



70 Mauldeth Road

Outline Sustainable Drainage Strategy

Job Number
FRA 25 1016

Report Date
09th April 2025

Client
Waheed Akbar



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Ground Investigation | Land Remediation | Project Management



LK CONSULT

DOCUMENT QUALITY ASSURANCE

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Client	Waheed Akbar

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EXECUTIVE SUMMARY

Scope and Background

This Sustainable Drainage (SuDS) Strategy has been undertaken by LK Consult Ltd (LKC) to satisfy planning condition 12 of application reference 141006/FO/2024, the erection of an extension of an existing house located at 70 Mauldeth Road Manchester, M20 4WF.

LKC has prepared this SuDS Strategy in line with the NPPF and Technical Guidance where appropriate.

Consultations

Manchester City Council – Lead Local Flood Authority (LLFA) and United Utilities have been contacted during preparation of this report.

The Environment Agency (EA) website has been utilised to assess if there are any limitations that may affect the form of SuDS that may be appropriate to this site. The records show that the site is within Flood Zone 2 and 3. A Flood Risk Assessment was completed by a third party to support the planning application and as such does not form part of this report.

Drainage Strategy

The ground conditions beneath the site are recorded as Till, Devensian superficial deposits that mainly consist of slightly gravelly Clay over Sandstone bedrock which have been confirmed by British Geological Survey (BGS) borehole records

There is a slight slope towards the south.

The outline drainage strategy considers the use of an infiltration-based SuDS not to be feasible, based on the cohesive nature of strata beneath the site and the distance to adjacent buildings / highway, in line with Building Regs Part H requirements.

A culverted watercourse is located to the north of the site. A connection to this watercourse, given the scale and nature of the development, is not considered to be proportionate.

It is proposed that surface water runoff arising from the development will discharge into sewer within boundary of the site.

The proposed development will marginally increase the proportion of the site covered by impermeable surfaces and will therefore generate more runoff. Attenuation will be required to allow for climate change and restrictions placed upon the proposed development due to planning requirements.

The estimated volume to be retained on site for the 1 in 30-year storm event including an allowance for climate change is **0m³**.

The estimated volume to be retained on site for the 1 in 100-year storm event including an allowance for climate change is **0.1m³**.

The flows from the site should be restricted to an acceptable level to the Lead Local Flood Authority and the EA / UU etc.

The most effective strategy, in line with the SuDS management train, would be to have a bioretention planter adjacent to the building. The estimated volume can be stored within the site boundary.

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1. Introduction

1.1. Background

LKC were commissioned to carry out an outline Sustainable Drainage Strategy for 70 Mauldeth Road. The report was undertaken to satisfy condition 12 of the planning application (ref:141006/FO/2024) for an extension of an existing house located at 70 Mauldeth Road Manchester, M20 4WF.

The report will consider the impact of the development on surface water runoff accounting for climate change. The sustainable drainage assessment in Section 4 will provide an overview of the SuDS techniques which could be considered on the site.

This outline SuDS assessment complies with the principles presented in the Draft National Standards for Sustainable Drainage Systems (Defra, 2015)¹ and the Planning Practice Guidance (PPG) March 2014². The sustainable drainage assessment is presented with reference to the hydrological and hydrogeological context of the development.

The report findings are based upon professional judgement and are summarised below. The report includes baseline data from the Environment Agency (EA), rainfall data from the Wallingford Studies and Hydrogeological information from the British Geological Survey (BGS). The assessment will summarise and refer to these datasets in the text.

Drainage on the site has been assessed by considering the following key constraints:

- Topography of the site.
- Local water features and hydrological context.
- Underlying geology, soil types and permeability.
- Layout and geometry of the proposed development.

The site is subject to a planning approval, reference DC/086934, dated 28th July 2023, and within the Decision Notice there is a condition relating to surface water drainage, Condition 12, as follows:

Condition 12:

‘Prior to the commencement of the development hereby approved, a surface water drainage layout or the development site shall be submitted for approval in writing by the City Council, as Local Planning Authority. This shall include the following:

- i. Evidence of drainage hierarchy adherence.*
- ii. Finalised surface water drainage layout including all components, levels and connectivity.*
- iii. Evidence of connection approval in principle.*
- iv. Maintenance and management plan.’*

1.2. Site Details

A summary of the general site details is presented in Table 1-1. Plans, Figure 1 shows the site location plan. Details of the site design can be found in Appendix A.

Location	70 Mauldeth Road, Manchester, M20 4WF. Centred at approximate National Grid Reference 385632E 393169N.
Area	Approximately 300m ² .
Topography	37.6 metres above ordnance datum (AOD) in the north of the site and 37.1 m AOD in the south. Site is sloping down gently to the south.
Current Site Use	<u>Site</u> Previous use of the site was a two-storey dwelling. The site is currently a hardstood construction site with an impervious driveway to the north and a private grassy rear garden to the south. <u>Surrounding Area/ Boundary Treatment</u> The site is located in a dense residential area.
Proposed Development	Erection of a two-storey dwellinghouse. Access will be from Mauldeth Road on the northern boundary. It should be noted that the site previously comprised a two-storey residential dwelling which is effectively being extended.

Table 1-1: Summary of site details.

2. Site Setting

2.1. Environmental Setting

LKC has undertaken a review of public domain information including British Geological Survey data, Environment Agency data, historical mapping and aerial photography to provide a summary of the environmental setting of the site. This is summarised in Table 2-1 below.

Summary of the Environmental Setting			
Geology	Superficial	Till, Devensian	
	Bedrock	Chester Formation, described as Sandstone.	
	BGS Boreholes	There are no BGS boreholes within the immediate vicinity of the site.	
	Defra Soilscape Mapping	Slowly permeable seasonally wet acid loamy and clayey soils	
	BGS Groundwater Flooding Susceptibility	BH Ref: SJ89SE233 400m northeast. Soft to form light brown mottled silty sandy clay.	
Hydrogeology	Aquifer Designation	Bedrock	Principal Aquifer.
		Superficial	Secondary Undifferentiated Aquifer.
	Source Protection Zone (SPZ)	Site not within an SPZ.	
Hydrology	All adjacent and internal surface water	The Cringle Brook is a culverted main river that is located 300m to the north of the site. There is a culverted watercourse is located in Mauldeth road approximately 10m north of the site. There is an open channel ordinary watercourse, the Shaw Brook, 440m southwest of the site.	
	Risk Flooding from Groundwater	Limited potential for groundwater flooding to occur. According to the Long-Term Risk of Flooding service by the EA.	
Flood Zone	The site is within Fluvial Flood Zone 2 and 3. Flood Zone 3: High risk of flooding with an annual probability of flooding of 1.0% or greater from rivers, and 0.5% or greater from the sea. Flood Risk at the site has been assessed under separate cover by UNDA Consulting, reference 94802-NADA-MauldethRd, dated October 2024, in support of the planning application, reference 141006/FO/2024, dated 1st November 2024, and as such is not considered further in this report.		
Site History	Previous use of the site was a two-storey dwelling. The site is currently a hardstood construction site with an impervious driveway to the north and a private grassy rear garden to the south. There is no record of any ponds or watercourses within the site boundary.		

Table 2-1: Summary of the Environmental Setting.

2.2. Site and Access Levels

A topographic survey of the site was not provided, therefore opensource LiDAR levels have been extracted to OS GPS datum. The site falls 37.6 metres above ordnance datum (AOD) in the north of the site and 37.1m AOD in the south. Site is sloping down gently to the south the image below shows the Lidar undulation from north to south.

The final site levels and ground floor levels of dwellings have not yet been determined. The proposed access would join Mauldeth Road at around 37.5m AOD.

As discussed in the Flood Risk Assessment by UNDA Consulting, reference 94802-NADA-MauldethRd, dated October 2024, the proposed dwelling and extension will be set no lower than the existing dwelling.



Image 1: An image showing the LiDAR undulation from north to south for 70 Mauldeth Road.

3. Consultation

Information from all relevant consultees is summarised in Table 3-1 below.

Relevant correspondence is provided in Appendix B (LLFA/UU).

Source	Details	
Lead Local Flood Authority (LLFA)	No information provided at the time of writing.	
	Sewer Map	<p>UU have provided maps of public sewers within the vicinity of the site. There is a 150 (VC) mm diameter combined sewer adjacent to the northern boundary of site flowing in a westerly direction. This sewer sits within the property boundary of houses 60 – 72. Node 6110 site within the site boundary of 70 Mauldeth Road.</p> <p>70 Mauldeth road has an additional 150mm combined head of system sewer located roughly in the centre east of the site boundary.</p> <p>There are two additional public combined sewers (825mm and 300mm diameters) that run parallel to Mauldeth road to the north of site flowing in a westerly direction.</p> <p>In addition, UU sewer plans indicate the presence of a 450 mm surface water culvert flowing in an east to west orientation within Mauldeth Road to the north of the site.</p>
	Likely conditions for connecting into their sewerage system	<p>All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80 (now 56) of the National Planning Practice Guidance.</p> <p>UU have requested that surface water generated by the new development discharge into the culverted watercourse in Mauldeth Road.</p> <p>If not feasible, United Utilities will consider a connection to the 150mm diameter public combined sewer within the development at a pass forward flow to be agreed by the Lead Local Flood Authority, that does not exceed 2l/s.</p> <p>UU have requested an evidence-based study to demonstrate that infiltration is not possible as per the drainage hierarchy. UU have recommended that the surface water be discharged into the culverted watercourse located in Mauldeth Road.</p> <p>Foul flow from this site will be allowed to drain into the public combined sewer system. UU's preferred point of discharge would be to the 150mm diameter public combined sewer within the development boundary at an unrestricted rate.</p> <p>UU confirmed that they did not have any record of internal or external sewer flooding of properties in the vicinity of the site as a result of overloaded sewers.</p> <p>UU would also request for a condition to prevent development within 3m either side of the sewer running through the site.</p>

Table 3-1: Summary consultee information.

4. Sustainable Drainage Strategy

4.1. Introduction

The NPPF recognises that flood risk and other environmental damage can be managed by minimising changes in the volume and rate of surface run-off from development sites through the use of Sustainable Drainage Systems (SuDS), this being complementary to the control of development within the floodplain.

SuDS will not alleviate flooding in an area prone to flooding; however, properly designed SuDS have the potential to prevent the surface water runoff from new development worsening the flood risk. The effective disposal of surface water from development is a material planning consideration in determining proposals for the development and use of land.

The accepted principles are that surface water arising from a developed area should, as far as practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development, while reducing the flood risk to the site itself and elsewhere, taking climate change into account.

The Building Regulations Requirement H3³ stipulates that rainwater from roofs and paved areas is carried away from the surface to discharge to one of the following, listed in order of priority:

- an adequate soakaway or other adequate infiltration system,
- a watercourse or, where that is not practicable,
- a sewer.

The concept of a sustainable drainage system has been incorporated into the outline drainage strategy for the study area in order to comply with the Flood and Water Management Act 2010.

Suitability of different SuDS will be governed by prevailing site conditions, such as the type and scale of development, topography, ground conditions (soil permeability, ground stability, depth to water table), local hydrogeology and risk of groundwater contamination (presence of sensitive aquifers and source protection zones) etc.

4.2. Sustainable Drainage Hierarchy

4.2.1. Infiltration

The Groundwater Source Protection Zone mapping from the EA website shows that the site is not within any identified protection zones.

A summary of the BGS superficial and bedrock aquifer descriptions and classifications supplemented by local records is shown in Table 4-1 below:

Classification	Description	Recorded Water Table Depth	Soakaway Potential
Till Devensian - Diamicton	Diamicton (unsorted sediment with gravel in a fine mud matrix)	N/A	Poor
Chester formation - sandstone	Sandstone	N/A	Limited

Table 4-1: Geological and Hydrogeological Setting.

Based on the superficial deposits beneath the site comprising clayey strata, it is considered unlikely that infiltration will be a suitable means for the disposal of surface water from the site.

In addition, based on the site setting, there is insufficient distance to traditional soakaways as the site is constrained by the proximity of the adjacent properties and roads. According to the Building

Regulations, soakaways should be located at least **5m** away from any building foundations (Building Regs part H, Para 3.25, part a).

There is a slope over the site and surrounding area which indicates that groundwater in the vicinity of the site would likely drain towards the south.

4.2.2. Watercourses

There is a culverted watercourse running adjacent to the site along Mauldeth Road that currently collects the surface water. It is located approximately 10m north of the site.

Access to the watercourse would cause significant disruption through the road and 3rd party land as well as being disproportionately costly given the scale and nature of the site.

4.2.3. Public Sewer

There is a combined sewer running through the site into Mauldeth Road. There is a head of system inspection chamber within the site boundary. The head of system is centred approximately halfway on the eastern side of the development.

4.2.4. Other Sewers

By reference to the UU sewer map, there are no private connection to the public sewer within the vicinity of the land.

4.3. Surface Water Drainage Strategy

Following the assessment of the site settings and existing constraints to the development. The drainage options relating to the final discharge of surface water for this section of the site are listed in Table 4-2 in order of priority within the NPPF:

Option	Drainage Solution	Most feasible solution	Reasoning
a	Soakaway/Infiltration	N/A	Not likely to be feasible as the site is constrained by the proximity of the adjacent properties and roads. The impermeable ground conditions also make the use of infiltration unlikely.
b	Connection to Watercourse	N/A	Would require third party access, a road crossing and EA and LLFA consent. This would be disproportionately costly as well as disruptive due to the distance of the culverted watercourse from the development.
c	Discharge into a sewer	1	A connection into the 150mm diameter combined sewer within the development boundary would be possible – subject to approval from LLFA and connection consent from UU.

Table 4-2: Drainage options.

Due to the size and nature of this development the most feasible SuDS option would be to install a raised planter box. This would enable the surface water runoff generated from the development to be directed into attenuating planter, providing water storage and sediment control.

4.4. Surface Water Attenuation Requirements

In line with restrictions from UU, the flow from this development should be limited to a discharge rate of 2 l/s.

LKC have calculated the greenfield rate for the site and based on the limited overall catchment area, the greenfield rate is extremely low. Therefore, to allow for a suitable self-cleansing velocity and as stipulated by UU, the discharge has been limited to 2 l/s.

It is estimated from the supplied plan (see Appendix A) that the site will have the following designated areas (Table 4-4).

Designated Areas	Plot Area
Total area	Approximately 300 m ²
Contributing Catchment	
Catchment Area	46 m ²
Impermeable Area	46 m ² – as a result of the new built development at the site. The area of the existing dwelling and parking areas have not been included as they are existing hardstanding at the site that are already drained.

Table 4-3: Assumed plot areas.

There is an increase in impermeable area from the existing usage to the proposed. This is likely to require attenuation to reduce the proposed flow off site to a level which is acceptable to the LLFA and to UU, including an allowance for climate change.

4.4.1. Attenuation Estimate

For the contributing catchment an estimate has been produced using the development area of 46m² from the 300m² plot. The QBAR runoff calculation result is considered too low to facilitate effective self-cleansing through the pipes and increases the risk of blockages. UU have indicated that a surface water discharge level of 2 l/s will be accepted which is a favourable option.

The following attenuation has been estimated for the development:

- Attenuation storage volume: 0m³ (1 in 30-year event + 40% Climate Change)
- Retention on site volume: 0.1m³ (1 in 100-year + 45% Climate Change)

Calculations are included at Appendix C.

Attenuation storage aims to limit the peak rate of runoff from the development to 2 l/s runoff as required by UU.

The attenuation required for a 1 in 30-year storm event plus 40% climate change allowance, requires a storage volume of 0m³. for the 1 in 100-year event plus 45% climate change allowance, a storage capacity 0.1m³ will be required from on-site storage.

4.5. Site Specific SuDS

The use of attenuation SuDS are deemed to be the most feasible and practical option for the development. Figure 2 shows the Outline Drainage Strategy. A planter box will provide the required storage volume to limit peak runoff arising from the development. The volume can be stored within the planter box measuring 1 meter by 1 meter by 0.5 meters, with 30% voids and an overflow into the system. The planter box will have a total volume of 0.5m³. Given, given the 30% voids, it will effectively store approximately 0.15m³ of water.

The planter box should include an overflow mechanism, ensuring that any excess stormwater is safely directed into the drainage system, preventing flooding and waterlogging.

The planter box should be drained into the Head of System. This sewer has a depth of 0.75m and is closer to the extension and planter box. A connection to the sewer node 6110 would require additional pipework installation running parallel to the existing pipe work which would be onerous given the nature of the development. However, if a connection to the Head of System is unacceptable, a new pipe and connection can be made to connect the surface water to node 6110.

Assuming that the outline drainage strategy is acceptable to the Local Authority, a more detailed design can be presented and agreed with the appropriate regulatory bodies during the detailed design phase.

4.6. Maintenance and Management Plan

Typical maintenance schedules have been produced for the SuDS systems and have been in the table below.

It should be noted that this maintenance plan is not an exclusive guidance. It is important to review and adjust the plan based on the specific detailed design and conditions of your planter box. Regular assessments and updates will ensure the plan remains effective and relevant.

Maintenance Type	Frequency	Tasks
Routine Maintenance	Monthly	<ul style="list-style-type: none">- Litter Picking: Remove litter and debris.- Inspection: Check inlets and outlets for blockages or damage.- Watering: Ensure plants are adequately watered, especially during dry periods.
Occasional Maintenance	Annually	<ul style="list-style-type: none">- Vegetation Management: Trim and manage plant growth.- Silt Control: Remove accumulated silt to prevent clogging.
Remedial Maintenance	As needed	<ul style="list-style-type: none">- Repair Damage: Fix structural damage to the planter box.- Erosion Control: Address signs of erosion around the planter.- Silt Removal: Remove significant silt build-up.

Table 4.4: Maintenance plan based on CIRIA SuDS Manual 2015

5. Foul Drainage

The foul water could be discharged by gravity into the 150mm diameter combined sewer (node 6110) located within the development boundary as relative levels indicate that this will be feasible in terms of fall. The foul manhole has a depth of 1.6m which appears to be low enough to provide a suitable connection point. There are several possible alternative manholes for the connection of foul drainage from the site, which could pass into the Head of System as this is closer to the extension.

6. Conclusion

The site is currently a two-storey dwelling. The proposal is for the erection of a two-storey dwellinghouse. It should be noted that the site previously comprised a two-storey residential dwelling which is effectively being extended. Therefore, the report considers the additional hardstanding because of the new built development.

An assessment of the site settings and existing constraints in conjunction with the development proposals have resulted in the following recommendations for the safe development of the site:

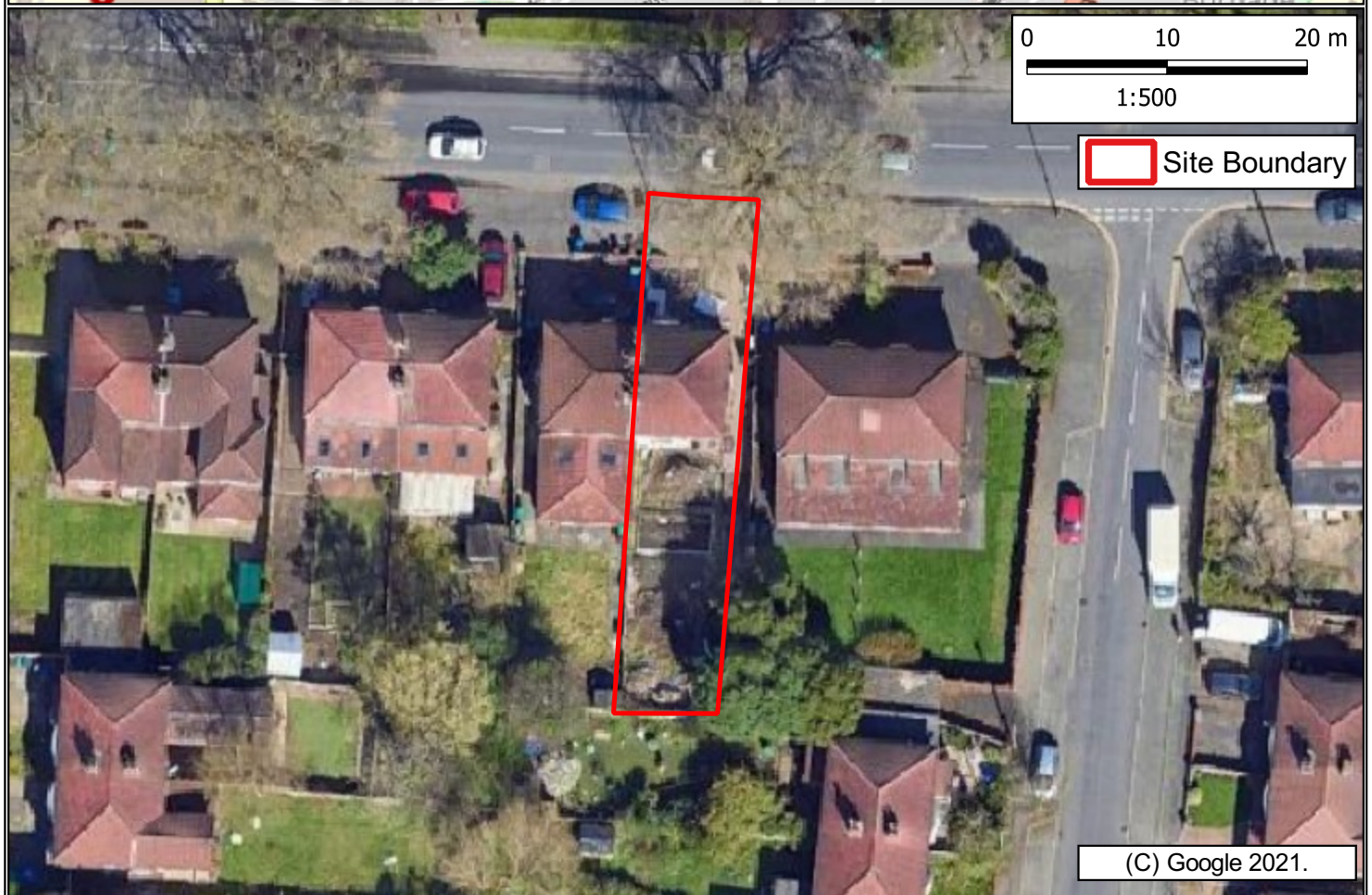
The site is considered to be too constrained due to the existing topography and proximity of the adjacent properties for the use of soakaway. In addition, the existing ground conditions on site indicate that the use of infiltration SuDS for surface water disposal will not be practical.

Based on the distance of the surface watercourses to the site, discharge to such a feature is not possible. Therefore, surface water flows will be discharged to the onsite surface water sewer. Sewer plans have been obtained from UU, along with a predevelopment enquiry.

The attenuation required for a 1 in 30-year event plus 40% climate change allowance, requires a storage volume of 0m³ and for the 1 in 100-year event plus 45% climate change allowance, a storage capacity of 0.1m³ will be required from on-site storage as well as SuDS systems. The volume can be stored within the site boundary within the planter box.

All proposed outflow connections from the development should be agreed with the Lead Local Planning Authority and United Utilities.

Figures



Client: Waheed Akbar				Title: Site Location & Boundary Plan		
Site: 70 Mauldeth Road, M20 4WF				Scale (see scale bar): 1:10,000 & 1:500 @ A4		
Job No.: FRA 251016	Drawn By: AY	Checked By: MB	Drawn: April 2025	Figure: 1	Revision:	

PROPOSED GA SIDE ELEVATION 1

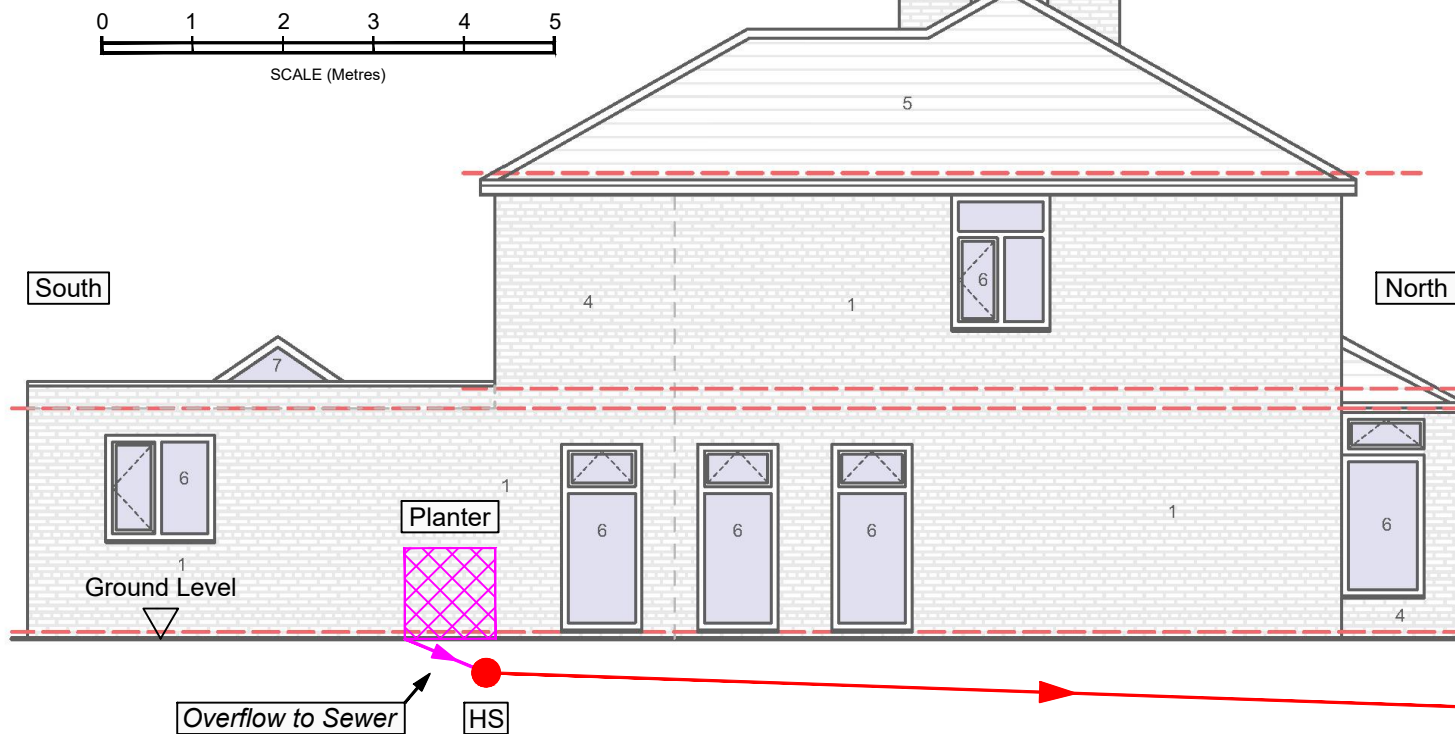
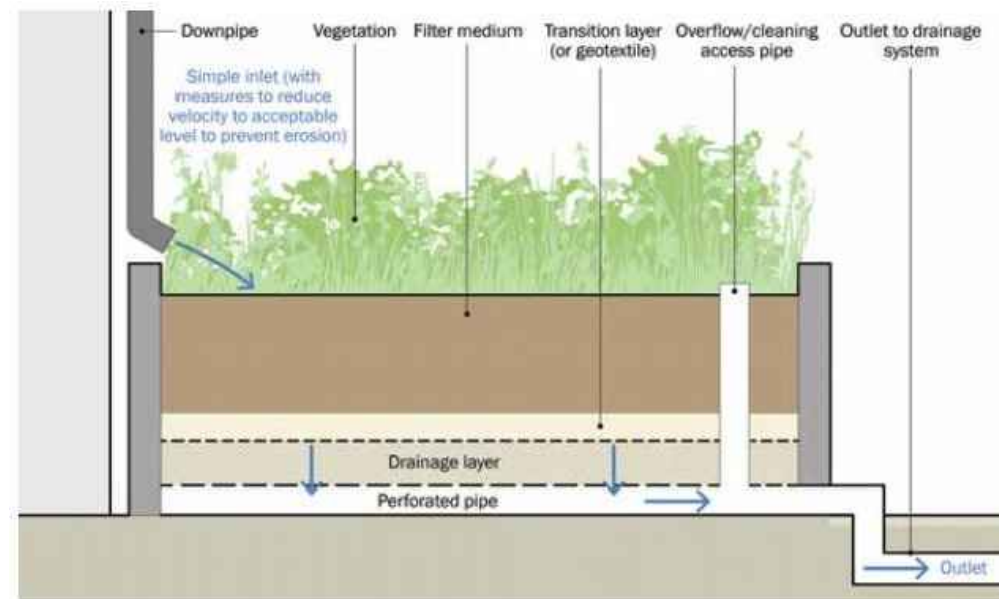
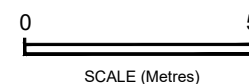
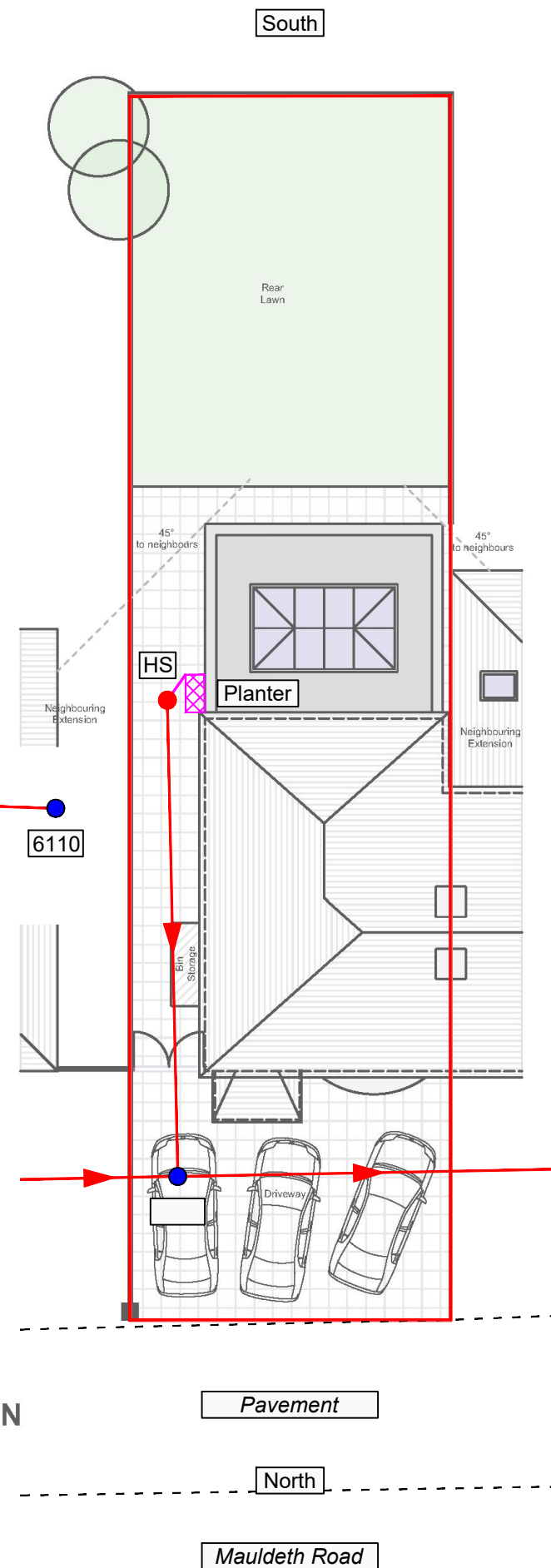


Figure 18.5 Section through a raised planter

PROPOSED GA SITE PLAN



KEY

- Site Boundary
- Approximate Location of United Utilities Sewer
- Existing Head of System Sewer (HS), 0.75m bgl. (United Utilities Sewer)
- Existing Combined Sewer Node (6110)
- Planter Box
- Overflow to Sewer

NOTE:

A planter box will provide the required storage volume to limit peak runoff arising from the development. The volume can be stored within the planter box measuring 1x1x0.5 metres, with 30% voids & an overflow into the system. The planter box will have a total volume of 0.5m³. Given the 30% voids, it will effectively store approximately 0.15m³ of stormwater.

The planter box should include an overflow mechanism, ensuring that any excess stormwater is safely directed into the drainage system, preventing flooding and waterlogging.

NOTE:

Re: Insert 'Fig 18.5 Section Through a Raised Planter', Source: CIRIA SUDS MANUAL 2015

NOTE:

Subject to Detailed Design

Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



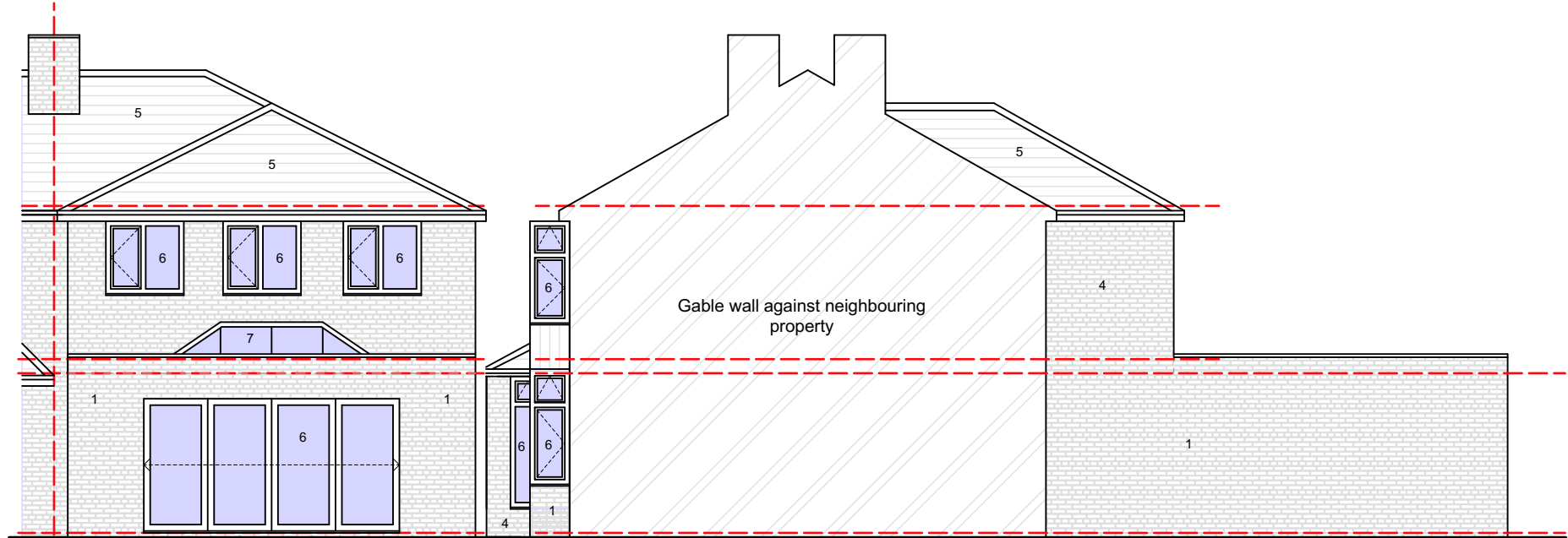
Client:		Waheed Akbar	
Site:		70 Mauldeth Road	
Title:		Outline Surface Water Drainage Strategy	
Job No.:	FRA251016	Scale (See Scale Bar):	See Scale Bar
Drawn By:	AC	Checked By:	AY
		Drawn:	Apr 2025
		Figure:	2
		Revision:	

Appendix A – Site Information



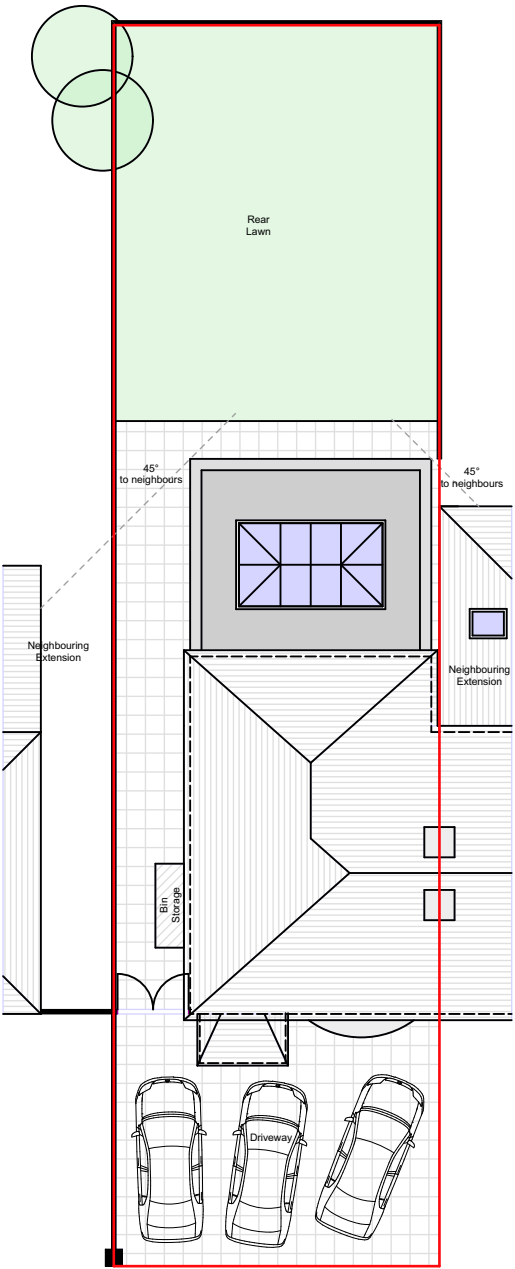
PROPOSED GA FRONT
ELEVATION @1:100

PROPOSED GA SIDE
ELEVATION 1 @1:100



PROPOSED GA REAR
ELEVATION @1:100

PROPOSED GA SIDE
ELEVATION 2 @1:100



MAULDETH
ROAD
PROPOSED GA SITE PLAN
@1:200

notes

This drawing is subject to a detailed building and site survey, therefore no guarantee of its accuracy can be given. This drawing has been draughted in accordance with the clients design requirements.

All areas are approximate and are subject to a detailed building and site survey and further design development.

All dimensions should be checked prior to commencement of construction on site. Measurements should not be taken off the drawing.

All dimensions shown are in millimetres (mm).

- Text Key
- Existing facing brickwork
 - Existing terracotta pantile roof tiles
 - Existing uPVC door/window
 - Proposed facing brickwork
 - Proposed terracotta pantile roof tiles
 - Proposed uPVC door/window
 - Proposed skylight



SCALE BAR 1:100

SCALE BAR 1:200

PL0 Planning Issue 20.08.24

revisions

NADA Architects Ltd
169 Kingsway
Burnage
Manchester
M19 2ND
Mob: 07974 735527
E: ahmed@nadaarchitects.com
W: www.nadaarchitects.com

D - design PL - planning PT - pre-tender
T - tender P - preliminary
C - construction R - record

HABIB AKBAR

HOUSE EXTENSIONS
70 MAULDETH ROAD,
MANCHESTER, M20 4WF

PROPOSED GA ELEVATIONS

scale 1:100 @ A3 1:200 @ A3 date 20.08.24 drawn MI checked AC

job no (category) dwg no revision

24-1280 (02)001 PL0

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notes

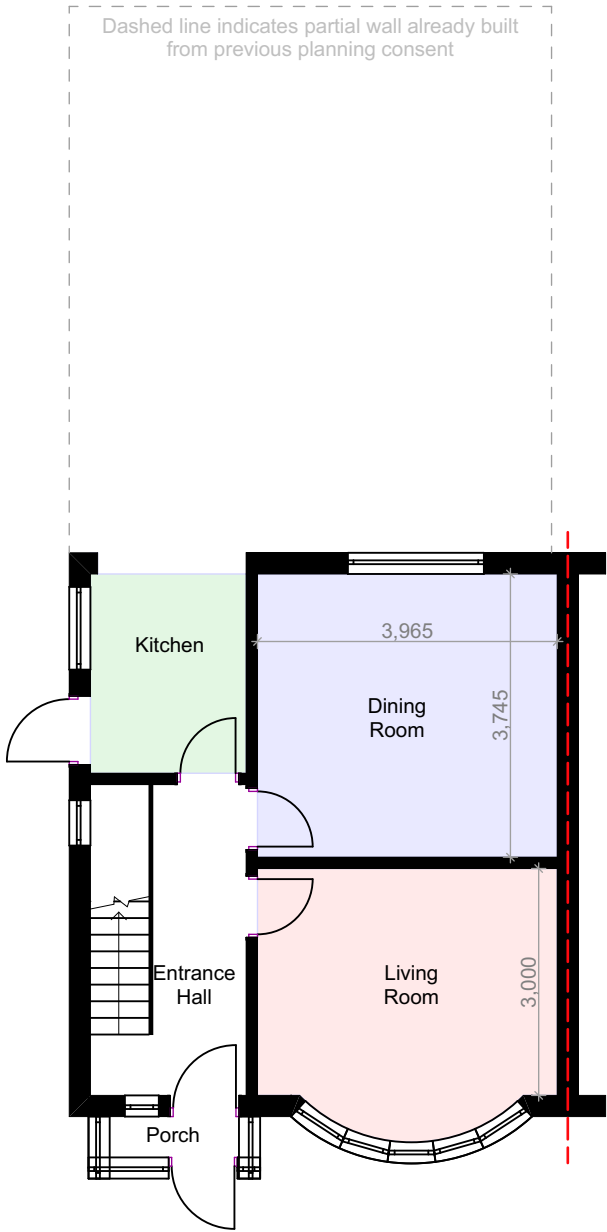
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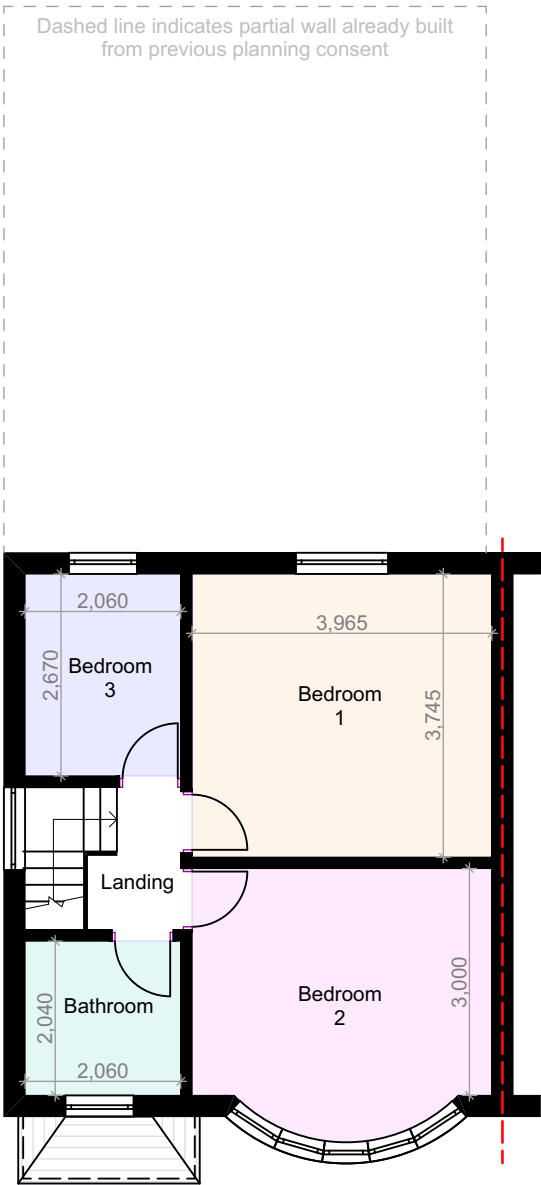
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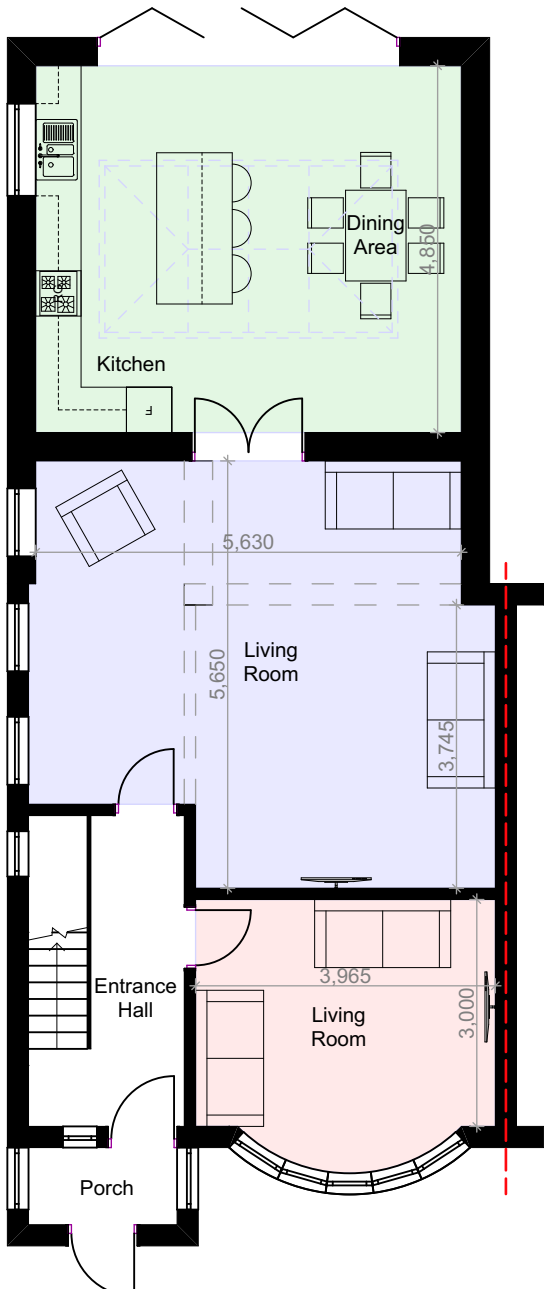
SCALE BAR 1:100



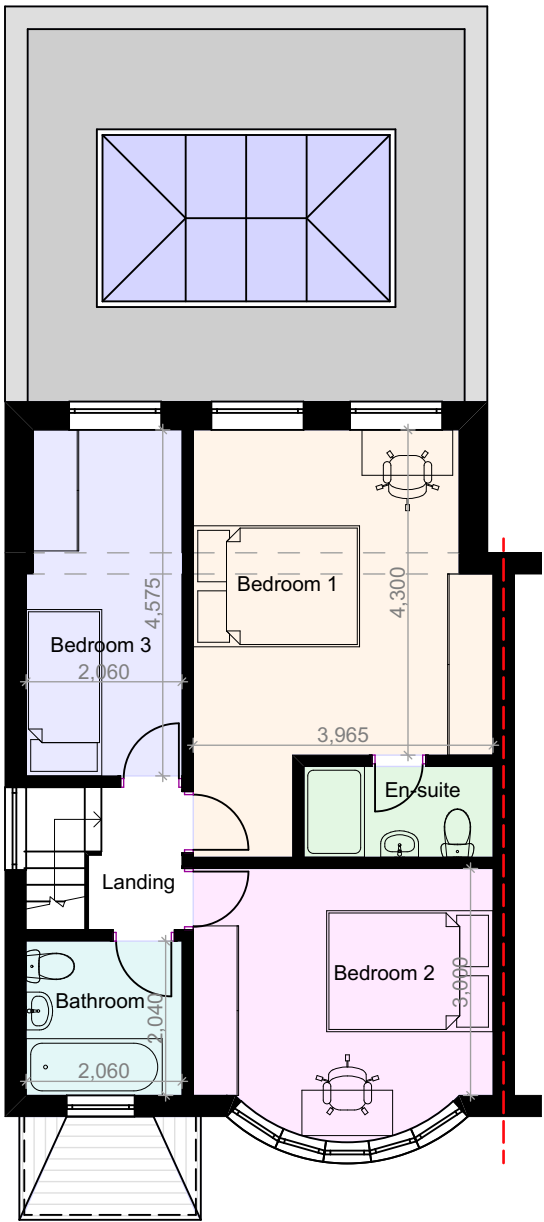
EXISTING GA GROUND FLOOR PLAN



EXISTING GA FIRST FLOOR PLAN



PROPOSED GA GROUND FLOOR PLAN



PROPOSED GA FIRST FLOOR PLAN

PL0 Planning Issue

20.08.24

revisions

NADA Architects Ltd
169 Kingsway
Burnage
Manchester
M19 2ND
Mob: 07974 735527
E: ahmed@nadaarchitects.com
W: www.nadaarchitects.com

D - design
T - tender
C - construction

PL - planning
P - preliminary
R - record

PT - pre-tender

HABIB AKBAR

HOUSE EXTENSIONS
70 MAULDETH ROAD,
MANCHESTER, M20 4WF

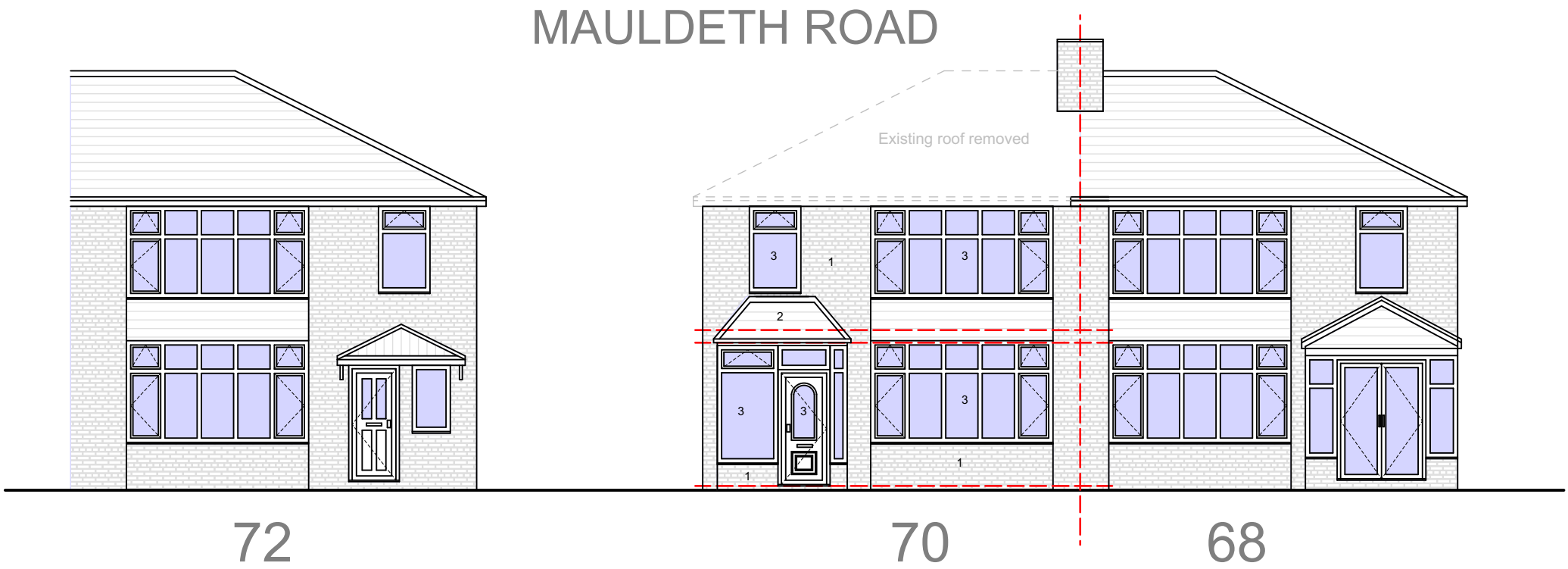
EXISTING & PROPOSED GA
FLOOR PLANS

scale	date	drawn	checked
1:100 @ A3	20.08.24	MI	AC

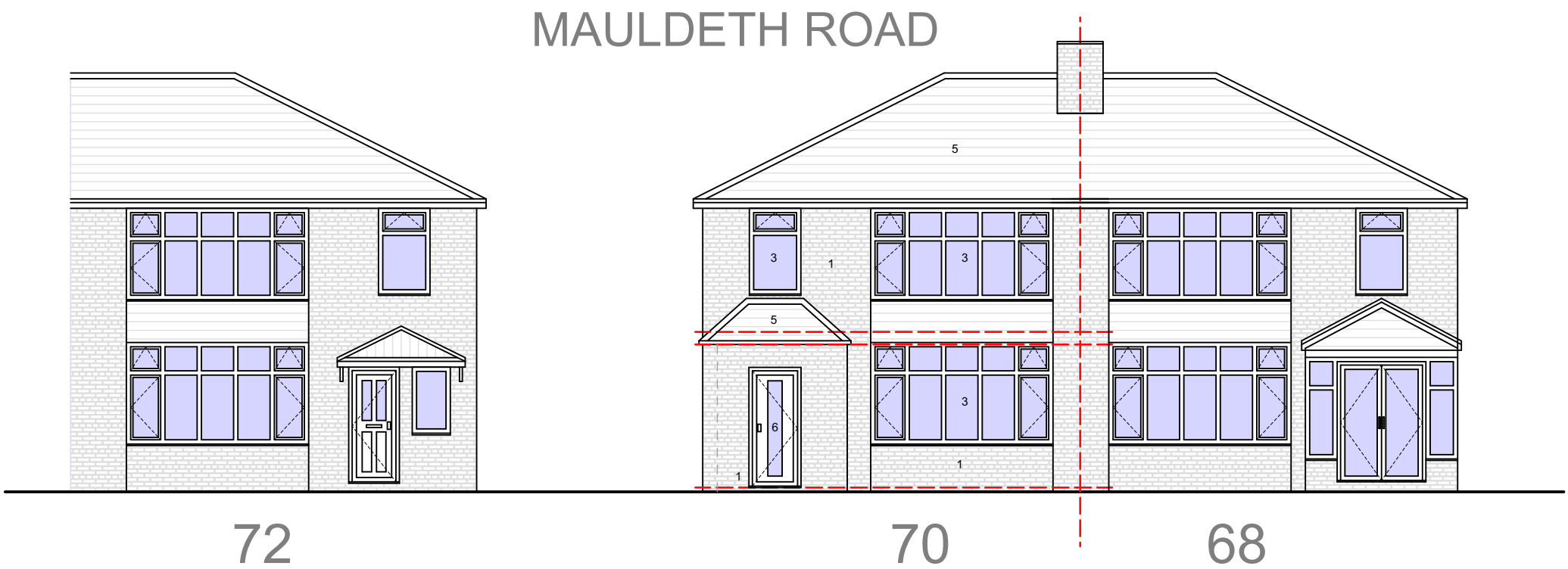
job no	(category) dwg no	revision
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24-1280 (03)001 PL0

Drawing measurements shall not be obtained by scaling. Verify all dims prior to construction. Immediately report any discrepancies on this drawing to Architect. This drawing shall be read in conjunction with associated specifications and related consultant's documents.



EXISTING GA STREET SCENE
ELEVATION



PROPOSED GA STREET SCENE
ELEVATION

notes

This drawing is subject to a detailed building and site survey, therefore no guarantee of its accuracy can be given. This drawing has been draughted in accordance with the clients design requirements.

All areas are approximate and are subject to a detailed building and site survey and further design development.

All dimensions should be checked prior to commencement of construction on site. Measurements should not be taken off the drawing.

All dimensions shown are in millimetres (mm).

- Text Key
1. Existing facing brickwork
 2. Existing terracotta pantile roof tiles
 3. Existing uPVC door/window
 4. Proposed facing brickwork
 5. Proposed terracotta pantile roof tiles
 6. Proposed uPVC door/window
 7. Proposed skylight

SCALE BAR 1:100

PL0 Planning Issue 20.08.24

revisions

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HABIB AKBAR

HOUSE EXTENSIONS
70 MAULDETH ROAD,
MANCHESTER, M20 4WF

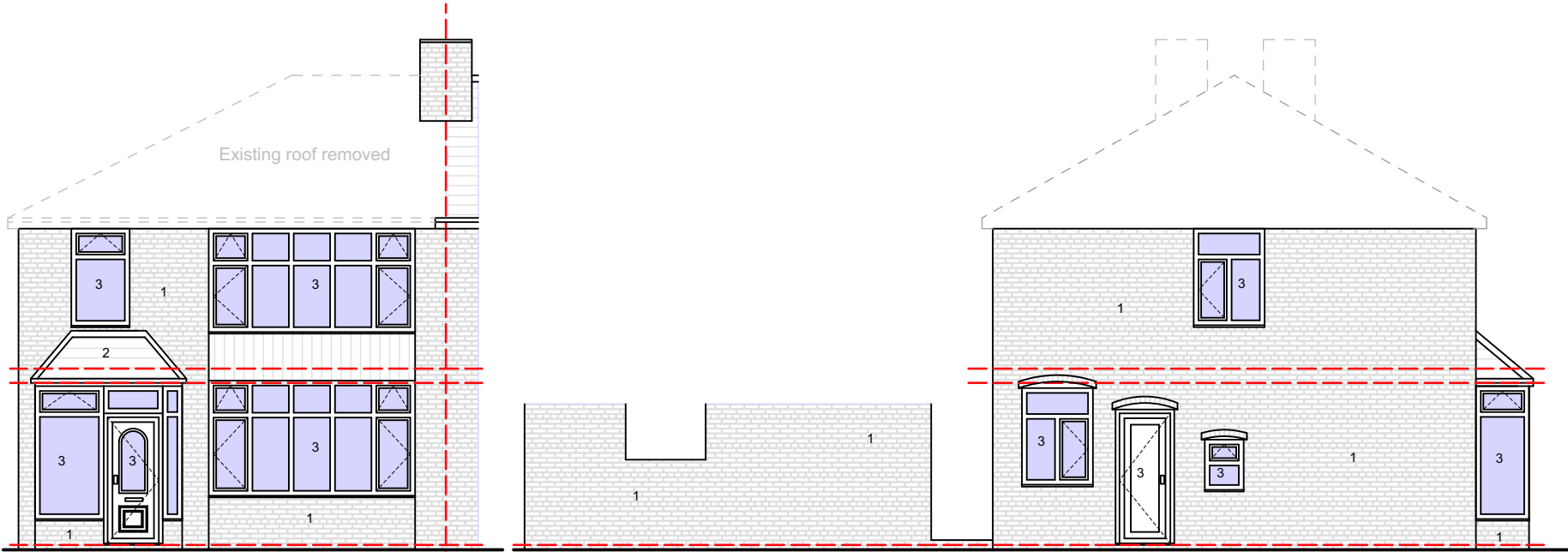
EXISTING & PROPOSED GA
ELEVATIONS

scale 1:100 @ A3 date 20.08.24 drawn MI checked AC

job no (category) dwg no revision

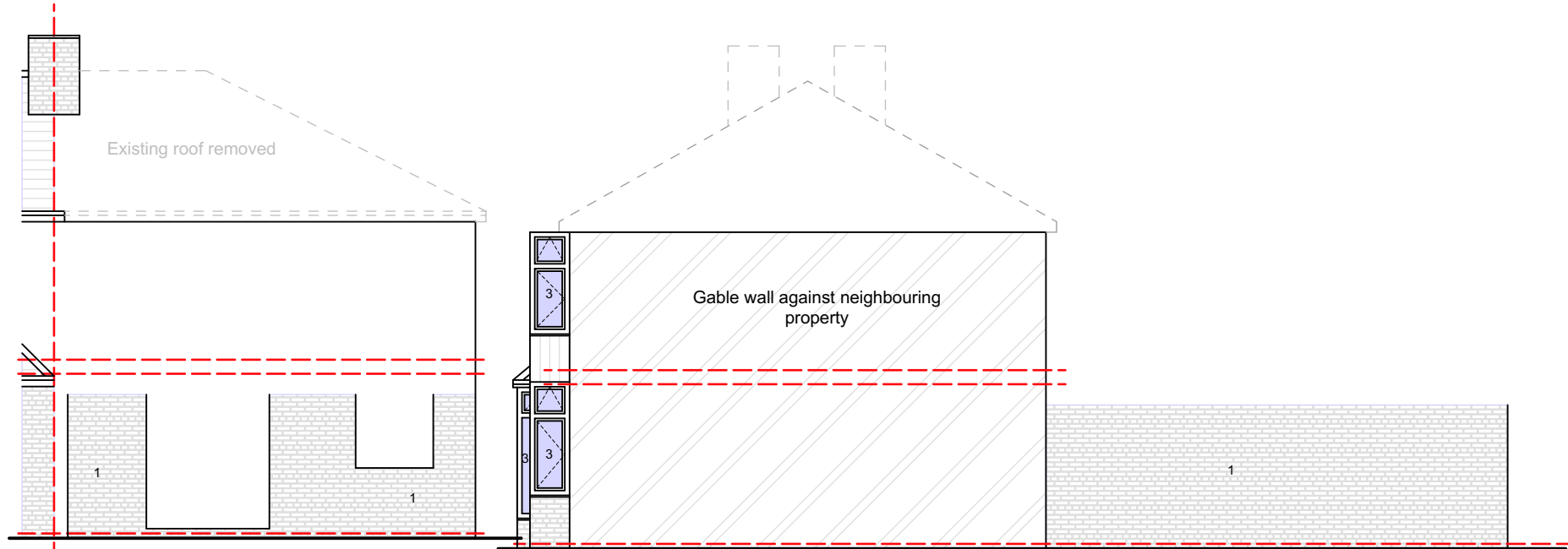
24-1280 (04)001 PL0

Drawing measurements shall not be obtained by scaling. Verify all dims prior to construction. Immediately report any discrepancies on this drawing to Architect. This drawing shall be read in conjunction with associated specifications and related consultant's documents.



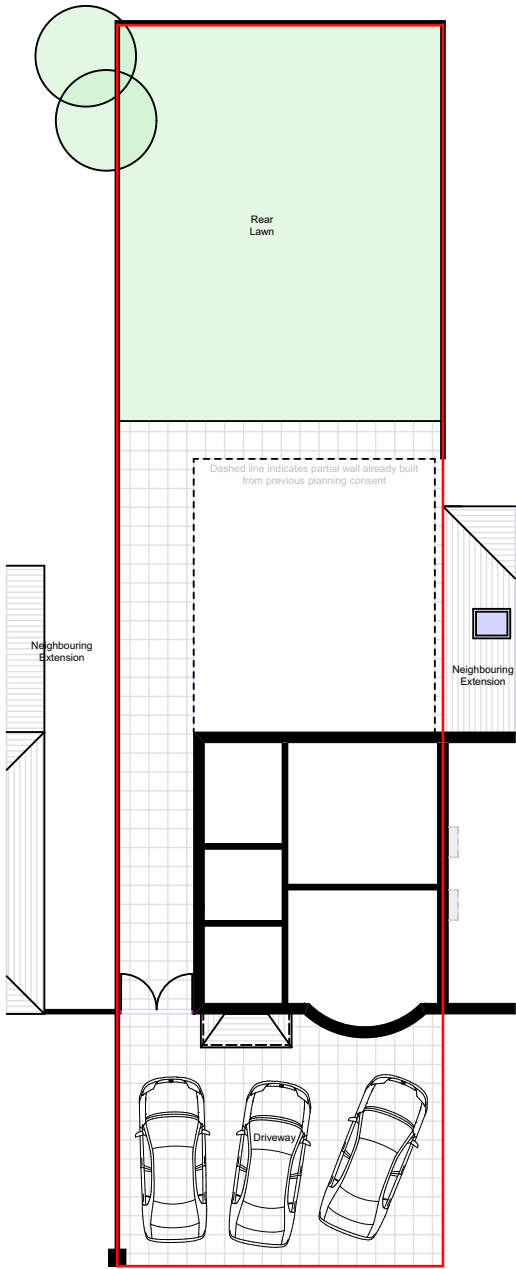
EXISTING GA FRONT
ELEVATION @1:100

EXISTING GA SIDE
ELEVATION 1 @1:100



EXISTING GA REAR
ELEVATION @1:100

EXISTING GA SIDE
ELEVATION 2 @1:100



MAULDETH
ROAD
EXISTING GA SITE PLAN
@1:200

notes

This drawing is subject to a detailed building and site survey, therefore no guarantee of its accuracy can be given. This drawing has been draughted in accordance with the clients design requirements.

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Text Key

1. Existing facing brickwork
2. Existing terracotta pantile roof tiles
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4. Proposed facing brickwork
5. Proposed terracotta pantile roof tiles
6. Proposed uPVC door/window
7. Proposed skylight



SCALE BAR 1:100

SCALE BAR 1:200

PL0 Planning Issue 20.08.24

revisions

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HABIB AKBAR

HOUSE EXTENSIONS
70 MAULDETH ROAD,
MANCHESTER, M20 4WF

EXISTING GA ELEVATIONS

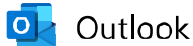
scale 1:100 @ A3 1:200 @ A3 date 20.08.24 drawn MI checked AC

job no (category) dwg no revision

24-1280 (01)001 PL0

Drawing measurements shall not be obtained by scaling. Verify all dims prior to construction. Immediately report any discrepancies on this drawing to Architect. This drawing shall be read in conjunction with associated specifications and related consultant's documents.

Appendix B – Consultee Correspondence



Automatic reply: FRA251016 , 70 Mauldeth road

From Flood Risk Management <floodriskmanagement@manchester.gov.uk>

Date Mon 2025-03-10 11:20 AM

To Alaika Yusaf <a.yusaf@thelkgroup.com>

Thank you for contacting Flood Risk Management Team (LLFA). Your enquiry has been received and will be processed as below.

Service Response Times:**Planning Consultation:**

New planning notifications from planning@manchester.gov.uk – 21 days

Reviews of further CDN submission via Planning Officer – 14 days

Pre-Application advice requested by Planning Officer – 14 days

Land Drainage Consent:

Decision in statutory 2 month time frame

All Other Enquiries:

21 days target timescale

Kind Regards,

Flood Risk Management Team (LLFA)

floodriskmanagement@manchester.gov.uk

Highways Service

Neighbourhoods Directorate

Manchester City Council

PO Box 532

Town Hall

Manchester

M60 2LA

Web: <http://www.manchester.gov.uk>

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Your personal data is very important to us. Please refer to our privacy notice at: www.manchester.gov.uk/privacy for further information.

This footnote also confirms that this email message has been swept for the presence of computer viruses.

LKGroup**Unit 29
Eton Hill Road,
Radcliffe,
m26 2zs****FAO:****How to contact us:****United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP****Telephone: 0370 7510101****E-mail: propertysearches@uuplc.co.uk****Your Ref: FRA251016
Our Ref: UUPS-ORD-638188
Date: 13/03/2025****Dear Sirs****Location: 70 MAULDETH ROAD, MANCHESTER, M20 4WF**

I acknowledge with thanks your request dated 10/03/2025 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



Refo	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	Refo	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
8100	38.61	CO	0	300	300	VC	17.1225	17.1225	1 in 276	7219	38.61	CO	0	300	300	VC	17.1225	17.1225	1 in 276
4000	37.48	CO	0	300	300	VC	11.3578	11.3578	1 in 223	7101	38.61	CO	0	300	300	VC	11.3578	11.3578	1 in 223
5301	37.37	CO	0	300	300	VC	58.00862	58.00862	1 in 223	4011	38.61	CO	0	300	300	VC	58.00862	58.00862	1 in 223
3302	37.37	CO	0	300	300	VC	16.99447	16.99447	1 in 223	4221	38.61	CO	0	300	300	VC	16.99447	16.99447	1 in 223
3010	37.37	CO	0	300	300	VC	3.217647	3.217647	1 in 223	7210	38.61	CO	0	300	300	VC	3.217647	3.217647	1 in 223
7302	37.37	CO	0	300	300	VC	2.820506	2.820506	1 in 223	4222	38.61	CO	0	300	300	VC	2.820506	2.820506	1 in 223
8322	37.37	CO	0	300	300	VC	4.491817	4.491817	1 in 223	6202	38.61	CO	0	300	300	VC	4.491817	4.491817	1 in 223
3301	37.37	CO	0	300	300	VC	38.22042	38.22042	1 in 223	6300	38.61	CO	0	300	300	VC	38.22042	38.22042	1 in 223
6302	37.37	CO	0	300	300	VC	118.277	118.277	1 in 141	6300	38.61	CO	0	300	300	VC	118.277	118.277	1 in 141
3011	37.37	CO	0	300	300	VC	15.41821	15.41821	1 in 223	7201	38.61	CO	0	300	300	VC	15.41821	15.41821	1 in 223
3409	37.37	CO	0	300	300	VC	6.679519	6.679519	1 in 197	6000	37.39	CO	0	300	300	VC	6.679519	6.679519	1 in 197
6301	37.29	CO	0	300	300	VC	63.53174	63.53174	1 in 127	6200	38.84	CO	0	300	300	VC	63.53174	63.53174	1 in 127
3915	37.57	CO	0	300	300	VC	5.159782	5.159782	1 in 98	4803	38.5	CO	0	300	300	VC	5.159782	5.159782	1 in 98
87	37.04	CO	0	300	300	VC	8.286228	8.286228	1 in 141	6113	38.5	CO	0	300	300	VC	8.286228	8.286228	1 in 141
8320	37.57	CO	0	300	300	VC	31.43515	31.43515	1 in 141	6111	38.5	CO	0	300	300	VC	31.43515	31.43515	1 in 141
8320	37.57	CO	0	300	300	VC	7.922004	7.922004	1 in 141	6116	38.5	CO	0	300	300	VC	7.922004	7.922004	1 in 141
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3200	36.26	CO	0	300	300	VC	30.52868	30.52868	1 in 127	6404	39.05	CO	0	300	300	VC	30.52868	30.52868	1 in 127
5402	37.2	CO	0	300	300	VC	93.83085	93.83085	1 in 98	4803	38.5	CO	0	300	300	VC	93.83085	93.83085	1 in 98
7306	37.2	CO	0	300	300	VC	8.286228	8.286228	1 in 141	6203	38.5	CO	0	300	300	VC	8.286228	8.286228	1 in 141
7409	37.2	CO	0	300	300	VC	31.43515	31.43515	1 in 141	6111	38.5	CO	0	300	300	VC	31.43515	31.43515	1 in 141
8017	37.2	CO	0	300	300	VC	7.922004	7.922004	1 in 141	6116	38.5	CO	0	300	300	VC	7.922004	7.922004	1 in 141
6200	37.78	CO	0	300	300	VC	30.99412	30.99412	1 in 52	6206	38.5	CO	0	300	300	VC	30.99412	30.99412	1 in 52
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8108	37.78	CO	0	300	300	VC	6.462914	6.462914	1 in 223	6204	38.42	CO	0	300	300	VC	6.462914	6.462914	1 in 223
3205	36.45	CO	0	300	300	VC	11.18034	11.18034	1 in 35	8200	38.42	CO	0	300	300	VC	11.18034	11.18034	1 in 35
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8418	36.04	CO	0	300	300	VC	21.63348	21.63348	1 in 35	8330	38.42	CO	0	300	300	VC	21.63348	21.63348	1 in 35
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8218	36.56	CO	0	300	300	VC	18.41369	18.41369	1 in 223	8218	38.42	CO	0	300	300	VC	18.41369	18.41369	1 in 223
8218	36.56	CO	0	300	300	VC	24.62007	24.62007	1 in 223	8218	38.42	CO	0	300	300	VC	24.62007	24.62007	1 in 223
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5102	37.11	SW	0	450	450	BR	90.44888	90.44888	1 in 302	7420	37.72	CO	0	300	300	VC	90.44888	90.44888	1 in 302
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4301	37.11	SW	0	450	450	BR	8.67374	8.67374	1 in 302	3203	38.25	CO	0	300	300	VC	8.67374	8.67374	1 in 302
8419	37.11	SW	0	450	450	BR	14.31598	14.31598	1 in 302	3202	38.33	CO	0	300	300	VC	14.31598	14.31598	1 in 302
7400	38.52	CO	0	300	300	VC	105.019	105.019	1 in 184	3202	38.33	CO	0	300	300	VC	105.019	105.019	1 in 184
3005	38.45	CO	0	300	300	VC	81.1264	81.1264	1 in 184	3202	38.33	CO	0	300	300	VC	81.1264	81.1264	1 in 184
8901	38.45	CO	0	300	300	VC	44.8144	44.8144	1 in 308	3202	38.33	CO	0	300	300	VC	44.8144	44.8144	1 in 308
6901	37.92	CO	0	300	300	VC	67.06713	67.06713	1 in 216	7333	38.33	CO	0	300	300	VC	67.06713	67.06713	1 in 216
4311	38.28	CO	0	300	300	VC	6.469409	6.469409	1 in 216	3308	38.33	CO	0	300	300	VC	6.469409	6.469409	1 in 216
6102	37.45	CO	0	300	300	VC	12.07107	12.07107	1 in 216	3811	38.33	CO	0	300	300	VC	12.07107	12.07107	1 in 216
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8227	38.35	CO	0	300	300	VC	8.889652	8.889652	1 in 216	8017	38.33	CO	0	300	300	VC	8.889652	8.889652	1 in 216
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8100	38.09	CO	0	300	300	VC	112.361												

Pre Development Enquiry Guidance

Version 1 (September 24)

(This document should be read in conjunction with PDE response letter)



Water for the North West

Comment no.	Technical Guidance
General Guidance	
1	<p>Sewer Access</p> <p>If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:</p> <p>https://www.unitedutilities.com/builders-developers/working-near-our-assets/</p> <p>Sewer Adoption Under S104</p> <p>If you intend to offer sewers for adoption, design per current Design and Construction and local practices which have now replaced Sewers for Adoption 6th Edition..</p> <p>S104 Pre-Design Assessment</p> <p>We recommend submitting a pre-design assessment. This is a free service to discuss the high level design and potential challenges. Please see link to application form in guidance sheet.</p> <p>Adoption of Sewers</p> <ul style="list-style-type: none">• Designs must comply with current Design & Construction Guidance.• S104 1b Pre-design assessment, and S104 for adoption of new sewers applications can be found at Sewer adoptions - United Utilities• Submit pre-design assessment to SewerAdoptions@uuplc.co.uk.• No construction should commence until detailed design is approved in writing. <p>Sewer Connections:</p> <ul style="list-style-type: none">• Formal S106 application required for sewer connections. Application details available at: www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/ <p>Water Assets</p> <ul style="list-style-type: none">• Contact DeveloperServicesWater@uuplc.co.uk regarding clean water assets on site.• Further information: Water pre-development - United Utilities <p>Additional Considerations</p> <ul style="list-style-type: none">• Land drainage, overland flows, and track drainage are not accepted into public sewer network. <p>Useful Resources:</p> <ul style="list-style-type: none">• Codes for Adoption: www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/• Design & Construction Guidance: www.water.org.uk/sewerage-sector-guidance-approved-documents/• United Utilities website: www.unitedutilities.com/builders-developers/ <p>Contact Information:</p> <ul style="list-style-type: none">• Main contact number: 0345 6723 723• Sewer Adoptions and Pre-Development: SewerAdoptions@uuplc.co.uk
2	<p>Flooding Events</p> <p>Please note that United Utilities Water Limited (UUW) can only record and check flooding events which are reported to us, and we must comply with our Regulators instructions on the qualification of flooding events.</p> <p>Our response does not include:</p> <ul style="list-style-type: none">• any sewer flooding events caused by blockages or collapses which are the result of third-party actions, natural events, or other actions over which UUW has no control and not a facet of sewer capacity; or• any historical sewer flooding events that have been resolved from investment in our infrastructure.

	<p>Further consideration.</p> <ul style="list-style-type: none"> For low-lying sites, care should be taken to ensure that the property is not at increased risk of flooding. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme. Consult Lead Local Flood Authority (LLFA) for surface water drainage concerns. Check Environment Agency guidelines if site is in a Groundwater Source Protection Zone.
3	<p>Asset Protection</p> <ul style="list-style-type: none"> Due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records. We ask that you proceed with caution and conduct adequate site investigation works. If any uncharted sewers are identified while conducting your investigation, we ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records. Obtain asset data records before planning development United Utilities - Property Search : Please be aware that any proposed diversion may require modelling. This process may take up to 6 months to reach an acceptable design. Maintain minimum easement in line with our easement local practice, unless there is a formal easement in place, in which case the specified easement width would apply. easement-local-practice.pdf (unitedutilities.com) Contact United Utilities for guidance on work near assets or if diversion is necessary.
4	<p>Surface Water Drainage Hierarchy</p> <p>Follow the hierarchy as per National Planning Practice Guidance:</p> <ol style="list-style-type: none"> 1. Infiltration 2. Discharge to waterbody 3. Discharge to surface water sewer or highway drain 4. Discharge to combined sewer (last resort) <p>For guidance, The Northwest SuDS Pro-Forma provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.</p> <p>The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).</p> <p>The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining the cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.</p> <p>SuDS (Sustainable Drainage Systems)</p> <ul style="list-style-type: none"> Prioritise multi-functional SuDS in accordance with national planning policy. Design SuDS components as per CIRIA SuDS Manual (C753). Consult the North West SuDS Pro-Forma for required evidence at each stage of the drainage hierarchy. <p>Infiltration</p> <p>Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.</p> <p>A detailed evidence-based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.</p> <p>Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website: https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs</p> <p>If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below: https://www.gov.uk/government/publications/groundwater-protection-position-statements</p> <p>Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.</p> <p>Surface Water Discharge Rates</p> <p>Please note the given discharge rate is based on the site area believed to be developed. If there are significant areas of the site that will not be developed, the discharge rate should be reduced accordingly.</p>
5	<p>Please note that this guidance is current as of the date of issue. Always check for the most up-to-date regulations and guidelines when planning your development.</p>

United Utilities Grasmere House, 2nd Floor
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Response Date: 22/03/2025

Dear LK

Pre-Development Enquiry for 70 Mauldeth Road Manchester M20 4WF

UU Reference Number: 07211016

We have assessed your application based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your strategy will need review by other authorities as part of the planning process. We advise conducting necessary site investigations to confirm viability of your proposals.

Modelled Flood Risk

I can confirm that we do not have modelled flood risk within the vicinity of the proposed development.

Please note that our modelling data is indicative, and only representative of the 1:100year storm event.

[Please see **comment 2** of the attached guidance sheet](#)

Asset Protection

According to our public sewer records, there are public sewers located within your site boundary. This requires an easement of **3m**. If you cannot achieve the required clearance, you may wish to consider diverting and or abandoning the public sewer.

[Please see **comment 3** of the attached guidance sheet and **Working Near Our Pipelines Guidance document**](#)

Foul Water

Foul flow from this site will be allowed to drain into the public combined sewer system.

Our preferred point of discharge would be to the **150mm combined sewer located within** your proposed development at an unrestricted rate.

Manhole reference SJ85936110, **Grid reference** 385634, 393173

[Please see the images below for clarification](#)

Surface Water

Follow the National Planning Policy Guidance drainage hierarchy and provide evidence for discounting higher options before considering public sewer discharge. Consult the Lead Local Flood Authority regarding surface water concerns.

[Please see comment 4 within the guidance sheet](#)

Infiltration

[Please see comment 4 within the guidance sheet](#)

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the **culverted watercourse** located north of the site boundary.

We would encourage you to engage with any third-party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

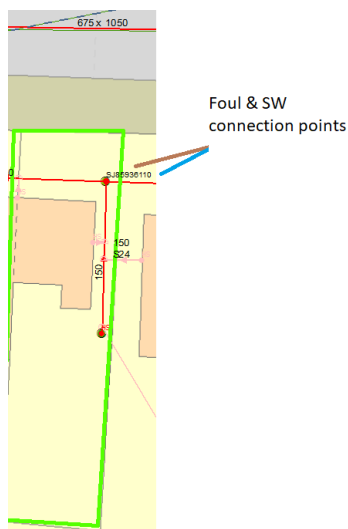
Public Sewer

United Utilities will consider a connection to the 150mm diameter public **combined sewer** within **the development** at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities requests that any agreed rate does not exceed **2l/s**.

Manhole reference SJ85936110, **Grid reference** 385634, 393173

[Please see images below for clarification](#)

Site Images



Appendix C – Calculations



MasterDrain
SW

The LK Group

www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No.

FRA251016

Sheet no.

1

Date

02/04/25

Project

70 Mauldeth Road, M20 4WF

Title

30yr + 40%cc

By

AY

Checked

Reviewed

Data:-

FSR Hydrology:-

Location = 70 Mauldeth Road

M5-60 (mm) = 18

Soil index = 0.30

Return period = 30

UCWI = 86.0

Grid reference = SJ3526

r = 0.37

SAAR (mm/yr) = 800

WRAP = 2

Climate change = 40

i) Very permeable soils with shallow ground water;

ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; The layer is low in organic matter, mottled and (fragipan - a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. Slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).

iii) Moderately permeable soils, some with slowly permeable subsoils.

Runoff factor (RF) = 76.0, calculated from:-

Runoff factor = $(0.829 \times \text{PIMP}) + (25 \times \text{SOIL}) + (0.078 \times \text{UCWI}) - 20.7$

where

PIMP = Impervious Area * 100 / (Impervious Area + Pervious Area)

UCWI = Calculated value for Wetness Index

Design data:-

Imperv. area = 46 m²

Total area (TA) = 46 m²

Allowed discharge rate = 2.000 l/s

Additional flow = 0.00 l/s

Pervious area = 0 m²

Equiv area = 35 m² (TA x RF).

Areal reduction factor = 1.000

Climate change factor = 40

Calculated data:-

Time to max = 1.0 mins

Rainfall at max = 232.37 mm/hr

Pipeline storage = 0.0 m³

Offline storage = 0.0 m³

Calculated storage volume = 0.0 m³

Allowed discharge rate = 2.000 l/s

Available MH storage = 0.0 m³

Fixed 6 hour data:-

Rainfall event = 6 hours

Rainfall rate = 10.00 mm/hr

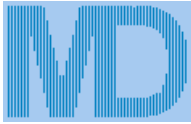
Calculated storage volume = 0.0 m³

Allowed discharge rate = 2.000 l/s

Rainfall intensities calculated using the Wallingford Procedure

Storage lengths for initial calculation (x 1.1, 1.2, 1.3 or 1.5 as above if required) :-

Diam	Len	Diam	Len	Ovoid	Len	Box culvert	Len
100	2.0	1125	0.0	400 x 600	0.1	500 x 500	0.1
150	0.9	1200	0.0	600 x 900	0.0	500 x 750	0.0
225	0.4	1275	0.0	800 x 1200	0.0	500 x 1000	0.0
300	0.2	1350	0.0			750 x 1000	0.0
375	0.1	1425	0.0			750 x 1200	0.0
450	0.1	1500	0.0			750 x 1500	0.0
525	0.1	1575	0.0			1000 x 1000	0.0
600	0.1	1650	0.0			1000 x 1200	0.0
675	0.0	1725	0.0			1000 x 1500	0.0
750	0.0	1800	0.0			1000 x 1800	0.0
825	0.0	1875	0.0			1000 x 2000	0.0
900	0.0	1950	0.0			1500 x 1500	0.0
975	0.0	2025	0.0			1500 x 1800	0.0
1050	0.0	2100	0.0			1500 x 2000	0.0



MasterDrain
SW

Data:-

The LK Group

www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No.

FRA251016

Sheet no.

2

Date

02/04/25

Project

70 Mauldeth Road, M20 4WF

Title

30yr + 40%cc

By

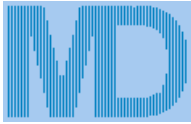
AY

Checked

Reviewed

Time (mins)	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)
10	115.0	0.668	1.200	0.000
20	79.0	0.915	2.400	0.000
30	61.0	1.070	3.600	0.000
40	51.0	1.184	4.800	0.000
50	44.0	1.276	6.000	0.000
60	39.0	1.353	7.200	0.000
70	35.0	1.420	8.400	0.000
80	32.0	1.479	9.600	0.000
90	29.0	1.532	10.800	0.000
100	27.0	1.580	12.000	0.000
110	25.0	1.624	13.200	0.000
120	24.0	1.665	14.400	0.000
130	22.0	1.703	15.600	0.000
140	21.0	1.738	16.800	0.000
150	20.0	1.771	18.000	0.000
160	19.0	1.803	19.200	0.000
170	18.0	1.832	20.400	0.000
180	18.0	1.860	21.600	0.000
190	17.0	1.887	22.800	0.000
200	16.0	1.913	24.000	0.000
210	16.0	1.937	25.200	0.000
220	15.0	1.961	26.400	0.000
230	15.0	1.983	27.600	0.000
240	14.0	2.005	28.800	0.000
250	14.0	2.025	30.000	0.000
260	14.0	2.045	31.200	0.000
270	13.0	2.065	32.400	0.000
280	13.0	2.083	33.600	0.000
290	12.0	2.101	34.800	0.000
300	12.0	2.119	36.000	0.000
310	12.0	2.136	37.200	0.000
320	12.0	2.152	38.400	0.000
330	11.0	2.168	39.600	0.000
340	11.0	2.184	40.800	0.000
350	11.0	2.199	42.000	0.000
360	11.0	2.213	43.200	0.000
370	10.0	2.228	44.400	0.000
380	10.0	2.243	45.600	0.000
390	10.0	2.257	46.800	0.000
400	10.0	2.271	48.000	0.000
410	10.0	2.285	49.200	0.000
420	9.0	2.299	50.400	0.000
430	9.0	2.312	51.600	0.000
440	9.0	2.325	52.800	0.000
450	9.0	2.338	54.000	0.000
460	9.0	2.350	55.200	0.000
470	9.0	2.362	56.400	0.000
480	8.0	2.375	57.600	0.000
490	8.0	2.386	58.800	0.000
500	8.0	2.398	60.000	0.000
510	8.0	2.410	61.200	0.000
520	8.0	2.421	62.400	0.000
530	8.0	2.432	63.600	0.000
540	8.0	2.443	64.800	0.000
550	8.0	2.454	66.000	0.000
560	8.0	2.465	67.200	0.000
570	7.0	2.475	68.400	0.000
580	7.0	2.486	69.600	0.000
590	7.0	2.496	70.800	0.000
600	7.0	2.506	72.000	0.000

Storage volume (m³) = 0.0 m³



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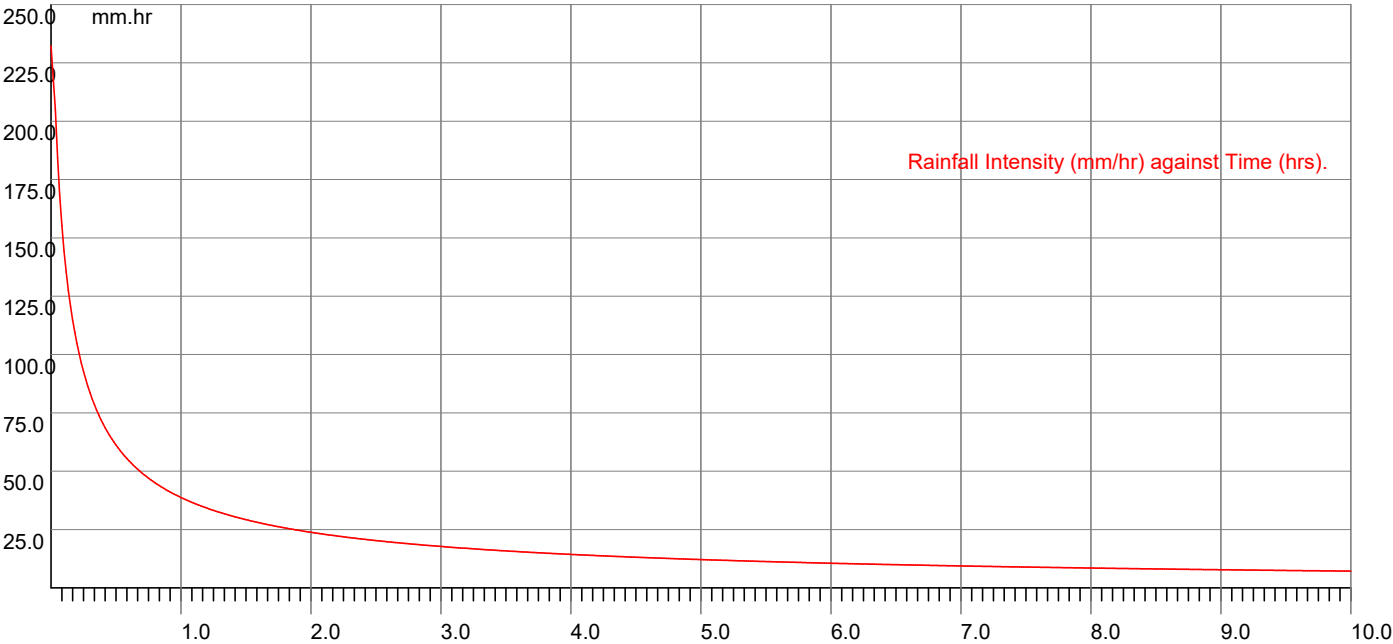
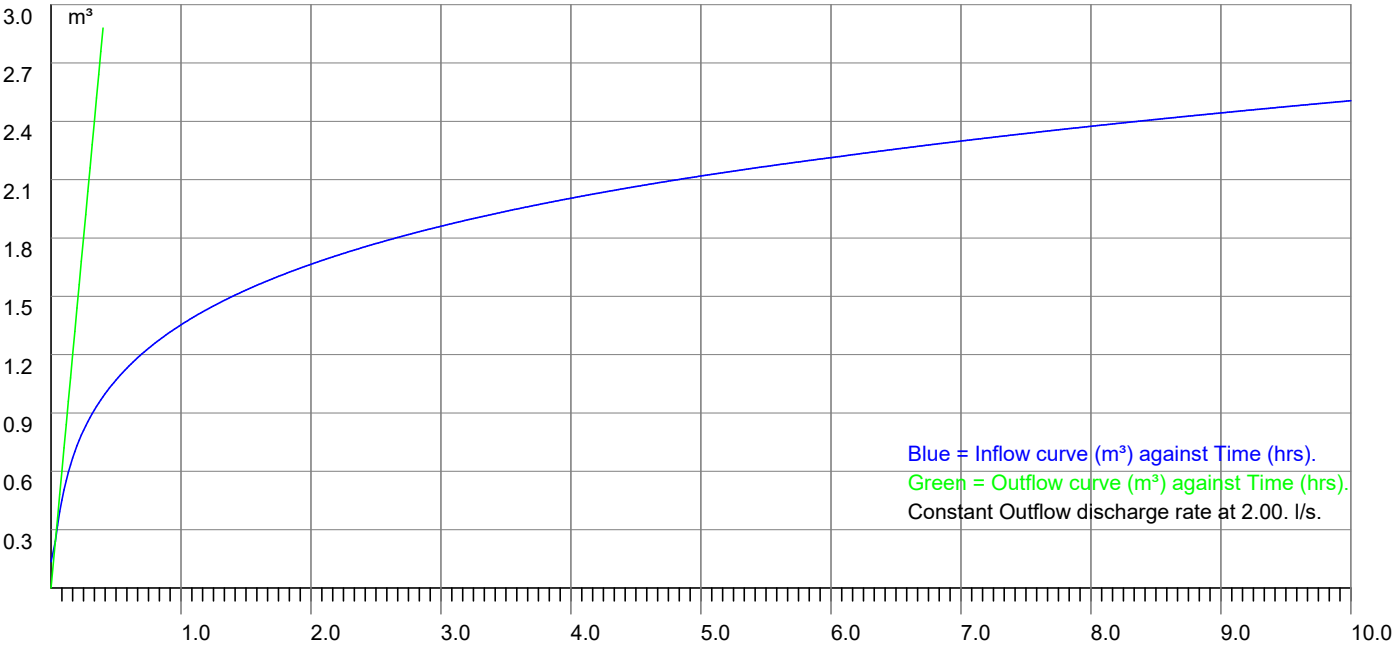
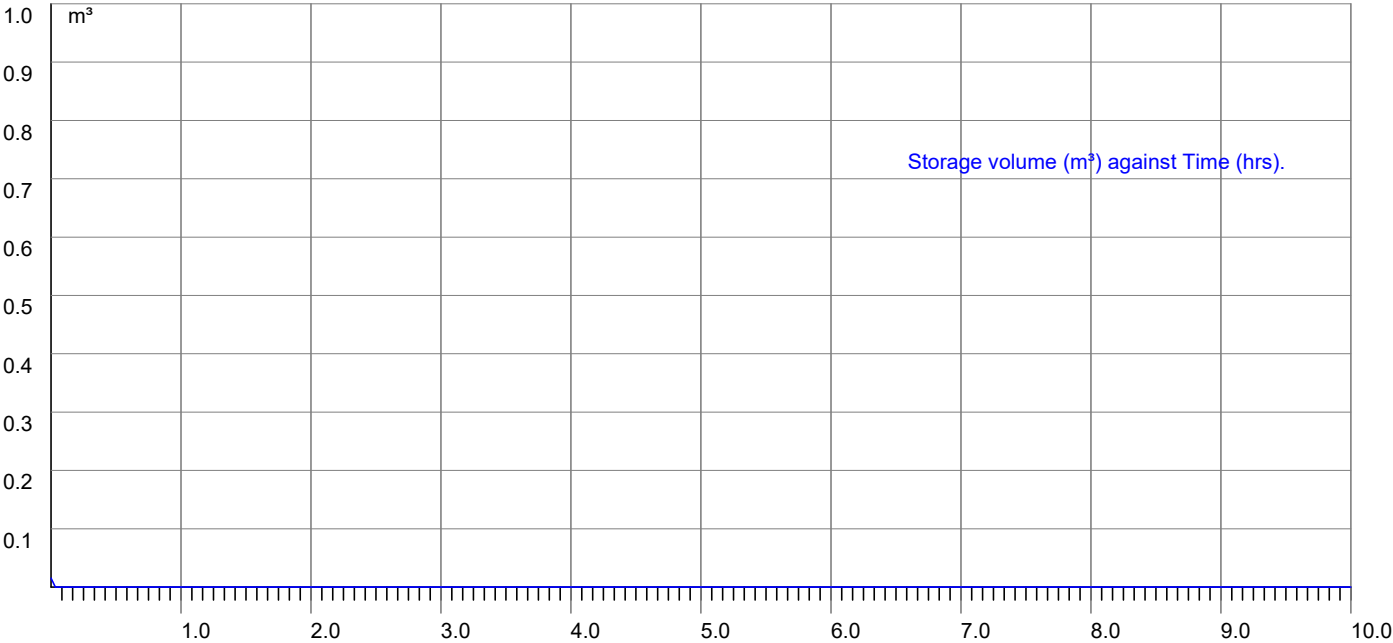
www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No. FRA251016		
Sheet no. 3		
Date 02/04/25		
By AY	Checked	Reviewed

Project
70 Mauldeth Road, M20 4WF

Title
30yr + 40%cc





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Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No. FRA251016		
Sheet no. 4		
Date 02/04/25		
By AY	Checked	Reviewed

Project
70 Mauldeth Road, M20 4WF

Title
30yr + 40%cc

Explanatory notes for Peak Flow Storage

- 1) This system uses the rainfall intensity/ duration curve calculated using either the Wallingford or FEH method as selected.
- 2) The balance is calculated from the inflow minus the outflow.
- 3) The storage volume is the maximum value of the balance curve.
- 4) This method was described by Davis (1963) - see Butler & Davies, 2nd edition, p294
- 5) References to 'storm duration' relate only to the hydrograph method (qv).
- 6) There are always 600 steps in the calculation process, thus a 'run' time of 10 hours will be sampled every minute,

Explanatory notes for Hydrograph Storage

- 1) The user has the choice of Summer or Winter curves
- 2) The mean intensity varies with the duration of the storm curve
- 3) There are always 120 steps in the calculation process, irrespective of storm duration.
- 4) The balance is calculated from the inflow minus the outflow.
- 5) The storage volume is the sum of the balance values for each step.
- 6) Varying durations should be tried to find the maximum storage value - this can be narrowed down very closely.

*Modelling using the flow characteristics of the restrictor is available using Vortex Control modelling function. Please be aware that this function needs the full design data file to function.

Why do the two methods give different results?

The rainfall characteristics for each method are very different.

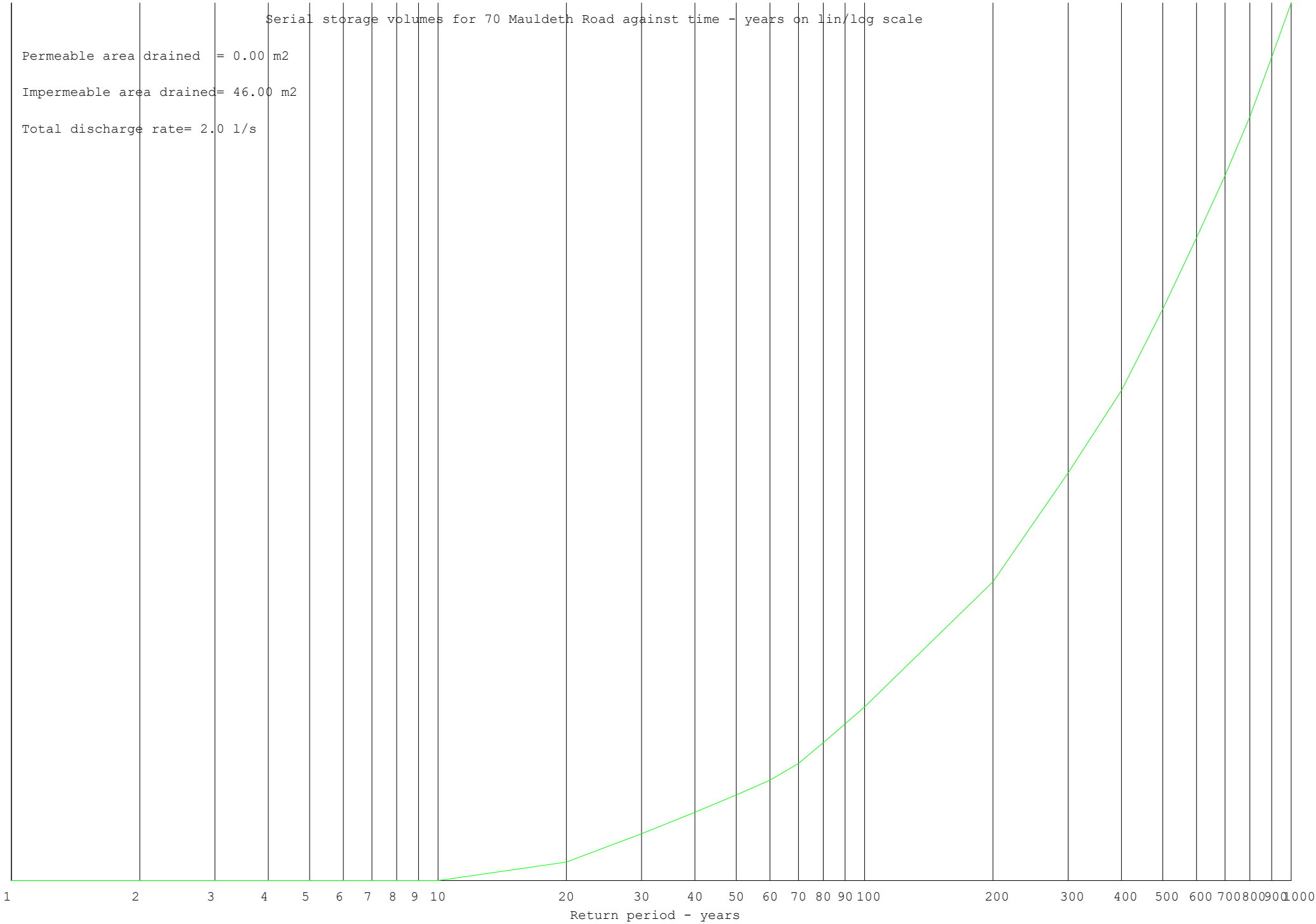
The Peak flow (using the Intensity/Duration/Frequency curve) does not model the actual rainfall. This curve is joined points which represent the mean intensity of a storm at a given duration i.e. a value of 19.5 mm/hr for a 60 minute storm indicates that over the sixty minute period, the mean intensity was 19.5 mm/hr. The calculation method samples the IDF curve for a given location and frequency (Return Period) and calculates the storage for that rate and duration less the outflow volume. The maximum value is displayed as the 'worst case' storage.

The hydrograph method uses a standard curve for either Winter or Summer storms. Traditionally these are symmetrical about the central peak. UK rainfall does not fit into this convenient curve, so the calculations are dealing with a stylised set of data. The mean intensity for the storm is calculated from the IDF curve and applied to the curve data, calculating the storage for that step less the outflow volume. The final storage volume is the sum of the storage for all the steps.

It can be seen that these two methods are very different, and the user may have the choice of which result to use. This is not an exact science, though is often treated as such by those that do not understand the principles of the calculations.

Serial storage volumes for 70 Mauldeth Road against time - years on lin/log scale

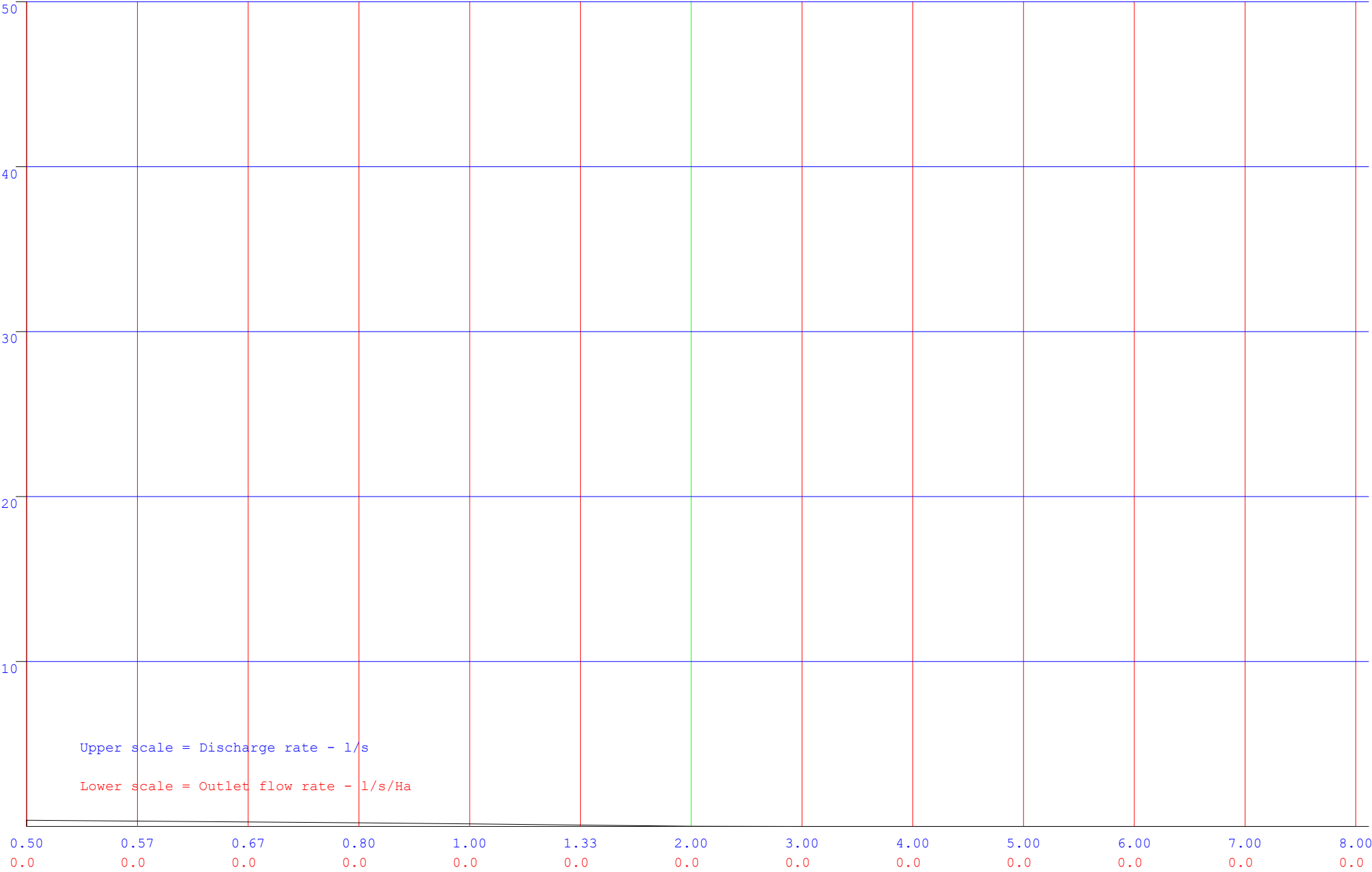
Permeable area drained = 0.00 m2
Impermeable area drained= 46.00 m2
Total discharge rate= 2.0 l/s



Storage volumes for 70 Mauldeth Road against varying discharge rates

m3 storage

Design discharge rate= 2.0





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www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No.	FRA251016		
Sheet no.	1		
Date	02/04/25		
By	AY	Checked	Reviewed

Project **70 Mauldeth Road, M20 4WF**
Title **100yr + 45%cc**

Data:-

FSR Hydrology:-

Location = 70 Mauldeth Road

M5-60 (mm) = 18

Soil index = 0.30

Return period = 100

UCWI = 86.0

Grid reference = SJ3526

r = 0.37

SAAR (mm/yr) = 800

WRAP = 2

Climate change = 45

i) Very permeable soils with shallow ground water;

ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils; The layer is low in organic matter, mottled and (fragipan - a natural subsurface horizon having a higher bulk density than the solum above. Seemingly cemented when dry but showing moderate to weak brittleness when moist. Slowly or very slowly permeable to water. It is found in profiles of either cultivated or virgin soils but not in calcareous material).

iii) Moderately permeable soils, some with slowly permeable subsoils.

Runoff factor (RF) = 76.0, calculated from:-

Runoff factor = $(0.829 \times \text{PIMP}) + (25 \times \text{SOIL}) + (0.078 \times \text{UCWI}) - 20.7$

where

PIMP = Impervious Area * 100 / (Impervious Area + Pervious Area)

UCWI = Calculated value for Wetness Index

Design data:-

Imperv. area = 46 m²

Total area (TA) = 46 m²

Allowed discharge rate = 2.000 l/s

Additional flow = 0.00 l/s

Pervious area = 0 m²

Equiv area = 35 m² (TA x RF).

Areal reduction factor = 1.000

Climate change factor = 45

Calculated data:-

Time to max = 2.0 mins

Rainfall at max = 264.00 mm/hr

Pipeline storage = 0.0 m³

Offline storage = 0.0 m³

Calculated storage volume = 0.1 m³

Allowed discharge rate = 2.000 l/s

Available MH storage = 0.0 m³

Fixed 6 hour data:-

Rainfall event = 6 hours

Rainfall rate = 14.00 mm/hr

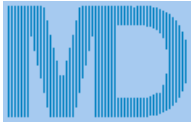
Calculated storage volume = 0.0 m³

Allowed discharge rate = 2.000 l/s

Rainfall intensities calculated using the Wallingford Procedure

Storage lengths for initial calculation (x 1.1, 1.2, 1.3 or 1.5 as above if required) :-

Diam	Len	Diam	Len	Ovoid	Len	Box culvert	Len
100	8.6	1125	0.1	400 x 600	0.4	500 x 500	0.3
150	3.8	1200	0.1	600 x 900	0.2	500 x 750	0.2
225	1.7	1275	0.1	800 x 1200	0.1	500 x 1000	0.1
300	1.0	1350	0.0			750 x 1000	0.1
375	0.6	1425	0.0			750 x 1200	0.1
450	0.4	1500	0.0			750 x 1500	0.1
525	0.3	1575	0.0			1000 x 1000	0.1
600	0.2	1650	0.0			1000 x 1200	0.1
675	0.2	1725	0.0			1000 x 1500	0.0
750	0.2	1800	0.0			1000 x 1800	0.0
825	0.1	1875	0.0			1000 x 2000	0.0
900	0.1	1950	0.0			1500 x 1500	0.0
975	0.1	2025	0.0			1500 x 1800	0.0
1050	0.1	2100	0.0			1500 x 2000	0.0



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SW

Data:-

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www.thelkgroup.com

Eton Business Park,
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Job No.

FRA251016

Sheet no.

2

Date

02/04/25

Project

70 Mauldeth Road, M20 4WF

Title

100yr + 45%cc

By

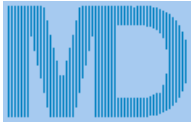
AY

Checked

Reviewed

Time (mins)	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)
10	152.0	0.887	1.200	0.000
20	106.0	1.230	2.400	0.000
30	83.0	1.445	3.600	0.000
40	69.0	1.605	4.800	0.000
50	59.0	1.733	6.000	0.000
60	53.0	1.840	7.200	0.000
70	47.0	1.932	8.400	0.000
80	43.0	2.014	9.600	0.000
90	40.0	2.087	10.800	0.000
100	37.0	2.152	12.000	0.000
110	35.0	2.213	13.200	0.000
120	32.0	2.268	14.400	0.000
130	31.0	2.319	15.600	0.000
140	29.0	2.367	16.800	0.000
150	28.0	2.412	18.000	0.000
160	26.0	2.454	19.200	0.000
170	25.0	2.494	20.400	0.000
180	24.0	2.531	21.600	0.000
190	23.0	2.566	22.800	0.000
200	22.0	2.600	24.000	0.000
210	22.0	2.632	25.200	0.000
220	21.0	2.663	26.400	0.000
230	20.0	2.692	27.600	0.000
240	19.0	2.720	28.800	0.000
250	19.0	2.747	30.000	0.000
260	18.0	2.772	31.200	0.000
270	18.0	2.797	32.400	0.000
280	17.0	2.821	33.600	0.000
290	17.0	2.844	34.800	0.000
300	16.0	2.866	36.000	0.000
310	16.0	2.887	37.200	0.000
320	16.0	2.908	38.400	0.000
330	15.0	2.927	39.600	0.000
340	15.0	2.947	40.800	0.000
350	15.0	2.965	42.000	0.000
360	14.0	2.983	43.200	0.000
370	14.0	3.002	44.400	0.000
380	14.0	3.021	45.600	0.000
390	13.0	3.039	46.800	0.000
400	13.0	3.057	48.000	0.000
410	13.0	3.075	49.200	0.000
420	13.0	3.092	50.400	0.000
430	12.0	3.108	51.600	0.000
440	12.0	3.125	52.800	0.000
450	12.0	3.141	54.000	0.000
460	12.0	3.157	55.200	0.000
470	12.0	3.172	56.400	0.000
480	11.0	3.188	57.600	0.000
490	11.0	3.203	58.800	0.000
500	11.0	3.218	60.000	0.000
510	11.0	3.232	61.200	0.000
520	11.0	3.246	62.400	0.000
530	11.0	3.260	63.600	0.000
540	10.0	3.274	64.800	0.000
550	10.0	3.288	66.000	0.000
560	10.0	3.301	67.200	0.000
570	10.0	3.315	68.400	0.000
580	10.0	3.328	69.600	0.000
590	10.0	3.340	70.800	0.000
600	10.0	3.353	72.000	0.000

Storage volume (m³) = 0.1 m³



MasterDrain
SW

The LK Group

www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No.

FRA251016

Sheet no.

3

Date

02/04/25

By

AY

Checked

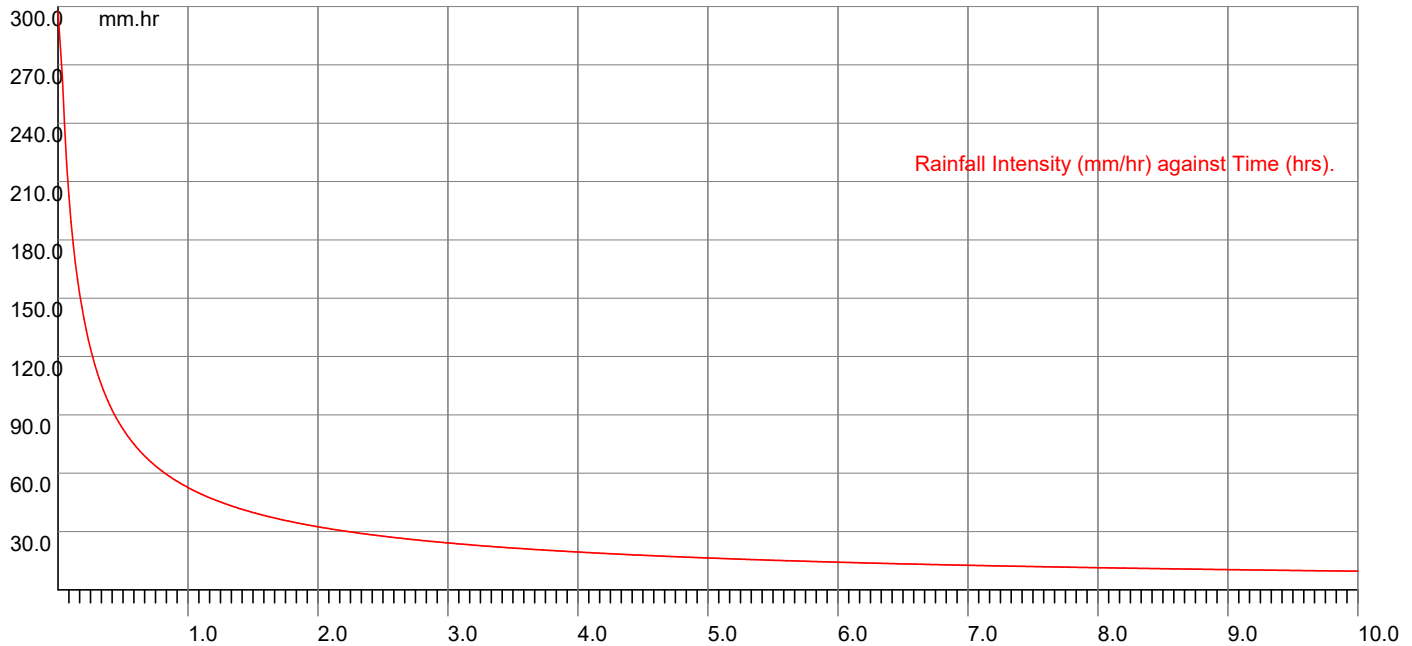
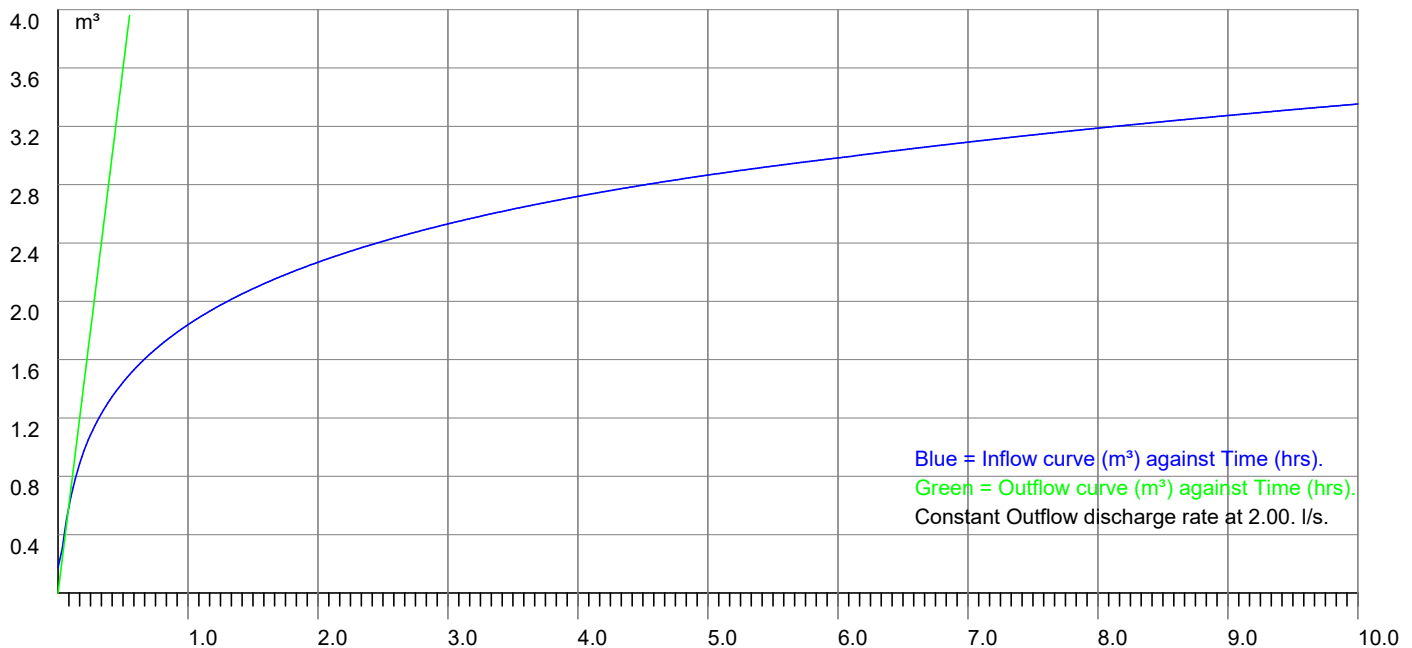
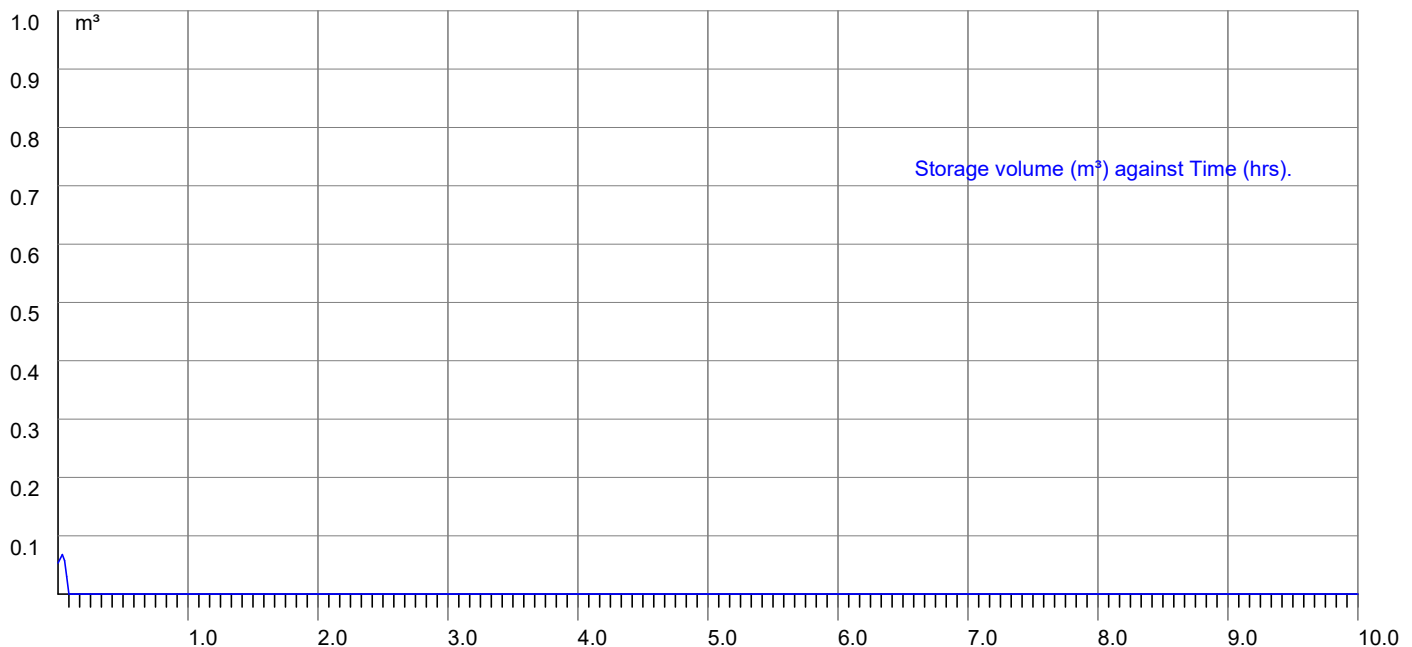
Reviewed

Project

70 Mauldeth Road, M20 4WF

Title

100yr + 45%cc





MasterDrain
SW

The LK Group

www.thelkgroup.com

Eton Business Park,
Eton Hill Road,
Radcliffe M26 2ZS
Tel: 0161 763 7200
email: m.jones@thelkgroup.com

Job No.

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Sheet no.

4

Date

02/04/25

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Title

100yr + 45%cc

By

AY

Checked

Reviewed

Explanatory notes for Peak Flow Storage

- 1) This system uses the rainfall intensity/ duration curve calculated using either the Wallingford or FEH method as selected.
- 2) The balance is calculated from the inflow minus the outflow.
- 3) The storage volume is the maximum value of the balance curve.
- 4) This method was described by Davis (1963) - see Butler & Davies, 2nd edition, p294
- 5) References to 'storm duration' relate only to the hydrograph method (qv).
- 6) There are always 600 steps in the calculation process, thus a 'run' time of 10 hours will be sampled every minute,

Explanatory notes for Hydrograph Storage

- 1) The user has the choice of Summer or Winter curves
- 2) The mean intensity varies with the duration of the storm curve
- 3) There are always 120 steps in the calculation process, irrespective of storm duration.
- 4) The balance is calculated from the inflow minus the outflow.
- 5) The storage volume is the sum of the balance values for each step.
- 6) Varying durations should be tried to find the maximum storage value - this can be narrowed down very closely.

*Modelling using the flow characteristics of the restrictor is available using Vortex Control modelling function. Please be aware that this function needs the full design data file to function.

Why do the two methods give different results?

The rainfall characteristics for each method are very different.

The Peak flow (using the Intensity/Duration/Frequency curve) does not model the actual rainfall. This curve is joined points which represent the mean intensity of a storm at a given duration i.e. a value of 19.5 mm/hr for a 60 minute storm indicates that over the sixty minute period, the mean intensity was 19.5 mm/hr. The calculation method samples the IDF curve for a given location and frequency (Return Period) and calculates the storage for that rate and duration less the outflow volume. The maximum value is displayed as the 'worst case' storage.

The hydrograph method uses a standard curve for either Winter or Summer storms. Traditionally these are symmetrical about the central peak. UK rainfall does not fit into this convenient curve, so the calculations are dealing with a stylised set of data. The mean intensity for the storm is calculated from the IDF curve and applied to the curve data, calculating the storage for that step less the outflow volume. The final storage volume is the sum of the storage for all the steps.

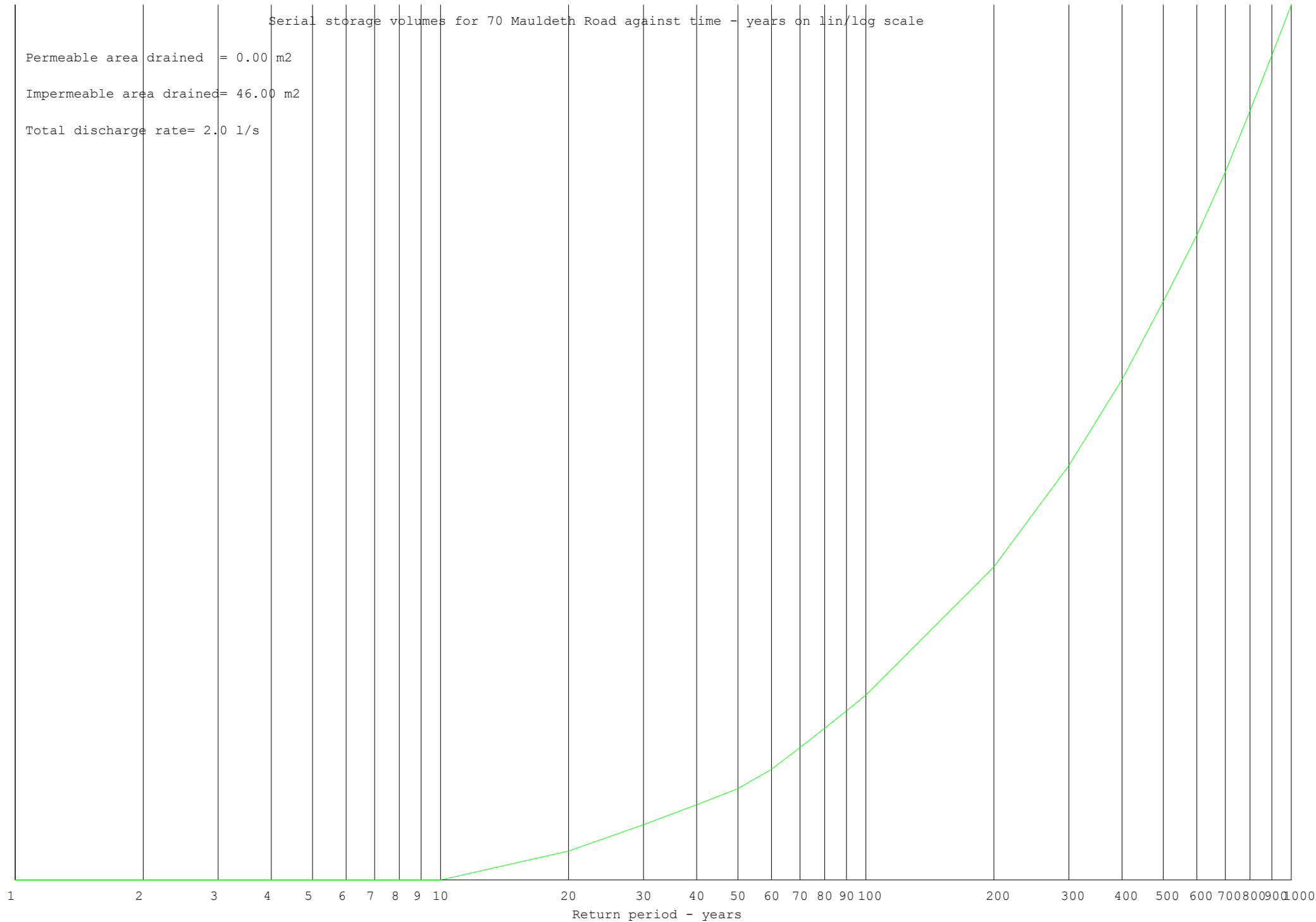
It can be seen that these two methods are very different, and the user may have the choice of which result to use. This is not an exact science, though is often treated as such by those that do not understand the principles of the calculations.

Serial storage volumes for 70 Mauldeth Road against time - years on lin/log scale

Permeable area drained = 0.00 m2

Impermeable area drained= 46.00 m2

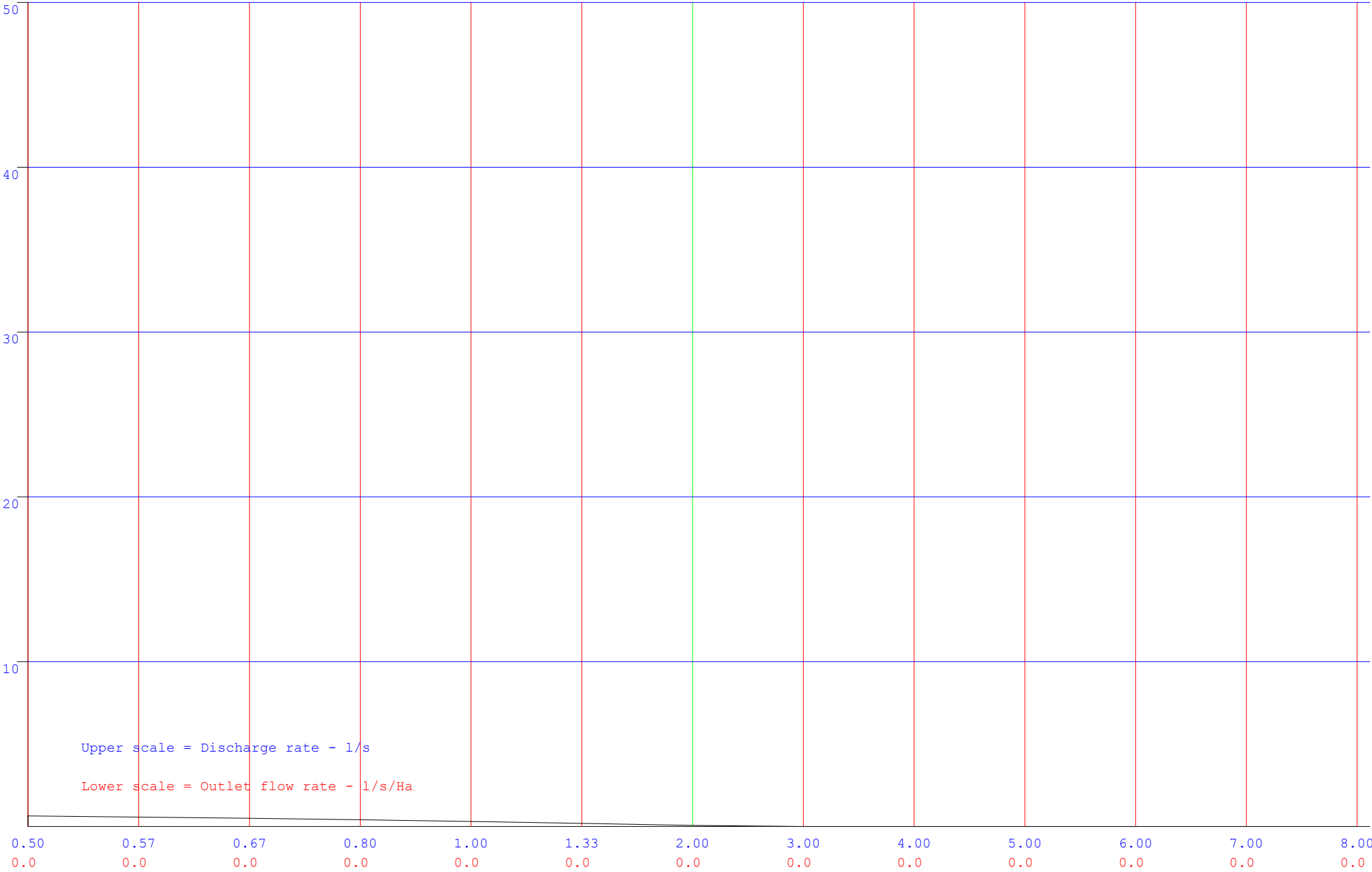
Total discharge rate= 2.0 l/s



Storage volumes for 70 Mauldeth Road against varying discharge rates

m3 storage

Design discharge rate= 2.0



Appendix D – References

¹ Department for Environment, Food & Rural Affairs, March 2015, “Non-statutory technical standards for sustainable drainage systems”.

² Ministry of Housing, Communities and Local Government, February 2024, “Planning practice guidance”.

³ Ministry of Housing, Communities and Local Government, December 2010, “Drainage and waste disposal: Approved Document H”, Part H3.

Based across the UK with
offices in Manchester, Liverpool,
Swindon and Glasgow.

Manchester (Head Office)

Unit 29
Eton Business Park
Eton Hill Rd, Radcliffe
M26 2ZS

0161 763 7200
info@thelkgroup.com

Manchester (Ancoats Office)

84 Silk Street
Ancoats
Manchester
M4 6BJ

0161 763 7200
info@thelkgroup.com

Glasgow

Wright Business Centre
1 Lonmay Road
Glasgow
G33 4EL

0141 773 6269
info@thelkgroup.com

Swindon

39 Bowman House Business Centre
Bowman Court
Whitehill Lane
Royal Wootton Bassett
Swindon
SN4 7DB

01793 987390
info@thelkgroup.com



LK GROUP