Outline SuDS Strategy

No. 52 Eton Avenue

Camden

London

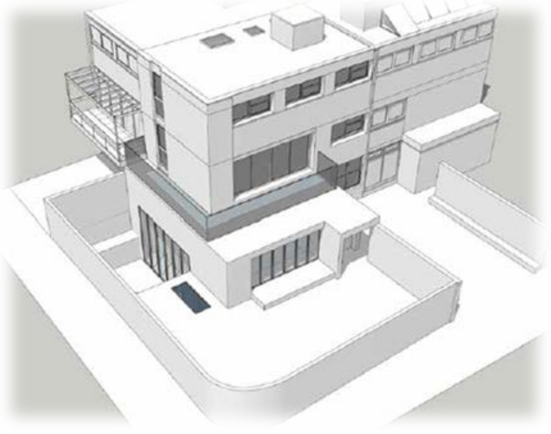
NW3 3HN

for

Natalie Matalon & Izzy Tepekoylu

LBH4564suds Ver. 1.0

January 2019



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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 construct a basement beneath a three-storey property at No. 52 Eton Avenue.

This drainage report has been prepared to support a planning application to the London Borough of Camden for the proposed development.

1.2 Guidance

Developments should provide betterment to the risk of surface water runoff by aiming to attenuate surface water on site through the use of SuDS.

The London Borough of Camden Planning Guidance for Sustainability (July 2015, updated March 2018) states:

"*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."

A surface water drainage strategy for this site is therefore required to incorporate SuDS principles as laid out in the Non-Statutory Technical Standards[1] for Sustainable Drainage Systems and the London Plan[2].

SuDS 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.

[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

1.3 Report Structure

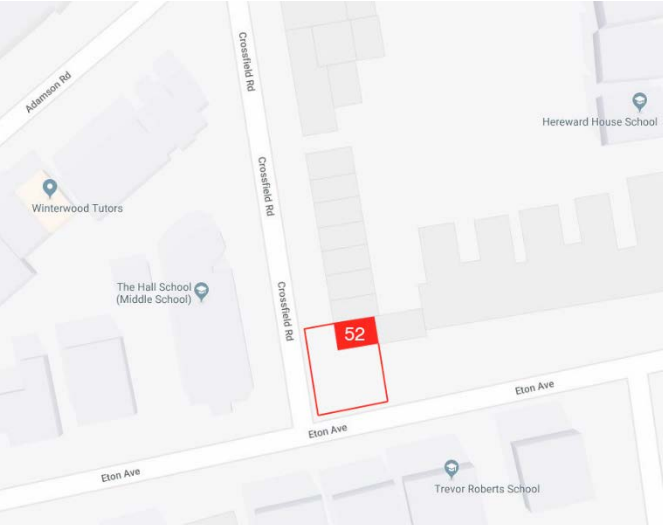
This report describes the site characteristics, following which consideration is given to the feasibility of SuDS techniques for this site. Finally, the recommended SuDS strategy to mitigate the risk of flooding across the site is presented in accordance with the 2015 CIRIA C753 SuDS Manual.

2. The Site

2.1 Site Location

The site is situated on the corner of Eton Avenue and Crossfield Road, approximately 300m to the northeast of Swiss Cottage Underground Station.

The site may be located approximately by postcode NW3 3HN or by National Grid Reference 526940, 184460.



Location plan

2.2 Topographical Setting

The site lies on a relatively gentle slope falling to the south, towards the valley of the River Tyburn.

2.3 Site Description

The site is occupied by a 1960s three storey house with a ground floor level set at approximately +56.9m OD.

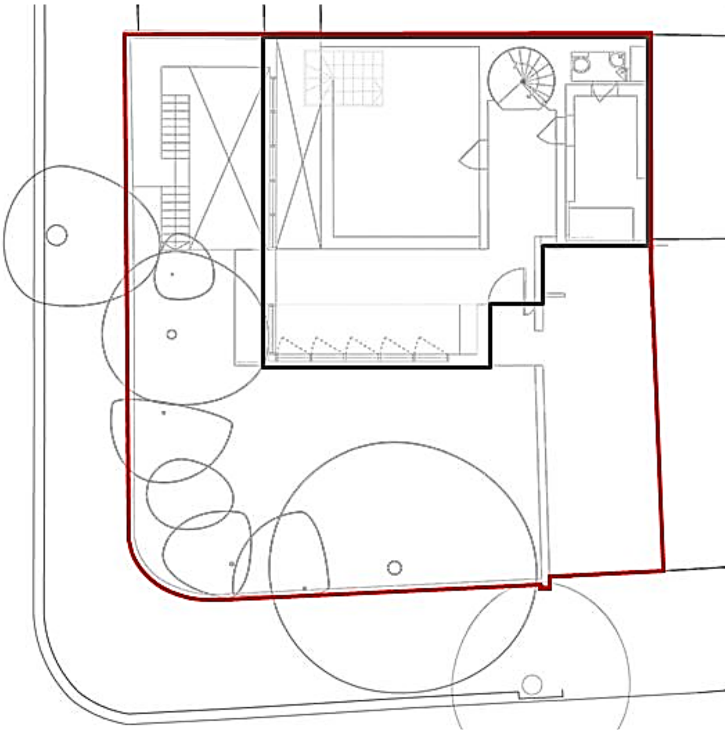
A shared driveway is present to the front of the house that serves both No. 52 and the adjoining No. 50 Eton Avenue. The house is also adjoined to the north by a three-storey house at No. 30 Crossfield Road.

An L-shaped garden is present to the front and side of the building that contains several trees and is bordered by a hedge inside a brick wall.

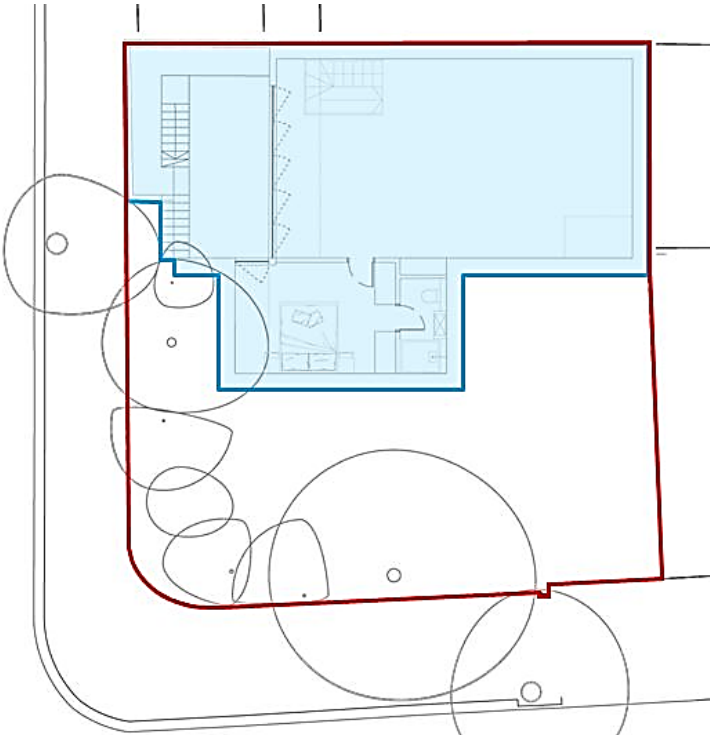
2.4 Proposed Development

It is proposed to construct an approximately 3m deep basement beneath the entire footprint of the existing building that will also extend laterally to the front and side beneath the existing garden areas.

A ground floor extension will be constructed above the basement to the front, while a basement level patio / garden area will be provided to the side. A basement patio level of approximately +53.9m OD is envisaged.



Proposed Ground Floor Plan



Proposed Basement Plan

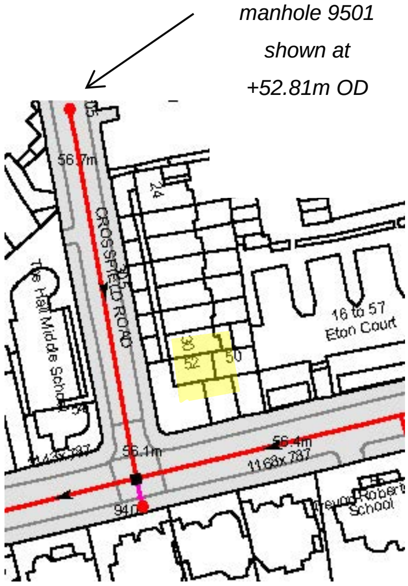
2.5 Site Characteristics

Thames Water public sewer records show that the site is served by a 300 mm diameter combined sewer running at around 4m depth beneath Crossfield Road that joins onto a sewer running westwards beneath Eton Avenue. This has local dimensions of 1168mm x 787mm.

Rainfall incident on the main roof is drained by internal downpipes. The balcony is served by a downpipe discharging into a grated gulley.

The drainage is shared with Nos. 24 to 30 Crossfield Street and No. 50 Eton Avenue.

Invert of spur manhole 9501 shown at +52.81m OD



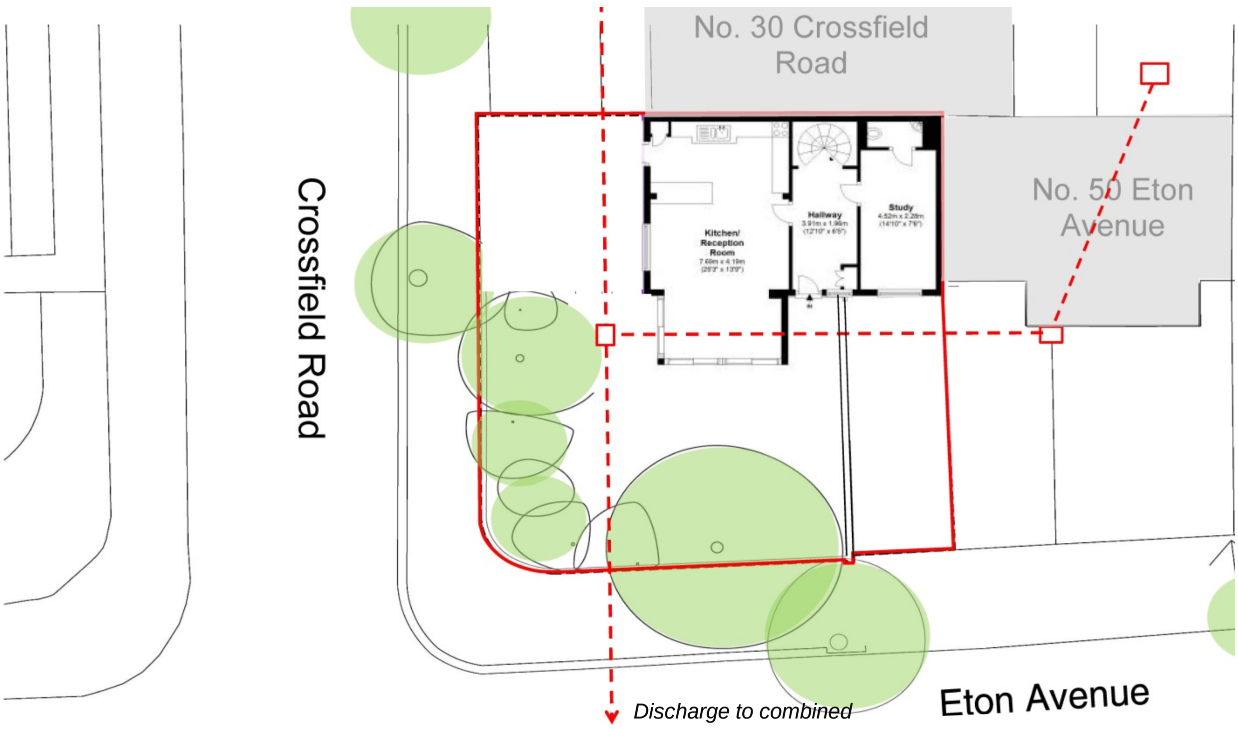


Diagram showing existing drainage across the property

2.6 Ground Conditions

A ground investigation has shown that, beneath shallow made ground, the site is directly underlain by the London Clay Formation.

No shallow groundwater table is present beneath this site.

3. SuDS Objectives and Drainage Route Appraisal

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.

The types of benefits that may be achieved by utilising SUDS are categorised by the design objectives

- **Water Quantity**
- **Water Quality**
- **Amenity**
- **Biodiversity**

These are outlined in the following sections.

3.1 Water Quantity Objective

The design objective is to control the quantity of runoff to support the management of flood risk and maintain and protect the natural water cycle.

In order to ensure that the surface water runoff from a developed site does not have a detrimental impact on people, property and the environment, it is important to control the rate and volume of the discharge from the site.

Sustainable Drainage Systems (SuDS) are to be incorporated into the design of a development. In aiming to achieve greenfield runoff rates, surface water runoff should be managed using the following techniques, as outlined in order of priority by the following drainage hierarchy:

SUDS Drainage Route Appraisal		
Drainage Route Option:	Suitable for the site? (Y/N)	Comment:
Store rainwater for later use	Y	There is an opportunity to harvest rainwater.
Use infiltration techniques	N	The site is directly underlain by the London Clay, inhibiting infiltration on the site.
Attenuate rainwater in ponds or open water features for gradual release	Y	There is an opportunity for a green roof to be included in the design of the development
Attenuate rainwater by storing in tanks or sealed water features for gradual release	Y	Attenuation storage could be provided by the provision of a high porosity drainage layer beneath the new basement patio area and the front driveway.
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	It is proposed that the new drainage system should ultimately include a discharge to the existing combined sewer serving the site as at present.

The hierarchy above 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.

3.2 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.

3.3 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

3.4 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

4. Potential SuDS Components

The feasibility of various potential SuDS components are assessed in the following table:

Assessment of Potential 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	There may not be sufficient space to achieve a gravity system.
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	.
Blue roofs	Roof design intended to store water providing attenuation storage.	N	It is assumed that there is not structural scope to convert the roof of the house to a blue roof.
Infiltration systems	Infiltration can contribute to reducing runoff rates and volumes while supporting base flow and groundwater recharge processes.	N	Infiltration is not possible into the London Clay Formation.
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	Not required.
Swales	Swales are shallow, flat bottomed, vegetated open channels designed to convey, treat, and attenuate surface water runoff.	N	Not required.
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	A small scale feature could be considered but is not required.
Trees	Trees aid surface water management through transpiration, inception, infiltration and phytoremediation.	N	No new tree planting is proposed.
Pervious Pavements	Pervious pavements facilitate the infiltration of surface water into a subsurface structure where filtration, adsorption,	Y	A pervious pavement is feasible in the basement patio area and the front draiveway. It is envisaged that the underlying

	biodegradation or sedimentation may also provide treatment of the runoff.		drainage layer would include collector pipes leading through a silt trap to the combined sewer
Attenuation storage tanks	Attenuation storage tanks provide below-ground void space for the temporary storage of surface water before infiltration, controlled release or use.	N	Not required.
Detention basins	Attenuation storage in the form of dry landscaped depressions.	N	Not required.
Ponds and wetlands	Permanent water filled ponds or wetlands that provide attenuation storage or treatment of surface water runoff.	N	Not required.

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.

Calculation sheets are appended. The initial design analysis may be summarised as follows.

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:	**0.09 l/sec**
1 in 1	**0.08 l/sec**
1 in 30	**0.22 l/sec**
1 in 100	**0.30 l/sec**
1 in 200	**0.35 l/sec**

5.2 Existing runoff rate

The site boundary encloses an area of approximately 160m^2 and consists of a combination of permeable (50%) and impermeable (50%) surfacing. There are considered to be no present SuDS features.

The existing peak storm runoff for the 1% (1 in 100 year) annual probability rainfall event on the site was estimated to be 4.6 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 163.2 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 10.5m^3.

5.3 Thames Water

Records held by Thames Water indicate incidents of sewer flooding as a result of surcharging of public sewers in the area.

It is apparent from their response to recent development nearby (23 Crossfield) that Thames Water has identified an inability of the existing wastewater infrastructure to accommodate any increase in discharge and that, in order to mitigate against the potential effects of climate change, retrofitting of SuDs in required.

Thus, although the Wallingford online tool would appear to indicate that no SuDs storage was required for a site of this size, it is incumbent upon the applicant to satisfy both Camden as LLFRA and SuDs regulator and Thames Water as the sewerage undertaker.

A 'Grampian Style' condition may be requested as follows:

> "*Development shall not commence until a drainage strategy detailing any on and/or off site drainage works, has been submitted to and approved by, the local planning authority in consultation with the sewerage undertaker. No discharge of foul or surface water from the site shall be accepted into the public system until the drainage works referred to in the strategy have been completed*"
>
> *Reason - The development may lead to sewage flooding; to ensure that sufficient capacity is made available to cope with the new development; and in order to avoid adverse environmental impact upon the community.*

This document will provide evidence that the developer has sought to manage as much run-off as possible on site and to minimise discharges into the public sewer.

5.4 Proposed Development

The proposed development will result in a net increase in impermeable area as a result of removal of part of the existing garden.

Schedule of estimated approximate areas for outline SuDS assessment

	Existing	Cv	%	%	Proposed	Cv	%	%
Garden	108 m^2	0.40	50	50	89 m^2	0.40	41	41
Building	59 m^2	0.77	27	50	81 m^2	0.77	37	59
Impermeable	51 m^2	0.77	23		33 m^2	0.77	15	
Basement Patio					15 m^2	0.77	7	
Total:	218 m^2		100	100	218 m^2		100	100

5.5 Proposed Drainage Scheme

The strategy will be to provide source control through infiltration and attenuation so that post development run-off rates are reduced as much as is practical in order to adhere to the guidance.

It is apparent that the existing shared drainage will require diversion around the proposed basement areas.

It is envisaged that the existing roof and the new extension roofs, together with the new basement patio area will all drain to areas of pervious paving over a porous substrate beneath the basement patio and the front driveway that will provide attenuation storage.

It is envisaged that the basement level water will be collected in a sump and pumped up to the diverted drainage system. From here it is envisaged that the system will drain by gravity to the sewer.

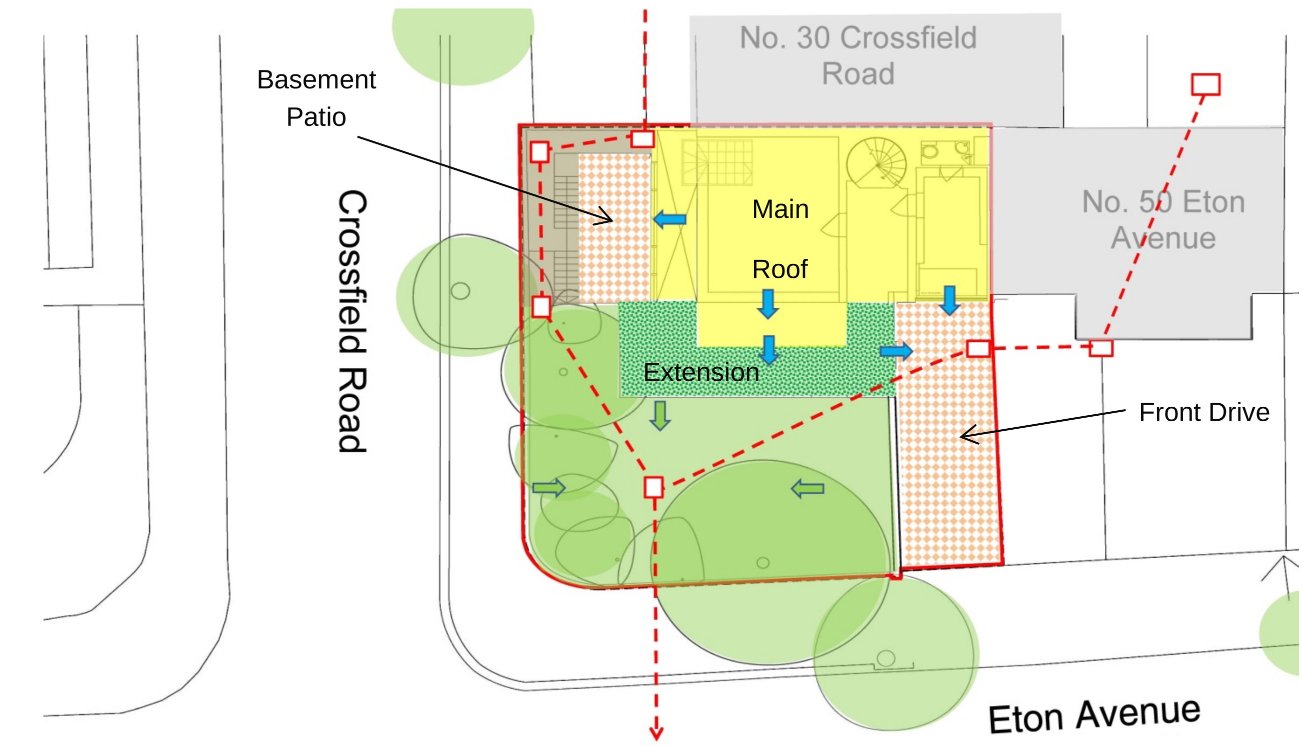
The proposed development will result in a 9% increase in the amount of impermeable surfacing.

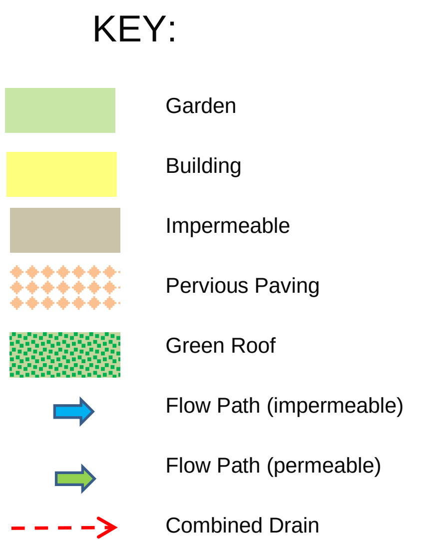
Although no significant increase in runoff is anticipated as a result of the development, there is a potential increase in runoff associated with future climate change.

In line with the guidance it is proposed to limit the peak storm runoff for the 1% (1 in 100) annual probability rainfall event plus 40% allowance for future climate change to at least 50% of the current rate.

5.6 Attenuation storage

HR Wallingford's Surface water storage volume estimation tool has been used to undertake attenuation storage volume calculations. On the basis of a default minimum discharge rate of 5 l/sec These calculations indicate that no attenuation storage is required to maintain greenfield runoff rates for the 1 in 100 year rainfall event in consideration of up to 40% climate change allowance.





Diagrammatic plan of potential SuDS layout

(showing drainage diverted around basement)

Nevertheless, in order to limit the discharge rate to the combined sewer serving the site, attenuation storage is to be included and it is proposed that an area of green roof will be incorporated into the development generating up to 2m^3 of storage and that the surface water will be collected in areas of porous substrate beneath pervious paving to the front drove and the basement patio providing approximately 5m^3 and 2m^3 storage capacity respectively.

5.7 Review of SuDS Objectives

5.7.1 Water Quantity

It is anticipated the use of a green roof and areas pervious paving will reduce runoff rates and volumes by providing a combined potential storage capacity of up to around 9m^3.

5.7.2 Water Quality

Given that the surface water runoff from the roofs and rear garden is not expected to pick up any contamination There is no expectation that any treatment will be necessary to meet the appropriate water quality requirements for the method of discharge.

5.7.3 Amenity

The green roof will providing valuable amenity in an urban area.

5.7.4 Biodiversity

The green roof will make a positive contribution to biodiversity – providing habitat and food for insects, invertebrates and birds and acting as a “stepping stone” or “island habitat”.

5.8 Maintenance

Suds Component	Maintenance	
Attenuation storage Tanks	Regular	• Inspect and identify any areas that are not operating correctly. If required, take remedial action • Remove sediment from silt traps (Annually) • Repair inlets, outlet overflows and vents as necessary
	Monitoring	• Inspect all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed. (Annually) • Survey inside of tank for sediment build-up and remove if necessary (~ every 5 years)
Pervious Paving	Regular	• Brush and clear sand joints of any vegetation or moss. • Remove sediment from silt traps (Annually)
	Monitoring	• Initial inspection (monthly for three months after installation). • Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.

		• Monitor inspection chambers (annually).
Open Storage	Regular	• Inspect all components for proper operation. • Inspect and check outfall flow controls. • Inspect drain inlets and outlets to ensure proper flow

6. Conclusion

This assessment has shown that although the site is of limited size and the development is of limited scale there is nevertheless an opportunity to incorporate some Sustainable Drainage System (SuDS) features to management the discharge of water from the site by means of a green roof and areas of porous paving to the existing driveway and basement patio area.

These may provide up to around $9m^3$ of attenuation storage and will help to alleviate reported local sewer flooding issues.

APPENDIX

INITIAL SUDS ASSESSMENT CALCULATIONS

Surface Water Drainage Pro-forma for new developments

LBH 4498

1. Site Details

Site	52 Eton Avenue
Address & post code or LPA reference	NW3 3HN
Grid reference	526940, 184460
Is the existing site developed or Greenfield?	Developed
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding? If yes, please demonstrate how this is managed, in line with DP23?	No
Total Site Area served by drainage system (excluding open space) (Ha)*	0.022

* The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	Proposed	Difference (Proposed-Existing)	Notes for developers
Impermeable area (ha)	0.011	0.013	0.002	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed impermeability is equal or less than existing, then section 6 can be skipped and section 7 filled in.
Drainage Method (infiltration/sewer/watercourse)		Combined Sewer	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible	Notes for developers
Existing and proposed Drainage calculations	Yes		HR Wallingford	Please provide calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration		No	Infiltration will not be possible as the site is directly underlain by impermeable London Clay.	e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse		No	There is no nearby watercourse.	e.g. Is there a watercourse nearby?
To surface water sewer		No	There is no nearby surface water sewer	Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above		No	See above - Not possible.	e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	Yes		HR Wallingford	Evidence must be provided to demonstrate that the proposed Sustainable Drainage strategy has had regard to the SuDS hierarchy as outlined in Section 2.5 above.
Layout plan showing where the sustainable drainage infrastructure will be located on site.	Yes		See SUDS Layout Plan	Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event.

	Existing Rates (l/s) (from Wallingford online tool and Procedure)	Proposed Rates (l/s) (taken as 50% Existing)	Difference (l/s) (Proposed - Existing)	% Difference (Difference / existing x 100)	Notes for developers
Greenfield QBAR	0.09	N/A	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	0.08	0.04	0.04	-50%	Proposed discharge rates (with mitigation) should aim to be equivalent to greenfield rates for all corresponding storm events. As a minimum, peak discharge rates must be reduced by 50% from the existing sites for all corresponding rainfall events.
1 in 30	0.22	0.11	0.11	-50%	
1in 100	0.30	0.15	0.15	-50%	
1 in 100 plus climate change	N/A	0.15	N/A	N/A	The proposed 1 in 100 +CC peak discharge rate (with mitigation) should aim to be equivalent to greenfield rates. As a minimum, proposed 1 in 100 +CC peak discharge rate must be reduced by 50% from the existing 1 in 100 runoff rate sites.

5. Calculate additional volumes for storage – The total volume of water leaving the development site. New hard surfaces potentially restrict

the amount of stormwater that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream.

	Greenfield runoff volume (m^3)	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
1 in 1	2	4	4	0	Proposed discharge volumes (with mitigation) should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable and as a minimum should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30	5	8	8	0	
1 in 100 6 hour	7	10	11	1	
1 in 100 6 hour plus climate change	N/A	N/A	15	5	The proposed 1 in 100 +CC discharge volume should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable. As a minimum, to mitigate for climate change the proposed 1 in 100 +CC volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate.

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m^3)	10	Volume of water to attenuate on site if discharging at a greenfield run off rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m^3)	2	Volume of water to attenuate on site if discharging at a 50% reduction from existing rates. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible] (m^3) . **3 x Greenfield**	9	Volume of water to attenuate on site if discharging at a rate different from the above – please state in 1st column what rate this volume corresponds to. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m^3)	4	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Percentage of attenuation volume stored above ground,	50% (green roof)	Percentage of attenuation volume which will be held above ground in swales/ponds/basins/green roofs etc. If 0, please demonstrate why.

7. How is Storm Water stored on site?

Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	**State the Site's Geology and known Source Protection Zones (SPZ)**	**London Clay (nil SPZ)**	Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	**No**	Infiltration rates should be no lower than 1x10 -6 m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	**n/a**	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.
	Were infiltration rates obtained by desk study or infiltration test?	**n/a**	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided..
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	**No**	Advice on contaminated Land in Camden can be found on our supporting documents webpage Water should not be infiltrated through land that is contaminated. The Environment Agency may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	**Yes/No? If the answer is No, please identify how the storm water will be stored prior to release**	**No**	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfield run off rate. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

		Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	Simple	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
Which Drainage Systems measures have been used, including green roofs?	Storage comprising 2m3 green roof and 2m3 porous substrate to basement patio area and 5m3 porous substrate to driveway	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	YES	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Will the drainage system contain the 1 in 100 +CC storm event? If no please demonstrate how buildings and utility plants will be protected.	YES	National standards require that the drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	YES	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.

How will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	**As present**	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased. Exceedance events are defined as those larger than the 1 in 100 +CC event.
How are rates being restricted (vortex control, orifice etc)	**Orifice**	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	**Natalie Matalon & Izzy Tepekoylu**	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
How is the entire drainage system to be maintained?	**by management**	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided. Details must demonstrate that maintenance and operation requirements are economically proportionate. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your proforma, in particular exceedance routes and ownership and location of SuDS (maintenance access strips etc

Pro-forma Section	Document reference where details quoted above are taken from	Page Number
Section 2	Suds Report	var
Section 3	Suds Report	var
Section 4	Calculation Sheets	var
Section 5	Calculation Sheets	var
Section 6	Calculation Sheets	var
Section 7	Suds Report	var
Section 8	Suds Report	var

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of thedrainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

VERSION	DATE	COMMENT	AUTHORISED
1	18th January 2019	Initial Issue	**Seamus Lefroy-Brooks** BSc(hons) MSc CEng MICE CGeol FGS CEnv MIEnvSc FRGS SiLC RoGEP UK Registered Ground Engineering Adviser NQMS SQP DoWCoP QP

GREENFIELD RUN-OFF

Catchment Area: 218sqm 0.022ha

PO Code : NW3 3HN

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

SAAR: 625mm *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 for 50ha

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:	**0.09 l/sec**
Greenfield Peak Run-off Rate:	
1 in 1	**0.08 l/sec**
1 in 30	**0.22 l/sec**
1 in 100	**0.30 l/sec**
1 in 200	**0.35 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:	52 Eton Avenue
GREENFIELD RUN-OFF	
Sheet 1 of 7	
Project Reference:	LBH 4564
Date: 18/01/2019	Rev: A
Client:	Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY
ENGINEERING

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: 52 Eton Avenue

RAINFALL PEAK INTENSITY

Project Reference: LBH 4564

Date: 18/01/2019 Rev: A

Client: Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING

GREENFIELD PEAK RUN-OFF

Hydrological Region: 6 *From Wallingford on-line tool* **Qbar: 0.09 l/sec**

D Duration			Run-Off Q								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
10min	10min	0.17hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
15min	15min	0.25hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
30min	30min	0.50hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
1hr	60min	1.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
2hr	120min	2.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
4hr	240min	4.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
6hr	360min	6.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
10hr	600min	10.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
24hr	1440min	24.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec
48hr	2880min	48.00hr	0.08 l/sec	0.08 l/sec	0.10 l/sec	0.11 l/sec	0.12 l/sec	0.15 l/sec	0.19 l/sec	0.23 l/sec	0.30 l/sec

D Duration			Run-Off Volume								
			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	0.1 m3	0.1 m3	0.1 m3
10min	10min	0.17hr	0.0 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3
15min	15min	0.25hr	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.1 m3	0.2 m3	0.2 m3	0.3 m3
30min	30min	0.50hr	0.1 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.3 m3	0.3 m3	0.4 m3	0.5 m3
1hr	60min	1.00hr	0.3 m3	0.3 m3	0.3 m3	0.4 m3	0.4 m3	0.6 m3	0.7 m3	0.8 m3	1.1 m3
2hr	120min	2.00hr	0.6 m3	0.6 m3	0.7 m3	0.8 m3	0.9 m3	1.1 m3	1.3 m3	1.6 m3	2.2 m3
4hr	240min	4.00hr	1.2 m3	1.2 m3	1.4 m3	1.6 m3	1.7 m3	2.2 m3	2.7 m3	3.3 m3	4.4 m3
6hr	360min	6.00hr	1.7 m3	1.8 m3	2.1 m3	2.3 m3	2.6 m3	3.3 m3	4.0 m3	4.9 m3	6.5 m3
10hr	600min	10.00hr	2.9 m3	3.0 m3	3.5 m3	3.9 m3	4.4 m3	5.5 m3	6.7 m3	8.2 m3	10.9 m3
24hr	1440min	24.00hr	7.0 m3	7.2 m3	8.3 m3	9.4 m3	10.5 m3	13.3 m3	16.1 m3	19.7 m3	26.1 m3
48hr	2880min	48.00hr	13.9 m3	14.4 m3	16.6 m3	18.8 m3	21.0 m3	26.5 m3	32.2 m3	39.3 m3	52.2 m3

SuDs CALCULATIONS

Project: 52 Eton Avenue

GREENFIELD PEAK RUN-OFF

Sheet 3 of 7

Project Reference: LBH 4564

Date: 18/01/2019 Rev: A

Client: Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING

EXISTING PEAK RUN-OFF

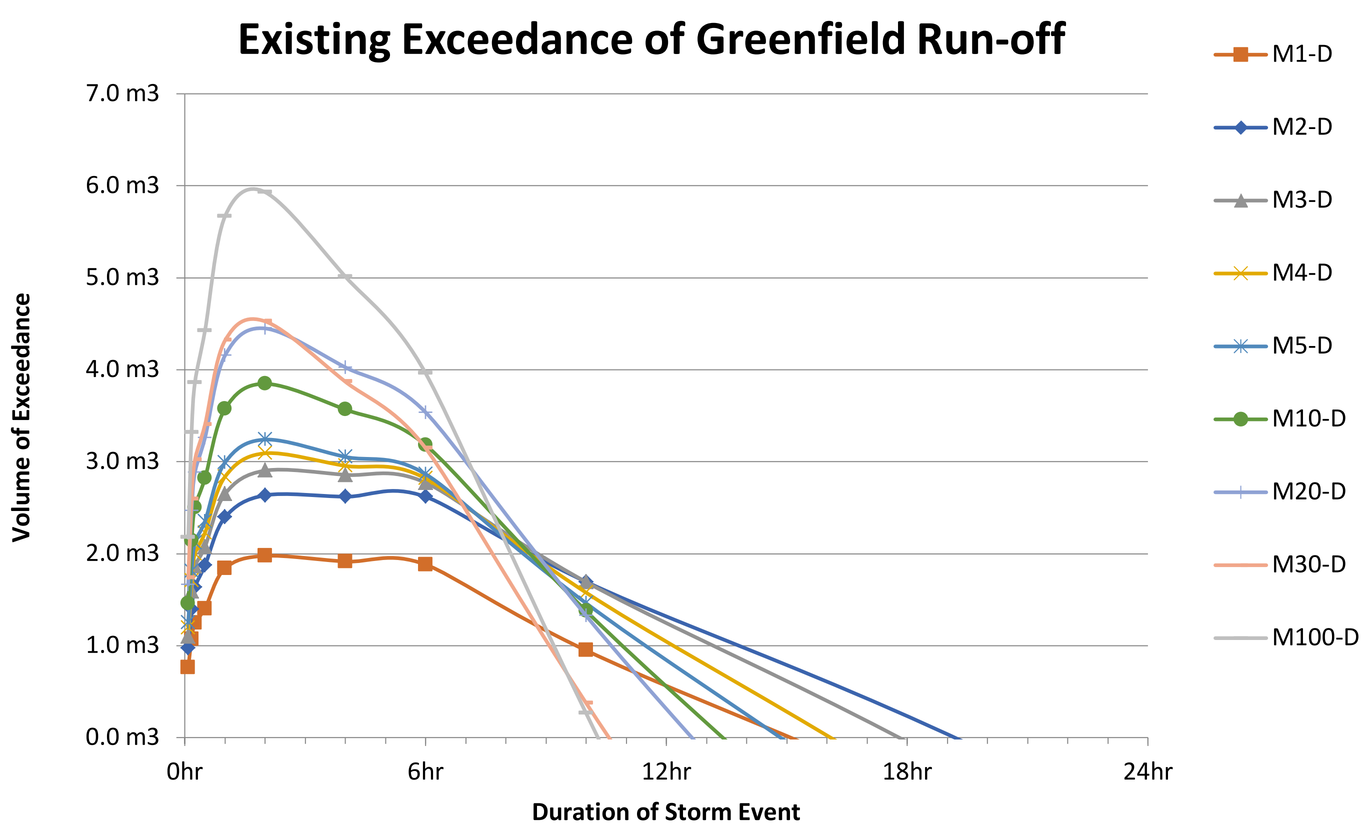
C_V:	0.59	*Volumetric Run-Off Coefficient*
C_R:	1.3	*Routing Coefficient*

			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	2.6 l/sec	3.3 l/sec	3.8 l/sec	4.1 l/sec	4.3 l/sec	5.0 l/sec	5.7 l/sec	6.0 l/sec	7.5 l/sec
10min	10min	0.17hr	1.9 l/sec	2.4 l/sec	2.7 l/sec	3.0 l/sec	3.1 l/sec	3.7 l/sec	4.3 l/sec	4.5 l/sec	5.8 l/sec
15min	15min	0.25hr	1.5 l/sec	1.9 l/sec	2.2 l/sec	2.3 l/sec	2.5 l/sec	2.9 l/sec	3.4 l/sec	3.6 l/sec	4.6 l/sec
30min	30min	0.50hr	0.9 l/sec	1.1 l/sec	1.2 l/sec	1.3 l/sec	1.4 l/sec	1.7 l/sec	2.0 l/sec	2.1 l/sec	2.8 l/sec
1hr	60min	1.00hr	0.6 l/sec	0.7 l/sec	0.8 l/sec	0.9 l/sec	1.0 l/sec	1.1 l/sec	1.3 l/sec	1.4 l/sec	1.9 l/sec
2hr	120min	2.00hr	0.4 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.6 l/sec	0.7 l/sec	0.8 l/sec	0.9 l/sec	1.1 l/sec
4hr	240min	4.00hr	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.5 l/sec	0.5 l/sec	0.7 l/sec
6hr	360min	6.00hr	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.2 l/sec	0.3 l/sec	0.3 l/sec	0.4 l/sec	0.4 l/sec	0.5 l/sec
10hr	600min	10.00hr	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	0.2 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	0.2 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	0.1 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	0.8 m3	1.0 m3	1.1 m3	1.2 m3	1.3 m3	1.5 m3	1.7 m3	1.8 m3	2.3 m3
10min	10min	0.17hr	1.1 m3	1.4 m3	1.6 m3	1.8 m3	1.9 m3	2.2 m3	2.6 m3	2.7 m3	3.5 m3
15min	15min	0.25hr	1.3 m3	1.7 m3	1.9 m3	2.1 m3	2.2 m3	2.6 m3	3.1 m3	3.2 m3	4.1 m3
30min	30min	0.50hr	1.5 m3	2.0 m3	2.2 m3	2.4 m3	2.6 m3	3.1 m3	3.6 m3	3.8 m3	5.0 m3
1hr	60min	1.00hr	2.1 m3	2.7 m3	3.0 m3	3.2 m3	3.4 m3	4.1 m3	4.8 m3	5.1 m3	6.8 m3
2hr	120min	2.00hr	2.6 m3	3.2 m3	3.6 m3	3.9 m3	4.1 m3	5.0 m3	5.8 m3	6.2 m3	8.1 m3
4hr	240min	4.00hr	3.1 m3	3.8 m3	4.2 m3	4.5 m3	4.8 m3	5.8 m3	6.7 m3	7.1 m3	9.4 m3
6hr	360min	6.00hr	3.6 m3	4.4 m3	4.8 m3	5.2 m3	5.5 m3	6.5 m3	7.6 m3	8.1 m3	10.5 m3
10hr	600min	10.00hr	3.8 m3	4.7 m3	5.1 m3	5.5 m3	5.8 m3	6.9 m3	8.0 m3	8.6 m3	11.1 m3
24hr	1440min	24.00hr	5.1 m3	6.2 m3	6.7 m3	7.1 m3	7.5 m3	8.7 m3	10.1 m3	10.7 m3	13.8 m3
48hr	2880min	48.00hr	6.0 m3	7.1 m3	7.7 m3	8.2 m3	8.5 m3	9.7 m3	11.1 m3	11.8 m3	15.1 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	0.8 m3	1.0 m3	1.1 m3	1.2 m3	1.3 m3	1.5 m3	1.7 m3	1.7 m3	2.2 m3
10min	10min	0.17hr	1.1 m3	1.4 m3	1.6 m3	1.7 m3	1.8 m3	2.1 m3	2.5 m3	2.6 m3	3.3 m3
15min	15min	0.25hr	1.2 m3	1.6 m3	1.9 m3	2.0 m3	2.1 m3	2.5 m3	2.9 m3	3.0 m3	3.9 m3
30min	30min	0.50hr	1.4 m3	1.9 m3	2.1 m3	2.2 m3	2.4 m3	2.8 m3	3.3 m3	3.4 m3	4.4 m3
1hr	60min	1.00hr	1.8 m3	2.4 m3	2.6 m3	2.8 m3	3.0 m3	3.6 m3	4.2 m3	4.3 m3	5.7 m3
2hr	120min	2.00hr	2.0 m3	2.6 m3	2.9 m3	3.1 m3	3.2 m3	3.8 m3	4.4 m3	4.5 m3	5.9 m3
4hr	240min	4.00hr	1.9 m3	2.6 m3	2.9 m3	3.0 m3	3.1 m3	3.6 m3	4.0 m3	3.9 m3	5.0 m3
6hr	360min	6.00hr	1.9 m3	2.6 m3	2.8 m3	2.8 m3	2.9 m3	3.2 m3	3.5 m3	3.1 m3	4.0 m3
10hr	600min	10.00hr	0.9 m3	1.7 m3	1.7 m3	1.6 m3	1.5 m3	1.4 m3	1.3 m3	0.4 m3	0.3 m3
24hr	1440min	24.00hr	-1.8 m3	-1.1 m3	-1.6 m3	-2.3 m3	-3.0 m3	-4.6 m3	-6.0 m3	-8.9 m3	-12.3 m3
48hr	2880min	48.00hr	-7.9 m3	-7.3 m3	-8.9 m3	-10.6 m3	-12.5 m3	-16.8 m3	-21.1 m3	-27.5 m3	-37.2 m3

			C_V:
Catchment Area:	218sqm	100%	
Permeable:	108sqm	50%	0.40
Impermeable:	110sqm	50%	0.77
			0.59



SuDs CALCULATIONS	
Project:	52 Eton Avenue
EXISTING PEAK RUN-OFF	
Sheet 4 of 7	
Project Reference:	LBH 4564
Date: 18/01/2019	Rev: A
Client:	Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING

POST- DEVELOPMENT PEAK RUN-OFF + CC

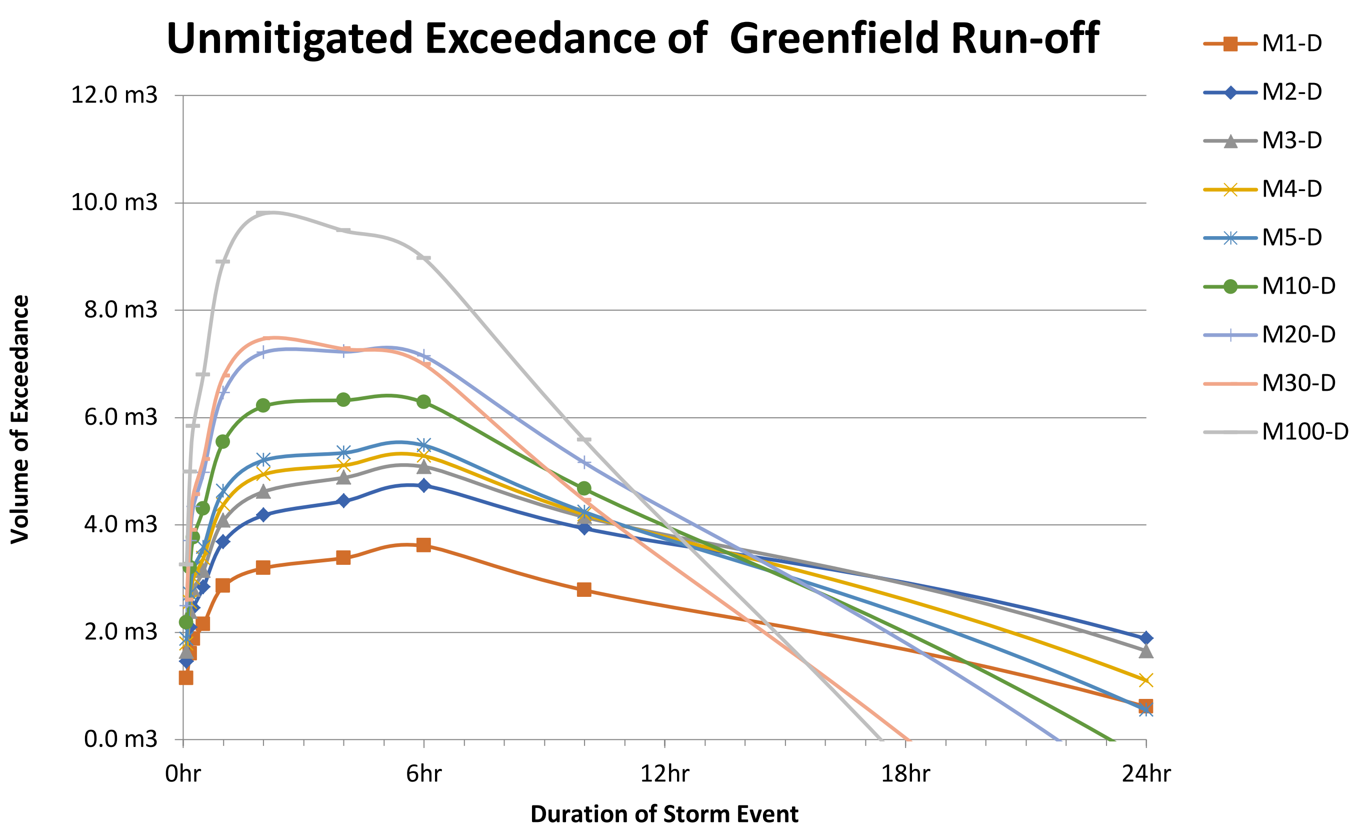
C_V:	0.62	*Volumetric Run-Off Coefficient*	Climate Change Allowance: 40%
C_R:	1.3	*Routing Coefficient*	

D Duration			Run-Off Q								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	3.9 l/sec	4.9 l/sec	5.5 l/sec	6.0 l/sec	6.4 l/sec	7.4 l/sec	8.5 l/sec	8.9 l/sec	11.1 l/sec
10min	10min	0.17hr	2.7 l/sec	3.6 l/sec	4.1 l/sec	4.4 l/sec	4.6 l/sec	5.5 l/sec	6.4 l/sec	6.7 l/sec	8.6 l/sec
15min	15min	0.25hr	2.2 l/sec	2.8 l/sec	3.2 l/sec	3.4 l/sec	3.7 l/sec	4.3 l/sec	5.0 l/sec	5.3 l/sec	6.8 l/sec
30min	30min	0.50hr	1.3 l/sec	1.7 l/sec	1.8 l/sec	2.0 l/sec	2.1 l/sec	2.5 l/sec	2.9 l/sec	3.1 l/sec	4.1 l/sec
1hr	60min	1.00hr	0.9 l/sec	1.1 l/sec	1.2 l/sec	1.3 l/sec	1.4 l/sec	1.7 l/sec	2.0 l/sec	2.1 l/sec	2.8 l/sec
2hr	120min	2.00hr	0.5 l/sec	0.7 l/sec	0.7 l/sec	0.8 l/sec	0.8 l/sec	1.0 l/sec	1.2 l/sec	1.3 l/sec	1.7 l/sec
4hr	240min	4.00hr	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
6hr	360min	6.00hr	0.2 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	0.6 l/sec	0.7 l/sec
10hr	600min	10.00hr	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	0.5 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	0.2 l/sec	0.2 l/sec	0.2 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	0.1 l/sec	0.1 l/sec	0.1 l/sec	0.1 l/sec

D Duration			Run-Off Volume								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	1.2 m3	1.5 m3	1.7 m3	1.8 m3	1.9 m3	2.2 m3	2.5 m3	2.7 m3	3.3 m3
10min	10min	0.17hr	1.6 m3	2.1 m3	2.4 m3	2.6 m3	2.8 m3	3.3 m3	3.8 m3	4.0 m3	5.2 m3
15min	15min	0.25hr	1.9 m3	2.5 m3	2.9 m3	3.1 m3	3.3 m3	3.9 m3	4.5 m3	4.8 m3	6.1 m3
30min	30min	0.50hr	2.3 m3	3.0 m3	3.3 m3	3.6 m3	3.8 m3	4.6 m3	5.3 m3	5.6 m3	7.3 m3
1hr	60min	1.00hr	3.1 m3	4.0 m3	4.4 m3	4.8 m3	5.1 m3	6.1 m3	7.1 m3	7.6 m3	10.0 m3
2hr	120min	2.00hr	3.8 m3	4.8 m3	5.3 m3	5.7 m3	6.1 m3	7.3 m3	8.6 m3	9.1 m3	12.0 m3
4hr	240min	4.00hr	4.5 m3	5.6 m3	6.3 m3	6.7 m3	7.1 m3	8.5 m3	9.9 m3	10.6 m3	13.8 m3
6hr	360min	6.00hr	5.3 m3	6.5 m3	7.2 m3	7.6 m3	8.1 m3	9.6 m3	11.2 m3	11.9 m3	15.5 m3
10hr	600min	10.00hr	5.7 m3	6.9 m3	7.6 m3	8.1 m3	8.6 m3	10.2 m3	11.9 m3	12.6 m3	16.5 m3
24hr	1440min	24.00hr	7.6 m3	9.1 m3	9.9 m3	10.5 m3	11.0 m3	12.9 m3	14.9 m3	15.9 m3	20.4 m3
48hr	2880min	48.00hr	8.8 m3	10.4 m3	11.4 m3	12.0 m3	12.5 m3	14.4 m3	16.5 m3	17.4 m3	22.2 m3

D Duration			Exceedance of Greenfield Run-Off Volume								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	1.1 m3	1.5 m3	1.6 m3	1.8 m3	1.9 m3	2.2 m3	2.5 m3	2.6 m3	3.3 m3
10min	10min	0.17hr	1.6 m3	2.1 m3	2.4 m3	2.6 m3	2.7 m3	3.2 m3	3.7 m3	3.9 m3	5.0 m3
15min	15min	0.25hr	1.9 m3	2.4 m3	2.8 m3	3.0 m3	3.2 m3	3.8 m3	4.3 m3	4.6 m3	5.8 m3
30min	30min	0.50hr	2.1 m3	2.8 m3	3.1 m3	3.4 m3	3.6 m3	4.3 m3	5.0 m3	5.2 m3	6.8 m3
1hr	60min	1.00hr	2.9 m3	3.7 m3	4.1 m3	4.4 m3	4.6 m3	5.5 m3	6.5 m3	6.8 m3	8.9 m3
2hr	120min	2.00hr	3.2 m3	4.2 m3	4.6 m3	4.9 m3	5.2 m3	6.2 m3	7.2 m3	7.5 m3	9.8 m3
4hr	240min	4.00hr	3.4 m3	4.4 m3	4.9 m3	5.1 m3	5.3 m3	6.3 m3	7.2 m3	7.3 m3	9.5 m3
6hr	360min	6.00hr	3.6 m3	4.7 m3	5.1 m3	5.3 m3	5.5 m3	6.3 m3	7.1 m3	7.0 m3	9.0 m3
10hr	600min	10.00hr	2.8 m3	3.9 m3	4.1 m3	4.2 m3	4.2 m3	4.7 m3	5.2 m3	4.5 m3	5.6 m3
24hr	1440min	24.00hr	0.6 m3	1.9 m3	1.7 m3	1.1 m3	0.5 m3	-0.4 m3	-1.2 m3	-3.8 m3	-5.7 m3
48hr	2880min	48.00hr	-5.1 m3	-4.0 m3	-5.2 m3	-6.7 m3	-8.4 m3	-12.2 m3	-15.7 m3	-21.9 m3	-30.0 m3

			C_V:
Catchment Area:	218sqm	100%	
Permeable Garden	89sqm	41%	0.40
Impermeable:	129sqm	59%	0.77
			0.62



SuDs CALCULATIONS	
Project:	52 Eton Avenue
POST-DEV. PEAK RUN-OFF	
Sheet 5 of 7	
Project Reference:	LBH 4564
Date: 18/01/2019	Rev: A
Client:	Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING

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

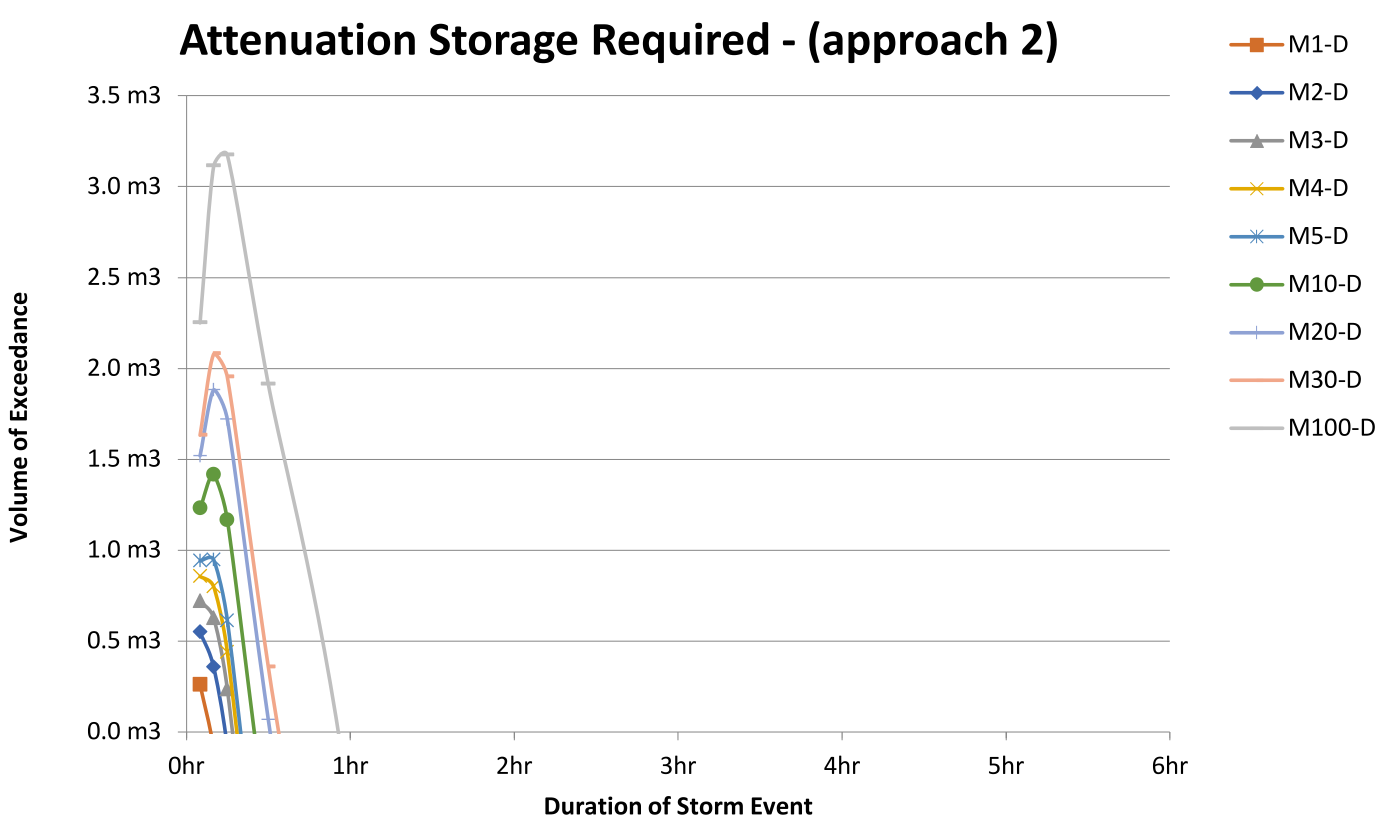
Proposed Discharge Rate: **2.65 l/sec** (approach 2 - 50% Existing)
0.09 l/sec *QBar*

D Duration			INFLOW								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	1.1 m3	1.3 m3	1.5 m3	1.7 m3	1.7 m3	2.0 m3	2.3 m3	2.4 m3	3.0 m3
10min	10min	0.17hr	1.5 m3	1.9 m3	2.2 m3	2.4 m3	2.5 m3	3.0 m3	3.5 m3	3.7 m3	4.7 m3
15min	15min	0.25hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	3.0 m3	3.6 m3	4.1 m3	4.3 m3	5.6 m3
30min	30min	0.50hr	2.1 m3	2.7 m3	3.0 m3	3.3 m3	3.5 m3	4.2 m3	4.8 m3	5.1 m3	6.7 m3
1hr	60min	1.00hr	2.9 m3	3.6 m3	4.0 m3	4.3 m3	4.6 m3	5.6 m3	6.5 m3	6.9 m3	9.1 m3
2hr	120min	2.00hr	3.4 m3	4.4 m3	4.8 m3	5.2 m3	5.5 m3	6.7 m3	7.8 m3	8.3 m3	10.9 m3
4hr	240min	4.00hr	4.1 m3	5.1 m3	5.7 m3	6.1 m3	6.5 m3	7.8 m3	9.0 m3	9.6 m3	12.6 m3
6hr	360min	6.00hr	4.9 m3	5.9 m3	6.5 m3	6.9 m3	7.4 m3	8.7 m3	10.2 m3	10.8 m3	14.1 m3
10hr	600min	10.00hr	5.2 m3	6.3 m3	6.9 m3	7.4 m3	7.8 m3	9.3 m3	10.8 m3	11.5 m3	15.0 m3
24hr	1440min	24.00hr	6.9 m3	8.3 m3	9.1 m3	9.6 m3	10.0 m3	11.7 m3	13.6 m3	14.4 m3	18.6 m3
48hr	2880min	48.00hr	8.1 m3	9.5 m3	10.4 m3	11.0 m3	11.4 m3	13.1 m3	15.0 m3	15.9 m3	20.3 m3

D Duration			OUTFLOW								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	0.8 m3	0.8 m3	0.8 m3	0.8 m3	0.8 m3	0.8 m3	0.8 m3	0.8 m3	0.8 m3
10min	10min	0.17hr	1.6 m3	1.6 m3	1.6 m3	1.6 m3	1.6 m3	1.6 m3	1.6 m3	1.6 m3	1.6 m3
15min	15min	0.25hr	2.4 m3	2.4 m3	2.4 m3	2.4 m3	2.4 m3	2.4 m3	2.4 m3	2.4 m3	2.4 m3
30min	30min	0.50hr	4.8 m3	4.8 m3	4.8 m3	4.8 m3	4.8 m3	4.8 m3	4.8 m3	4.8 m3	4.8 m3
1hr	60min	1.00hr	9.5 m3	9.5 m3	9.5 m3	9.5 m3	9.5 m3	9.5 m3	9.5 m3	9.5 m3	9.5 m3
2hr	120min	2.00hr	19.1 m3	19.1 m3	19.1 m3	19.1 m3	19.1 m3	19.1 m3	19.1 m3	19.1 m3	19.1 m3
4hr	240min	4.00hr	38.2 m3	38.2 m3	38.2 m3	38.2 m3	38.2 m3	38.2 m3	38.2 m3	38.2 m3	38.2 m3
6hr	360min	6.00hr	57.2 m3	57.2 m3	57.2 m3	57.2 m3	57.2 m3	57.2 m3	57.2 m3	57.2 m3	57.2 m3
10hr	600min	10.00hr	95.4 m3	95.4 m3	95.4 m3	95.4 m3	95.4 m3	95.4 m3	95.4 m3	95.4 m3	95.4 m3
24hr	1440min	24.00hr	229.0 m3	229.0 m3	229.0 m3	229.0 m3	229.0 m3	229.0 m3	229.0 m3	229.0 m3	229.0 m3
48hr	2880min	48.00hr	457.9 m3	457.9 m3	457.9 m3	457.9 m3	457.9 m3	457.9 m3	457.9 m3	457.9 m3	457.9 m3

D Duration			ATTENUATION STORAGE REQUIRED TO MEET PROPOSED DISCHARGE RATE								
			M1-D	**M2-D**	**M3-D**	**M4-D**	**M5-D**	**M10-D**	**M20-D**	**M30-D**	**M100-D**
5min	5min	0.08hr	0.3 m3	0.5 m3	0.7 m3	0.9 m3	0.9 m3	1.2 m3	1.5 m3	1.6 m3	2.3 m3
10min	10min	0.17hr	-0.1 m3	0.4 m3	0.6 m3	0.8 m3	0.9 m3	1.4 m3	1.9 m3	2.1 m3	3.1 m3
15min	15min	0.25hr	-0.6 m3	-0.1 m3	0.2 m3	0.4 m3	0.6 m3	1.2 m3	1.7 m3	2.0 m3	3.2 m3
30min	30min	0.50hr	-2.7 m3	-2.1 m3	-1.7 m3	-1.5 m3	-1.3 m3	-0.6 m3	0.1 m3	0.4 m3	1.9 m3
1hr	60min	1.00hr	-6.7 m3	-5.9 m3	-5.5 m3	-5.2 m3	-4.9 m3	-4.0 m3	-3.0 m3	-2.6 m3	-0.5 m3
2hr	120min	2.00hr	-15.6 m3	-14.7 m3	-14.2 m3	-13.9 m3	-13.5 m3	-12.4 m3	-11.3 m3	-10.8 m3	-8.2 m3
4hr	240min	4.00hr	-34.0 m3	-33.0 m3	-32.5 m3	-32.1 m3	-31.7 m3	-30.4 m3	-29.1 m3	-28.5 m3	-25.6 m3
6hr	360min	6.00hr	-52.4 m3	-51.3 m3	-50.7 m3	-50.3 m3	-49.9 m3	-48.5 m3	-47.1 m3	-46.4 m3	-43.1 m3
10hr	600min	10.00hr	-90.2 m3	-89.1 m3	-88.5 m3	-88.0 m3	-87.6 m3	-86.1 m3	-84.6 m3	-83.9 m3	-80.4 m3
24hr	1440min	24.00hr	-222.1 m3	-220.7 m3	-219.9 m3	-219.4 m3	-218.9 m3	-217.2 m3	-215.4 m3	-214.5 m3	-210.3 m3
48hr	2880min	48.00hr	-449.9 m3	-448.4 m3	-447.5 m3	-447.0 m3	-446.5 m3	-444.8 m3	-442.9 m3	-442.0 m3	-437.7 m3

Approach 2 ATTENUATION STORAGE REQUIRED: 3.2 m3



SuDs CALCULATIONS	
Project:	52 Eton Avenue
STORAGE REQUIREMENTS	
Sheet 6 of 7	
Project Reference:	LBH 4564
Date: 18/01/2019	Rev: A
Client:	Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING

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

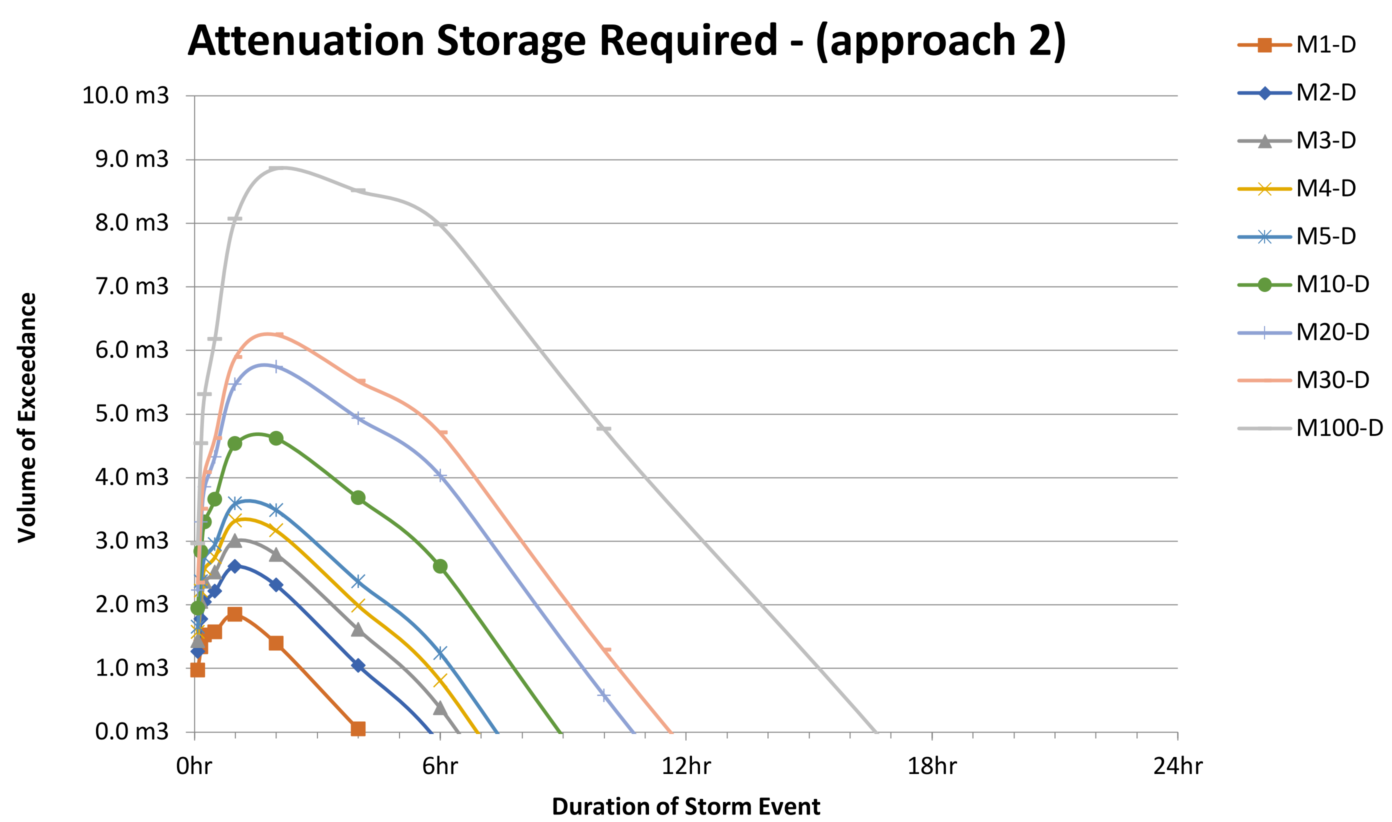
Proposed Discharge Rate: **0.28 l/sec** (3 x Qbar approach 2)
0.09 l/sec *QBar* 0.04 l/sec *(2.0 l/sec/ha)*

D Duration			INFLOW								
			M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	1.1 m3	1.3 m3	1.5 m3	1.7 m3	1.7 m3	2.0 m3	2.3 m3	2.4 m3	3.0 m3
10min	10min	0.17hr	1.5 m3	1.9 m3	2.2 m3	2.4 m3	2.5 m3	3.0 m3	3.5 m3	3.7 m3	4.7 m3
15min	15min	0.25hr	1.8 m3	2.3 m3	2.6 m3	2.8 m3	3.0 m3	3.6 m3	4.1 m3	4.3 m3	5.6 m3
30min	30min	0.50hr	2.1 m3	2.7 m3	3.0 m3	3.3 m3	3.5 m3	4.2 m3	4.8 m3	5.1 m3	6.7 m3
1hr	60min	1.00hr	2.9 m3	3.6 m3	4.0 m3	4.3 m3	4.6 m3	5.6 m3	6.5 m3	6.9 m3	9.1 m3
2hr	120min	2.00hr	3.4 m3	4.4 m3	4.8 m3	5.2 m3	5.5 m3	6.7 m3	7.8 m3	8.3 m3	10.9 m3
4hr	240min	4.00hr	4.1 m3	5.1 m3	5.7 m3	6.1 m3	6.5 m3	7.8 m3	9.0 m3	9.6 m3	12.6 m3
6hr	360min	6.00hr	4.9 m3	5.9 m3	6.5 m3	6.9 m3	7.4 m3	8.7 m3	10.2 m3	10.8 m3	14.1 m3
10hr	600min	10.00hr	5.2 m3	6.3 m3	6.9 m3	7.4 m3	7.8 m3	9.3 m3	10.8 m3	11.5 m3	15.0 m3
24hr	1440min	24.00hr	6.9 m3	8.3 m3	9.1 m3	9.6 m3	10.0 m3	11.7 m3	13.6 m3	14.4 m3	18.6 m3
48hr	2880min	48.00hr	8.1 m3	9.5 m3	10.4 m3	11.0 m3	11.4 m3	13.1 m3	15.0 m3	15.9 m3	20.3 m3

D Duration			OUTFLOW								
			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	0.1 m3	0.1 m3
10min	10min	0.17hr	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3	0.2 m3
15min	15min	0.25hr	0.3 m3	0.3 m3	0.3 m3	0.3 m3	0.3 m3	0.3 m3	0.3 m3	0.3 m3	0.3 m3
30min	30min	0.50hr	0.5 m3	0.5 m3	0.5 m3	0.5 m3	0.5 m3	0.5 m3	0.5 m3	0.5 m3	0.5 m3
1hr	60min	1.00hr	1.0 m3	1.0 m3	1.0 m3	1.0 m3	1.0 m3	1.0 m3	1.0 m3	1.0 m3	1.0 m3
2hr	120min	2.00hr	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
4hr	240min	4.00hr	4.1 m3	4.1 m3	4.1 m3	4.1 m3	4.1 m3	4.1 m3	4.1 m3	4.1 m3	4.1 m3
6hr	360min	6.00hr	6.1 m3	6.1 m3	6.1 m3	6.1 m3	6.1 m3	6.1 m3	6.1 m3	6.1 m3	6.1 m3
10hr	600min	10.00hr	10.2 m3	10.2 m3	10.2 m3	10.2 m3	10.2 m3	10.2 m3	10.2 m3	10.2 m3	10.2 m3
24hr	1440min	24.00hr	24.6 m3	24.6 m3	24.6 m3	24.6 m3	24.6 m3	24.6 m3	24.6 m3	24.6 m3	24.6 m3
48hr	2880min	48.00hr	49.1 m3	49.1 m3	49.1 m3	49.1 m3	49.1 m3	49.1 m3	49.1 m3	49.1 m3	49.1 m3

D Duration			ATTENUATION STORAGE REQUIRED TO MEET PROPOSED DISCHARGE RATE								
			M1-D	M2-D	M3-D	M4-D	M5-D	M10-D	M20-D	M30-D	M100-D
5min	5min	0.08hr	1.0 m3	1.3 m3	1.4 m3	1.6 m3	1.7 m3	1.9 m3	2.2 m3	2.3 m3	3.0 m3
10min	10min	0.17hr	1.3 m3	1.8 m3	2.0 m3	2.2 m3	2.4 m3	2.8 m3	3.3 m3	3.5 m3	4.5 m3
15min	15min	0.25hr	1.5 m3	2.0 m3	2.4 m3	2.6 m3	2.7 m3	3.3 m3	3.8 m3	4.1 m3	5.3 m3
30min	30min	0.50hr	1.6 m3	2.2 m3	2.5 m3	2.7 m3	2.9 m3	3.7 m3	4.3 m3	4.6 m3	6.2 m3
1hr	60min	1.00hr	1.8 m3	2.6 m3	3.0 m3	3.3 m3	3.6 m3	4.5 m3	5.5 m3	5.9 m3	8.1 m3
2hr	120min	2.00hr	1.4 m3	2.3 m3	2.8 m3	3.2 m3	3.5 m3	4.6 m3	5.7 m3	6.2 m3	8.9 m3
4hr	240min	4.00hr	0.0 m3	1.0 m3	1.6 m3	2.0 m3	2.4 m3	3.7 m3	4.9 m3	5.5 m3	8.5 m3
6hr	360min	6.00hr	-1.3 m3	-0.2 m3	0.4 m3	0.8 m3	1.2 m3	2.6 m3	4.0 m3	4.7 m3	8.0 m3
10hr	600min	10.00hr	-5.1 m3	-3.9 m3	-3.3 m3	-2.9 m3	-2.4 m3	-1.0 m3	0.6 m3	1.3 m3	4.8 m3
24hr	1440min	24.00hr	-17.7 m3	-16.3 m3	-15.5 m3	-15.0 m3	-14.5 m3	-12.8 m3	-11.0 m3	-10.1 m3	-5.9 m3
48hr	2880min	48.00hr	-41.1 m3	-39.6 m3	-38.7 m3	-38.2 m3	-37.7 m3	-36.0 m3	-34.1 m3	-33.2 m3	-28.9 m3

Approach 2 ATTENUATION STORAGE REQUIRED: 8.9 m3



SuDs CALCULATIONS	
Project:	52 Eton Avenue
STORAGE REQUIREMENTS	
Sheet 7 of 7	
Project Reference:	LBH 4564
Date: 18/01/2019	Rev: A
Client:	Natalie Matalon & Izzy Tepekoylu

LBH WEMBLEY ENGINEERING