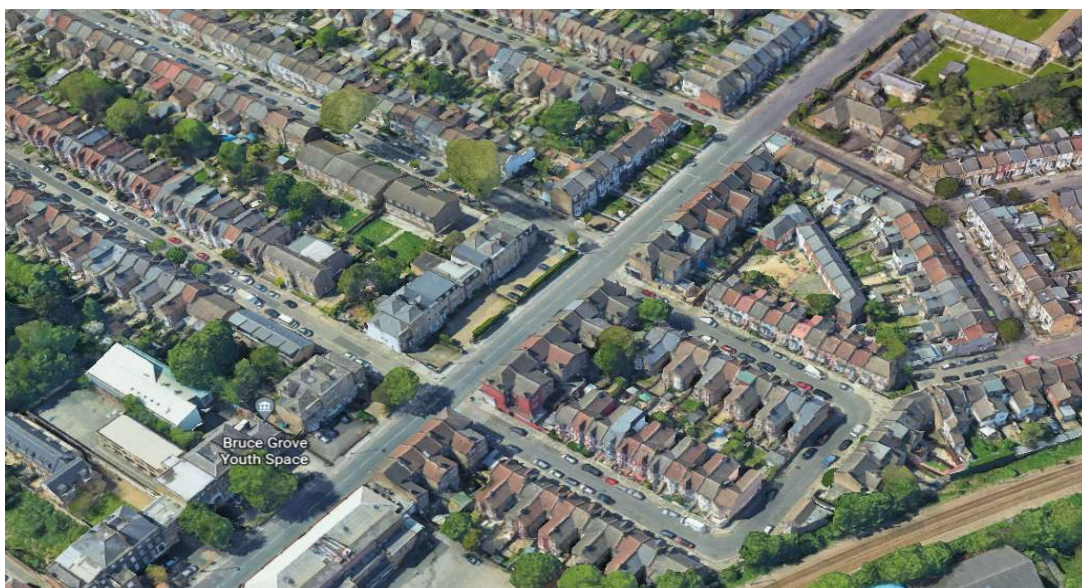

Job Title
Bruce Grove Public Realm
Improvements

Prepared for
London Borough of Haringey

Report Type
SuDS Strategy

Date
5 August 2022



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SuDS Strategy

Prepared by	Shubham Nayak MSc
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Reviewed by	Rhys Williams CEng MICE
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Approved by	
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Civic Job No.	2443/01
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Issued	05/08/2022
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Revised	13/09/2022 – Full Issue
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1. Introduction

Civic Engineers has been commissioned by London Borough of Haringey to produce a Drainage Strategy for a proposed improvement to villa forecourts along Bruce Grove in the London Borough of Haringey. The proposal is to provide SuDS features such as Raingardens and Permeable Paving to forecourts of property no. 8, 9, 11, 12 and 14. Refer to Figure 1 for the general layout outlined by Roger Mears Architects. The site will be accessed from Bruce Grove.

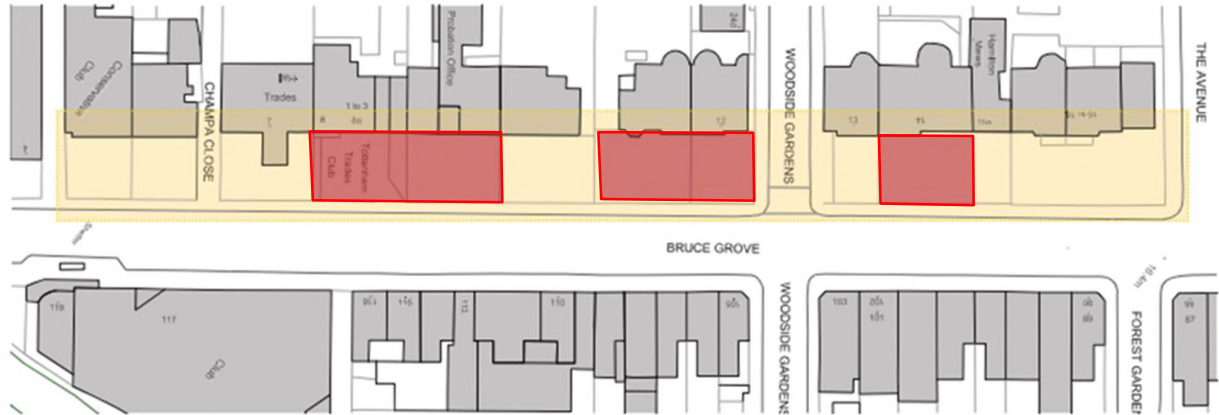


Figure 1: Site layout by Roger Mears Architects

This report has been prepared in support of the several minor planning applications, for each of the villas, and aims to assess it against the risk of flooding and to establish the principles of the drainage scheme in line with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG).

Note that the proposed drainage strategy is also in line with the London Plan 2021 Policy SI 12 Flood Risk Management and Policy SI 13 Sustainable Drainage.

2. Existing Site Details

2.1 Site Description

The sites, which are split into 3 no. separate sites, are located in North London, on Bruce Grove and 140m away from Bruce Grove tube station. Figure 2 shows an aerial view of the site, currently occupied by villas now incorporating a mix of uses. All of the properties are Grade II listed and were first built in 1789. See Appendix A for site plan.

The total site area which includes areas of individual forecourts is approximately 0.24 ha with national grid coordinates 533711, 190196 and the postcode is N17 6RA. The site is bordered by houses and on the opposite side of Bruce Grove Street are various shops.



Figure 2: Site location plan (© Google July 2022)

3. SuDS Strategy

3.1 Point of Discharge

The NPPF PPG – Flood risk and coastal change, states that:

“Generally, the aim should be 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.”*

An appraisal of the discharge hierarchy has been conducted in the following paragraphs.

Infiltration Based Systems

The forecourt sites are too limited in space to allow infiltration-based systems to be feasible. The sites are typically bordered to one side by Bruce Grove, a public highway, an existing residential building to the other and other properties either side. In accordance with Building Regulations infiltration features need to maintain a 5m offset from buildings and public highways and 2.5m from a property boundary. This would make infiltration-based systems unfeasible.

Waterbody

The closest waterbody to the site is the Moselle Brook, located approximately 1km away. Discharge to a water body is deemed unfeasible.

Surface Water Sewer

A connection to the public sewer is required to dispose of surface water emanating from the site. It is proposed to utilise the existing surface water connection from each of the forecourt sites.

Summary

Table 1: Summary of point of discharge suitability

Point of discharge	Suitability
Ground	x
Waterbody	x
Surface water sewer	√
Combined sewer	x
√ suitable x unsuitable	

3.2 Greenfield Run-off

Greenfield run-off rates for the site have been estimated with the HR Wallingford online tool using the IH124 method with a Standard Percentage Run-off (SPR) value of 0.47 and a Standard Average Annual Rainfall (SAAR) value of 653mm. The Greenfield run-off rates varies from 0.14l/s for a 1 in 1-year event to 0.51l/s for a 1 in 100-year event. The online tool outputs are available in Appendix B.

Table 2 Greenfield Runoff Rates

Greenfield Runoff Rates					
Property Number	Total site area	Qbar	1-in-1-year event	1-in-30-year event	1-in-100-year event
8	0.1 ha	0.16 l/s	0.14 l/s	0.37 l/s	0.51 l/s
9	0.1 ha	0.16l/s	0.14 l/s	0.37 l/s	0.51 l/s
11	0.1 ha	0.16l/s	0.14 l/s	0.37 l/s	0.51 l/s
12	0.1 ha	0.16l/s	0.14 l/s	0.37 l/s	0.51 l/s
14	0.1 ha	0.16l/s	0.14 l/s	0.37 l/s	0.51 l/s

3.3 Attenuation

Water Quantity

This report will support a series of minor planning applications and in line with Haringey Borough Council's Policy DM25 stating that:

- A. *"The Council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design, having regard to the following requirements:*
- All major development proposals will be required to reduce surface water flows to a greenfield run-off rate for a 1 in 100 year critical storm event;*
 - All minor development proposals should aim to achieve a greenfield run-off rate and, at a minimum, achieve a 50 per cent reduction on existing site run-off rates;*
 - All other development should seek to achieve a greenfield run-off rate and include at least one 'at source' SuDS measure resulting in a net improvement in water quantity or quality discharging to a sewer; and*
 - For all development where a greenfield runoff rate cannot be achieved justification must be provided to demonstrate that the run-off rate has been reduced as much as possible.*

It is proposed that the discharge rate will be different for each forecourt due to the varying site constraints.

See Table 3 for the betterment it represents for different storm events against the existing surface water discharge rate from the site. See Appendix C for existing discharge rate and Appendix D for proposed discharge rate calculations.

Table 3: Surface Water Discharge Rate Betterment when Reducing to proposed discharge rate (in L/s)

Storm event return period	1-in-100-year + 40% allowance for climate change					
Property Number	8	9	11	12	14	Total
Existing discharge rate (L/s)	9.8	11.5	12.5	7.6	12.1	53.5
Proposed discharge rate (L/s)	2.1	0.5	5.5	0.5	0.5	9.1
Betterment (%)	79	98	56	98	98	83

It is proposed to store rainwater on-site by the means of permeable pavement and raingardens. The total proposed raingarden and permeable paving area is listed in the below Table 4.

Table 4: Proposed SuDS features area for each forecourts

Property No.	Permeable paving area (m ²)	Raingarden area (m ²)
8	N/A	24
9	162	17
11	12	12
12	100	N/A
14	134	N/A
Total area (m ²)	230	36

Industry standard Causeway Flow software has been used to estimate the volume of storage required to attenuate the 1 in 100-year storm event + 40% allowance for climate change without any flooding. The total volume required for all the forecourts is estimated to be approximately 43m³, full Flow outputs can be found in Appendix E.

Raingardens have been modelled with 450mm depth of sub-base storage with a 30% void ratio. Permeable paving has been modelled with 300mm depth of sub-base storage and 30% void ratio. It is proposed to restrict the discharge rate using an orifice plate in a new inspection chamber before connecting into the existing system.

There is currently 450m² of the total site dedicated to surface water management in the forms of different SuDS features which will provide 49m³ storage, Table 5 shows how this will be achieved on a plot-by-plot basis.

Table 5: Attenuation details

Property Number	8	9		11	12	14
SuDS feature	Raingarden	Raingarden	Permeable paving	Raingarden	Permeable paving	Permeable paving
Area(m ²) x Depth(m) x Porosity	24*0.45*0.3	17*0.40*0.3	162*0.4*0.3	12*0.45*0.3	100*0.3*0.3	134*0.3*0.3
Volume provided (m ³)	4m ³	2m ³	20m ³	2m ³	9m ³	12m ³
Total Volume provided (m ³)	49m ³					

The Proposed SuDS features plan is available in Appendix F and shows the location for all the proposed SuDS features.

The above proposals demonstrate that three out of the five forecourt plots are able to achieve Greenfield Runoff Rate following the implementation of the proposed SuDS features, Plots 8 and 11 are able to produce a 79% and 56% betterment, respectively, through the implementation of SuDS features.

Following an assessment of opportunities for each site, the specific constraints posed meant greater levels of betterment were not able to be achieved. Notwithstanding, all proposals achieve the 50% on site reduction in run off rate as required by Policy DM 25 B (b) and offer significant betterment from the existing position.

Sustainability

Haringey Council's Policy DM25 states that: "the council will require Sustainable Drainage Systems (SuDS) to be sensitively incorporated into new development by way of site layout and design."

The 'SuDS Manual' CIRIA report C753 states that "surface water run-off should be managed for maximum benefit." The types of benefits that can be achieved by SuDS can be put into four categories, the four pillars of SuDS: water quantity, water quality, amenity and biodiversity. Table 6 presents what benefits are likely to be achieved by different SuDS features.

Table 6: SuDS Likely Benefits

	SuDS Feature	Water quantity	Water quality	Amenity	Biodiversity
	Living roofs	✓	✓	✓	✓
	Infiltration systems	✓	✓	✓	✓
	Dry planted features – Swales, bio retentions areas, trees, detention basins	✓	✓	✓	✓
	Ponds and wetlands	✓	✓	✓	✓
	Pervious & reservoir pavements	✓	✓		
	Filter strips	✓	✓		
	Filter drains	✓	✓		
	Proprietary treatment systems		✓		
Least Benefits	Attenuation storage tanks	✓			

Table 7 shows what SuDS techniques are proposed to manage surface water on-site. These features are being designed in collaboration with the landscape architect to achieve a maximum of benefits to the project.

Table 7 Summary of SuDS Techniques Proposed

SuDS Technique	Proposed?	Comment
Living roofs	N	Roof areas are not part of this proposed development.
Infiltration systems	N	Spatial constraints deem this as unfeasible.
Dry planted features	Y	Raingarden areas is proposed for water attenuation. The raingarden areas will act as water treatment and will also create opportunities for biodiversity and amenity.
Open water features	N	Not considered appropriate for the site due to spatial constraints.
Pervious & reservoir pavements	Y	Pervious pavement is proposed within the forecourts where this has been deemed financially viable.
Attenuation storage tanks	N	Storage tanks have been deemed financially unviable.

4. Maintenance strategy

4.1 Maintenance

This maintenance section is intended to give an overview of the operation and maintenance of the drainage features included within the drainage strategy and in relation to typical details. Where propriety products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document, unless specifically noted otherwise due to project constraints.

The recommended maintenance actions and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation of the system. The frequency should then be adjusted to suit the site-specific requirements.

The surface water network has been designed to accommodate the 1 in 100-year rainfall event plus a 40% allowance for climate change. As the flows are attenuated on site there will be a period after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48 hours, appropriate action should be taken as noted in this section.

4.2 Components

The following components are included within the drainage design for the proposed development:

- Raingardens.
- Permeable paving.

Raingardens

Raingardens are shallow depressions with absorbent, yet free draining soil which are populated with plants that can withstand temporary flooding conditions. The surface water run-off is allowed to soak into the ground or convey it to a water storage feature. They should always be kept clear to ensure uninterrupted flow of surface water into the drainage system and any debris above them should be removed.

Sediment/material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols.

Table 8 presents the recommended maintenance schedule for the Raingardens.

Table 8 Maintenance schedule for raingardens

Raingardens			
Activity/Maintenance Schedule	Required Action	Frequency	Maintenance Responsibility
Regular inspections	<i>Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary</i>	<i>Quarterly</i>	Property Owner
	<i>Check operation of underdrains by inspection of flows after rain</i>	<i>Annually</i>	Property Owner
	<i>Assess plants for disease infection, poor growth, invasive species etc and replace as necessary</i>	<i>Quarterly</i>	Property Owner
	<i>Inspect inlets and outlets for blockages</i>	<i>Quarterly</i>	Property Owner
Regular maintenance	<i>Remove litter and surface debris and weeds</i>	<i>Quarterly (or more frequently for tidiness or aesthetic reasons)</i>	Property Owner
	<i>Replace any plants, to maintain planting density</i>	<i>As required</i>	Property Owner
	<i>Remove sediment, litter, and debris build-up from around inlets or from forebays</i>	<i>Quarterly to biannually</i>	Property Owner
Occasional maintenance	<i>Infill any holes or scour in the filter medium, improve erosion protection if required</i>	<i>As required</i>	Property Owner
	<i>Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch</i>	<i>As required</i>	Property Owner
Remedial actions	<i>Remove and replace filter medium and vegetation above</i>	<i>As required but likely to be > 20 years</i>	Property Owner

Permeable Paving

Permeable paving is proposed in the parking bays and throughout the private road within the site.

Permeable paving is a proprietary product; the manufacturer's maintenance recommendation should therefore be followed. The information regarding operation and maintenance can be found within the manufacturer's specification and should be included in the hand-over documentation.

Table 9 presents the recommended maintenance schedule for the permeable paving.

Table 9 Maintenance schedule for permeable paving

Permeable Paving			
Activity/Maintenance Schedule	Required Action	Frequency	Maintenance Responsibility
Regular maintenance	<i>Brushing and vacuuming (standard cosmetic sweep over whole surface)</i>	<i>Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto previous surface from adjacent impermeable areas as this area is most likely to collect the most sediment</i>	Property Owner
Occasional maintenance	<i>Stabilise and mow contributing and adjacent areas</i>	<i>As required</i>	Property Owner
	<i>Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying</i>	<i>As required – once per year on less frequently used pavements</i>	Property Owner
Remedial actions	<i>Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving</i>	<i>As required</i>	Property Owner

	<i>Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material</i>	<i>As required</i>	Property Owner
	<i>Rehabilitation of surface and upper substructure by remedial sweeping</i>	<i>Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)</i>	Property Owner
Monitoring	<i>Initial inspection</i>	<i>Monthly for three months after installation</i>	Property Owner
	<i>Inspect for evidence of poor operation and/or weed growth – if required, take remedial action</i>	<i>Three-monthly, 48 h after large storms in the first six months</i>	Property Owner
	<i>Inspect silt accumulation rates and establish appropriate brushing frequencies</i>	<i>Annually</i>	Property Owner
	<i>Monitor inspection chambers</i>	<i>Annually</i>	Property Owner

5. Conclusion and Recommendation

The proposed surface water drainage strategy proposes to reduce the risk of downstream flooding by reducing the existing discharge rates emanating from the proposed development sites.

In line with Haringey Borough Council Policy DM25: On Site Water Management and Surface Water Attenuation, it is proposed to drain surface water to a series of SuDS features providing a total of 49m³ of effective storage and restrict to the proposed discharge rates. The required attenuation volume has been estimated using industry standard Causeway Flow software to ensure that there is no flooding for up to the 1 in 100-year storm event +40% allowance for climate change.

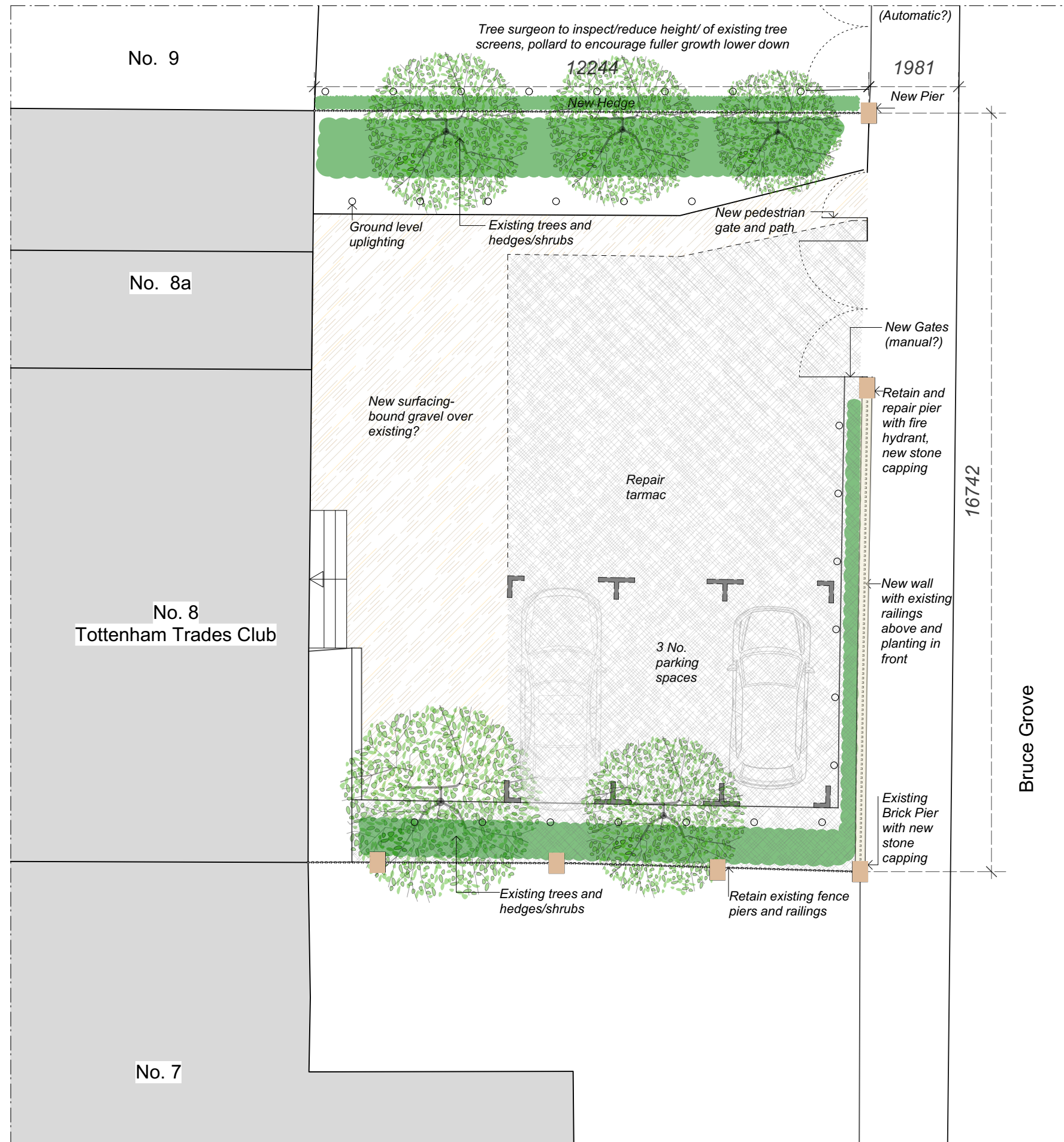
The proposed surface water drainage strategy demonstrates that three out of the five forecourt plots are able to achieve Greenfield Runoff Rate following the implementation of the proposed SuDS raingardens and permeable paving features, Plots 8 and 11 are able to produce a 79% and 56% betterment, respectively, through the implementation of SuDS raingardens and permeable paving features. Following an assessment of opportunities for each site, the specific constraints posed meant greater levels of betterment were not able to be achieved. Notwithstanding, all proposals achieve the 50% on site reduction in run off rate as required by Policy DM 25 B (b) and offer significant betterment from the existing position.

The SuDS features being proposed are pervious paving and raingardens. These will be designed in collaboration with the landscape architect on the project with the aim to achieve a wide range of benefits including water quality, amenity and biodiversity.

Appendices

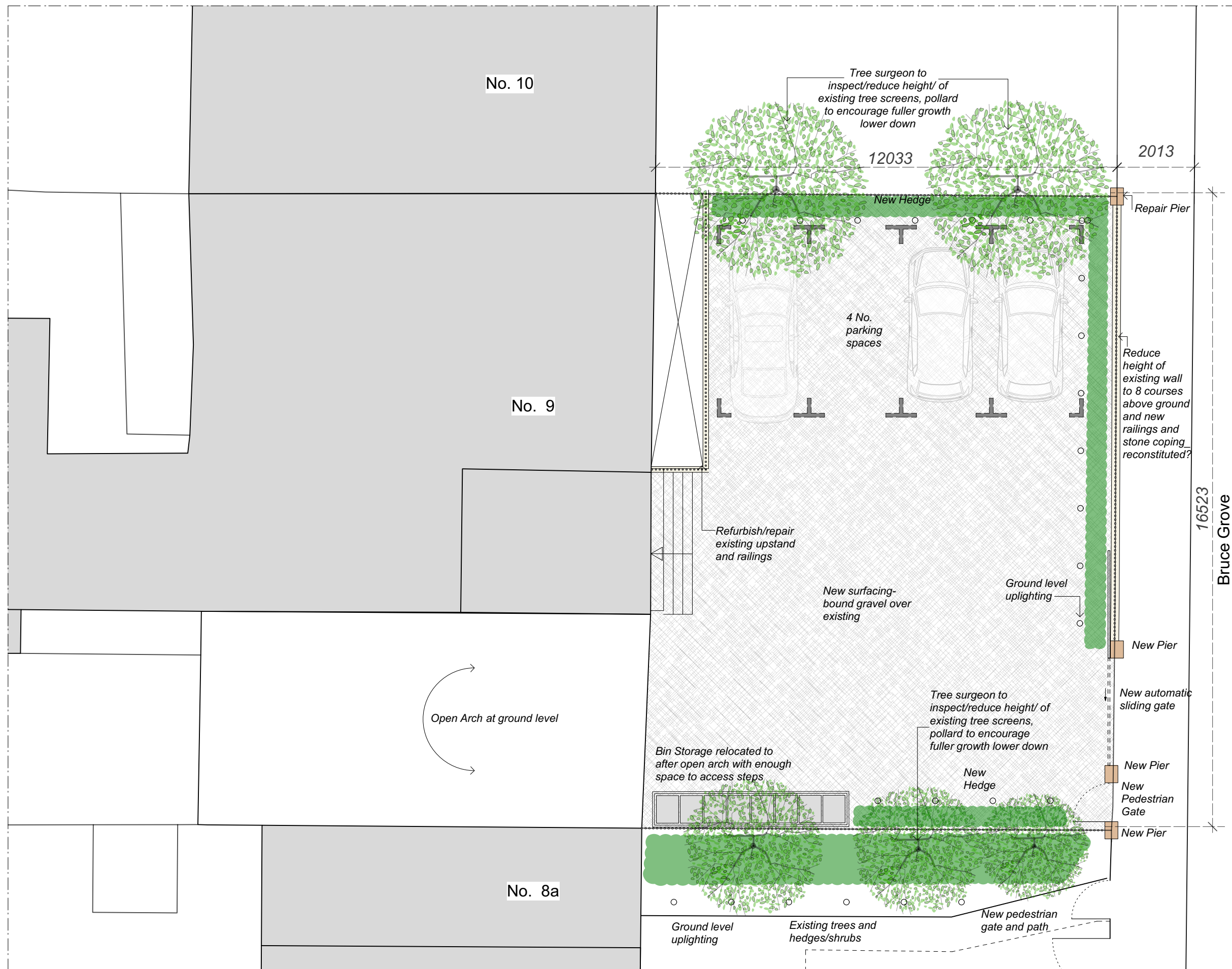
- A. Site layout
- B. Greenfield runoff rate calculations.
- C. Existing discharge rate
- D. Proposed attenuation calculations
- E. Storage Estimate
- F. Drawings
- G. Haringey SuDS Proforma

A. Site layout

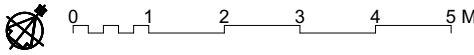


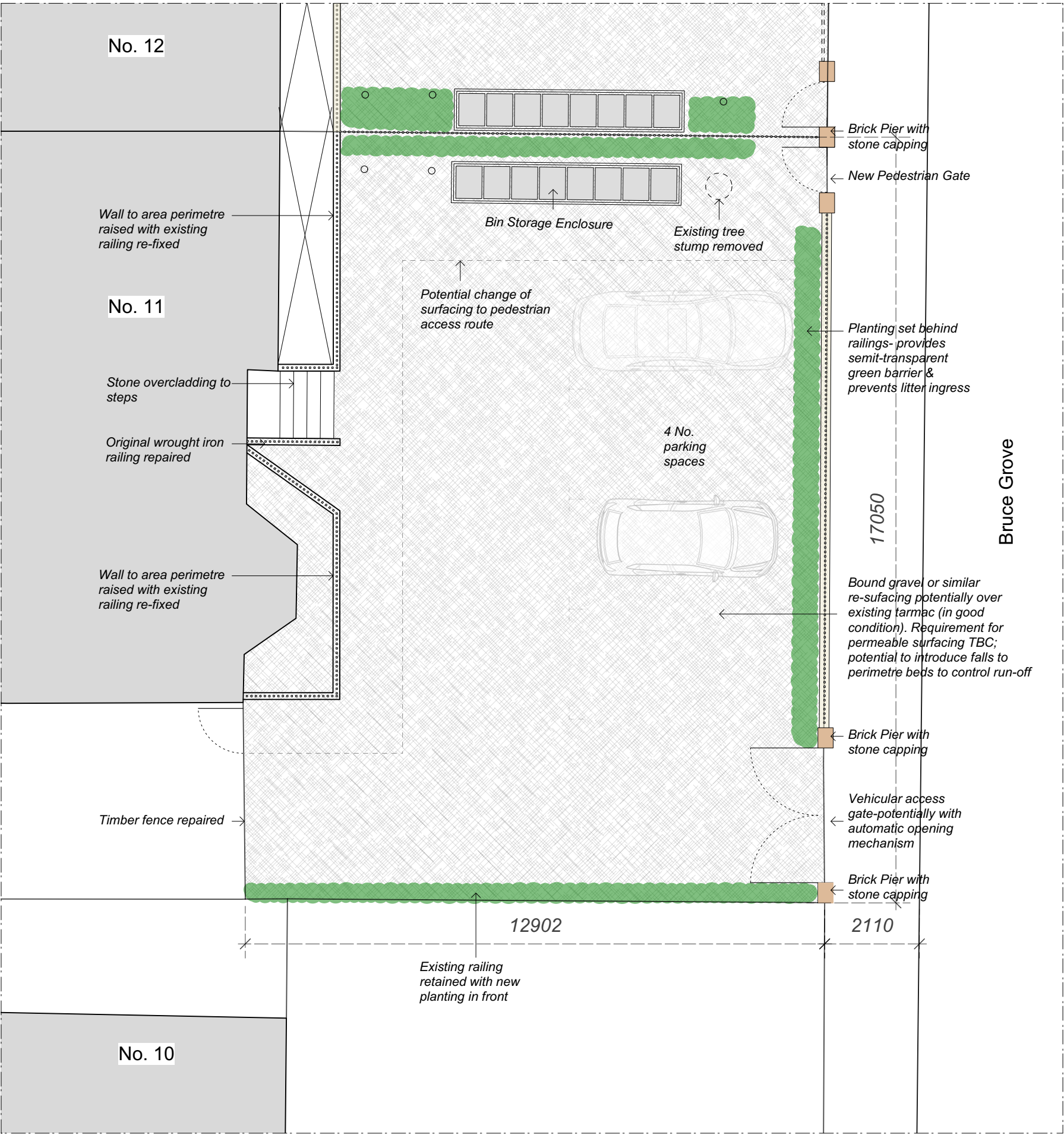
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Revisions				
Scale  				
Haringey Heritage Action Zone Proposed 8 Bruce Grove Forecourt				
ROGER MEARS ARCHITECTS LLP Union Chapel, Compton Avenue London N1 2XD rma@rmears.co.uk www.rmears.co.uk tel 020 7359 8222				
Date	Scale	Job No.	Code	Dwg No.
31.01.2022	1:100@A3	2141	-	BG08-02



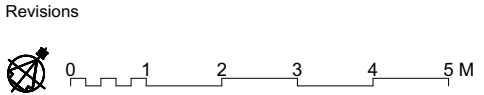
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Revisions 			
Haringey Heritage Action Zone N17			
Proposed Forecourt 9 Bruce Grove			
ROGER MEARS ARCHITECTS LLP Union Chapel, Compton Avenue London N1 2XD rma@rmears.co.uk tel 020 7359 8222 www.rmears.co.uk © Roger Mears Architects LLP 2022			
Date	Scale	Job No.	Code Dwg No.
Jan 2022	1:100@A3 1:50@A1	2141	BG09-02 A



01 11 Bruce Grove Plan
BG11-02 1:100@A3; 1:50@A1

Notes DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK

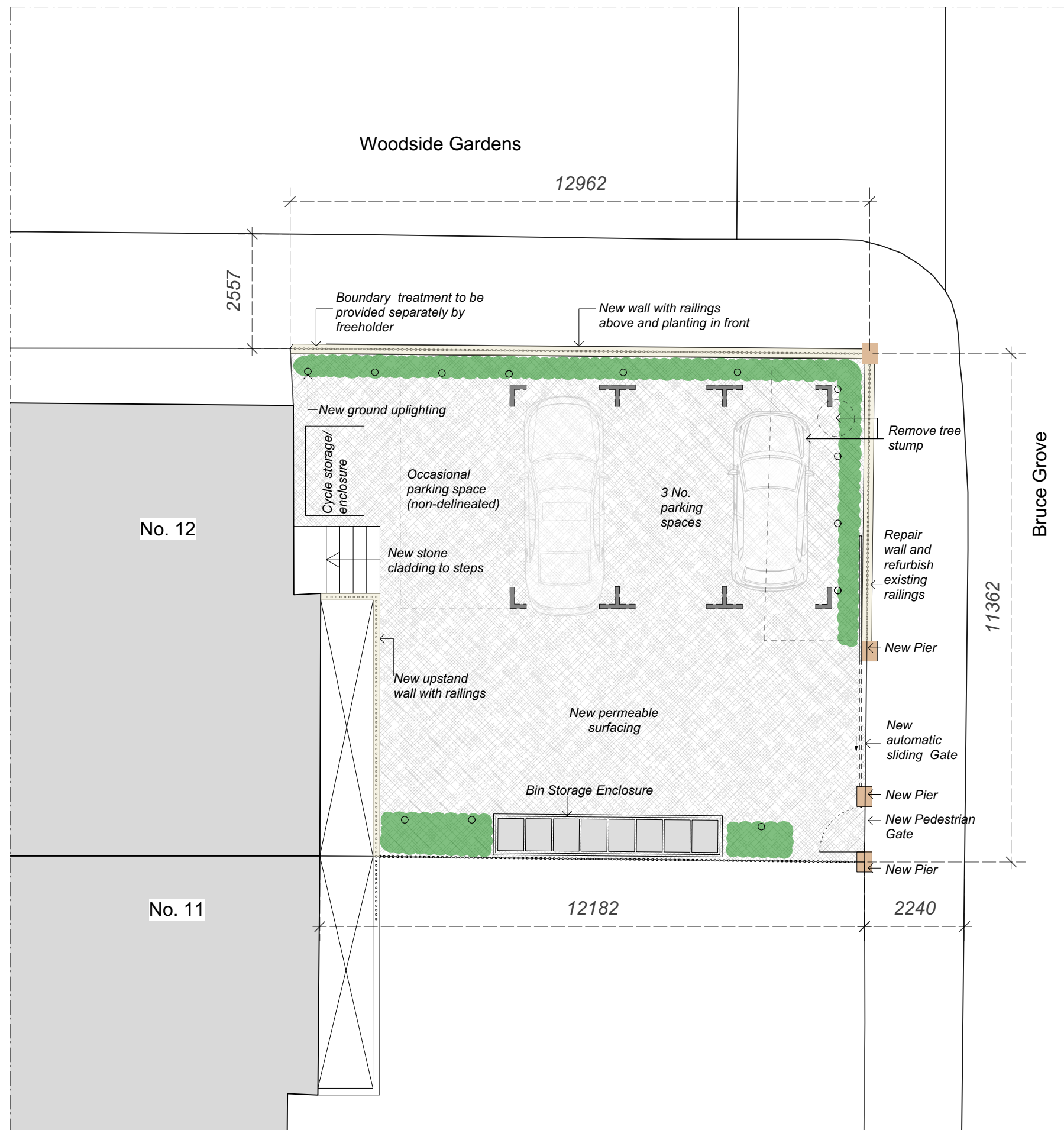


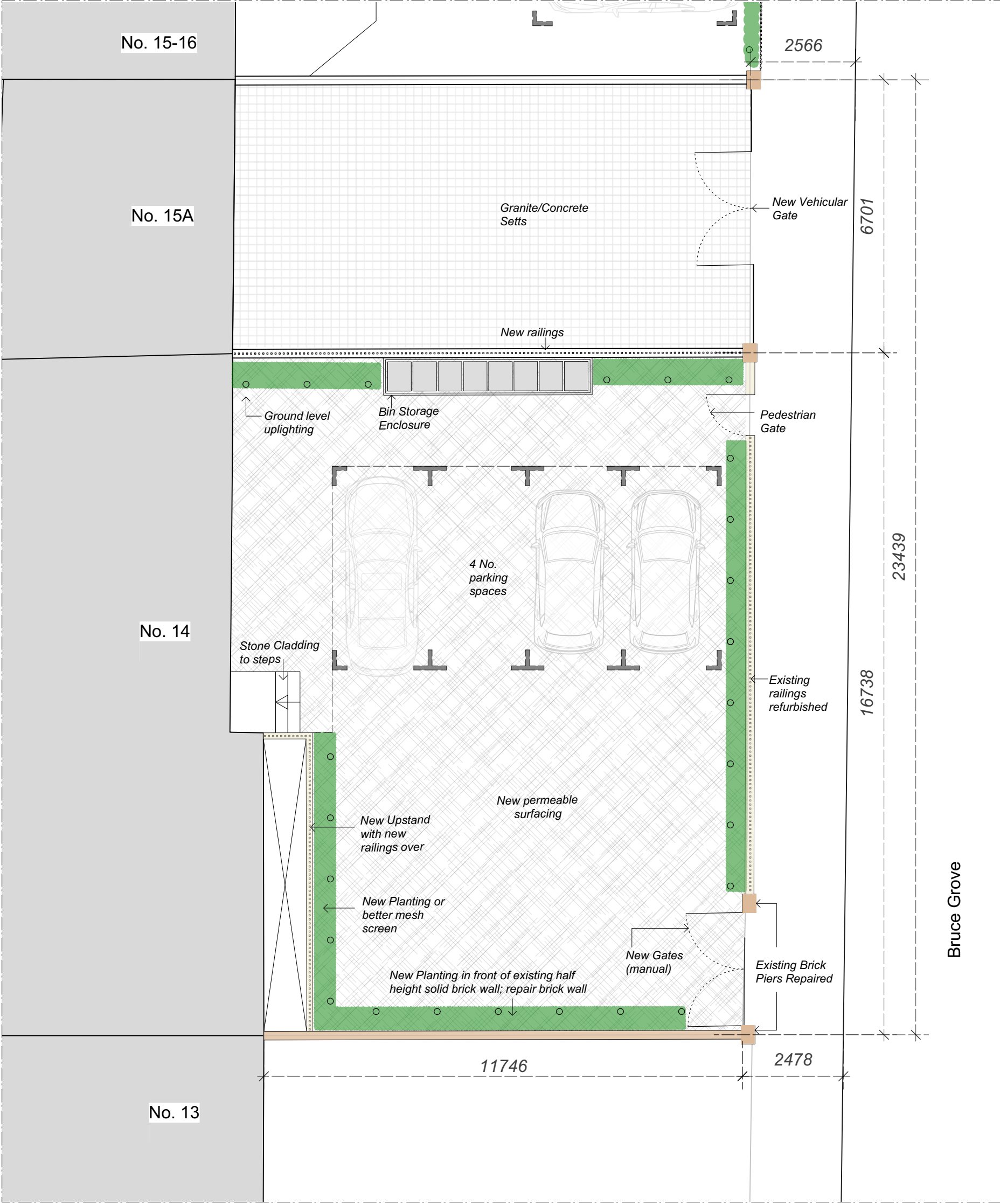
Haringey Heritage Action Zone
N17

Proposed Forecourt
11 Bruce Grove

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Date	Scale	Job No.	Code	Dwg No.
Jan 2022	1:100@A3 1:50@A1	2141		BG11-02





01 14-15A Bruce Grove Plan
BG14-02 1:100@A3; 1:50@A1

Notes	DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK	Revisions	Haringey Heritage Action Zone N17					ROGER MEARS ARCHITECTS LLP Union Chapel, Compton Avenue London N1 2XD				
		A 23/06/2022 Updated layout	Proposed Forecourt 14 Bruce Grove					rma@rmears.co.uk www.rmears.co.uk				
								Date	Scale	Job No.	Code	Dwg No.
			 0 1 2 3 4 5 M					Jan 2022	1:100@A3 x:xx@A1	2141		BG14-02 A

B. Greenfield runoff rate calculations.

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Shubham S Nayak

Site name: Property No. 8, Bruce Grove

Site location: Bruce Grove, Harringey

Site Details

Latitude: 51.59480° N

Longitude: 0.07101° W

Reference: 3813018758

Date: Jul 15 2022 08:33

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics Default Edited

SOIL type: 2 2

HOST class: N/A N/A

SPR/SPRHOST: 0.3 0.3

Hydrological characteristics Default Edited

SAAR (mm): 623 623

Hydrological region: 6 6

Growth curve factor 1 year: 0.85 0.85

Growth curve factor 30 years: 2.3 2.3

Growth curve factor 100 years: 3.19 3.19

Growth curve factor 200 years: 3.74 3.74

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates Default Edited

Q_{BAR} (l/s): 0.16 0.16

1 in 1 year (l/s): 0.14 0.14

1 in 30 years (l/s): 0.37 0.37

1 in 100 year (l/s): 0.51 0.51

1 in 200 years (l/s): 0.59 0.59

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Shubham Nayak

Site name: Property No. 9, Bruce Grove

Site location: Bruce Grove, Harringey

Site Details

Latitude: 51.59501° N

Longitude: 0.07119° W

Reference: 3442328169

Date: Aug 04 2022 16:43

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics: Default Edited

SOIL type: 2 2

HOST class: N/A N/A

SPR/SPRHOST: 0.3 0.3

Hydrological characteristics: Default Edited

SAAR (mm): 623 623

Hydrological region: 6 6

Growth curve factor 1 year: 0.85 0.85

Growth curve factor 30 years: 2.3 2.3

Growth curve factor 100 years: 3.19 3.19

Growth curve factor 200 years: 3.74 3.74

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates: Default Edited

Q_{BAR} (l/s): 0.16 0.16

1 in 1 year (l/s): 0.14 0.14

1 in 30 years (l/s): 0.37 0.37

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Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by: Shubham S Nayak

Site name: Property No. 11, Bruce Grove

Site location: Bruce Grove, Harringey

Site Details

Latitude: 51.59514° N

Longitude: 0.07136° W

Reference: 3281843233

Date: Jul 15 2022 14:31

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

Default Edited

SOIL type: 2 2

HOST class: N/A N/A

SPR/SPRHOST: 0.3 0.3

Hydrological characteristics

Default Edited

SAAR (mm): 623 623

Hydrological region: 6 6

Growth curve factor 1 year: 0.85 0.85

Growth curve factor 30 years: 2.3 2.3

Growth curve factor 100 years: 3.19 3.19

Growth curve factor 200 years: 3.74 3.74

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s): 0.16 0.16

1 in 1 year (l/s): 0.14 0.14

1 in 30 years (l/s): 0.37 0.37

1 in 100 year (l/s): 0.51 0.51

1 in 200 years (l/s): 0.59 0.59

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Calculated by: Shubham S Nayak

Site name: Property No. 12, Bruce Grove

Site location: Bruce Grove, Harringey

Site Details

Latitude: 51.59531° N

Longitude: 0.07153° W

Reference: 3867348806

Date: Jul 15 2022 08:38

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	623	623
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	0.16	0.16
1 in 1 year (l/s):	0.14	0.14
1 in 30 years (l/s):	0.37	0.37
1 in 100 year (l/s):	0.51	0.51
1 in 200 years (l/s):	0.59	0.59

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Calculated by: Shubham S Nayak

Site name: Property No. 14, Bruce Grove

Site location: Bruce Grove, Harringey

Site Details

Latitude: 51.59544° N

Longitude: 0.07177° W

Reference: 1807739849

Date: Jul 15 2022 08:39

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach: IH124

Site characteristics

Total site area (ha): 0.1

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	623	623
Hydrological region:	6	6
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

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

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

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

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0.16	0.16
1 in 1 year (l/s):	0.14	0.14
1 in 30 years (l/s):	0.37	0.37
1 in 100 year (l/s):	0.51	0.51
1 in 200 years (l/s):	0.59	0.59

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C. Existing discharge rate

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.400
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.016	4.00	10.000	1900	9.756	55.351	2.200
2			10.000	1900	100.394	54.621	2.502
3	0.018	4.00	10.000	1900	9.993	45.588	2.200
4			10.000	1900	100.321	44.958	2.501
5	0.012	4.00	10.000	1900	9.888	36.240	2.200
6			10.000	1900	100.741	35.610	2.503
7	0.019	4.00	10.000	1900	10.098	26.368	2.200
8			10.000	1900	100.321	25.632	2.501
9	0.020	4.00	10.000	1900	9.997	16.705	2.200
10			10.000	1900	100.846	16.113	2.503

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
Property No. 8	1	2	90.641	0.600	7.800	7.498	0.302	300.0	1000	4.78	50.0
Property No. 9	3	4	90.330	0.600	7.800	7.499	0.301	300.0	1000	4.78	50.0
Property No. 12	5	6	90.855	0.600	7.800	7.497	0.303	300.0	1000	4.79	50.0
Property No. 14	7	8	90.226	0.600	7.800	7.499	0.301	300.0	1000	4.78	50.0
Property No.11	9	10	90.851	0.600	7.800	7.497	0.303	300.0	1000	4.79	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
Property No. 8	1.925	1511.9	2.1	1.200	1.502	0.016	0.0	28	0.355
Property No. 9	1.925	1511.9	2.5	1.200	1.501	0.018	0.0	30	0.372
Property No. 12	1.925	1511.9	1.7	1.200	1.503	0.012	0.0	25	0.329
Property No. 14	1.925	1511.9	2.6	1.200	1.501	0.019	0.0	30	0.372
Property No.11	1.925	1511.9	2.7	1.200	1.503	0.020	0.0	31	0.380

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
Property No. 8	90.641	300.0	1000	Circular	10.000	7.800	1.200	10.000	7.498	1.502
Property No. 9	90.330	300.0	1000	Circular	10.000	7.800	1.200	10.000	7.499	1.501
Property No. 12	90.855	300.0	1000	Circular	10.000	7.800	1.200	10.000	7.497	1.503
Property No. 14	90.226	300.0	1000	Circular	10.000	7.800	1.200	10.000	7.499	1.501
Property No.11	90.851	300.0	1000	Circular	10.000	7.800	1.200	10.000	7.497	1.503

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
Property No. 8	1	1900	Manhole	Adoptable	2	1900	Manhole	Adoptable
Property No. 9	3	1900	Manhole	Adoptable	4	1900	Manhole	Adoptable
Property No. 12	5	1900	Manhole	Adoptable	6	1900	Manhole	Adoptable
Property No. 14	7	1900	Manhole	Adoptable	8	1900	Manhole	Adoptable
Property No.11	9	1900	Manhole	Adoptable	10	1900	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
1	9.756	55.351	10.000	2.200	1900					
						0	Property No. 8	7.800	1000	
2	100.394	54.621	10.000	2.502	1900		1	Property No. 8	7.498	1000
3	9.993	45.588	10.000	2.200	1900					
						0	Property No. 9	7.800	1000	
4	100.321	44.958	10.000	2.501	1900		1	Property No. 9	7.499	1000
5	9.888	36.240	10.000	2.200	1900					
						0	Property No. 12	7.800	1000	
6	100.741	35.610	10.000	2.503	1900		1	Property No. 12	7.497	1000
7	10.098	26.368	10.000	2.200	1900					
						0	Property No. 14	7.800	1000	
8	100.321	25.632	10.000	2.501	1900		1	Property No. 14	7.499	1000

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
9	9.997	16.705	10.000	2.200	1900				
						0	Property No.11	7.800	1000
10	100.846	16.113	10.000	2.503	1900		1	Property No.11	7.497
						1	Property No.11	7.497	1000

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	7.830	0.030	2.3	0.0907	0.0000	OK
15 minute winter	2	11	7.512	0.014	2.0	0.0000	0.0000	OK
15 minute winter	3	11	7.832	0.032	2.7	0.0975	0.0000	OK
15 minute winter	4	11	7.516	0.017	2.4	0.0000	0.0000	OK
15 minute winter	5	11	7.827	0.027	1.8	0.0807	0.0000	OK
15 minute winter	6	11	7.508	0.011	1.5	0.0000	0.0000	OK
15 minute winter	7	11	7.833	0.033	2.9	0.1008	0.0000	OK
15 minute winter	8	11	7.517	0.018	2.6	0.0000	0.0000	OK
15 minute winter	9	11	7.834	0.034	3.0	0.1019	0.0000	OK
15 minute winter	10	11	7.516	0.019	2.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	Property No. 8	2	2.0	0.494	0.001	0.3953	1.0
15 minute winter	3	Property No. 9	4	2.4	0.500	0.002	0.4521	1.2
15 minute winter	5	Property No. 12	6	1.5	0.474	0.001	0.3211	0.8
15 minute winter	7	Property No. 14	8	2.6	0.503	0.002	0.4825	1.3
15 minute winter	9	Property No.11	10	2.6	0.503	0.002	0.4959	1.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.844	0.044	5.7	0.1310	0.0000	OK
15 minute winter	2	11	7.536	0.038	5.3	0.0000	0.0000	OK
15 minute winter	3	10	7.847	0.047	6.7	0.1412	0.0000	OK
15 minute winter	4	11	7.543	0.044	6.3	0.0000	0.0000	OK
15 minute winter	5	11	7.840	0.040	4.5	0.1174	0.0000	OK
15 minute winter	6	11	7.526	0.029	4.1	0.0000	0.0000	OK
15 minute winter	7	10	7.848	0.048	7.1	0.1450	0.0000	OK
15 minute winter	8	11	7.544	0.045	6.6	0.0000	0.0000	OK
15 minute winter	9	10	7.849	0.049	7.3	0.1471	0.0000	OK
15 minute winter	10	11	7.542	0.045	6.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	Property No. 8	2	5.3	0.516	0.004	0.9468	2.5
15 minute winter	3	Property No. 9	4	6.3	0.517	0.004	1.1185	2.9
15 minute winter	5	Property No. 12	6	4.1	0.513	0.003	0.7402	2.0
15 minute winter	7	Property No. 14	8	6.6	0.520	0.004	1.1567	3.1
15 minute winter	9	Property No.11	10	6.8	0.525	0.005	1.1853	3.2

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.849	0.049	7.4	0.1461	0.0000	OK
15 minute winter	2	11	7.544	0.046	6.9	0.0000	0.0000	OK
15 minute winter	3	10	7.853	0.053	8.7	0.1588	0.0000	OK
15 minute winter	4	11	7.547	0.048	8.1	0.0000	0.0000	OK
15 minute winter	5	10	7.844	0.044	5.8	0.1303	0.0000	OK
15 minute winter	6	11	7.535	0.038	5.4	0.0000	0.0000	OK
15 minute winter	7	10	7.854	0.054	9.2	0.1635	0.0000	OK
15 minute winter	8	11	7.548	0.049	8.6	0.0000	0.0000	OK
15 minute winter	9	10	7.855	0.055	9.5	0.1664	0.0000	OK
15 minute winter	10	11	7.547	0.050	8.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	Property No. 8	2	6.9	0.527	0.005	1.1932	3.2
15 minute winter	3	Property No. 9	4	8.1	0.557	0.005	1.3231	3.8
15 minute winter	5	Property No. 12	6	5.4	0.516	0.004	0.9602	2.5
15 minute winter	7	Property No. 14	8	8.6	0.568	0.006	1.3723	4.0
15 minute winter	9	Property No.11	10	8.9	0.574	0.006	1.4128	4.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	7.858	0.058	10.4	0.1718	0.0000	OK
15 minute winter	2	11	7.550	0.052	9.8	0.0000	0.0000	OK
15 minute winter	3	10	7.862	0.062	12.2	0.1875	0.0000	OK
15 minute winter	4	11	7.555	0.056	11.5	0.0000	0.0000	OK
15 minute winter	5	10	7.851	0.051	8.1	0.1506	0.0000	OK
15 minute winter	6	11	7.544	0.047	7.6	0.0000	0.0000	OK
15 minute winter	7	10	7.864	0.064	12.8	0.1927	0.0000	OK
15 minute winter	8	11	7.556	0.057	12.1	0.0000	0.0000	OK
15 minute winter	9	10	7.865	0.065	13.3	0.1967	0.0000	OK
15 minute winter	10	11	7.555	0.058	12.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	Property No. 8	2	9.8	0.592	0.006	1.5028	4.5
15 minute winter	3	Property No. 9	4	11.5	0.623	0.008	1.6763	5.3
15 minute winter	5	Property No. 12	6	7.6	0.544	0.005	1.2680	3.5
15 minute winter	7	Property No. 14	8	12.1	0.633	0.008	1.7341	5.6
15 minute winter	9	Property No.11	10	12.5	0.640	0.008	1.7929	5.8

D. Proposed attenuation calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Raingarden (Property 8 - Option A)	0.016	2.000	46.855	52.018	1.100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Raingarden (Property 8 - Option A) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	2.0		
Invert Level (m)	0.900	Diameter (m)	0.031		

Node Raingarden (Property 8 - Option A) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.450
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	42	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	3.000	Number Required	1
Porosity	0.30	Pit Length (m)	8.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	Raingarden (Property 8 - Option A)	24	1.012	0.112	1.8	0.8055	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
30 minute winter	Raingarden (Property 8 - Option A)	Orifice	0.6	1.4				

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	Raingarden (Property 8 - Option A)	25	1.209	0.309	4.4	2.2274	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
30 minute winter	Raingarden (Property 8 - Option A)	Orifice	1.1	3.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	Raingarden (Property 8 - Option A)	45	1.323	0.423	3.8	3.0454	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
60 minute winter	Raingarden (Property 8 - Option A)	Orifice	1.3	5.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	Raingarden (Property 8 - Option A)	38	2.000	1.100	5.3	3.2436	0.3378	FLOOD
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
60 minute winter	Raingarden (Property 8 - Option A)	Orifice	2.1	7.3				

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Property (RG plus permeable paving)	0.018	4.00	2.000	44.150	52.189	1.100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Property (RG plus permeable paving) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Property (RG plus permeable paving) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	10.000	Number Required	1
Porosity	0.30	Pit Length (m)	18.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
480 minute winter	Property (RG plus permeable paving)	448	0.946	0.046	0.3	2.4844	0.0000	OK
Link Event (Upstream Depth)	US Node			Link	Outflow (l/s)	Discharge Vol (m ³)		
480 minute winter	Property (RG plus permeable paving)			Orifice	0.1	2.7		

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
360 minute winter	Property (RG plus permeable paving)	328	1.005	0.105	0.9	5.6478	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m ³)
360 minute winter	Property (RG plus permeable paving)	Orifice	0.1	3.8

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
480 minute winter	Property (RG plus permeable paving)	440	1.039	0.139	0.9	7.4850	0.0000	OK
Link Event (Upstream Depth)	US Node			Link	Outflow (l/s)	Discharge Vol (m³)		
480 minute winter	Property (RG plus permeable paving)			Orifice	0.2	5.3		

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	Property (RG plus permeable paving)	344	1.099	0.199	1.5	10.7305	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
360 minute winter	Property (RG plus permeable paving)	Orifice	0.2	5.5				

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Raingarden (Property 11 - Option A)	0.020	2.000	42.845	50.896	1.100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Raingarden (Property 11 - Option A) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	5.5		
Invert Level (m)	0.900	Diameter (m)	0.051		

Node Raingarden (Property 11 - Option A) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.450
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	13	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	2.000	Number Required	1
Porosity	0.30	Pit Length (m)	6.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Raingarden (Property 11 - Option A)	12	1.045	0.145	3.0	0.5223	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
15 minute winter	Raingarden (Property 11 - Option A)	Orifice	1.9	1.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Raingarden (Property 11 - Option A)	13	1.340	0.440	7.5	1.5825	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
15 minute winter	Raingarden (Property 11 - Option A)	Orifice	3.5	3.2				

Results for 100 year Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Raingarden (Property 11 - Option A)	12	1.798	0.898	9.7	1.6218	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
15 minute winter	Raingarden (Property 11 - Option A)	Orifice	5.1	4.2				

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 98.78%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	Raingarden (Property 11 - Option A)	10	2.000	1.100	13.6	1.6218	1.0224	FLOOD
Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)				
15 minute winter	Raingarden (Property 11 - Option A)	Orifice	5.6	5.1				

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Permeable paving (Property no. 12)	0.012	2.000	45.785	51.233	1.100
Permeable paving (Property no. 14)	0.019	2.000	48.324	51.243	1.100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Permeable paving (Property no. 12) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Permeable paving (Property no. 14) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Permeable paving (Property no. 12) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.300
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	180	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	10.000	Number Required	1
Porosity	0.30	Pit Length (m)	10.000		

Node Permeable paving (Property no. 14) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.300
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	10.500	Number Required	1
Porosity	0.30	Pit Length (m)	13.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Permeable paving (Property no. 12)	172	0.946	0.046	0.4	1.3751	0.0000	OK
480 minute winter	Permeable paving (Property no. 14)	328	0.958	0.058	0.3	2.3579	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	Permeable paving (Property no. 12)	Orifice	0.1	1.5
480 minute winter	Permeable paving (Property no. 14)	Orifice	0.1	3.0

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Permeable paving (Property no. 12)	168	1.009	0.109	1.0	3.2835	0.0000	OK
360 minute winter	Permeable paving (Property no. 14)	328	1.039	0.139	0.9	5.6885	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	Permeable paving (Property no. 12)	Orifice	0.1	2.7
360 minute winter	Permeable paving (Property no. 14)	Orifice	0.2	4.4

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Permeable paving (Property no. 12)	172	1.045	0.145	1.3	4.3486	0.0000	OK
360 minute winter	Permeable paving (Property no. 14)	344	1.082	0.182	1.2	7.4487	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	Permeable paving (Property no. 12)	Orifice	0.2	3.3
360 minute winter	Permeable paving (Property no. 14)	Orifice	0.2	5.2

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Permeable paving (Property no. 12)	208	1.108	0.208	1.4	6.2528	0.0000	OK
360 minute winter	Permeable paving (Property no. 14)	344	1.166	0.266	1.6	10.8999	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Permeable paving (Property no. 12)	Orifice	0.2	4.5
360 minute winter	Permeable paving (Property no. 14)	Orifice	0.2	6.4

E. Storage Estimate

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
Attenuation crate (Property no. 9)	0.018	2.000	43.404	49.601	1.100
Attenuation crate (Property no. 12)	0.012	2.000	48.235	49.587	1.100
Attenuation crate (Property no. 14)	0.019	2.000	50.649	49.585	1.100
Attenuation crate (Property no. 8)	0.016	2.000	41.024	49.559	1.100
Attenuation crate (Property No.11)	0.020	2.000	45.790	49.581	1.100

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Node Attenuation crate (Property no. 9) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Attenuation crate (Property no. 12) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Attenuation crate (Property no. 14) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Attenuaton crate (Property no. 8) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Attenuation crate (Property No.11) Online Orifice Control

Flap Valve	x	Design Depth (m)	1.000	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	0.900	Diameter (m)	0.015		

Node Attenuation crate (Property no. 9) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.450
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.000	Number Required	1
Porosity	1.00	Pit Length (m)	5.000		

Node Attenuation crate (Property no. 12) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	260	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.000	Number Required	1
Porosity	1.00	Pit Length (m)	4.000		

Node Attenuation crate (Property no. 14) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.350
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	5.000	Number Required	1
Porosity	1.00	Pit Length (m)	6.000		

Node Attenuaton crate (Property no. 8) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.450
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	312	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.000	Number Required	1
Porosity	1.00	Pit Length (m)	4.000		

Node Attenuation crate (Property No.11) Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	0.900	Depth (m)	0.450
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	5.000	Number Required	1
Porosity	1.00	Pit Length (m)	5.000		

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Attenuation crate (Property no. 9)	180	0.997	0.097	0.5	1.9481	0.0000	OK
180 minute winter	Attenuation crate (Property no. 12)	132	0.975	0.075	0.4	1.2046	0.0000	OK
360 minute winter	Attenuation crate (Property no. 14)	264	0.976	0.076	0.4	2.2936	0.0000	OK
240 minute winter	Attenuation crate (Property no. 8)	176	0.999	0.099	0.5	1.5855	0.0000	OK
240 minute winter	Attenuation crate (Property No.11)	184	0.991	0.091	0.6	2.2769	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Attenuation crate (Property no. 9)	Orifice	0.1	2.6
180 minute winter	Attenuation crate (Property no. 12)	Orifice	0.1	1.8
360 minute winter	Attenuation crate (Property no. 14)	Orifice	0.1	3.0
240 minute winter	Attenuation crate (Property no. 8)	Orifice	0.1	2.5
240 minute winter	Attenuation crate (Property No.11)	Orifice	0.1	2.6

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute winter	Attenuation crate (Property no. 9)	168	1.146	0.246	1.5	4.9148	0.0000	OK
180 minute winter	Attenuation crate (Property no. 12)	140	1.089	0.189	1.0	3.0316	0.0000	OK
180 minute winter	Attenuation crate (Property no. 14)	176	1.082	0.182	1.6	5.4561	0.0000	OK
180 minute winter	Attenuation crate (Property no. 8)	148	1.155	0.255	1.3	4.0821	0.0000	OK
180 minute winter	Attenuation crate (Property No.11)	172	1.122	0.222	1.6	5.5504	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
180 minute winter	Attenuation crate (Property no. 9)	Orifice	0.2	4.3
180 minute winter	Attenuation crate (Property no. 12)	Orifice	0.2	3.5
180 minute winter	Attenuation crate (Property no. 14)	Orifice	0.2	3.7
180 minute winter	Attenuation crate (Property no. 8)	Orifice	0.2	4.2
180 minute winter	Attenuation crate (Property No.11)	Orifice	0.2	4.1

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Attenuation crate (Property no. 9)	224	1.231	0.331	1.5	6.6294	0.0000	OK
180 minute winter	Attenuation crate (Property no. 12)	148	1.155	0.255	1.3	4.0821	0.0000	OK
180 minute winter	Attenuation crate (Property no. 14)	176	1.142	0.242	2.0	7.2675	0.0000	OK
180 minute winter	Attenuation crate (Property no. 8)	168	1.238	0.338	1.7	5.4097	0.0000	OK
240 minute winter	Attenuation crate (Property No.11)	228	1.199	0.299	1.7	7.4745	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Attenuation crate (Property no. 9)	Orifice	0.3	5.7
180 minute winter	Attenuation crate (Property no. 12)	Orifice	0.2	4.2
180 minute winter	Attenuation crate (Property no. 14)	Orifice	0.2	4.4
180 minute winter	Attenuation crate (Property no. 8)	Orifice	0.3	5.0
240 minute winter	Attenuation crate (Property No.11)	Orifice	0.3	5.5

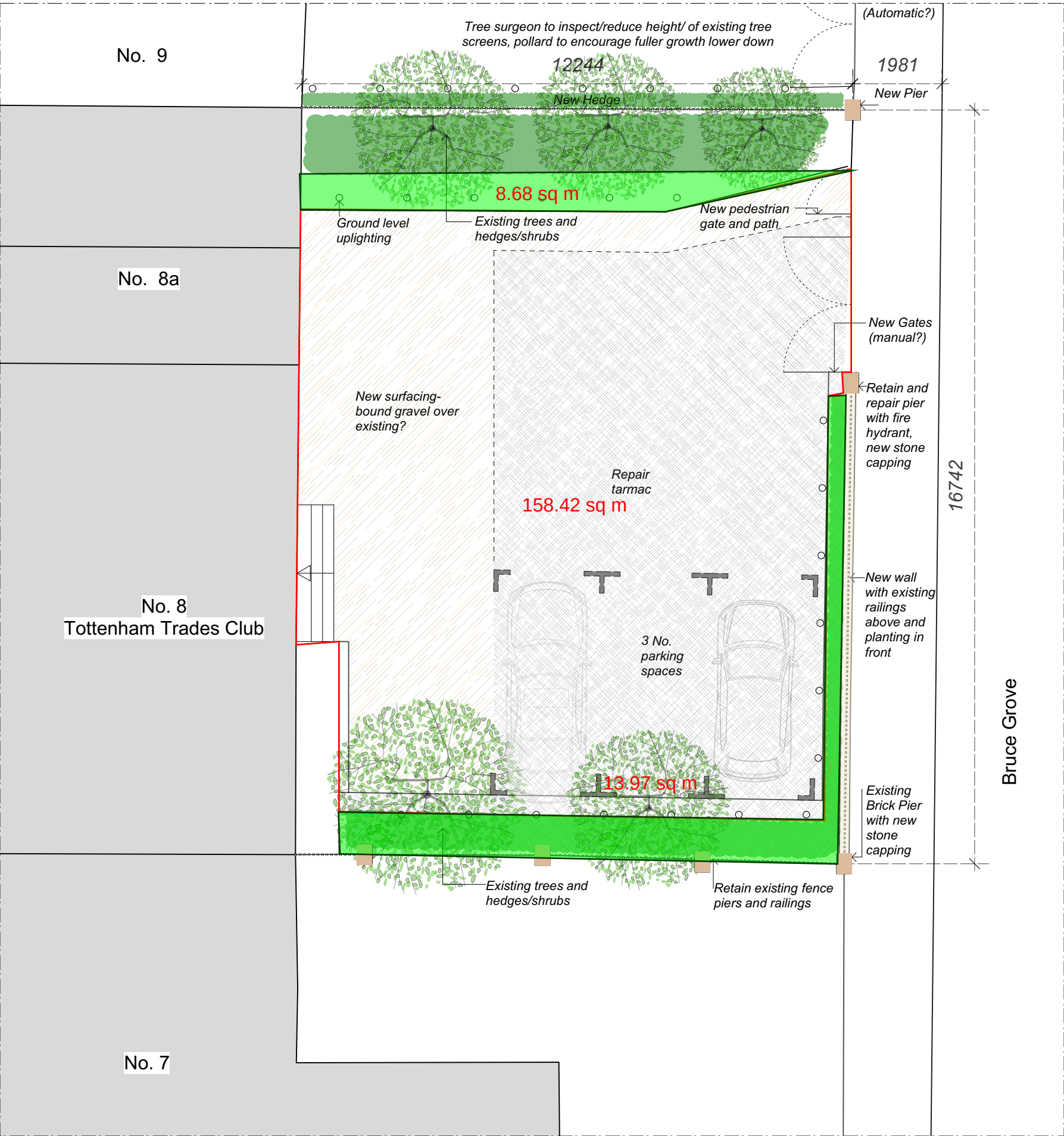
Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	Attenuation crate (Property no. 9)	192	1.657	0.757	2.2	9.0100	0.0000	OK
180 minute winter	Attenuation crate (Property no. 12)	144	1.462	0.562	1.8	5.6080	0.0000	OK
240 minute winter	Attenuation crate (Property no. 14)	232	1.304	0.404	2.3	10.5150	0.0000	OK
240 minute winter	Attenuation crate (Property no. 8)	184	1.785	0.885	1.9	7.2080	0.0000	OK
240 minute winter	Attenuation crate (Property No.11)	232	1.330	0.430	2.4	10.7426	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	Outflow (l/s)	Discharge Vol (m³)
240 minute winter	Attenuation crate (Property no. 9)	Orifice	0.4	7.3
180 minute winter	Attenuation crate (Property no. 12)	Orifice	0.3	5.4
240 minute winter	Attenuation crate (Property no. 14)	Orifice	0.3	6.1
240 minute winter	Attenuation crate (Property no. 8)	Orifice	0.4	7.2
240 minute winter	Attenuation crate (Property No.11)	Orifice	0.3	6.7

F. Drawings

1. SuDS features plan for each forecourts



01 8 Bruce Grove Plan
08-02 1:100@A3; 1:50@A1

Notes DO NOT SCALE - Use Figure
Dimensions Only IF IN DOUBT - ASK

Revisions



Haringey Heritage Action Zone

Proposed
8 Bruce Grove Forecourt

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Union Chapel, Compton Avenue London N1 2XD
rma@rmears.co.uk www.rmears.co.uk tel 020 7359 8222

Date	Scale	Job No.	Code	Dwg No.
31.01.2022	1:100@A3	2141	-	BG08-02



Notes DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK

A Updated Layout 23/06/2022

Revisions
0 1 2 3 4 5 M

Haringey Heritage Action Zone
N17

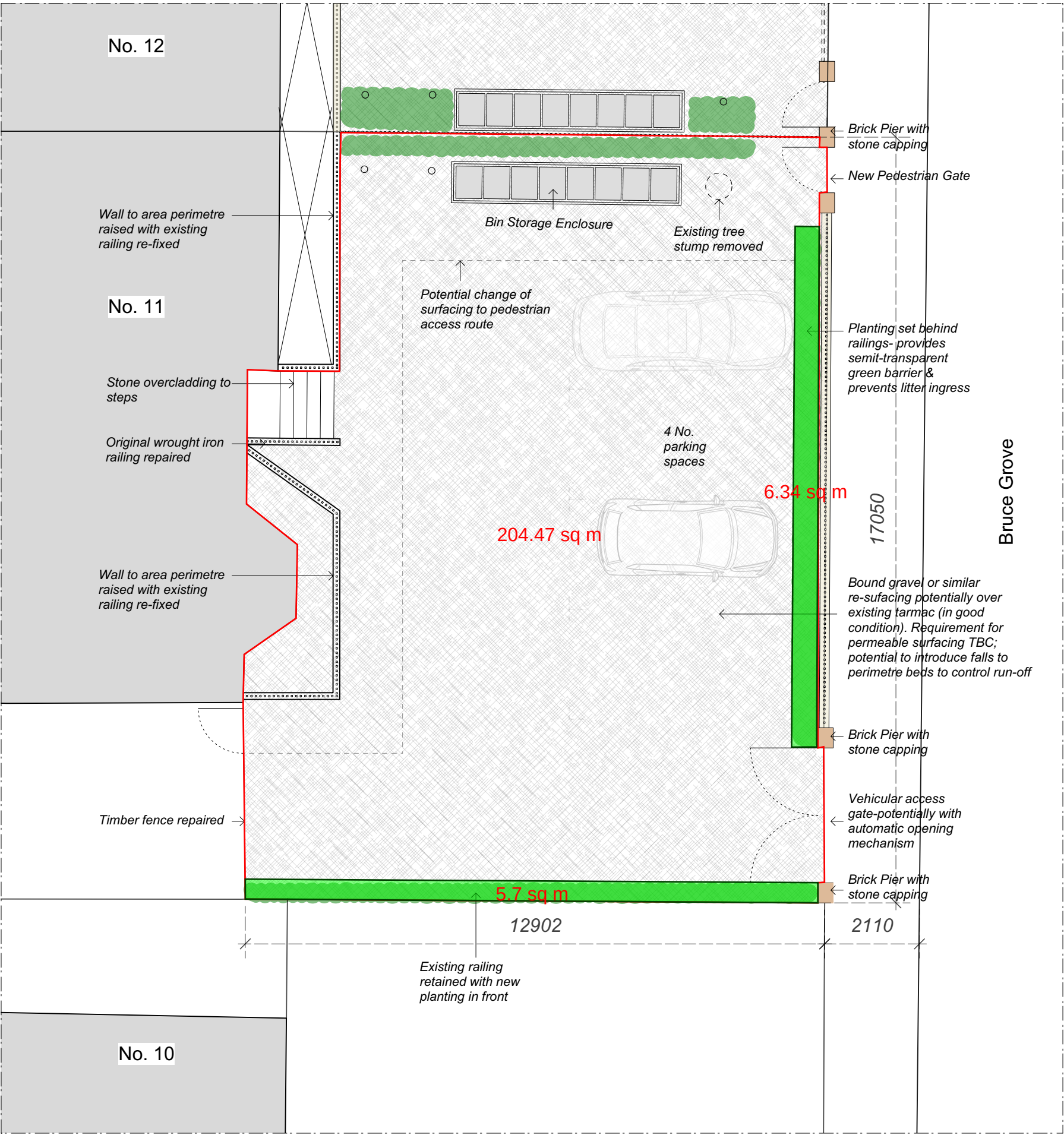
Proposed Forecourt
9 Bruce Grove

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Union Chapel, Compton Avenue London N1 2XD

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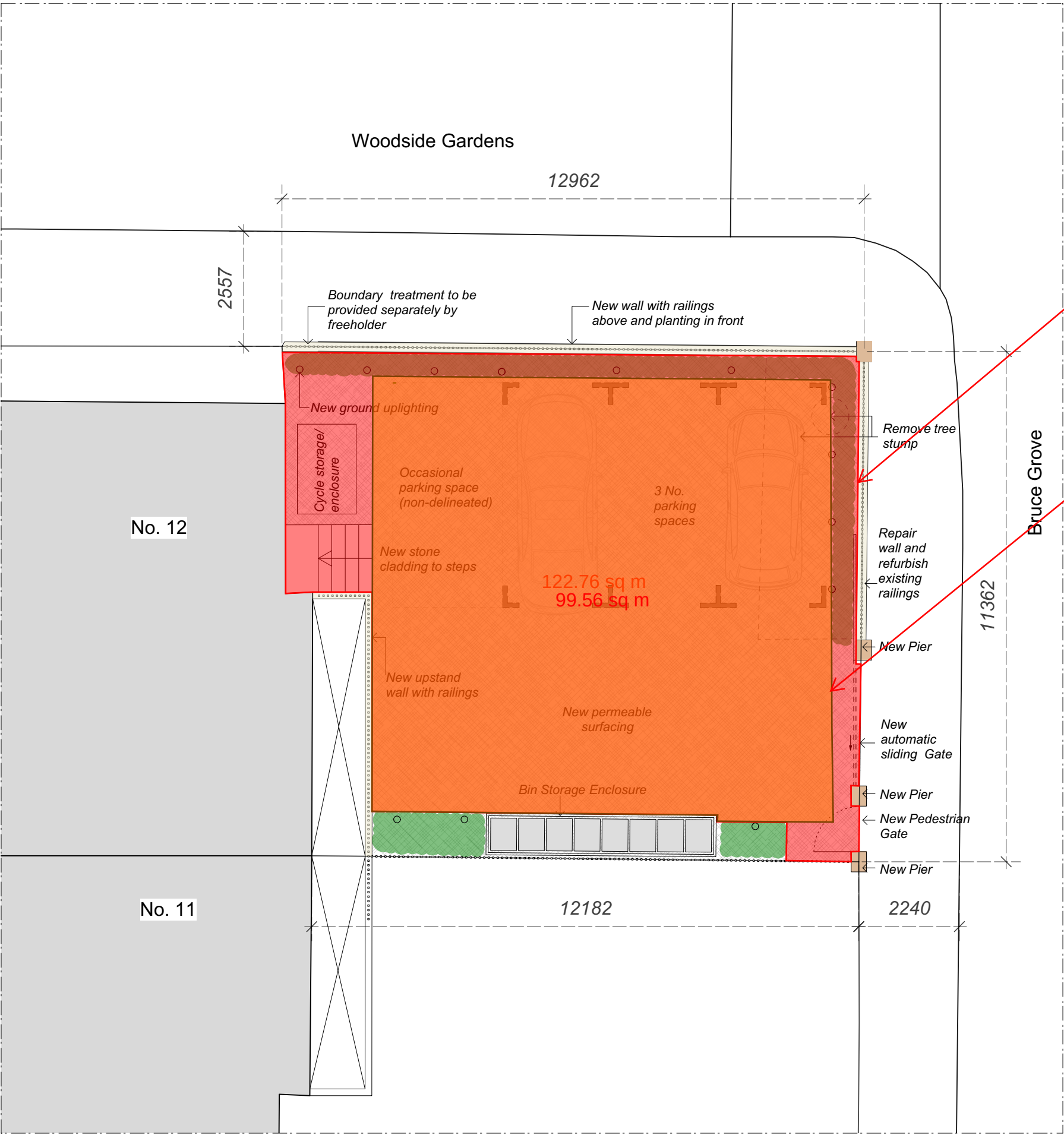
Date	Scale	Job No.	Code	Dwg No.
Jan 2022	1:100@A3 1:50@A1	2141		BG09-02A

01 9 Bruce Grove Plan
BG09-02 1:100@A3; 1:50@A1



01 11 Bruce Grove Plan
BG11-02 1:100@A3; 1:50@A1

Notes		DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK			
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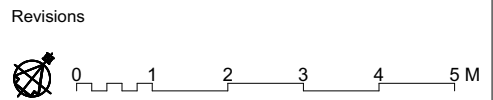


Notes DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK

Existing impermeable area: 122.76 sq.m

Permeable paving area: 96.44 sq.m

A Updated Layout 23/06/2022



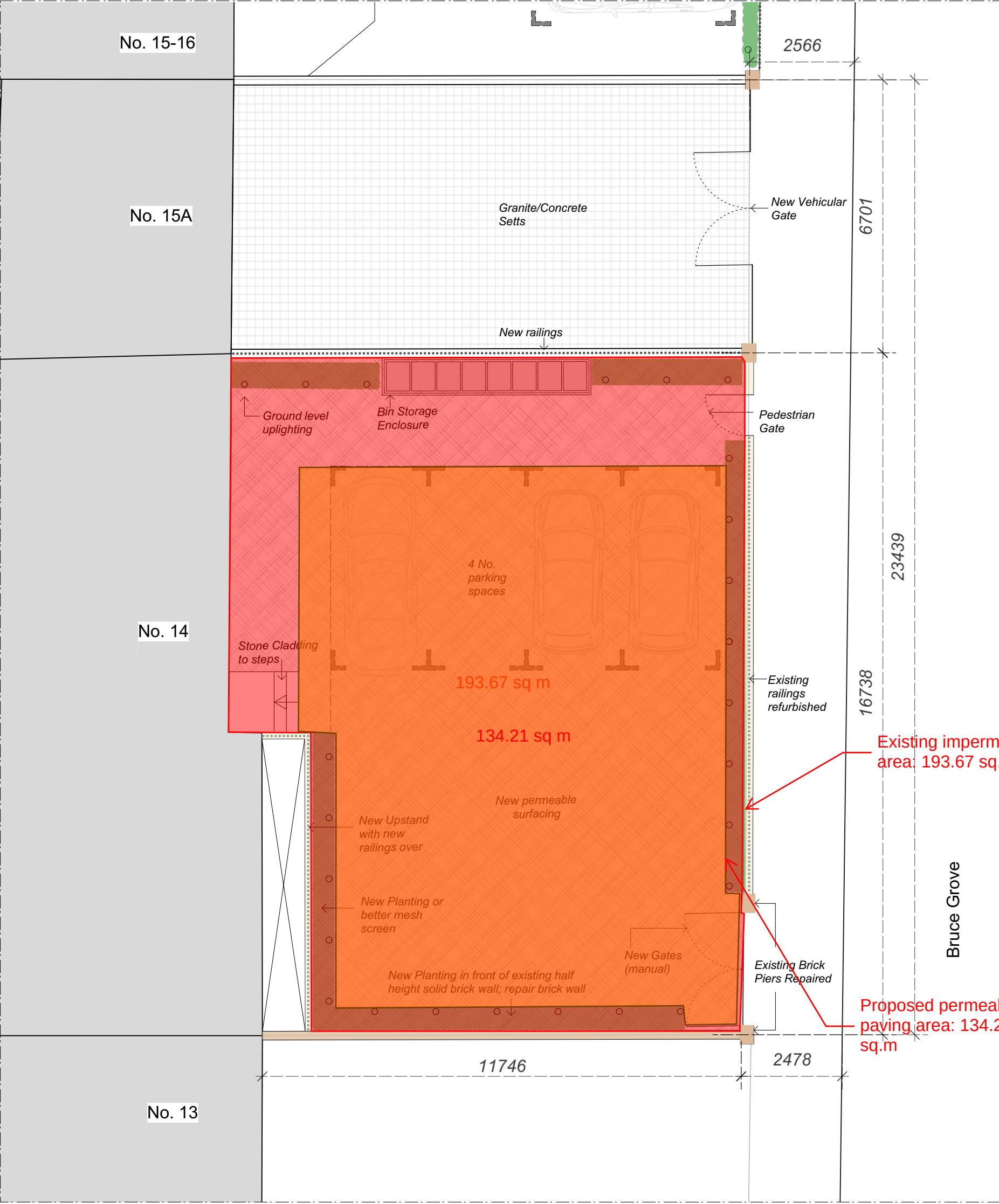
Haringey Heritage Action Zone N17

Proposed Option B
12 Bruce Grove Forecourt

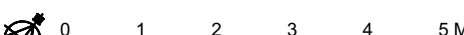
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Date	Scale	Job No.	Code	Dwg No.
Jan 2022	1:100@A3 1:50@A1	2141	BG12-02 iA	



01 14-15A Bruce Grove Plan
BG14-02 1:100@A3; 1:50@A1

Notes	DO NOT SCALE - Use Figure Dimensions Only IF IN DOUBT - ASK	Revisions	Haringey Heritage Action Zone N17					ROGER MEARS ARCHITECTS LLP Union Chapel, Compton Avenue London N1 2XD				
		A 23/06/2022 Updated layout	Proposed Forecourt 14 Bruce Grove					rma@rmears.co.uk www.rmears.co.uk				
								Date	Scale	Job No.	Code	Dwg No.
								Jan 2022	1:100@A3 x:xx@A1	2141		BG14-02 A

G. Haringey SuDS Proforma

1. Property 8
2. Property 9
3. Property 11
4. Property 12
5. Property 14

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Bruce Grove property no.8 forecourt
	Address & post code	N17 6RA
	OS Grid ref. (Easting, Northing)	E 533711 N 190196
	LPA reference (if applicable)	
	Brief description of proposed work	Bruce Grove Public Realm improvements
	Total site Area	203.9 m ²
	Total existing impervious area	158.42 m ²
	Total proposed impervious area	135.77 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Yes
	Existing drainage connection type and location	Existing drainage connection is assumed lateral connection to public sewer
Designer Name	Shubham Nayak	
Designer Position	Graduate Civil Engineer	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	London Clay formation	
	Bedrock geology classification	London Clay formation	
	Site infiltration rate	N/A	m/s
	Depth to groundwater level	N/A	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	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	Y	Y
7 discharge rainwater to the combined sewer.	N	N	
2c. Proposed Discharge Details			
Proposed discharge location	ing into public sewers at a controlled discharge point		
Has the owner/regulator of the discharge location been consulted?	Yes		

	Designer Company	Civic Engineers
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	consulted?	
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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)
Q _{bar}				
1 in 1	0.14	2	1.5	0.6
1 in 30	0.37	5.3	4	1.1
1 in 100	0.51	6.9	5.4	1.3
1 in 100 + CC			7.2	2.1
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Orifice		
3c. Proposed SuDS Measures				
	Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
Rainwater harvesting	0		0	
Infiltration systems	0		0	
Green roofs	0	0	0	
Blue roofs	0	0	0	
Filter strips	0	0	0	
Filter drains	0	0	0	
Bioretention / tree pits	60	24	3.3	
Pervious pavements	0	0	0	
Swales	0	0	0	
Basins/ponds	0	0	0	
Attenuation tanks	0		0	
Total	60	24	3.3	

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3.1
	Drainage hierarchy (2b)	Section 3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 3.3 + Appendix D
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.3 + Appendix C & E
	Proposed SuDS measures & specifications (3b)	Section 3.3 + Appendix F
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix A
	Detailed drainage design drawings, including exceedance flow routes	Appendix F
	Detailed landscaping plans	Appendix F
	Maintenance strategy	Section 4
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Section 3.3, Table 6
	b) biodiversity?	Section 3.3, Table 6
	c) amenity?	Section 3.3, Table 6

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Bruce Grove property no.9 forecourt
	Address & post code	N17 6RA
	OS Grid ref. (Easting, Northing)	E 533711 N 190196
	LPA reference (if applicable)	
	Brief description of proposed work	Bruce Grove Public Realm improvements
	Total site Area	200 m ²
	Total existing impervious area	183.1 m ²
	Total proposed impervious area	183 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Yes
	Existing drainage connection type and location	Existing drainage connection is assumed lateral connection to public sewer
Designer Name	Shubham Nayak	
Designer Position	Graduate Civil Engineer	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	London Clay formation	
	Bedrock geology classification	London Clay formation	
	Site infiltration rate	N/A	m/s
	Depth to groundwater level	N/A	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	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	Y	Y
7 discharge rainwater to the combined sewer.	N	N	
2c. Proposed Discharge Details			
Proposed discharge location	gung into public sewers at a controlled discar		
Has the owner/regulator of the discharge location been	Yes		

	Designer Company	Civic Engineers
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	consulted?	
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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)
Q _{bar}				
1 in 1	0.14	2	1.94	0.1
1 in 30	0.37	6.3	4.91	0.1
1 in 100	0.51	8.1	6.62	0.2
1 in 100 + CC			9	0.2
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Orifice		
3c. Proposed SuDS Measures				
	Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
Rainwater harvesting	0		0	
Infiltration systems	0		0	
Green roofs	0	0	0	
Blue roofs	0	0	0	
Filter strips	0	0	0	
Filter drains	0	0	0	
Bioretention / tree pits	53.6	17	2	
Pervious pavements	108.4	162	20	
Swales	0	0	0	
Basins/ponds	0	0	0	
Attenuation tanks	0		0	
Total	162	179	22	

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3.1
	Drainage hierarchy (2b)	Section 3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 3.3 + Appendix D
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.3 + Appendix C & E
	Proposed SuDS measures & specifications (3b)	Section 3.3 + Appendix F
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix A
	Detailed drainage design drawings, including exceedance flow routes	Appendix F
	Detailed landscaping plans	Appendix F
	Maintenance strategy	Section 4
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Section 3.3, Table 6
	b) biodiversity?	Section 3.3, Table 6
	c) amenity?	Section 3.3, Table 6

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Bruce Grove property no.11 forecourt
	Address & post code	N17 6RA
	OS Grid ref. (Easting, Northing)	E 533711 N 190196
	LPA reference (if applicable)	
	Brief description of proposed work	Bruce Grove Public Realm improvements
	Total site Area	211 m ²
	Total existing impervious area	204.47 m ²
	Total proposed impervious area	192.4 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Yes
	Existing drainage connection type and location	Existing drainage connection is assumed lateral connection to public sewer
Designer Name	Shubham Nayak	
Designer Position	Graduate Civil Engineer	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	London Clay formation	
	Bedrock geology classification	London Clay formation	
	Site infiltration rate	N/A	m/s
	Depth to groundwater level	N/A	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	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	Y	Y
	7 discharge rainwater to the combined sewer.	N	N
2c. Proposed Discharge Details			
Proposed discharge location	gung into public sewers at a controlled discar		
Has the owner/regulator of the discharge location been	Yes		

	Designer Company	Civic Engineers
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	consulted?	
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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)
	Q _{bar}				
	1 in 1	0.14	2.6	2.27	1.2
	1 in 30	0.37	6.8	5.55	2.2
	1 in 100	0.51	8.9	7.47	2.6
	1 in 100 + CC			10.74	5.5
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control		Orifice		
	3c. Proposed SuDS Measures				
		Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
	Rainwater harvesting	0		0	
	Infiltration systems	0		0	
	Green roofs	0	0	0	
	Blue roofs	0	0	0	
Filter strips	0	0	0		
Filter drains	0	0	0		
Bioretention / tree pits	46.8	25	3.38		
Pervious pavements	0	0	0		
Swales	0	0	0		
Basins/ponds	0	0	0		
Attenuation tanks	0		0		
Total	46.8	25	3.38		

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3.1
	Drainage hierarchy (2b)	Section 3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 3.3 + Appendix D
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.3 + Appendix C & E
	Proposed SuDS measures & specifications (3b)	Section 3.3 + Appendix F
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix A
	Detailed drainage design drawings, including exceedance flow routes	Appendix F
	Detailed landscaping plans	Appendix F
	Maintenance strategy	Section 4
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Section 3.3, Table 6
	b) biodiversity?	Section 3.3, Table 6
	c) amenity?	Section 3.3, Table 6

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Bruce Grove property no.12 forecourt
	Address & post code	N17 6RA
	OS Grid ref. (Easting, Northing)	E 533711 N 190196
	LPA reference (if applicable)	
	Brief description of proposed work	Bruce Grove Public Realm improvements
	Total site Area	143.23 m ²
	Total existing impervious area	122.76 m ²
	Total proposed impervious area	100 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Yes
	Existing drainage connection type and location	Existing drainage connection is assumed lateral connection to public sewer
Designer Name	Shubham Nayak	
Designer Position	Graduate Civil Engineer	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	London Clay formation	
	Bedrock geology classification	London Clay formation	
	Site infiltration rate	N/A	m/s
	Depth to groundwater level	N/A	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	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	Y	Y
7 discharge rainwater to the combined sewer.	N	N	
2c. Proposed Discharge Details			
Proposed discharge location	gung into public sewers at a controlled disca		
Has the owner/regulator of the discharge location been	Yes		

	Designer Company	Civic Engineers
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	consulted?	
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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)
	Q _{bar}				
	1 in 1	0.14	1.5	1.2	0.1
	1 in 30	0.37	4.1	3.03	0.2
	1 in 100	0.51	5.4	4.08	0.2
	1 in 100 + CC			5.6	0.3
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control		Orifice		
	3c. Proposed SuDS Measures				
		Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
	Rainwater harvesting	0		0	
	Infiltration systems	0		0	
	Green roofs	0	0	0	
	Blue roofs	0	0	0	
	Filter strips	0	0	0	
Filter drains	0	0	0		
Bioretention / tree pits	0	0	0		
Pervious pavements	15	100	9		
Swales	0	0	0		
Basins/ponds	0	0	0		
Attenuation tanks	0		0		
Total	15	100	9		

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3.1
	Drainage hierarchy (2b)	Section 3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 3.3 + Appendix D
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.3 + Appendix C & E
	Proposed SuDS measures & specifications (3b)	Section 3.3 + Appendix F
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix A
	Detailed drainage design drawings, including exceedance flow routes	Appendix F
	Detailed landscaping plans	Appendix F
	Maintenance strategy	Section 4
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Section 3.3, Table 6
	b) biodiversity?	Section 3.3, Table 6
	c) amenity?	Section 3.3, Table 6

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)	Bruce Grove property no.14 forecourt
	Address & post code	N17 6YT
	OS Grid ref. (Easting, Northing)	E 533711 N 190196
	LPA reference (if applicable)	
	Brief description of proposed work	Bruce Grove Public Realm improvements
	Total site Area	206.62 m ²
	Total existing impervious area	193.67 m ²
	Total proposed impervious area	167.07 m ²
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?	Yes
	Existing drainage connection type and location	Existing drainage connection is assumed lateral connection to public sewer
Designer Name	Shubham Nayak	
Designer Position	Graduate Civil Engineer	

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification	London Clay formation	
	Bedrock geology classification	London Clay formation	
	Site infiltration rate	N/A	m/s
	Depth to groundwater level	N/A	m below ground level
	Is infiltration feasible?	No	
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	1 store rainwater for later use	N	N
	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	Y	Y
7 discharge rainwater to the combined sewer.	N	N	
2c. Proposed Discharge Details			
Proposed discharge location	gung into public sewers at a controlled discar		
Has the owner/regulator of the discharge location been	Yes		

	Designer Company	Civic Engineers
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	consulted?	
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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)
Q _{bar}				
1 in 1	0.14	2.6	2.29	0.1
1 in 30	0.37	6.6	5.45	0.2
1 in 100	0.51	8.6	7.26	0.3
1 in 100 + CC			10.5	0.5
Climate change allowance used		40%		
3b. Principal Method of Flow Control		Orifice		
3c. Proposed SuDS Measures				
	Catchment area (m ²)	Plan area (m ²)	Storage vol. (m ³)	
Rainwater harvesting	0		0	
Infiltration systems	0		0	
Green roofs	0	0	0	
Blue roofs	0	0	0	
Filter strips	0	0	0	
Filter drains	0	0	0	
Bioretention / tree pits	0	0	0	
Pervious pavements	33.57	134	9	
Swales	0	0	0	
Basins/ponds	0	0	0	
Attenuation tanks	0		0	
Total	33.57	134	9	

4. Supporting Information	4a. Discharge & Drainage Strategy	Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results	Section 3.1
	Drainage hierarchy (2b)	Section 3
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location	Section 3.3 + Appendix D
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations	Section 3.3 + Appendix C & E
	Proposed SuDS measures & specifications (3b)	Section 3.3 + Appendix F
	4b. Other Supporting Details	Page/section of drainage report
	Detailed Development Layout	Appendix A
	Detailed drainage design drawings, including exceedance flow routes	Appendix F
	Detailed landscaping plans	Appendix F
	Maintenance strategy	Section 4
	Demonstration of how the proposed SuDS measures improve:	
	a) water quality of the runoff?	Section 3.3, Table 6
	b) biodiversity?	Section 3.3, Table 6
	c) amenity?	Section 3.3, Table 6

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