4.1 m3	2.9 m3	-3.5 m3	-6.6 m3
48hr	2880min	48.00hr	-9.6 m3	-6.1 m3	-8.8 m3	-12.7 m3	-16.8 m3	-25.8 m3	-34.2 m3	-49.7 m3	-68.9 m3
ATTENUATION STORAGE REQUIRED:			11.5 m3	14.9 m3	16.0 m3	16.7 m3	17.4 m3	20.1 m3	23.0 m3	23.1 m3	**30.2 m3**



SuDs CALCULATIONS	
Project: 27 MARESFIELD ROAD	
STORAGE REQUIREMENTS	
Sheet 7 of 8	
Project Reference: LBH 4626	
Date: 20/01/2021	Rev: 1
Client: Ron Golan	

LBHGEO

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

Proposed Discharge Rate: **6.67 l/sec** 100 yr 15min) **50% of existing** **(or greenfield where this is greater)**

INFLOW

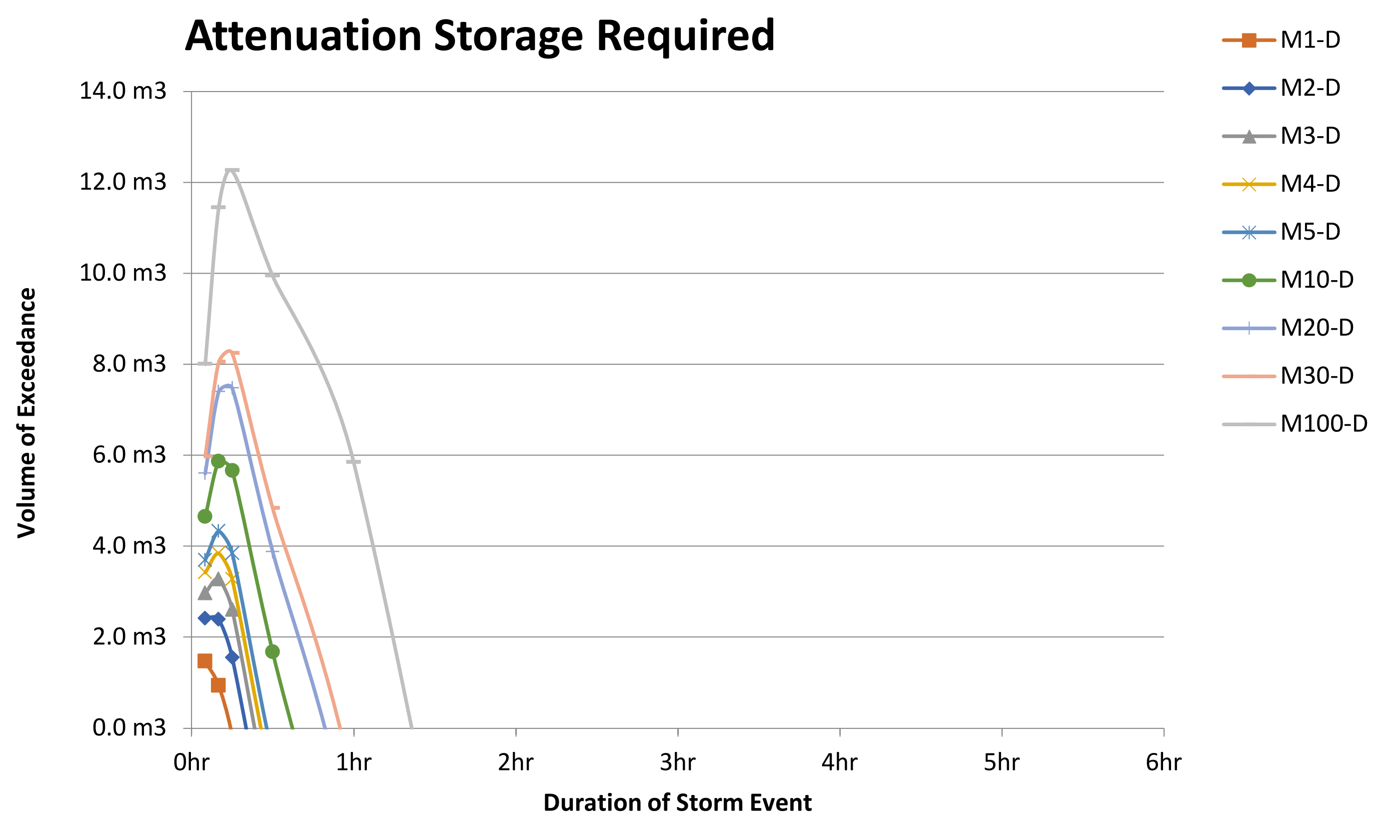
	D Duration		M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	3.5 m3	4.4 m3	5.0 m3	5.4 m3	5.7 m3	6.6 m3	7.6 m3	8.0 m3	10.0 m3
10min	10min	0.17hr	4.9 m3	6.4 m3	7.3 m3	7.8 m3	8.3 m3	9.9 m3	11.4 m3	12.0 m3	15.4 m3
15min	15min	0.25hr	5.8 m3	7.5 m3	8.6 m3	9.3 m3	9.8 m3	11.7 m3	13.5 m3	14.2 m3	18.2 m3
30min	30min	0.50hr	6.8 m3	8.9 m3	9.9 m3	10.7 m3	11.4 m3	13.7 m3	15.9 m3	16.8 m3	21.9 m3
1hr	60min	1.00hr	9.4 m3	11.9 m3	13.2 m3	14.3 m3	15.1 m3	18.2 m3	21.3 m3	22.7 m3	29.8 m3
2hr	120min	2.00hr	11.3 m3	14.3 m3	15.9 m3	17.1 m3	18.2 m3	21.9 m3	25.6 m3	27.2 m3	35.8 m3
4hr	240min	4.00hr	13.6 m3	16.9 m3	18.7 m3	20.0 m3	21.2 m3	25.5 m3	29.6 m3	31.6 m3	41.4 m3
6hr	360min	6.00hr	16.0 m3	19.5 m3	21.4 m3	22.8 m3	24.2 m3	28.7 m3	33.4 m3	35.6 m3	46.3 m3
10hr	600min	10.00hr	17.0 m3	20.7 m3	22.7 m3	24.2 m3	25.7 m3	30.5 m3	35.5 m3	37.8 m3	49.2 m3
24hr	1440min	24.00hr	22.6 m3	27.2 m3	29.8 m3	31.4 m3	33.0 m3	38.5 m3	44.6 m3	47.4 m3	61.1 m3
48hr	2880min	48.00hr	26.5 m3	31.2 m3	34.2 m3	36.0 m3	37.5 m3	43.0 m3	49.2 m3	52.2 m3	66.5 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	2.0 m3	2.0 m3	2.0 m3	2.0 m3	2.0 m3	2.0 m3	2.0 m3	2.0 m3	2.0 m3
10min	10min	0.17hr	4.0 m3	4.0 m3	4.0 m3	4.0 m3	4.0 m3	4.0 m3	4.0 m3	4.0 m3	4.0 m3
15min	15min	0.25hr	6.0 m3	6.0 m3	6.0 m3	6.0 m3	6.0 m3	6.0 m3	6.0 m3	6.0 m3	6.0 m3
30min	30min	0.50hr	12.0 m3	12.0 m3	12.0 m3	12.0 m3	12.0 m3	12.0 m3	12.0 m3	12.0 m3	12.0 m3
1hr	60min	1.00hr	24.0 m3	24.0 m3	24.0 m3	24.0 m3	24.0 m3	24.0 m3	24.0 m3	24.0 m3	24.0 m3
2hr	120min	2.00hr	48.0 m3	48.0 m3	48.0 m3	48.0 m3	48.0 m3	48.0 m3	48.0 m3	48.0 m3	48.0 m3
4hr	240min	4.00hr	96.0 m3	96.0 m3	96.0 m3	96.0 m3	96.0 m3	96.0 m3	96.0 m3	96.0 m3	96.0 m3
6hr	360min	6.00hr	144.0 m3	144.0 m3	144.0 m3	144.0 m3	144.0 m3	144.0 m3	144.0 m3	144.0 m3	144.0 m3
10hr	600min	10.00hr	240.0 m3	240.0 m3	240.0 m3	240.0 m3	240.0 m3	240.0 m3	240.0 m3	240.0 m3	240.0 m3
24hr	1440min	24.00hr	576.1 m3	576.1 m3	576.1 m3	576.1 m3	576.1 m3	576.1 m3	576.1 m3	576.1 m3	576.1 m3
48hr	2880min	48.00hr	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 m3	1152.1 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	1.5 m3	2.4 m3	3.0 m3	3.4 m3	3.7 m3	4.6 m3	5.6 m3	6.0 m3	8.0 m3
10min	10min	0.17hr	0.9 m3	2.4 m3	3.3 m3	3.8 m3	4.3 m3	5.9 m3	7.4 m3	8.0 m3	11.4 m3
15min	15min	0.25hr	-0.2 m3	1.5 m3	2.6 m3	3.3 m3	3.8 m3	5.7 m3	7.5 m3	8.2 m3	12.2 m3
30min	30min	0.50hr	-5.2 m3	-3.1 m3	-2.1 m3	-1.3 m3	-0.6 m3	1.7 m3	3.9 m3	4.8 m3	9.9 m3
1hr	60min	1.00hr	-14.6 m3	-12.1 m3	-10.8 m3	-9.7 m3	-8.9 m3	-5.8 m3	-2.7 m3	-1.3 m3	5.8 m3
2hr	120min	2.00hr	-36.7 m3	-33.7 m3	-32.1 m3	-30.9 m3	-29.8 m3	-26.1 m3	-22.4 m3	-20.8 m3	-12.2 m3
4hr	240min	4.00hr	-82.4 m3	-79.1 m3	-77.3 m3	-76.0 m3	-74.8 m3	-70.5 m3	-66.4 m3	-64.5 m3	-54.6 m3
6hr	360min	6.00hr	-128.0 m3	-124.5 m3	-122.6 m3	-121.2 m3	-119.8 m3	-115.3 m3	-110.6 m3	-108.4 m3	-97.7 m3
10hr	600min	10.00hr	-223.0 m3	-219.3 m3	-217.3 m3	-215.8 m3	-214.3 m3	-209.5 m3	-204.5 m3	-202.2 m3	-190.8 m3
24hr	1440min	24.00hr	-553.4 m3	-548.9 m3	-546.3 m3	-544.7 m3	-543.1 m3	-537.6 m3	-531.4 m3	-528.6 m3	-514.9 m3
48hr	2880min	48.00hr	-1125.7 m3	-1120.9 m3	-1117.9 m3	-1116.1 m3	-1114.6 m3	-1109.1 m3	-1102.9 m3	-1099.9 m3	-1085.6 m3
ATTENUATION STORAGE REQUIRED:			1.5 m3	2.4 m3	3.3 m3	3.8 m3	4.3 m3	5.9 m3	7.5 m3	8.2 m3	**12.2 m3**



SuDs CALCULATIONS	
Project: 27 DAWSON PLACE	
STORAGE REQUIREMENTS	
Sheet 8 of 8	
Project Reference: LBH 4604	
Date: 02/12/2020	Rev: 2
Client: Roxburgh	

LBHGEO