

Technical Note

Project:	Thamesfield Retirement Village Development	Job No:	222351
Subject:	Drainage / SuDS Strategy	Revision:	04
Prepared by:	Richard James	Date:	28th November 2024

This technical note has been prepared to provide supporting evidence relating to the Drainage / SuDS Strategy for the proposed development at the above site.

The application site is located within the village of Remenham, directly opposite Henley-on-Thames. The site is bordered by the River Thames to the south west, and Wargrave Road to the north east. To the north west there are retirement properties known as Remenham Row and to the south east is the Eyot Centre. The site is broadly square in shape and comprises approximately 0.88ha of land. Vehicular and pedestrian access to the site is currently directly off Wargrave Road.

Thamesfield is an established and operational Integrated Retirement Community (IRC) providing extra care retirement accommodation and associated communal facilities. The Site currently comprises 37 extra care units (use class C2).

It contains two distinct buildings - the main building which covers the northern part of the site and Thamesfield Lodge which is located in the eastern corner. The main building comprises three elements: the original Stucco Fronted building which fronts on to the Thames and late 20th century extension to the north; the 1993 extension which is adjacent to the northern boundary of the site and the 1995 extension which is broadly centrally located within the site. A mix of hard and soft landscaping cover the remainder of the site including car parking, a croquet lawn and a landscaped lawn down to the banks of the River Thames.

The surrounding area comprises a diverse mix of uses, including residential, sports and hospitality. The site is a short distance (c. 300m) from Henley Bridge and, as such, is well located in respect of the facilities and services within Henley.

The following constraints and designations are relevant to the site:

- The site is entirely within Flood Zone 3;
- The site is within the Green Belt;
- Park Palace and Temple Combe Grade II* Registered Park and Garden, which is also designated as a Local Wildlife Site, is located at approximately 320m to the east of the site;
- The site is within Remenham Henley Bridge Conservation Area and is opposite the Henley Conservation Area on the western side of the River Thames;
- The site is on a 'Green Route'; and
- There are a number of trees covered by a Tree Preservation Order (TPO-0206-1981).

The existing site is considered a brownfield site and has an approximate site area of 0.88Ha, of which 0.43Ha is considered to be impermeable.

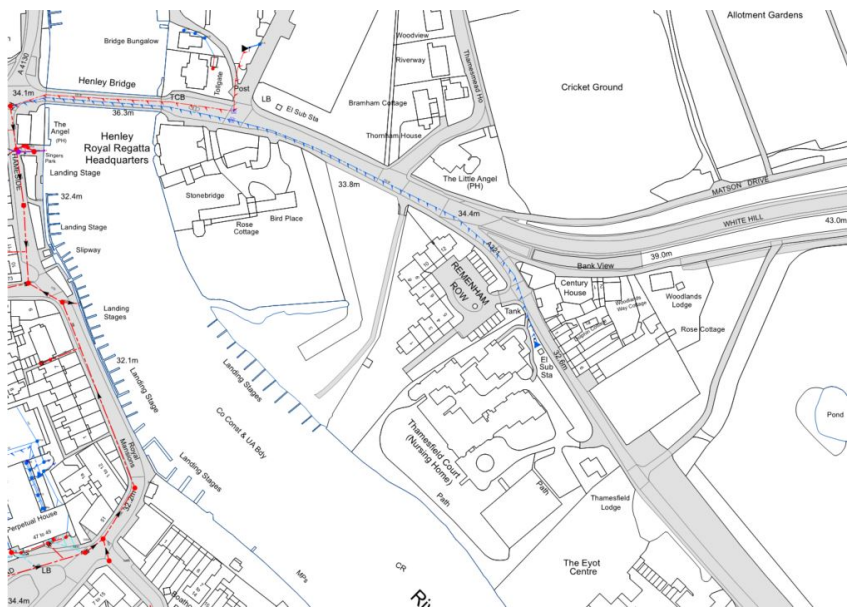
The development involves the part demolition of the existing building and replacement with a three-storey extension to provide extra-care units (Use Class C2), with associated soft and hard landscaping works; provision of additional vehicle parking, bin stores and ancillary structures; and alterations to existing basement".

Technical Note

A Geotechnical site investigation undertaken at the site confirmed that the site is underlain by made ground over clay up to approximately 2.4m deep. Sand and gravel was encountered below the clay with groundwater being encountered at just over 2m below ground rising to 1.6m below ground.

Existing Site Drainage

With reference to the Thames Water sewer record plan, there are no public sewers crossing the site.



A utility tracing survey undertaken by Laser Surveys Ltd and a drainage CCTV survey carried out by Utility Surveys Ltd, confirms that the existing surface water drainage discharges towards the River Thames.

The survey also confirms that the existing foul drainage for the site drains to an existing pump chamber at the north of the site next to the Substation where it is then pumped along Wargrave Road and connects into the public foul network in Thameside.

A separate foul pump chamber is provided for the lodge house, this pumps back into the site foul drainage.

For further information on the existing drainage arrangement refer to a copy of the drainage survey and utility survey drawings includes as part of this report.

The table below shows the greenfield run off rates for the site based on a site area of 1.24Ha

Technical Note

Event	Greenfield Run Off Rate
QBar	0.5l/s
1 in 1 year	0.4l/s
1 in 30 year	1.1l/s
1 in 100 year	1.6l/s

It can be assumed that the site currently freely discharges to the River Thames, the modified rational method can be adopted in line with Section 24.6.2 of the CIRIA “The SuDS Manual”, in order to determine an estimate for the existing surface water runoff rate from the site. The below table outlines the existing run off rates for a number of events. The peak intensities are based on FSR rainfall data and a winter rainfall profile for a duration of 60 minutes and an impermeable area of 0.43Ha.

Event	Peak intensity (i) 60min Winter Event	Calculation	Brownfield Discharge Rate
1 in 1 year	32.196mm/hr	$Q = 3.61 \times 1.00 \times 32.196 \times 0.43$	49.98 l/s
1 in 30 year	77.499mm/hr	$Q = 3.61 \times 1.00 \times 77.499 \times 0.43$	120.30l/s
1 in 100 year	101.894mm/hr	$Q = 3.61 \times 1.00 \times 101.894 \times 0.43$	158.17 l/s

The majority of the site and existing buildings are remaining and will continue to drain as per the existing arrangement, however 580m² of existing building is being demolished to make way for a new residential block. The existing runoff from this area can be calculated as follows:

Event	Peak intensity (i) 60min Winter Event	Calculation	Brownfield Discharge Rate
1 in 1 year	32.196mm/hr	$Q = 3.61 \times 1.00 \times 32.196 \times 0.058$	6.74 l/s
1 in 30 year	77.499mm/hr	$Q = 3.61 \times 1.00 \times 77.499 \times 0.058$	16.23l/s
1 in 100 year	101.894mm/hr	$Q = 3.61 \times 1.00 \times 101.894 \times 0.058$	21.33l/s

Local Planning Policies

Referring to Wokingham Borough Council’s planning guidance documents the following policies are applicable for flood risk & drainage.

Wokingham Borough Council Core Strategy Development Plan

Policy CP1 Sustainable Development

“Development must ensure that greenfield surface water run-off rates are achieved, where possible, through the use of Sustainable Urban Drainage Systems (SUDS).”

Wokingham Borough Council Sustainable Design and Construction Supplementary Planning Document section 12

“Sustainable Drainage Systems (SUDs) can be used to minimise the risk and impact of flooding. New development should be designed to be resilient to flooding as appropriate. There should be a nil

Technical Note

detriment situation, the run-off from the site (post development) must not increase and where possible be reduced.

The Council encourages the use of SUDs, which act as an alternative way to drainage in that they attempt to reduce the total amount, flow and rate of surface water run-off. They also aim to mimic the natural drainage patterns of a site."

The document also confirms that Brown Roofs should be considered for all buildings where appropriate.

Wokingham Borough Local Plan Update: Proposed Submission Plan 2023-2040

Policy FD2: Sustainable Drainage

"1. Development proposals must ensure surface water arising, including the impact of climate change, is managed in a sustainable manner. This must be demonstrated through either a:

- a) Site-specific Flood Risk Assessment; or*
- b) Surface Water Drainage Strategy.*

a) Surface Water Drainage Strategy. Development proposals will only be supported where the proposal would reproduce greenfield runoff characteristics and return run-off rates and volumes back to the original greenfield levels for greenfield sites; and for brownfield sites both run-off rates and volumes be reduced to as near greenfield as practicably possible, or 40% betterment of existing, whichever is achievable;

2. The provision of SuDS should:

- a) Be of an appropriate design (in line with the principles and local standards set out in the council's latest SuDS strategy and technical guide and any current national technical standards) to meet the long term needs over the lifetime of the development and which achieve wider social, ecological and environmental benefits;*
- b) Include a clear strategy for adoption and maintenance to the satisfaction of the council, as the Lead Local Flood Authority (LLFA);*
- c) Do not cause adverse impacts on the public sewerage network serving the development where discharging surface water to a public sewer. Any discharges should be agreed in writing by the local sewerage undertaker;*
- d) Effectively manage flood risk, improve the water environment, enhance biodiversity and mitigate and adapt to the effects of climate change;*

Proposed Drainage Strategy

Given the underlying geology and the fact that groundwater was found at a shallow depth on the site infiltration is not a viable method of surface water discharge from the development, in addition it is not proposed that any below ground attenuation tanks will be installed at the site.

Given the site already discharges surface water to the adjacent River Thames, it is proposed to continue this method of surface water disposal but with the inclusion of SuDs.

The existing buildings that are unchanged as part of the redevelopment will continue to drain as per the existing arrangement with a new drainage system being provided for the proposed new block.

The greenfield runoff rate for the whole site has been calculated as 0.5l/s, however given it would be impractical to restrict the runoff from the development to this small a flow rate due to the potential

Technical Note

issues with blockages, it is proposed that surface water runoff from the new block (680m²) will be restricted to 1l/s.

This provides an 85% reduction in runoff when compared to existing block / building discharge rate.

In order to achieve the surface water runoff rate of 1l/s, approximately 40m³ of surface water attenuation will be required to cater for all events up to and including the 1 in 100-year event with an additional allowance of 40% for climate change.

To manage surface water run-off generated by the post development site in a manner which is compliant with current design criteria, Sustainable Urban Drainage Systems (SUDS) will be incorporated within the onsite drainage design. Generally, there are a number of options available to achieve the proposed discharge restrictions such as above ground storage facilities, oversized sewers, below ground storage tanks, water features such as ornate ponds etc. Feasibility of available options is assessed based in the site constraints. The SUDS hierarchy is included in the table below:

	SuDS Heirachy	Constraints/Opportunities
1	Store rainwater for later use	Rainwater harvesting to be reviewed subject to further investigation.
2	Discharge into the ground (infiltration)	Due to the existing soil conditions and geology as there is no scope to use infiltration techniques.
3	Discharge to a surface water body	Existing site discharges to the River Thames River it is proposed that the existing outfalls will be utilised.
4	Discharge to a surface water sewer, highway drain or other drainage system	No public surface water drain, therefore not viable.
5	Discharge to a combined sewer.	No public combined water drain, therefore not viable.

Based on the above hierarchy, it is proposed that attenuation will be provided at roof level as a brown / blue roof, this will help to ensure that the surface water runoff is suitably treated before it enters the below ground drainage system.

The microdrainage storage calculations appended to this report show that a storage depth of 80mm over the brown / blue roof area provides sufficient storage to cater for the 1 in 100-year event with an additional allowance of 40% for climate change.

A drainage strategy has been prepared for the development and is included in this report.

Summary

Due to the underlying ground conditions and the shallow depth of the groundwater encountered at the site, the implementation of infiltration drainage will not be viable and therefore a positive drainage system connecting to the existing drainage outfall on the site is proposed.

Technical Note

Post development discharge from the new block will be limited to 1.0l/s for all events up to the 1:100 year + 40% climate change event. This will provide significant betterment over the existing unattenuated brownfield discharge rates from the site.

In order to attenuate flows the proposed scheme includes a brown / blue roof to the new block with a restricted discharge and connection to the existing outfall to the River Thames.

New parking areas will be constructed using a permeable surface water a lined sub-base material and a connection to the existing drainage system.

The proposed surface water drainage design principles set out in this document will ensure that the development does not increase the risk of flooding to surrounding area.

A drainage maintenance strategy has been detailed for the site and is included with this report.

Encl.

Existing Drainage Survey Plans

Micro Drainage Calculations - Greenfield Run Off

Micro Drainage Calculations - Rainfall intensity Values

Micro Drainage Calculations - Attenuation Volume

MNP Drainage Strategy GA Plan

Drainage and SuDS Maintenance Strategy

- 1) The data presented in this drawing has been collected using a combination of the following techniques; electromagnetic location and ground penetrating radar.
- 2) The utility routes depicted may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities and other subsurface features therefore some features shown may not be utility related. Due to the limitations of techniques employed all utility identifications should be treated with caution and verified prior to design/build works.
- 3) The material and ground conditions surrounding and particularly above buried utilities can lead to inferior data resolution when using ground penetrating radar, e.g. reinforced concrete, standing ground water, saturated soil/soil types, and changes in feature material.
- 4) Small gullies and downpipes that go straight into the ground can not be traced due to restrictive access.
- 5) Note that not all buried utilities can be detected and mapped due to (but not limited by) their depth, location, material, geology and proximity to other utilities. Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate.
- 6) No utility mapping survey can be considered a 100% accurate depiction of the sub-surface environment, the use of these drawings does not remove the requirement for the use of safe digging technique in line with the requirements of HSG47 and CDM regulations.

- | | |
|-------------|-----------------------|
| Underground | Foul Drainage |
| Underground | Storm Drainage |
| Underground | Combined Drainage |
| Underground | Electric |
| Underground | Cables |
| Underground | Gas |
| Underground | Unidentified Services |
| Underground | Telecoms BT |
| Underground | Water |
| GPR Survey | Linear Feature |

[illegible]

Type: Relates to Section Number in CCTV Report.

- Drainage pipe sizes (where shown) have been gauged from the surface for safety reasons and should be regarded as approximate only.
- The sockets (where shown) should be treated with mastic and expert cast/roster is advised.
- Although this is a digital survey, the accuracy and amount of detail shown is only commensurate with the traditional mode of mapping as specified. Care should be exercised when working to larger scales.
- Visible features in the vicinity of the boundaries as shown above, may not represent the extent of legally conveyed easements.
- ENVI survey data has been made to achieve accuracy on this plot, CROOK, contains dimensions, levels and point notes should be checked prior to design and construction.
- Earth walls have been taken in the bottom of the channel.
- All pipe sizes are 150mm unless otherwise stated.

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3	4

SURVEYED FOR	Retirement Villages Developments LTD 3rd Floor, 123 Victoria Street London SW1E 6BA	SURVEYOR	Joe Stymisk
		DATE	06/0000

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Underground	Foul Drainage
Underground	Storm Drainage
Underground	Combined Drainage
Underground	Electric
Underground	Cables
Underground	Gas
Underground	Unidentified Service
Underground	Telecoms BT
Underground	Water
GPR Survey	Linear Feature

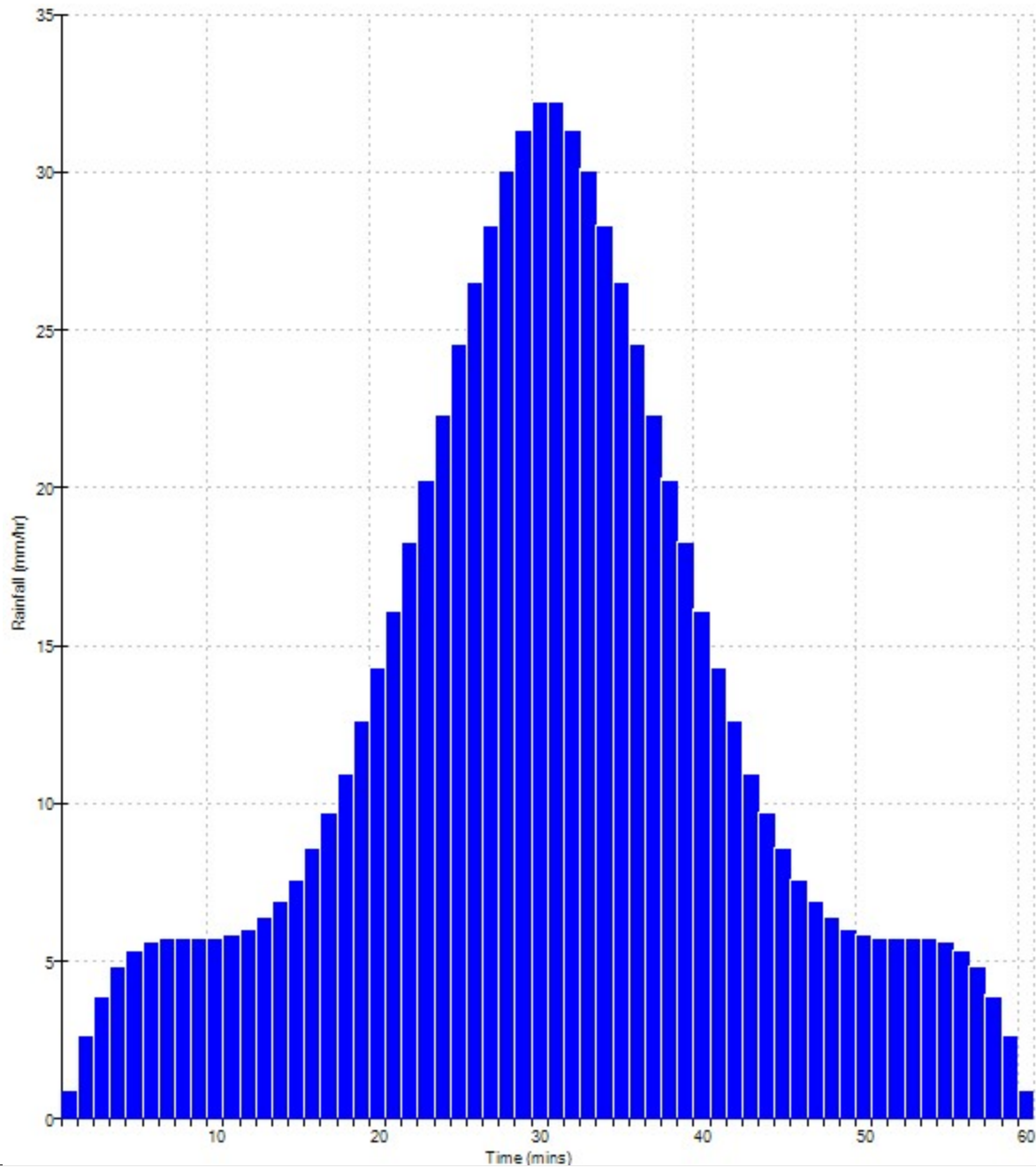
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<u>ICP SUDS Mean Annual Flood</u> Input <table><tr><td>Return Period (years)</td><td>100</td><td>SAAR (mm)</td><td>700</td><td>Urban</td><td>0.000</td></tr><tr><td>Area (ha)</td><td>1.240</td><td>Soil</td><td>0.150</td><td>Region Number</td><td>Region 6</td></tr></table> Results 1/s <table><tr><td>QBAR Rural</td><td>0.5</td></tr><tr><td>QBAR Urban</td><td>0.5</td></tr><tr><td>Q100 years</td><td>1.6</td></tr><tr><td>Q1 year</td><td>0.4</td></tr><tr><td>Q30 years</td><td>1.1</td></tr><tr><td>Q100 years</td><td>1.6</td></tr></table>			Return Period (years)	100	SAAR (mm)	700	Urban	0.000	Area (ha)	1.240	Soil	0.150	Region Number	Region 6	QBAR Rural	0.5	QBAR Urban	0.5	Q100 years	1.6	Q1 year	0.4	Q30 years	1.1	Q100 years	1.6
Return Period (years)	100	SAAR (mm)	700	Urban	0.000																					
Area (ha)	1.240	Soil	0.150	Region Number	Region 6																					
QBAR Rural	0.5																									
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Rainfall profile

Storm duration (mins) 60

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.400
Peak Intensity (mm/hr) 32.196
Ave. Intensity (mm/hr) 12.800
Return Period (years) 1.0

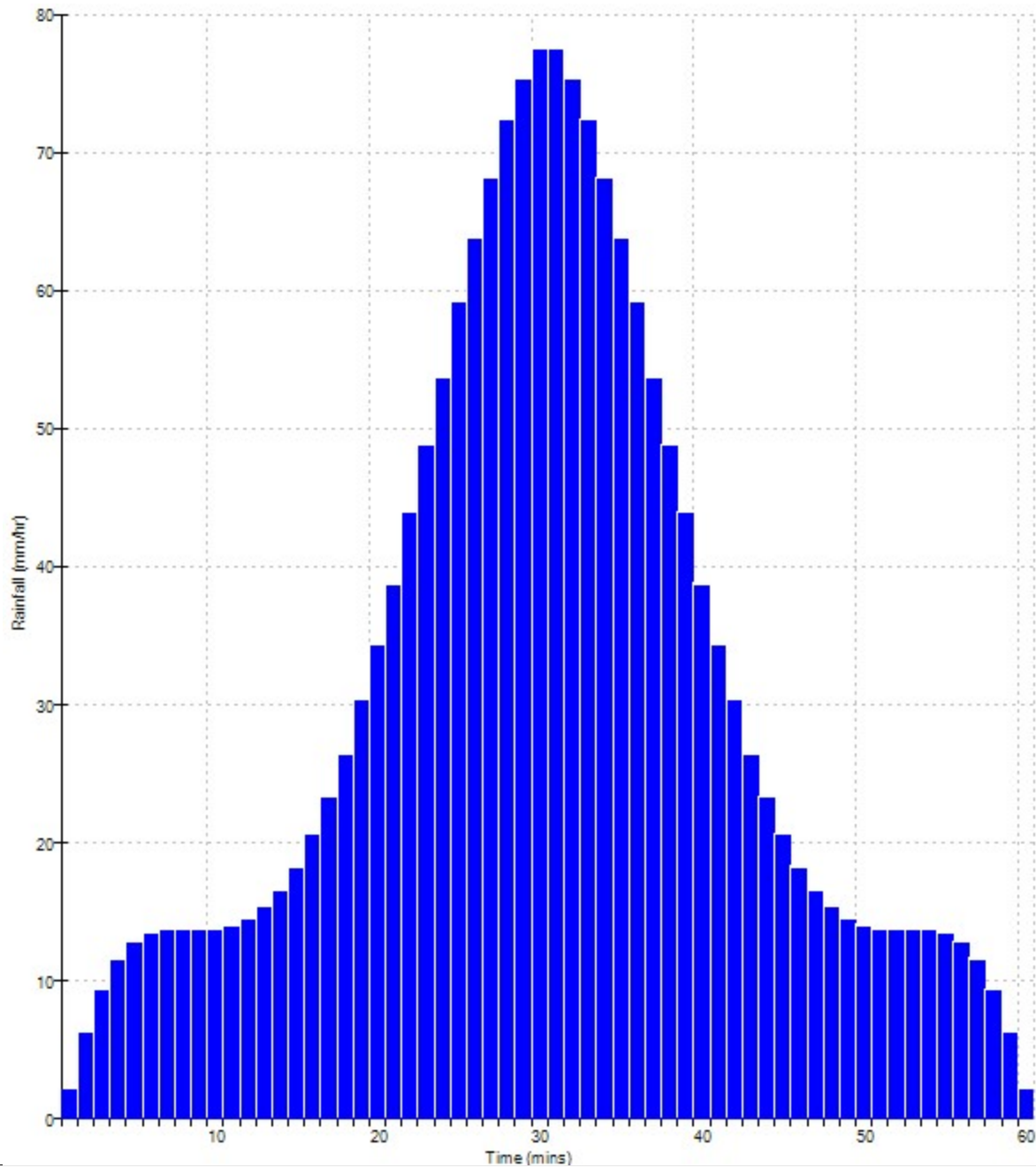


Mason Navarro Pledge		Page 1
Bancroft Court Hitchin Hertfordshire, SG5 1LH		
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Rainfall profile

Storm duration (mins) 60

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.400
Peak Intensity (mm/hr) 77.499
Ave. Intensity (mm/hr) 30.811
Return Period (years) 30.0

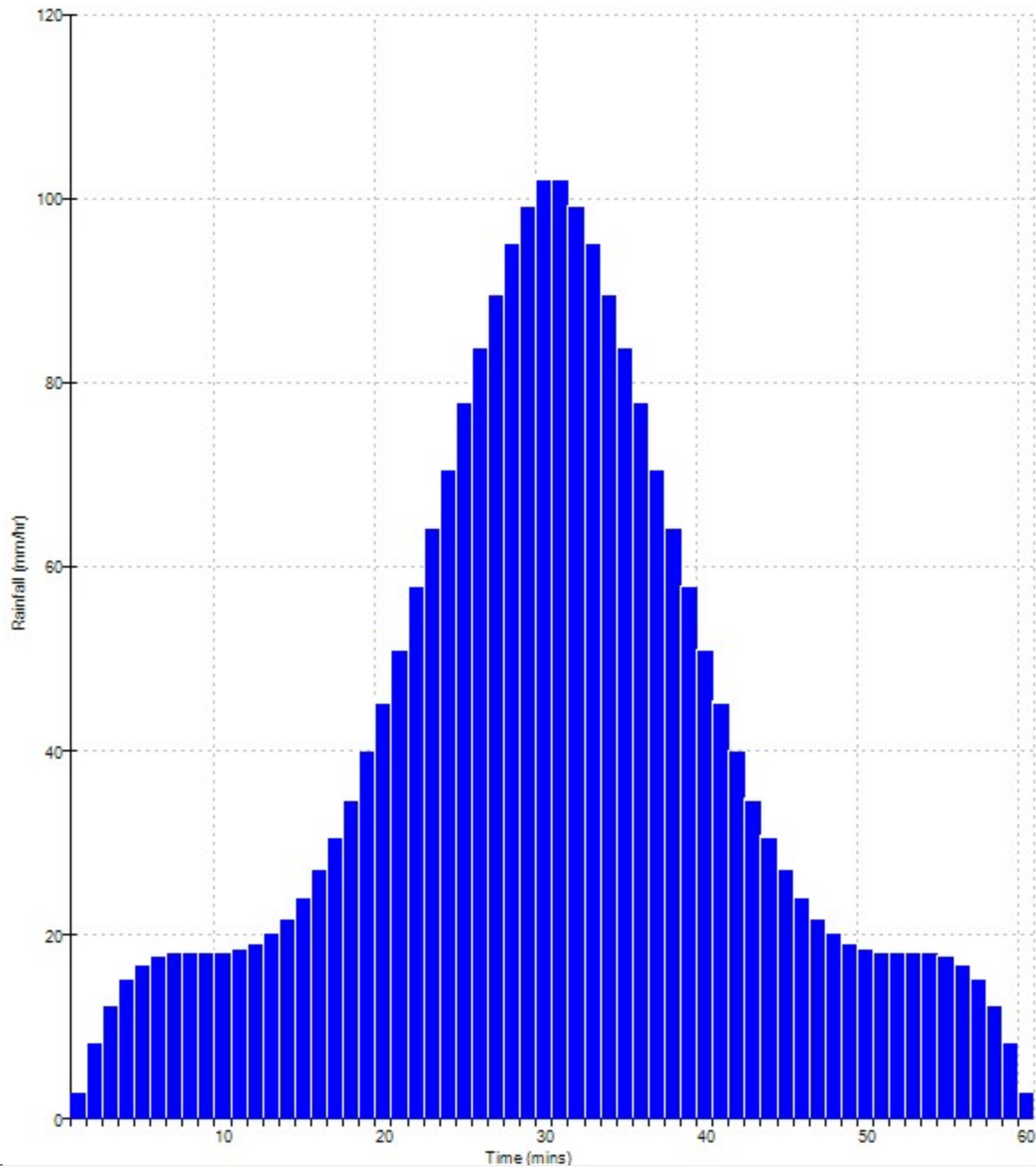


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Rainfall profile

Storm duration (mins) 60

FSR Data
Region England and Wales
M5-60 (mm) 20.000
Ratio R 0.400
Peak Intensity (mm/hr) 101.894
Ave. Intensity (mm/hr) 40.510
Return Period (years) 100.0



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Innovyze			Designed by Richard James Checked by Source Control 2020.1				
Summary of Results for 100 year Return Period (+40%)							
Half Drain Time : 476 minutes.							
Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	4.581	0.031	0.0	0.3	0.3	17.4	0 K
30 min Summer	4.590	0.040	0.0	0.5	0.5	22.6	0 K
60 min Summer	4.598	0.048	0.0	0.7	0.7	27.6	0 K
120 min Summer	4.606	0.056	0.0	0.8	0.8	32.0	0 K
180 min Summer	4.609	0.059	0.0	0.9	0.9	33.8	0 K
240 min Summer	4.611	0.061	0.0	0.9	0.9	34.6	0 K
360 min Summer	4.612	0.062	0.0	0.9	0.9	35.1	0 K
480 min Summer	4.612	0.062	0.0	0.9	0.9	35.5	0 K
600 min Summer	4.613	0.063	0.0	0.9	0.9	35.7	0 K
720 min Summer	4.613	0.063	0.0	0.9	0.9	35.7	0 K
960 min Summer	4.612	0.062	0.0	0.9	0.9	35.5	0 K
1440 min Summer	4.610	0.060	0.0	0.9	0.9	34.4	0 K
2160 min Summer	4.607	0.057	0.0	0.8	0.8	32.3	0 K
2880 min Summer	4.603	0.053	0.0	0.8	0.8	30.4	0 K
4320 min Summer	4.598	0.048	0.0	0.7	0.7	27.2	0 K
5760 min Summer	4.594	0.044	0.0	0.6	0.6	24.8	0 K
7200 min Summer	4.590	0.040	0.0	0.5	0.5	23.0	0 K
8640 min Summer	4.588	0.038	0.0	0.5	0.5	21.5	0 K
10080 min Summer	4.586	0.036	0.0	0.4	0.4	20.4	0 K
15 min Winter	4.584	0.034	0.0	0.4	0.4	19.5	0 K
30 min Winter	4.594	0.044	0.0	0.6	0.6	25.3	0 K
60 min Winter	4.604	0.054	0.0	0.8	0.8	31.0	0 K
120 min Winter	4.613	0.063	0.0	0.9	0.9	35.9	0 K
180 min Winter	4.617	0.067	0.0	1.0	1.0	38.1	0 K
240 min Winter	4.618	0.068	0.0	1.0	1.0	39.0	0 K
360 min Winter	4.619	0.069	0.0	1.0	1.0	39.4	0 K
480 min Winter	4.620	0.070	0.0	1.0	1.0	39.6	0 K
600 min Winter	4.619	0.069	0.0	1.0	1.0	39.6	0 K
720 min Winter	4.619	0.069	0.0	1.0	1.0	39.3	0 K
960 min Winter	4.617	0.067	0.0	1.0	1.0	38.4	0 K
1440 min Winter	4.613	0.063	0.0	0.9	0.9	36.2	0 K
2160 min Winter	4.608	0.058	0.0	0.8	0.8	32.9	0 K
2880 min Winter	4.603	0.053	0.0	0.8	0.8	30.1	0 K
4320 min Winter	4.596	0.046	0.0	0.6	0.6	26.0	0 K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)			
15 min Summer	138.153	0.0	11.4	26			
30 min Summer	90.705	0.0	16.2	41			
60 min Summer	56.713	0.0	24.8	68			
120 min Summer	34.246	0.0	30.6	126			
180 min Summer	25.149	0.0	34.0	184			
240 min Summer	20.078	0.0	36.4	240			
360 min Summer	14.585	0.0	39.8	300			
480 min Summer	11.622	0.0	42.4	360			
600 min Summer	9.738	0.0	44.5	424			
720 min Summer	8.424	0.0	46.2	492			
960 min Summer	6.697	0.0	48.9	628			
1440 min Summer	4.839	0.0	52.4	900			
2160 min Summer	3.490	0.0	61.1	1296			
2880 min Summer	2.766	0.0	64.3	1676			
4320 min Summer	1.989	0.0	68.1	2424			
5760 min Summer	1.573	0.0	75.3	3168			
7200 min Summer	1.311	0.0	78.1	3896			
8640 min Summer	1.129	0.0	80.1	4600			
10080 min Summer	0.994	0.0	81.4	5352			
15 min Winter	138.153	0.0	13.3	26			
30 min Winter	90.705	0.0	18.7	40			
60 min Winter	56.713	0.0	28.2	68			
120 min Winter	34.246	0.0	34.7	124			
180 min Winter	25.149	0.0	38.5	180			
240 min Winter	20.078	0.0	41.2	236			
360 min Winter	14.585	0.0	45.1	334			
480 min Winter	11.622	0.0	48.0	378			
600 min Winter	9.738	0.0	50.3	454			
720 min Winter	8.424	0.0	52.2	528			
960 min Winter	6.697	0.0	55.2	676			
1440 min Winter	4.839	0.0	59.3	962			
2160 min Winter	3.490	0.0	68.7	1368			
2880 min Winter	2.766	0.0	72.3	1760			
4320 min Winter	1.989	0.0	76.8	2508			
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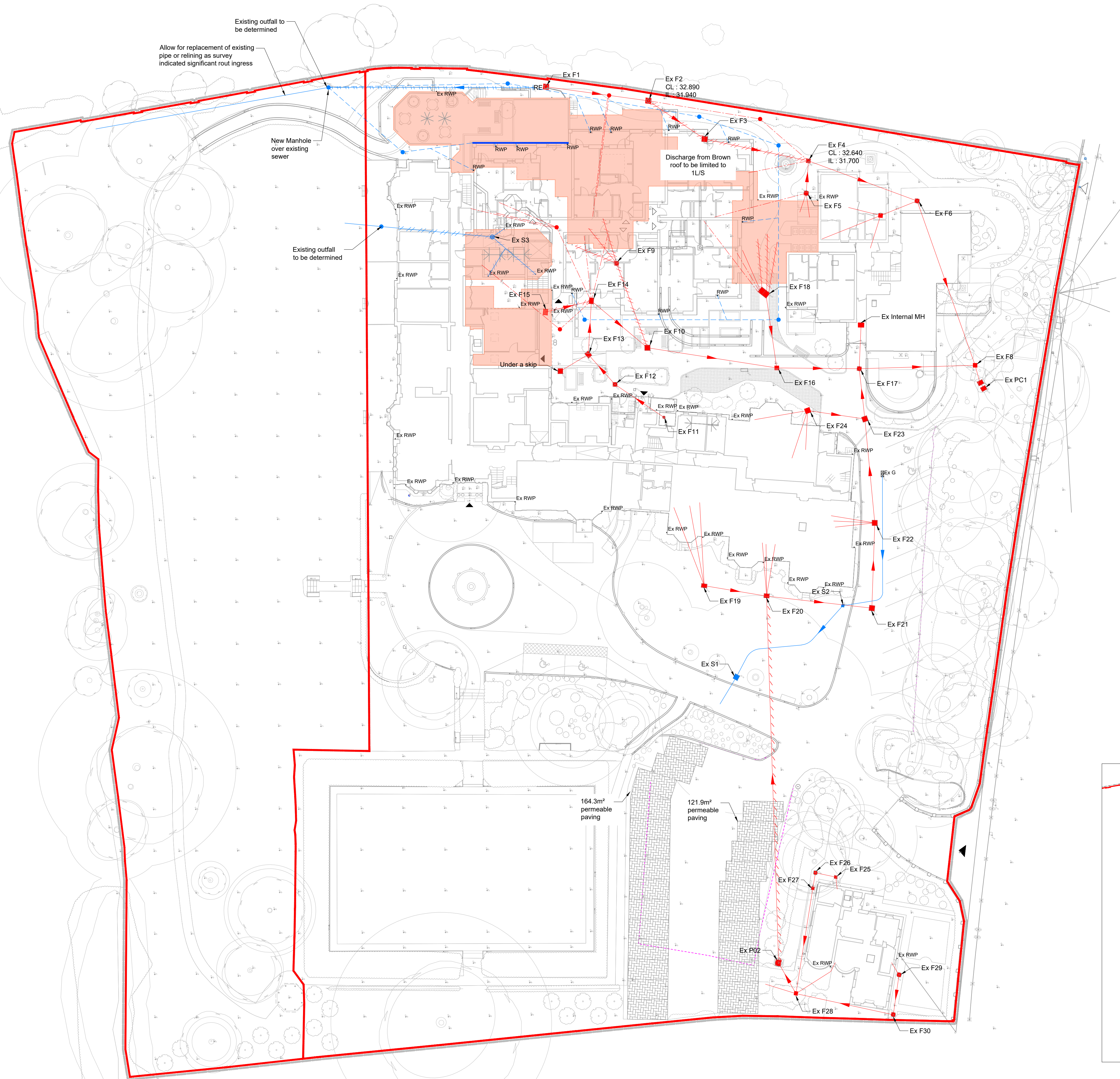
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Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Outflow (l/s)	Max Volume (m³)	Status
5760 min Winter	4.591	0.041	0.0	0.5	0.5	23.2	OK
7200 min Winter	4.587	0.037	0.0	0.5	0.5	21.1	OK
8640 min Winter	4.584	0.034	0.0	0.4	0.4	19.6	OK
10080 min Winter	4.582	0.032	0.0	0.4	0.4	18.3	OK

Storm Event	Rain (mm/hr)	Flooded Volume (m ³)	Discharge Volume (m ³)	Time-Peak (mins)
5760 min Winter	1.573	0.0	84.5	3240
7200 min Winter	1.311	0.0	87.7	3968
8640 min Winter	1.129	0.0	90.1	4760
10080 min Winter	0.994	0.0	91.6	5448

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Rainfall Details <table><tr><td>Rainfall Model</td><td>FSR</td><td>Ratio R</td><td>0.400</td><td>Cv (Winter)</td><td>0.840</td></tr><tr><td>Return Period (years)</td><td>100</td><td>Summer Storms</td><td>Yes</td><td>Shortest Storm (mins)</td><td>15</td></tr><tr><td>Region</td><td>England and Wales</td><td>Winter Storms</td><td>Yes</td><td>Longest Storm (mins)</td><td>10080</td></tr><tr><td>M5-60 (mm)</td><td>20.000</td><td>Cv (Summer)</td><td>0.750</td><td>Climate Change %</td><td>+40</td></tr></table> Time Area Diagram Total Area (ha) 0.068 <table><tr><td>Time (mins)</td><td>Area (ha)</td><td>Time (mins)</td><td>Area (ha)</td><td>Time (mins)</td><td>Area (ha)</td></tr><tr><td>From:</td><td>To:</td><td>From:</td><td>To:</td><td>From:</td><td>To:</td></tr><tr><td>0</td><td>4</td><td>4</td><td>8</td><td>8</td><td>12</td></tr><tr><td>0.023</td><td>0.023</td><td>0.023</td><td>0.023</td><td>0.023</td><td>0.023</td></tr></table>			Rainfall Model	FSR	Ratio R	0.400	Cv (Winter)	0.840	Return Period (years)	100	Summer Storms	Yes	Shortest Storm (mins)	15	Region	England and Wales	Winter Storms	Yes	Longest Storm (mins)	10080	M5-60 (mm)	20.000	Cv (Summer)	0.750	Climate Change %	+40	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	From:	To:	From:	To:	From:	To:	0	4	4	8	8	12	0.023	0.023	0.023	0.023	0.023	0.023
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Mason Navarro Pledge			Page 4																																																																																																												
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Model Details Storage is Online Cover Level (m) 5.000 Cellular Storage Structure Invert Level (m) 4.550 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>600.0</td><td>600.0</td><td>0.070</td><td>600.0</td><td>610.0</td><td>0.071</td><td>0.0</td><td>610.0</td></tr></tbody></table> Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0059-1000-0100-1000 Sump Available Yes Design Head (m) 0.100 Diameter (mm) 59 Design Flow (l/s) 1.0 Invert Level (m) 4.550 Flush-Flo™ Calculated Minimum Outlet Pipe Diameter (mm) 75 Objective Minimise upstream storage Suggested Manhole Diameter (mm) 1200 Application Surface <table><thead><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>Design Point (Calculated)</td><td>0.100</td><td>1.0</td><td>Kick-Flo®</td><td>0.094</td><td>1.0</td></tr><tr><td>Flush-Flo™</td><td>0.074</td><td>1.0</td><td>Mean Flow over Head Range</td><td>-</td><td>0.6</td></tr></tbody></table> The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated <table><thead><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>0.100</td><td>1.0</td><td>0.800</td><td>2.6</td><td>2.000</td><td>4.0</td><td>4.000</td><td>5.6</td><td>7.000</td><td>7.5</td></tr><tr><td>0.200</td><td>1.4</td><td>1.000</td><td>2.8</td><td>2.200</td><td>4.2</td><td>4.500</td><td>6.0</td><td>7.500</td><td>7.7</td></tr><tr><td>0.300</td><td>1.6</td><td>1.200</td><td>3.1</td><td>2.400</td><td>4.4</td><td>5.000</td><td>6.3</td><td>8.000</td><td>8.0</td></tr><tr><td>0.400</td><td>1.9</td><td>1.400</td><td>3.3</td><td>2.600</td><td>4.5</td><td>5.500</td><td>6.6</td><td>8.500</td><td>8.2</td></tr><tr><td>0.500</td><td>2.1</td><td>1.600</td><td>3.5</td><td>3.000</td><td>4.9</td><td>6.000</td><td>6.9</td><td>9.000</td><td>8.5</td></tr><tr><td>0.600</td><td>2.2</td><td>1.800</td><td>3.8</td><td>3.500</td><td>5.3</td><td>6.500</td><td>7.2</td><td>9.500</td><td>8.7</td></tr></tbody></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	600.0	600.0	0.070	600.0	610.0	0.071	0.0	610.0	Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	0.100	1.0	Kick-Flo®	0.094	1.0	Flush-Flo™	0.074	1.0	Mean Flow over Head Range	-	0.6	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	1.0	0.800	2.6	2.000	4.0	4.000	5.6	7.000	7.5	0.200	1.4	1.000	2.8	2.200	4.2	4.500	6.0	7.500	7.7	0.300	1.6	1.200	3.1	2.400	4.4	5.000	6.3	8.000	8.0	0.400	1.9	1.400	3.3	2.600	4.5	5.500	6.6	8.500	8.2	0.500	2.1	1.600	3.5	3.000	4.9	6.000	6.9	9.000	8.5	0.600	2.2	1.800	3.8	3.500	5.3	6.500	7.2	9.500	8.7
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Ground Floor Drainage
Scale 1:500

Legend	
Surface Water	Description
---	New surface water drain
•---	New shallow inspection chamber (typ. 450mmØ)
RE---	New surface water rodding eye
RWP---	New rain water down pipe
YG---	New yard gully
---	Existing surface water sewer
■	Existing surface water manhole
Foul	Description
---	New foul water drain
•---	New shallow foul inspection chamber (typ. 450mmØ)
SVP---	New soil and vent pipe
---	New foul gully
---	Existing foul water sewer
■	Existing foul water manhole
---	New foul water rising main
■	Existing Demo
---	Site Boundary
■	Permeable Surface 250mm thick subbase

- General
- 1.1. This drawing is to be read in conjunction with all Architect's, Engineer's and Services Engineer's drawings and specifications.
 - 1.2. Do not scale from any of the Civils drawings. All dimensions to be verified on site and any discrepancies should be highlighted.
 - 1.3. All materials to comply with the relevant British Standard. General Drainage Specification
1. All private drains shall be constructed and commissioned in accordance with the relevant sections of the Building Regulations Approved Documents and relevant British Standards.
 2. All pipework to be 100Ø minimum unless noted otherwise.
 3. Private surface water drains shall be laid at a minimum gradient of 1 in 100 or to the gradients and invert levels shown.
 4. Private foul water drains shall be laid at a minimum gradient of 1 in 80 or to the gradients and invert levels shown
 5. Foul pipework connections to first access point shall be laid at a minimum gradient of 1 in 40 or to the levels shown.
 6. All connections to be made soffit to soffit unless noted otherwise.
 7. Pipe bedding to be Class 'B' bedding for rigid pipes and Class 'T' bedding for flexible pipes (100 mm granular bed and surround).
 8. Where cover to soffit of pipe is less than 600 mm in private areas, the following shall apply:-
 - a) Vitrified clay pipes - provide a 100 mm min. thick concrete bed and surround (instead of class 'B' & 'T' bedding) and a 13 mm thick compressible filler at each joint.
 - b) uPVC pipes - provide a concrete bridging (in addition to class 'B' or 'T' bedding) in accordance with appendix A15, Building Regulations part 'H'.
 9. All concrete indicated in the construction of drainage infrastructure (pipe bedding, bridging, manholes etc) shall be standardised prescribed concrete ST2 and is to conform to BS EN 206-1 and BS 8500-2. The maximum aggregate size shall be 20mm.
 10. Foundations adjacent to pipe runs or manholes are to have their formation level set above the invert level no higher than the equivalent of the horizontal distance between the pipe/excavation trench and the foundation, minus 500mm.
 11. Excavations for manholes, pipe runs etc located within a 45 degree load distribution splay from any adjoining existing foundations, are to be adequately supported for the duration of the works and pipe runs protected as note 8 above.
 12. Where excavations for pipe runs are parallel and in close proximity to each other and/or other service trenches, The Contractor shall ensure that adequate safety measures, including temporary shoring, are provided in line with current health & safety legislation and good practice. Particular attention is to be paid to adjacent trenches of differing invert levels.
 13. All existing drainage found on site during the works shall be investigated, its operational status confirmed and the following applied:-
 - a) Inoperative drainage shall be cut back and pipe runs filled with concrete grout.
 - b) 'Live' drainage shall be advised to the engineer.

P03	Drawing revised	AGD
P02	Drawing revised	14.12.23 RJ
P01	First issue	11.09.23 RJ

REV	COMMENTS	DATE	CHK
STATUS			

PRELIMINARY

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CLIENT

PROJECT

THAMESFIELD

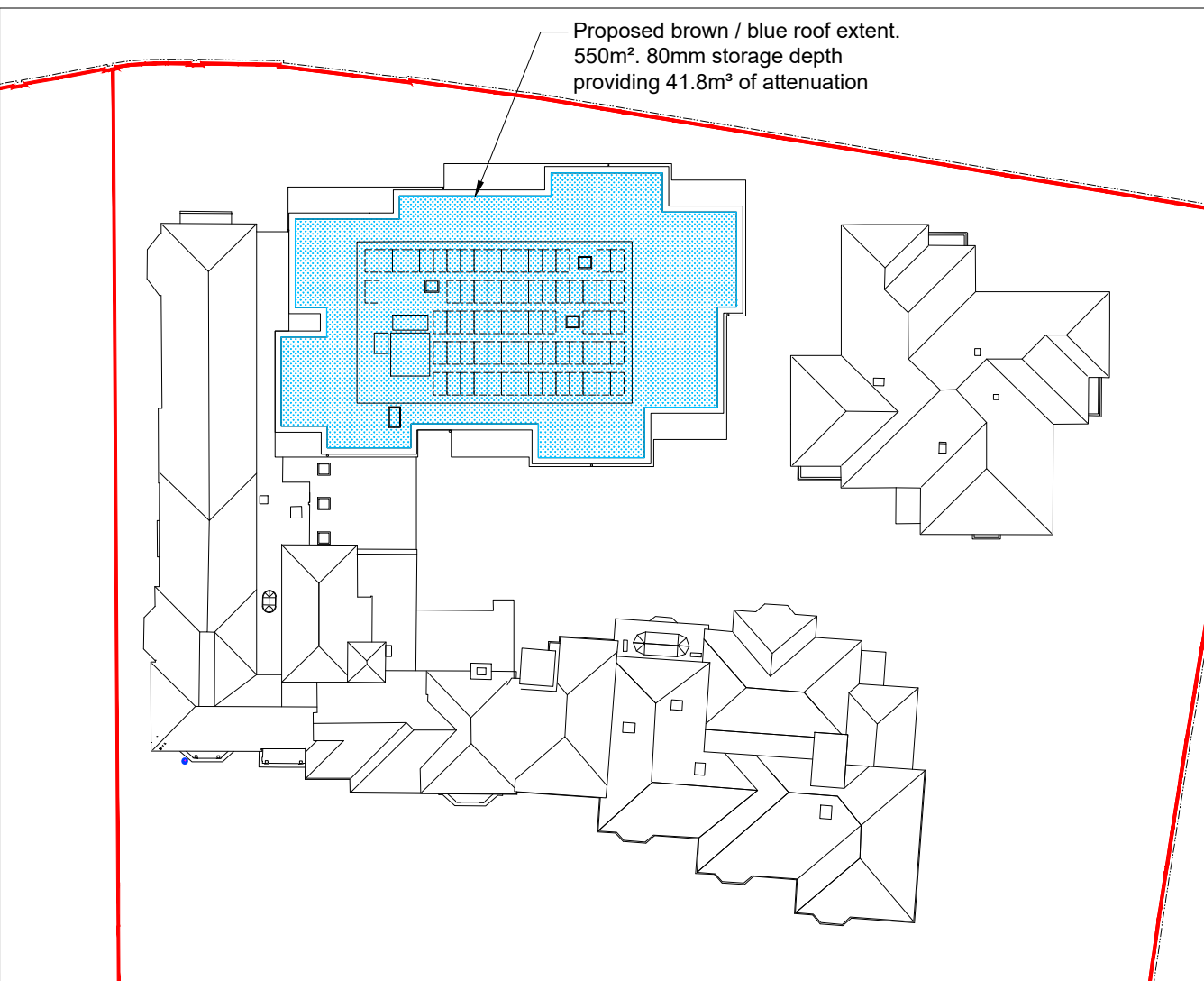
DRAWING TITLE

DRAINAGE STRATEGY

SCALE @ A1	DRAWN BY	DATE
1:250	JSE	05.09.23

MNP No.	STATUS CODE	REV
222351		P 03

Ref No. 222351-MNP-XX-XX-DR-C-1800



Roof Plan
Scale 1:500

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Hitchin
Hertfordshire SG5 1LH

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**DRAINAGE / SUDS
MAINTENANCE STRATEGY**

AT

**THAMESFIELD RETIREMENT
VILLAGE DEVELOPMENT**

**REF: 222351-MNP-ZZ-ZZ-RP-C-0002
DEC 2023**

CONTENTS

1.	INTRODUCTION	2
2.	DESCRIPTION OF PROPOSED DRAINAGE	3
3.	MANAGEMENT AND MAINTENANCE RESPONSIBILITY	4
4.	INVENTORY OF DRAINAGE COMPONENTS	5

APPENDICES

APPENDIX A - PROPOSED DRAINAGE LAYOUT

Report prepared by:



Tom Murray

Project Engineer

1. INTRODUCTION

- 1.1. Mason Navarro Pledge Ltd have been appointed to prepare a Drainage Maintenance and Management Plan for the proposed redevelopment at Thamesfield Retirement Village.
- 1.2. The proposed development comprises the part demolition of the existing building and replacement with a three-storey extension to provide 35 extra-care units, with associated soft and hard landscaping works; provision of additional vehicle parking, bin stores and ancillary structures; and alterations to existing basement.
- 1.3. This report gives details of the proposed SuDS / Drainage system and describes the long-term operation and maintenance requirements which should be carried out in accordance with the guidance in the CIRIA SuDS Manual.
- 1.4. This report has been prepared by Tom Murray HNC.

2. DESCRIPTION OF PROPOSED DRAINAGE

2.1 The proposed drainage is shown on drawings:

222351-MNP-XX-XX-DR-C-1800 - Drainage Strategy Plan

2.2 Surface water run-off from the site discharges into the river Thames and it is proposed to continue utilising the existing outfalls with the provision of a new network of pipework, manholes, porous paving, and green / blue roofs

2.3 The drainage has been designed to accommodate the 1 in 100-year storm event including a 40% allowance for climate change.

3. MAINTENANCE / MANAGEMENT RESPONSIBILITY

- 3.1 The management and maintenance responsibility for the drainage and SuDS components across the site will be the operator / owner of the development (Retirement Villages Group).

4. INVENTORY OF SURFACE WATER DRAINAGE COMPONENTS

GULLIES

- 4.1 Gullies provide a degree of pollution control in preventing silt and debris passing into the sewer network.

TABLE 1: GULLY MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	RECOMMENDED FREQUENCY
Regular maintenance	Clean and empty gullies.	Quarterly.

CATCHPITS

- 4.1 Catchpit chambers and manholes provide a degree of pollution control in preventing silt and debris passing forwards into the drainage network.
- 4.2 The operation and maintenance requirements are given in the table below:

TABLE 2: CATCHPIT MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	RECOMMENDED FREQUENCY
Regular maintenance	Clean and empty catchpits.	Quarterly.

BELOW GROUND MANHOLES AND DRAINAGE - GENERAL

- 4.3 Manholes and Catchpit Inspections should be frequent and regular, depending on local conditions, but at least annually. The drainage system should be cleaned / jetted as necessary.

PERMEABLE PAVING

- 4.4 Permeable block paving allows water to infiltrate through gaps between the blocks into a lined layer of granular material, from which it is collected and discharges into the below ground drainage network.
- 4.5 The operation and maintenance requirements are given the table below:

TABLE 3: PERMEABLE PAVING MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	RECOMMENDED FREQUENCY
Regular maintenance	Sweeping. Note: Any jointing material between the blocks that is lost or displaced as a result of sweeping must be replaced. New jointing material must be the same type as that removed or a suitable replacement.	Three times a year at the end of winter, mid-summer and after autumn lead fall. Also as required based on site-specific observations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas to prevent excess sediment being washing into the paving. Removal of weed.	As required
Remedial actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users. Rehabilitation of surface and underlying sand and geotextile.	As required
Monitoring	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	Monthly for three months after installation, then during regular maintenance visits.

- 4.6 Over time the ability of the permeable paving to infiltrate and convey surface water run-off may degrade due to clogging of the joints by silt and other sediments.
- 4.7 All areas of permeable pavement should be regularly inspected by those responsible, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

GREEN ROOFS

4.8 The operation and maintenance requirements are given the table below:

TABLE 6: GREEN ROOF MAINTENANCE

MAINTENANCE SCHEDULE	REQUIRED ACTION	RECOMMENDED FREQUENCY
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drainage system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required.
	During establishment replace dead plants as required	Monthly.
	Post establishment replace dead plants as required	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
	Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting as required - clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to original material, and sources of erosion damage should be identified and controlled.	As required.
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

APPENDICIES

APPENDIX A
PROPOSED DRAINAGE LAYOUT