

Land at the Former Burnage Cricket Club, Manchester

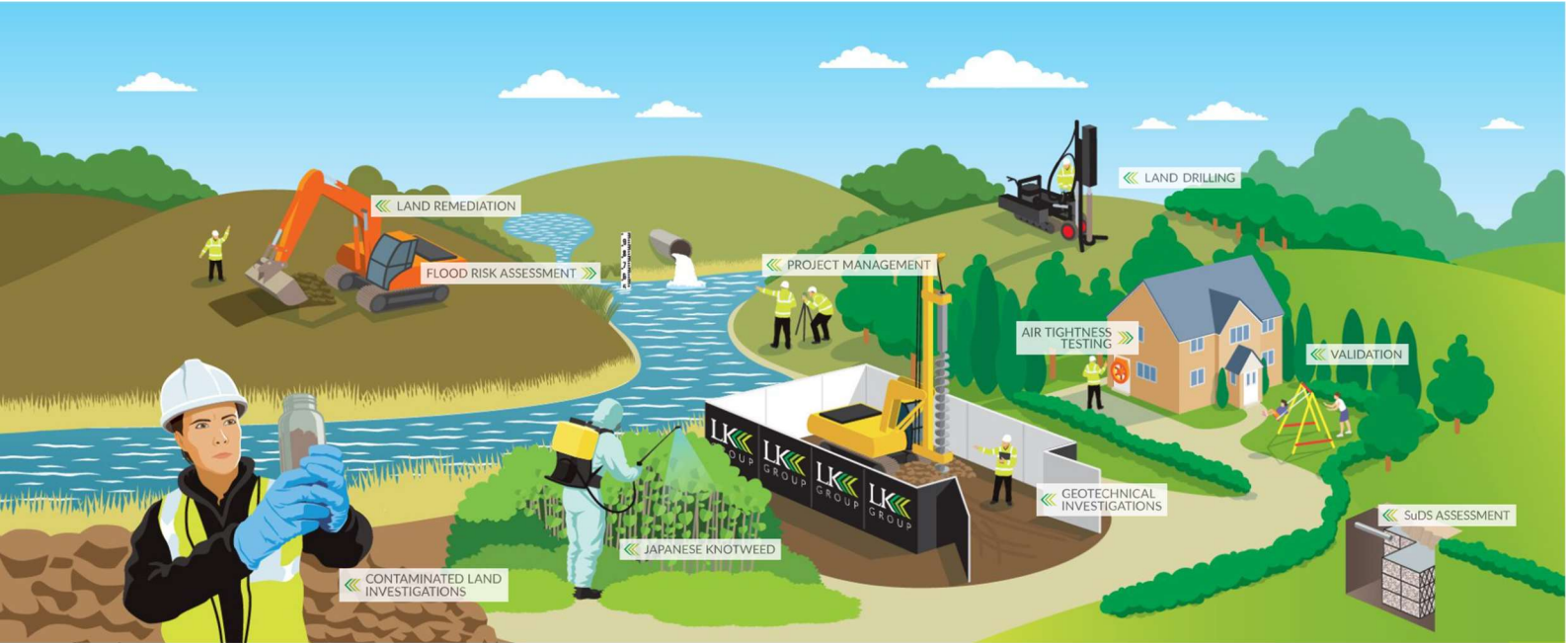
Flood Risk Assessment & Conceptual Drainage Strategy

Job Number: FRA241110
Date: February 2025
Client: Views (Holdings) Ltd



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DOCUMENT QUALITY ASSURANCE

Site Address	Land at the Former Burnage Cricket Club, Mauldeth Road, Manchester, M19 1AB
Report Title	Flood Risk Assessment & Conceptual Drainage Strategy
Job Number	FRA241110
Client	Views (Holdings) Ltd

Revision	0	Date of Issue	24/12/2024
Document Ref:	FRA241110-FRA&SuDS-Land at Burnage Cricket Club, Manchester		
Status	Draft for comment		
Written By	Joe Walker / Matthew Bell		
Approved By	Colin Crompton		

Revision	1	Date of Issue	14/01/2025
Document Ref:	FRA241110-FRA&SuDS-Land at Burnage Cricket Club, Manchester		
Status	Final		
Nature of Revision	Minor updates following comments by client		
Written By	Matthew Bell		
Approved By	Colin Crompton		

Revision	2	Date of Issue	24/02/2025
Document Ref:	FRA241110-FRA&SuDS-Land at Burnage Cricket Club, Manchester		
Status	Final		
Nature of Revision	Minor updates following comments by client / planning consultant		
Written By	Matthew Bell		
Approved By	Colin Crompton		

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EXECUTIVE SUMMARY

Scope and Background

This Flood Risk Assessment (FRA) and Conceptual Drainage Strategy has been undertaken by LKC to support a planning application for the development of land at Burnage Cricket and Social Club, Mauldeth Road, Burnage, M19 1AB. The site comprises a former cricket club.

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

In considering the proposals the following key principles have therefore been applied:

- » Identification of flood risks.
- » Protection of users of the new development.
- » No increased flood risk to third parties.

Consultations

The Environment Agency (EA) has been consulted to inform the preparation of this report and indicated they have no detailed information with regard to the site. The site is within Flood Zone 1.

Manchester City Council - Lead Local Flood Authority (LLFA) have been consulted and a response is awaited at the time of writing.

United Utilities (UU) were also consulted.

- » Sewer plans have been provided and confirm the presence of a 600x900mm combined sewer in Mauldeth Road.
- » UU plans indicate that the invert of the sewer is 7.64 m bgl in Mauldeth Road where the cover level is indicated at 45.97 m AOD.
- » UU have indicated that pass forward flows for surface water of 5 l/s are acceptable subject to exhausting higher options on the drainage hierarchy.
- » UU have identified that foul flows can pass to the combined sewer in Mauldeth Road.

Flood Risk

The site is located within Flood Zone 1 and a Negligible to Low risk of flooding from fluvial, tidal, pluvial, groundwater, sewers, artificial sources have been identified for the site.

Mitigation

Consideration should be given to the proposed levels and a levels strategy for the site should be produced. This should include consideration of the infrastructure levels and the levels of the proposed dwellings in line with building regulations (i.e. plots raised a minimum of 150 mm over road levels).

The attenuation required for a 1 in 30 year event, plus 40% allowance for climate change, is 267 m³ and for the 1 in 100-year event plus 45% allowance for climate change a storage capacity of 395 m³ will be required from on-site storage as well as SuDS systems.

The volume could be stored within the site boundary within permeable paving with an area of 1,365 m². Based on a depth of 400 mm and 30% void space providing up to 163.8 m³ before

passing forward into downstream features. The remainder could be provided by two 1.65 m diameter oversized pipes of 55 m length (110m overall length required). This would provide approx. 235 m³ for the site. This is subject to details design.

All proposed outflow connections from the development should be agreed with the Lead Local Planning Authority and United Utilities and are subject to detailed design.

Access

Safe and dry access is available via Mauldeth Road to the South of the site.

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Figure 2 – Conceptual Surface Water Drainage Strategy

Figure 3 – Conceptual Foul Water Drainage Strategy

APPENDICES

Appendix A – Proposed Development Plan

Appendix B – Topographic Survey

Appendix C – Environment Agency Data

Appendix D – LLFA and UU Data

Appendix E – Greenfield and Attenuation Calculations

Appendix F – Maintenance Plan

1 Introduction

1.1 Background

LKC were commissioned by Views (Holdings) Ltd to carry out a Flood Risk Assessment (FRA) and Conceptual Drainage Strategy for Land at the Former Burnage Cricket Club, Manchester. The report was undertaken in support of a future planning application to redevelop the site for residential use.

The report will address the vulnerability to flooding from all possible sources and will also consider the impact of the development on surface water runoff accounting for climate change and the potential to increase flood risk elsewhere. The Conceptual Drainage Strategy in Section 5 will provide an overview of the SuDS techniques which could be considered on the site. The issues of actual flood risk are discussed in Section 4.

Government policy with respect to development in flood risk areas is contained within the Ministry of Housing Communities and Local Government National Planning Policy Framework¹ and accompanying guidance note². The guidance on Climate Change allowance issued by the Environment Agency in June 2022 has also been considered.

LKC has prepared this FRA in line with the NPPF and the PPG where appropriate. The level of detail entered into any flood risk assessment is dependent upon the scale and potential impact of the proposed development, and the vulnerability classification of the proposed land-use.

SuDS should be designed where practical to maximise the opportunities and benefits that can be secured from surface water management. The strategy will consider the four 'pillars' of SuDS. To maximise these benefits, surface water management should be considered from the beginning of the development planning process and throughout influencing site and wildlife layout and design, and the use and characteristics of open spaces.

The report findings are based upon professional judgement and are summarised below. The report includes baseline data from the Environment Agency (EA) 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.

¹ Ministry of Housing Communities and Local Government. "National Planning Policy Framework." Last updated 12th December 2024.

² Ministry of Housing Communities and Local Government. "Planning Practice Guidance" <https://www.gov.uk/guidance/flood-risk-and-coastal-change>. Last updated 25th August 2022.

1.2 Site Details

A summary of the general site details is presented in Table 1-1.

Location	Site located on the last east of Kingsway and north of Mauldeth Road, Manchester M19 1AB. Centred at approximate National Grid Reference 386372E, 392908N. A site location plan is included at Figure 1.
Area	Approximately 0.98 hectares (ha).
Topography	45-46 metres above ordnance datum (AOD) - further description provided in Section 2.4. Overall, the site is approximately level.
Current Site Use	<u>Site</u> Grassed land comprises the majority of the site. Several structures with areas of hardstood ground are present on the south-west. A tarmacadam / gravel car park area is present in the east / south-east. <u>Surrounding Area/ Boundary Treatment</u> North and East: Residential Properties. South: Mauldeth Road West: Kingsway (Road). South-west: Hardstood land and commercial buildings.
Proposed Development	Residential Development with associated access, infrastructure and landscaping'. Access will be from Mauldeth Road. Proposed development plan included at Appendix A.

Table 1-1: Summary of site details.

2 Site Setting

2.1 Vulnerability

As an initial phase in identifying whether a site is potentially at risk of flooding, LKC has consulted the EA's Flood Zone Mapping website. This mapping is (often) based on coarse scale modelling and provides only an initial indication of the flood risk to a site. The EA Flood Zone maps were developed using a very coarse Digital Elevation Map (DEM) and are superseded by a more detailed analysis of modelled flood levels and topographic survey levels.

The Flood Zones divide the floodplain into three categories of flood risk, and do not take flood defences into account. The PPG (Table 1: Flood Zones, Paragraph 78) defines the Flood Zones as:

- Flood Zone 1 – Very Low Risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000).
- Flood Zone 2 – Low Risk, with annual probability of flooding of 0.1 to 1.0% from rivers and 0.1 to 0.5% from the sea.
- Flood Zone 3 – Medium to 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.

The Flood Zone Mapping indicates the site as being within Flood Zone 1 but is approximately 1 hectare (Ha) therefore a Flood Risk Assessment is required for planning (footnote 63, NPPF).

The proposed development is for a residential end use, and this is classified within the 'More Vulnerable' category in the NPPF (Annex 3).

2.2 The Sequential and Exception Tests

The NPPF requires a Sequential approach to all sources of flooding (set out in Paragraphs 173 – 176) both now and in the future. Since the site has been shown to be in Flood Zone 1 for fluvial flood risk (see Section 3 and 4.1) and is at a low risk of flooding from all other sources (Section 4.2 and 4.3), it is considered that the site therefore does not require a Sequential Test.

2.3 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. The ground conditions encountered during the site investigation and reported in the Phase II Geoenvironmental Site Assessment have been reviewed.

This is summarised in Table 2-1 below.

Summary of the Environmental Setting			
Geology	Superficial		Till, Devensian (diamicton).
	Bedrock		Chester Formation (sandstone).
	BGS Boreholes		BH Ref: SJ89SE803, 210M S: Made ground to 0.50m, soft-firm silty clay to 0.90m, sand and gravel to 1.00m, stiff-very stiff sandy clay to 5.00m. BH Ref: SJ89SE796, 285M E: Tarmacadam / infill to 1.00m, sandstone to 26m, sandstone/marl to 46.00m.
	Site Specific Ground Conditions		The e3p Phase I Geoenvironmental Site Assessment³ report indicates that the site is underlain by Till (diamicton), which is underlain by the Chester Pebble Beds Formation (sandstone). The e3p Phase II Geoenvironmental Site Assessment⁴ report indicates that Made Ground perched water was encountered in 8no. out of 20no. investigation locations across the site. Drift deposits were encountered across all locations and comprised uniform strata of an orange, brown slightly gravelly CLAY between 0.2 m below ground level (bgl) and 5.4 m bgl. Weathered sandstone was encountered between 4.7 m bgl and 6.45 m bgl. Groundwater was struck at one (TP102) location in the natural strata at 1.4 m bgl. The e3p report notes, ‘given the presence of low permeability clays across the site soakaway drainage is unlikely to be suitable. During return monitoring visits falling head tests were undertaken in three locations (WS101, WS105 and WS106), tests in all locations failed to fall during the duration of the test. As such, it is not recommended that soakaways are utilised for disposal of surface water runoff.’
	Defra Soilscape Mapping		Type 17 – Slowly permeable seasonally wet acid loamy and clayey soils
	BGS Groundwater Flooding Susceptibility		Not within an area at risk of groundwater flooding.
Hydro-geology	Aquifer Designation	Superficial	Secondary Undifferentiated Aquifer.
		Bedrock	Principal Aquifer.
	Source Protection Zone (SPZ)		Site not within an SPZ.
Hydrology	All adjacent and internal surface water		Cringle Brook, 171m NE, flowing south-east to north-west.
	Flooding		Flood Zone 1.
Site History			On Site: Pond, Cricket Ground. Surrounding area: Ponds, Residential & Commercial Buildings.

Table 2-1: Summary of the Environmental Setting.

³ Phase I Geoenvironmental Site Assessment, reference 16-953-R1-1. e3p. June 2023

⁴ Phase II Geoenvironmental Site Assessment, reference 16-953-R2-1. e3p. August 2023.

2.4 Site and Access Levels

A topographic survey of the site has been undertaken by JLP Surveying, drawing number S23-0603, dated 26.06.2023 to OS (Newlyn) datum. The topographic survey is included at Appendix B. A summary of the levels around the site are provided below:

- » Levels at the eastern end of the site range from approximately 45.88 m AOD in the northeastern corner to 46.30 m AOD in the southeast corner, adjacent to Mauldeth Road;
- » Levels at the western end of the site range between approximately 45.5.0 m AOD in the northwestern corner to 45.3 m AOD in the southwest corner;
- » Levels along Mauldeth Road to the south of the site fall from east to west, from approximately 46.26 m AOD adjacent to the southeast corner of the site to approximately 44.9 m AOD adjacent to the site entrance to approximately 45.90 m AOD at the junction with Kingsway;
- » Levels along Kingsway fall from north to south adjacent to the western boundary of the site, from approximately 45.14 m AOD to approximately 44.80 m AOD; and,
- » Overall, the site falls from east to west at an average gradient of 1 in 120.

3 Consultation

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

Relevant correspondence / information is provided in Appendix C (EA) and Appendix D (UU / LLFA).

Source	Details	
EA / Flood Map for Planning / Long-Term Flood Mapping	Reference to the Flood Map for Planning indicates that site is within Flood Zone 1: Very Low risk, with annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000). The Flood Map for Planning is included at Appendix C.	
	Reference to the Flood Map for Planning indicates the nearest flood zone is 140 m northeast of the site.	
	Reference to OS mapping indicates the presence of an open reach of Shaw Brook located approximately 340 m southeast of the site. The Hidden Manchester Map ⁵ indicates that this watercourse is routed between Burnage Lane and Kingsway at its closest point, approximately 300 m south of the site. Historic maps included in the e3p Phase I Geoenvironmental Site Assessment ⁶ indicate an open watercourse approximately 250 m south of the site.	
	Modelled Levels / Records of Flooding	The EA responded to indicate they do not have any flood risk data for this location.
Surface Water Flooding	Records of Flood Warning Service	The site is not within a flood warning service area.
	The Long-Term Flood Map indicates a low risk (between 1 in 1000 and 1 in 100) of surface water flooding up to a depth of 300mm in the south of the site, with no direction of flow and a flow of less than 0.25m/s, suggesting ponding of surface water. During the same event some areas of Mauldeth Road and Kingsway and the junction between the two are indicated to have a shallow depth of surface water flooding (up to 300 mm). This has been replaced on 28th January 2025 with the Risk of Flood from Surface Water Map (ROSFW), which indicates that some portions of the western end of the site have a low to high chance of flooding or surface water ponding overall. Correspondence with the EA has noted that that this is showing a chance that flooding could occur regardless of depth. In addition, correspondence with the EA identified that areas where buildings are shown to be partially impacted are infilled, therefore potentially creating a conservative mapping for this scenario. The mapping is also banded to show flooding based on depth, and in this instance a small area at the western end of the site is shown to have a low to medium chance of flooding to a depth of 200 mm. This suggests that the	

⁵ <https://hidden-manchester.org.uk/#>

⁶ Phase I Geoenvironmental Site Assessment, reference 16-953-R1-1. e3p. June 2023.

Source	Details	
		overall mapping of chance has a depth of less than 200 mm.
	Flooding from reservoirs	The Long-Term Flood Map indicates that the site is not impacted by reservoir flooding. The closest area impacted by reservoir flooding appears to be 140 m northeast of the site.
Manchester City Council (LLFA)	No information provided at the time of writing.	
United Utilities (UU)	Sewer map	No surface water sewers running parallel to the site's boundary along Mauldeth Road or Kingsway. A 600x900mm combined public sewer is present south along Mauldeth Road and a 300mm diameter combined public sewer is present west along Kingsway. Along the 600x900mm combined public sewer in Mauldeth Road, at node 3800, the cover level is indicated to be 45.97 m AOD and the invert level is indicated to be 38.33 m AOD, giving a depth of 7.64 m.
	Likely conditions for connecting into their sewerage system	United Utilities would request conditions for a separate system with only foul draining to foul / combined sewers and surface water draining to soakaway/SuDS, watercourse or surface water sewer. All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80 [note: updated to paragraph 56] of the National Planning Practice Guidance. Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible. If not feasible, and the higher options of the surface water drainage hierarchy have been exhausted, UU would have no objection to a connection to the 600x900mm diameter public combined sewer located in Mauldeth Road at a pass forward flow of 5l/s. 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 600x900mm diameter public combined sewer within Mauldeth Road at an unrestricted rate. United Utilities confirmed they have no modelled flood risk within the vicinity of the proposed development.
	Level 1 SFRA ⁷	The SFRA does not include any specific information in relation to history of flooding.

⁷ Strategic Flood Risk Assessment Level 1: Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, JBA Consulting. March 2010.

Source	Details	
Strategic Flood Risk Assessment (SFRA)	Level 2 SFRA ⁸	The SFRA does not include any specific information in relation to history of flooding.
Preliminary Flood Risk Assessment (PFRA) ⁹	The Preliminary Flood Risk Assessment (PFRA) for the area indicates that there are no records of flooding for the area which conforms with information supplied by the EA.	

⁸ Strategic Flood Risk Assessment Level 2: Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, JBA Consulting. March 2011.

⁹ Preliminary Flood Risk Assessment, JBA Consulting. May 2011.

4 Assessment of Flood Risk

4.1 Flood Zones

The Flood Map for Planning indicates that the site is in Flood Zone 1 included at Appendix C. The EA do not have any flood risk data for this location.

Reference to the Flood Map for Planning indicates the nearest flood zone is 140 m northeast of the site and is approximately 2 m lower than the site level. A culverted watercourse appears to be located 300 m to the south of the site.

The extents of the Flood Map for Planning for the 1% (100-year) and 0.1% (1000-year) are a significant distance from the development area.

4.2 Sources of Flooding

The risk of flooding from the following flood sources has been considered:

Fluvial – The EA has confirmed the study area is within Flood Zone 1. Therefore, the flood risk associated with this source is considered to be **Low**.

Tidal – The study area is remote from the sea and tidally influenced water bodies. Therefore, the flood risk associated with this source is considered to be **Negligible**.

Pluvial (Rainfall) – The Long-Term Surface Water Flood Maps show small areas within the south-west of the site that have the potential to flood during prolonged heavy rainfall. These areas are likely to be associated with current depressions in the areas of hardstanding some of which are likely to be removed during the development process.

The surface water element of the Long Term Flood Map has been updated with the Risk of Flood from Surface Water Map (ROSFW), which indicates that some areas of the western end of the site have a low to high chance of flooding or surface water ponding overall, however, LKC have undertaken consultation with the EA who have noted that that the flood map is showing a chance that flooding could occur regardless of depth. The EA also identified that areas where buildings are shown to be partially impacted are infilled within the modelling, therefore potentially creating a conservative mapping for this scenario.

The ROSFW mapping is also banded to show flooding based on depth, and in this instance a small area at the western end of the site is shown to have a low to medium chance of flooding to a depth of 200 mms suggesting that that the overall mapping of chance has a depth of less than 200 mm.

The area where 200 mm depth is indicated appears to correspondence with the car parking around the apartments at the western end of the site. These areas need consideration within the detailed design. Based on the depth indicated by the mapping the overall risk of flooding from pluvial sources is considered to be **Low**.

Surface Water (Overland flow) – This relates to surface water entering the site. No observed impermeable areas are at a level above that of the study area. The adjacent Kingsway and Mauldeth Road are generally at a similar / slightly lower level than the site. Surface water arising from the south and west of the study area is likely to be intercepted by the highway drains and take a preferential flow path along the road to

the southwest (Mauldeth Road) and south (Kingsway). If there was a drainage failure causing overland flow it would back up towards the southern / south-western boundary. Overall, the flood risk of flooding from surface water sources is considered to be **Low**.

Groundwater – The BGS has no groundwater records for the study area. The superficial deposits are clayey in nature and are shown to be approximately 5.00 m thick. The Phase II Geoenvironmental Site Assessment indicates a groundwater strike at 1.40 m bgl.

The BGS Groundwater Flooding Susceptibility mapping shows it not to be within an area at risk of groundwater flooding.

LKC is not aware of any basements or underground structures proposed as part of the development. Therefore, the flood risk associated with groundwater sources is considered to be **Low**.

Sewers – United Utilities (UU) sewer records show combined sewers within the vicinity of the study area. UU state they have no modelled flood risk within the vicinity of the proposed development. The highways to the south and west would intercept flows from sewer flooding and this would take a preferential flow path along the road to the southwest (Mauldeth Road) and south (Kingsway) before it enters the site. Therefore, the flood risk associated with sewers is considered to be **Low**.

Artificial sources – According to the Long-Term Flood Map, the study area is not indicated to be at risk from reservoir flooding. No other artificial sources of flooding have been identified within the vicinity of the site.

Therefore, the flood risk associated with artificial sources is considered to be **Negligible**.

4.3 Summary of Flood Risk

Source of Flooding	Risk Assessment Level
Fluvial	Low
Tidal	Negligible
Pluvial (Rainfall)	Low
Surface Water	Low
Groundwater	Low
Sewers	Low
Artificial Sources	Negligible

Table 4-1: Summary of Existing Risk Level.

The site is located within Flood Zone 1 and a Negligible to Low risk of flooding from fluvial, tidal, pluvial, groundwater, sewers, artificial sources have been identified for the site.

LKC therefore consider that a strategy for surface water management will be required at the site to mitigate the risk to others. The assessments of a range of measures that are feasible for the site are outlined in Section 5.

5 Surface Water Management

5.1 Overview

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 any new development is a material planning consideration in determining if the proposals for the development and use of land are acceptable.

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 H3¹⁰ 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 2010¹¹.

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.

5.2 Sustainable Drainage Hierarchy

5.2.1 Infiltration

As discussed in Section 2.1 and 2.3, the published BGS mapping indicates that the site is underlain by superficial deposits of Till (diamicton), which are likely to be cohesive in nature. The Till is reported as being underlain by bedrock of the Chester Formation, described as Sandstone.

An Phase II Site Investigation was undertaken by e3p which confirmed the presence of low permeability clay strata. The Phase II Geoenvironmental Site Assessment report notes that *'given the presence of low permeability clays across the site soakaway drainage is unlikely to be suitable. During return monitoring visits falling head tests were*

¹⁰ Building Regulations part H3 2010: Approved Document, Drainage and Waste Disposal.

¹¹ Flood and Water Management Act 2010: UK Government.

undertaken in three locations (WS101, WS105 and WS106), tests in all locations failed to fall during the duration of the test. As such, it is not recommended that soakaways are utilised for disposal of surface water runoff.'

The logs confirm the presence of clay, which is described as orange, brown slightly gravelly CLAY and appears to confirm the presence of Till (diamicton) beneath the site.

Based on the published geology and results of the site investigation, it is confirmed that a shallow depth of made ground is present, underlain by clay. Therefore, it is considered that infiltration is not a suitable means for the disposal of surface water from the site.

5.2.2 Watercourses

There are no observable watercourses within or near the boundary of the site. Currently surface water from the site likely runs overland to the public highway (i.e. Mauldeth Road or Kingsway), into neighbouring properties, or ponds within the site. Therefore, disposal of surface water to a surface watercourse is not considered to be a suitable option for the development.

5.2.3 Public Sewer

Sewer plans have been requested from United Utilities and confirms the presence of a 600x900mm combined sewer located within Mauldeth Road. At node 3800, the cover level is indicated to be 45.97 m AOD and the invert level is indicated to be 38.33 m AOD, giving a depth of 7.64 m (to be confirmed on site via survey). UU have indicated that the surface water from the site can pass into this sewer at a rate of 5 l/s whereby options higher in the drainage hierarchy have been exhausted.

5.2.4 Other Sewers

LKC is not aware of any other sewers within the vicinity of the site.

5.3 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 5-2 in order of priority within the NPPF:

Option No:	Drainage Solution	Most feasible solution	Comments
a	Soakaway/Infiltration	Not achievable	The impermeable ground conditions also make the use of infiltration unfeasible.
b	Connection to Watercourse	Not achievable	Not feasible as there are no known watercourses within or adjacent to the site and would require significant off-site engineering works and potentially crossing third party access which is not commensurate to the scale and nature of the development.
c	Discharge into a sewer	1	A connection into the 600x900mm diameter combined sewer in Mauldeth Road would be possible, and UU have indicated a discharge rate of 5 l/s. Subject to approval from LLFA.

Table 5-2: Drainage options.

Table 5-3 provides a summary of the SuDS options appraisal with consideration of CIRIA C753 (The SUDS Manual)¹² for the development:

SuDS Option	Appropriate to Development	Comments	Benefits	Comments
Infiltration				
Soakaways	X	Due to the nature of the ground conditions, the use of infiltration systems are not considered to be feasible.	Water quantity Water quality	Soakaways provide stormwater attenuation, stormwater treatment and groundwater recharge. Runoff is treated by physical filtration to remove solids, by absorption into the soil and removal and by biochemical reactions involving micro-organisms growing on the soil.
Infiltration basin	X	Depressions that store and dispose of water via infiltration. Not be appropriate given the ground conditions.	Water quantity Water quality Biodiversity Amenity	Infiltration basin reduces the volume of runoff from a drainage area, can be very effective at pollutant removal via filtering through the soils, contributes to groundwater recharge and baseflow augmentation. Runoff is treated by physical filtration to remove solids, by absorption into the soil and removal and by biochemical reactions involving micro-organisms growing on the soil.
Infiltration trench	X	Infiltration trenches are shallow excavations with rubble or stone. Not be appropriate given the ground conditions.	Water quantity Water quality Amenity	An Infiltration trench can create temporary subsurface storage of stormwater runoff, thereby enhancing the natural capacity of the ground to store and drain water. Infiltration trenches allow water to dissipate into the surrounding soils from the bottom and sides of the trench where runoff is treated by physical filtration, adsorption and biochemical reactions involving micro-organisms growing in the soil. Infiltration trenches are easy to integrate into a site. They are ideal for use around playing fields, recreational areas or public open space.
Rain gardens	*	Rain gardens are relatively small depressions in the ground that are planted up with native vegetation. Most likely to be implemented on private property close to buildings on relatively flat areas.	Amenity Biodiversity Water quality Water quantity	Attractive features that can help to improve open space. Can be planned as landscaping features. Flexible layout to fit into landscape. Runoff can be treated by physical filtration to remove solids, by absorption and removal by biochemical reactions involving micro-organisms growing on the soil. They can reduce rate of run off and provide some volume reduction.
Filtration				
Filter drain / trench	X	Linear trenches filled with a permeable granular material, often with a perforated pipe in the base of the trench. Not	Water quantity Water quality	Filter trenches create temporary subsurface storage of stormwater runoff and provide stormwater treatment. These trenches can be used to filter and convey stormwater to downstream SuDS components.

¹² CIRIA C753 - The SUDS Manual. London 2015.

SuDS Option	Appropriate to Development	Comments	Benefits	Comments
		appropriate given the scale and nature of the site and the ground conditions.		
Filter strip	X	Engineered filters that use vegetation to remove and treat runoff. The filter strip is sloped to allow sheet flow across the vegetated strip. Not appropriate given the scale and nature of the site.	Water quality Amenity Biodiversity	A filter strip offers no storage and is used solely to remove pollutants from surface water. The vegetation traps organic and mineral particles that are then incorporated into the soil, while the vegetation takes up any nutrients. A filter strip features medium amenity potential. Local wild grass and flower species can be introduced for visual interest and to provide a wildlife habitat.
Retention & Detention				
Detention basin	X	Dry depressions designed to hold water for a specific retention time. Basins tend to be found towards the end of the SuDS management train, so are used if extended treatment of the runoff is required or if they are required for wildlife or landscape reasons. Not be appropriate given the site layout and the scale and nature of the site.	Water quantity Water quality Biodiversity Amenity	Detention basins provide flow control through attenuation of stormwater runoff for a wide range of rainfall events. Basins treat runoff in a variety of ways: settlement of solids in still or slow moving water, adsorption by the soil, biological activity. Basins offer many opportunities for the landscape designer. Basins should not be built on but can be used for sports and recreation. Basins can be part of public open space.
Attenuation Ponds	X	Attenuation ponds can be used to offset the increase in surface water flows attributable to increased area of hard standing, in order to minimise the risk of flooding to and from the proposed development. Not appropriate given the site layout and the scale and nature of the site.	Water quantity Water quality Biodiversity Amenity	Ponds will attenuate the surface water flow prior to discharging to the public surface water sewers. The storage volume afforded by these features should not include any permanent water in the pond. Ponds treat runoff in a variety of ways: settlement of solids in still water (having plants in the water enhances calm conditions and promotes settlement), adsorption by aquatic vegetation, biological activity. Permanently wet ponds can be used to store water for reuse and offer excellent opportunities for the provision of wildlife habitats. Ponds can be part of public open space.
Geo-cellular storage systems	✓	Modular block systems can be used to provide an underground storage facility. Any geo-cellular storage systems should be lined with a geo-membrane to provide attenuation storage.	Water quantity	Geo-cellular systems can be used to control and manage rainwater surface water runoff either as a soakaway or as a storage tank. Geo-cellular storage systems provide high storage volume capacity High void ratios (up to 96%). Capable of managing high flow events.
Oversized Pipes	✓	Oversizing the pipes that make up the on-site drainage network is a cost-effective method for providing attenuation storage within the network. Such systems could be	Water quantity	Oversized pipes can reduce rate of run off and provide some volume reduction.

SuDS Option	Appropriate to Development	Comments	Benefits	Comments
		considered on the parts of the development where gradients are relatively flat and in particular within the adoptable roads within the site.		
Tanks	✓	Prefabricated underground tanks could be considered at the detailed design stage in order to provide storage to attenuate surface water runoff.	Water quantity	Storage tanks can be used to control and manage rainwater surface water runoff providing high storage volume capacity. Tanks are capable of managing high flow events.
Swales & conveyance channels				
Swales	✗	Swales are shallow grass-lined channels that provide capacity for conveying flows at a controlled rate into ponds and watercourses. Not appropriate given the site layout and the scale and nature of the site.	Water quality Biodiversity Amenity Water quantity	Swales are effective at removing polluting suspended solids through filtration and sedimentation. The vegetation traps organic and mineral particles that are then incorporated into the soil, while the vegetation takes up any nutrients. Swales are often integrated into the surrounding land use. Local wild grass and flower species can be introduced for visual interest and to provide a wildlife habitat. Swales are usually designed as conveyance systems but can also be designed with check dams to increase attenuation and, where applicable, infiltration.
Channels & rills	✗	Channels and rills are open surface water channels with hard edges.	Water quality Amenity Water quantity Biodiversity	Effective in water & pollution treatment. Can act as pre-treatment to remove silt before water is conveyed into further SuDS features. Can be visually appealing in urban landscapes. Amenity value for the local community and biodiversity value (design dependant).
Control structures				
Flow control devices	✓	Flow control devices e.g. hydro-brake style flow control systems, and restricted orifices enable the discharge to be restricted to a constant rate from the development.	Water quantity	Control the peak flow. Complex controls can reduce upstream storage requirements.
Inlets, outlets and controls	✗	There are many different designs and variations, including landscaped pipes, perforated pipes, weirs.	Water quality Amenity	Inlets, outlets and other control structures are key elements of well-designed SuDS. Inlet and outlet features allow water to flow into and out of features and also limit the rate at which water flows along and out of the system. There are many different approaches and products available and they can be easily designed to add interest to the urban landscape. Can provide accurate flow control from one SuDS feature to another.

SuDS Option	Appropriate to Development	Comments	Benefits	Comments
Source control				
Green roofs	X	Green roofs comprise a multi-layered system that covers the roof of a building or podium structure with vegetation cover/landscaping. Not appropriate given the scale and nature of the site.	Water quality Water quantity Amenity Biodiversity	Green roof installations can help to reduce surface water runoff from roof areas depending on the system specified. Good removal capability of atmospherically deposited urban pollutants. Ecological, aesthetic and amenity benefits.
Blue roofs	X	A blue roof is a roof design that is explicitly intended to store water, typically rainfall. Not appropriate given the scale and nature of the site.	Water quantity Amenity Biodiversity	Blue roofs are designed to attenuate and manage stormwater on a flat roof in urban areas where options for ground-based attenuation systems are limited, and in particular, where construction is being carried out within flood sensitive areas. Amenity value for the local community.
Rainwater harvesting	X	Rainwater harvesting collects the rain which falls onto roofs, then stores it in a tank until required for a non-potable use. Not appropriate given the scale and nature of the site.	Water quantity	In the process, a volume of water is kept out of the storm-water management system, thereby helping to reduce flooding risks. When required, the water is pumped to the point of use, thus displacing what would otherwise be a demand for mains-water. Reduces demand on mains water.
Permeable Pavements – with granular and geo-cellular storage systems	✓	Permeable pavements allow inflow of rainwater into underlying construction. Any geo-cellular storage systems would have to be lined with an impermeable membrane to provide storage rather than infiltration and can be connected to the drainage system.	Water quality Water quantity	Reduced peak flows to watercourses, reducing the risk of flooding downstream. Reduced effects of pollution in runoff on the environment.

Table 5-3: Summary of the SuDS options appraisal.

Notes

✓ Suitable for use given the nature and scale of the development

* Possibly suitable for use – not included in the client and architect design proposal at present

X Not suitable

5.4 Surface Water Attenuation Requirements

UU have indicated a pass forward flow rate of 5 l/s to the 600x900mm combined sewer would be acceptable, subject to exhausting other options higher on the drainage hierarchy. Typically, the LLFA, would require discharge to be limited to a 'greenfield rate'. The 'greenfield rate' has been calculated the greenfield Q_{BAR} rate as 5.22 l/s for the site, and as this is slightly higher than the rate identified by UU, the lower rate of 5 l/s has been utilised. Calculations are included at Appendix E.

It is estimated from the proposed development plan (included at Appendix A) that the site will have the following designated areas (Table 5-4).

Designated Areas	Plot Area
Total area (ha / m ²)	0.982 / 9,818
Contributing Catchment	
Catchment Area (ha / m ²)	0.982 / 9,818
Impermeable Area (ha / m ²)	0.748 / 7,482
Permeable Area (ha / m ²)	0.234 / 2,336

Table 5-4: Proposed Site Areas

It can be seen that 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.

5.4.1 Attenuation Estimate

For the contributing catchment an estimate has been produced assuming an impermeable developable area of 0.748 ha / 7,482m² and a greenspace impermeable area of 0.234 ha / 2,336 m² the site.

As noted above, UU have indicated a pass forward flow rate of 5 l/s for the development to the existing 600x900mm combined sewer.

The following attenuation has been estimated for the development:

- Attenuation storage volume: **267 m³** (1 in 30 year event + 40% Climate Change)
- Retention on site volume: **395 m³** (1 in 100 year + 45% Climate Change)

Calculations are included at Appendix E.

5.5 Site Specific SuDS

The use of attenuation SuDS are deemed to be the most feasible and practical option for the development. The permeable paving sub grade will provide the required storage volume to limit peak runoff arising from the development. The rate used is less than the Q_{BAR} rate of 5.22 l/s, and therefore simply satisfies the requirements for long term storage.

The volume could be stored within the site boundary within the permeable paving subgrade (i.e. no fines aggregate) based on an area of 1,365 m², a depth of 400 mm and a void ratio of 30%, providing an overall volume of 163.8 m³. The base of the permeable

paving will be flat and flow controlled (orifice or similar) to allow the required volume to be provided. This is subject to detailed design.

The remainder could be provided by two 1.65 m diameter oversized pipes of 55 m length (110m overall length required), either laid in a 'T' formation or parallel within the main access. This would provide approximately 235 m³ for the site. Final discharges will be limited by flow control (Hydrobrake or similar) to the adjacent combined sewer. This is subject to detailed design.

An Indicative Surface Water Drainage Strategy (included at Figure 2) has been developed based on the approved development plan. This is subject to detailed design.

5.6 Maintenance and Management Plan

Typical maintenance schedules have been produced for the SuDS systems and have been presented in Appendix F.

The SuDS maintenance and inspections responsibility rests UU for adoptable features, subject to meeting adoption requirements, with a maintenance company, run by residents, maintaining unadopted features.

6 Foul Drainage

A predevelopment enquiry has been submitted to UU who have indicated that the foul water could be discharged into the adjacent 600x900mm diameter combined sewer in Mauldeth Road. UU have not identified any flow restriction for the foul flows.

The foul water could be discharged by gravity into the combined sewer and manhole 3800 has a recorded invert level of 38.33 m AOD / 7.64 m bgl, which appears to be low enough to provide a suitable connection point.

An indicative foul plan is included at Figure 3.

7 Mitigation Measures

7.1 Proposed Site Levels and Development Level

Current EA guidance recommends that the minimum ground floor levels of residential developments are set at a minimum of 600mm above the 1% annual probability (1 in 100 year) flood level including an additional fluvial allowance for climate change.

As the site is located away from any fluvial flood extents it is considered that there is **no specific requirement to raise levels with regard to fluvial flooding**.

Consideration should be given to the proposed levels and a levels strategy for the site should be produced. This should include consideration of the infrastructure levels and the levels of the proposed dwellings in line with building regulations (i.e. plots raised a minimum of 150 mm over surrounding ground and road levels).

7.2 Safe Access

Safe and dry access is available via Mauldeth Road to the South of the site.

7.3 Flood Resistance and Resilience

The development proposed may be subject to flooding at more extreme events than those considered. However, the risk appears to be sufficiently low that flood resilience measures need not be included into ground floor construction to aid recovery after any event. If utilised, typical measures would include solid floors, use of suitable materials and services fed from upper floors with outlets at high level. The need can be discussed and agreed with building control officers during detailed design.

7.4 Residual Risk

It is impossible to completely guard against flooding since extreme events greater than the design standard event are always possible.

However, ground floor levels should be set above proposed levels across the site and provide a nominal freeboard in line with building regulations to allow overland flow under exceptional conditions. Overland flow routes should be considered in case of drainage failure and the extreme events.

8 Conclusions

The site is occupied by the former Burnage Cricket Club. The proposal is to redevelop the site for residential use.

The site is located within Flood Zone 1 and a Negligible to Low risk of flooding from fluvial, tidal, pluvial, groundwater, sewers, artificial sources have been identified for the site.

Safe and dry access is available via Mauldeth Road to the South of the site.

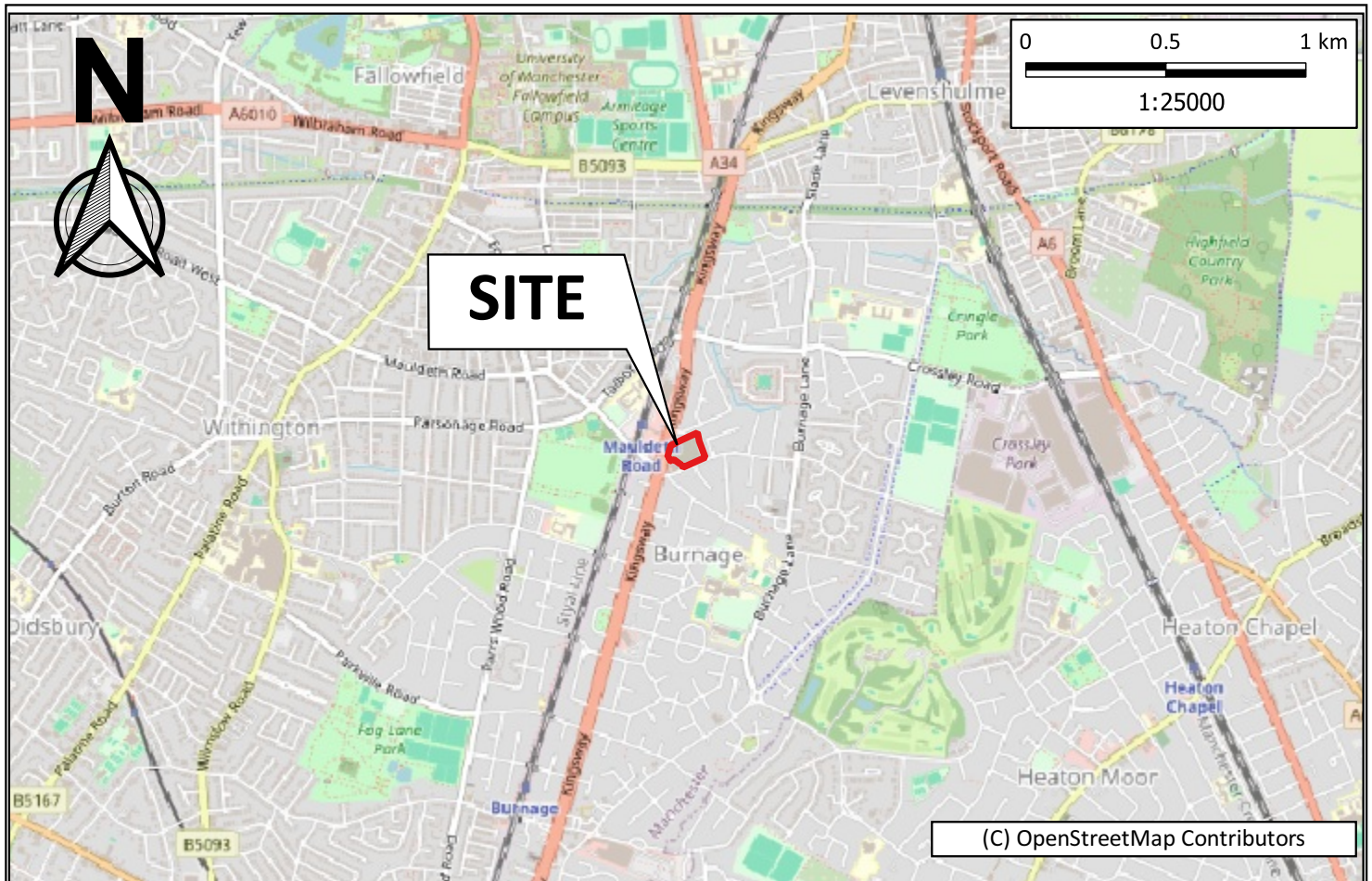
Consideration should be given to the proposed levels and a levels strategy for the site should be produced. This should include consideration of the infrastructure levels and the levels of the proposed dwellings in line with building regulations (i.e. plots raised a minimum of 150 mm over road levels).

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

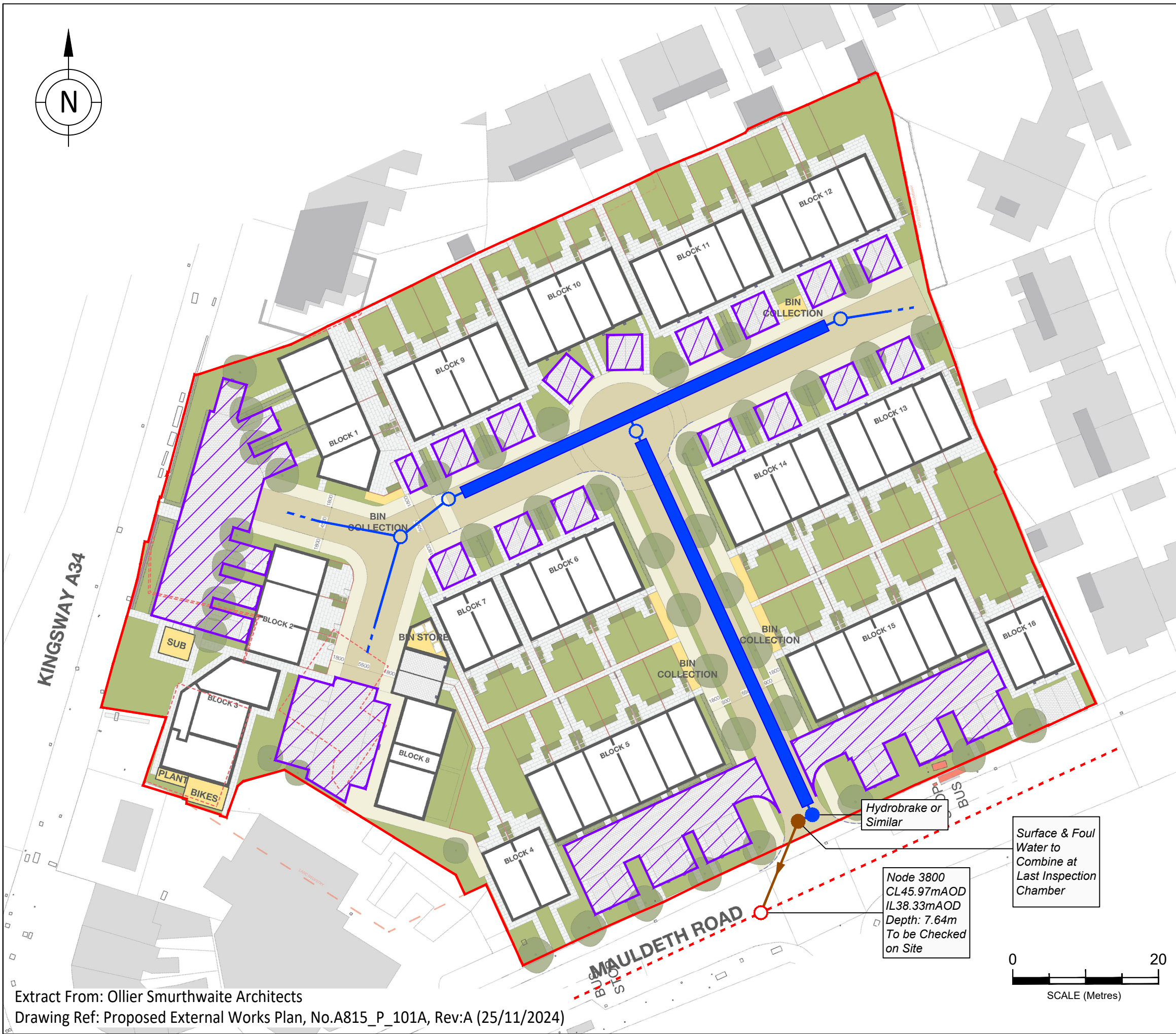
- » Given the existing ground conditions on site, which have been confirmed by the Site Investigation, the use of infiltration SuDS for surface water disposal will not be practical.
- » Based on the absence of a surface watercourses within the vicinity of the site, discharge to such a feature is not possible. Therefore, surface water flows will be discharged to the adjacent combined sewer. Sewer plans confirm the presence of a 600x900mm combined sewer in Mauldeth Road.
- » The suitability and depth of a potential connection into the adjacent sewer should be confirmed on site. LKC understand that the invert of the sewer is 7.64 m bgl in Mauldeth Road where the cover level is indicated at 45.97 m AOD.
- » UU have indicated that pass forward flow for surface water of 5 l/s is acceptable subject to exhausting higher options on the drainage hierarchy. UU have identified that foul flows can pass to the combined sewer in Mauldeth Road.
- » The attenuation required for a 1 in 30 year event, plus 40% allowance for climate change, is 267 m³ and for the 1 in 100-year event plus 45% allowance for climate change a storage capacity of 395 m³ will be required from on-site storage as well as SuDS systems.
- » The volume can be stored within the site boundary within permeable paving with an area of 1,365 m². Based on a depth of 400 mm and 30% void space providing up to 163.8 m³ before passing forward into downstream features. The remainder could be provided by two 1.65 m diameter oversized pipes of 55 m length (110m overall length required). This would provide approx. 235 m³ for the site.

All proposed outflow connections from the development should be agreed with the Lead Local Planning Authority and United Utilities and are subject to detailed design.

Figures



Client: Views (Holdings) Ltd				Title: Site Location & Boundary Plan		LK CONSULT	
Site: Land at Burnage Cricket Club, Manchester				Scale (see scale bar): 1:25,000 & 1:2,000 @ A4			
Job No.: FRA241110	Drawn By: JW	Checked By: MB	Drawn: Dec 2024	Figure: 1	Revision:		



KEY

Site Boundary
(Area = 9818.63m²)

Potential Permeable Paving Areas
(Area = 1365.65m². Based on a depth of 400mm & 30% void space this could provide up to 163.8m³)

Tanks
(Two 1.65m diameter oversized piped of 55m length (110m overall length required), to would provide approx. 235m³ for the site)

Indicative Location of United Utilities
600 x 900mm Combined Sewer

Indicative Location of United Utilities
Combined Sewer Inspection Chamber

Surface Water Pipes

Hydrobrake or Similar

Inspection Chamber

Combined Sewer Inspection Chamber

Combined Sewer Pipes

EXTERNAL WORKS KEY

TREES REMOVED

EXISTING TREE RETAINED

PROPOSED TREE

GRASS

LOW LEVEL HEDGE

PLANTING MIX

BINS

BIKES

EV CHARGING 7kW (25-55kWh)

DROPPED KERB AND TACTILE PAVING

MACADAM ROAD

MACADAM PAVEMENT

CONCRETE TEXTURED FLAG

TEGULA CONCRETE PAVING BLOCKS

EXISTING 2M CLOSE BOARDED FENCE

PROPOSED 2M CLOSE BOARDED FENCE

EXISTING WALL REDUCED TO 600MM

PROPOSED 600MM BRICK WALL

PROPOSED 1800MM TIMBER FENCE WITH GAPS FOR HEDGE/HOGS

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. Subject to Detailed Design.

LK

CONSULT LIMITED

Client:

Views (Holdings) Limited

Site:

Burnage Cricket Club

Title:

Conceptual Surface Water Drainage Strategy

Job No.:

FRA241110

Scale (See Scale Bar):

See Scale Bar

Figure:

2

Revision:

B

Drawn By:

AC

Checked By:

MB

Drawn:

Jan 2025

Extract From: Ollier Smurthwaite Architects
Drawing Ref: Proposed External Works Plan, No.A815_P_101A, Rev:A (25/11/2024)



KEY

- Site Boundary (Area = 9818.63m²)
- Indicative Location of United Utilities 600 x 900mm Combined Sewer
- Combined Sewer Inspection Chamber
- Foul Water Pipes
- Foul Water Inspection Chamber
- Combined Sewer Inspection Chamber
- Combined Sewer Pipes

EXTERNAL WORKS KEY

- TREES REMOVED
- EXISTING TREE RETAINED
- PROPOSED TREE
- GRASS
- LOW LEVEL HEDGE
- PLANTING MIX
- BINS
- BIKES
- EV CHARGING 7kW (28-56kWh)
- DROPPED KERB AND TACTILE PAVING
- MACADAM ROAD
- MACADAM PAVEMENT
- CONCRETE TEXTURED FLAG
- TEGULA CONCRETE PAVING BLOCKS
- EXISTING 2M CLOSE BOARDED FENCE
- PROPOSED 2M CLOSE BOARDED FENCE
- EXISTING WALL, REDUCED TO 600MM
- PROPOSED 600MM BRICK WALL
- PROPOSED 1800MM TIMBER FENCE WITH GAPS FOR HEDGEHOGS

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. Subject to Detailed Design.



Client: Views (Holdings) Limited

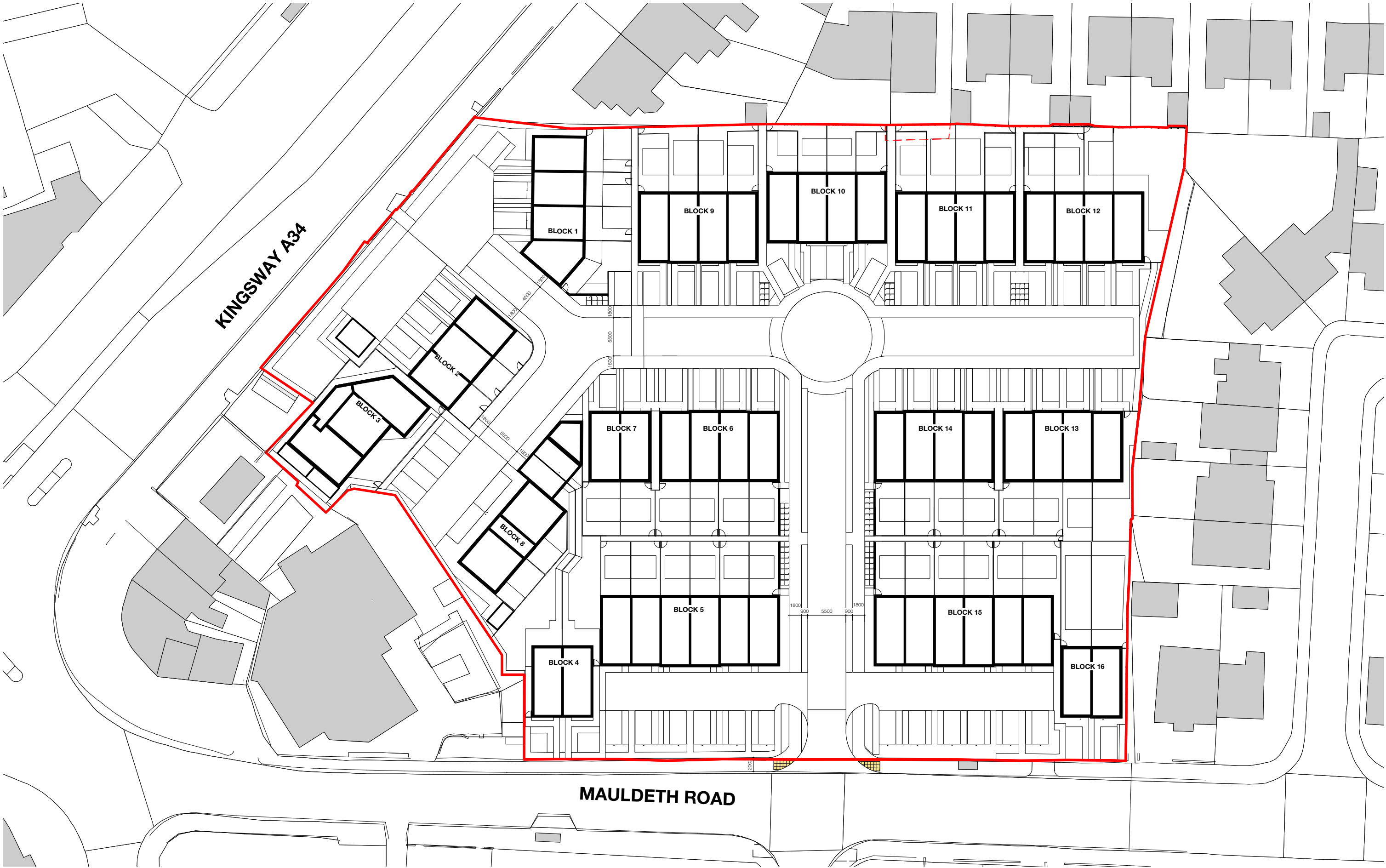
Site: Burnage Cricket Club

Title: Conceptual Foul Water Drainage Strategy

Job No.: FRA241110 Scale (See Scale Bar): See Scale Bar Figure: 3 Revision: A

Drawn By: AC Checked By: MB Drawn: Jan 2025

Appendix A – Proposed Development Plan



PROPOSED BLOCK PLAN

1:500@A3

05

10

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A	05/11/24	EXTENDED ADOPTED ROAD
REVISION	DATE	DESCRIPTION

CLIENT: VIEWS	
PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT	
ADDRESS: BURNAGE CRICKET CLUB, M19 1AX	
DRAWING TITLE: PROPOSED BLOCK PLAN	
SCALE: 1:500@A3	DATE: AUGUST 2024
DRAWING NO: A815_P_002A	

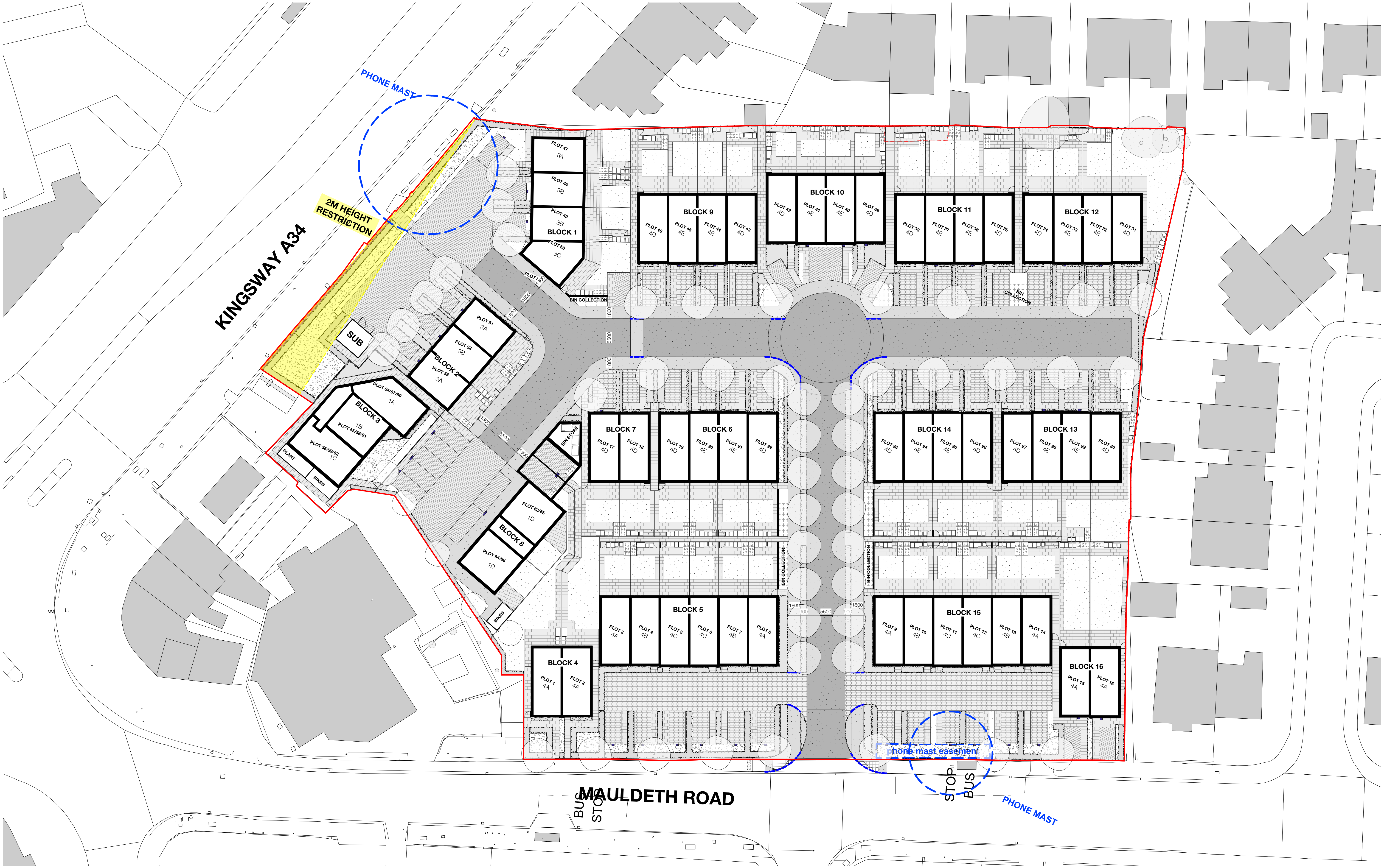
OLLIER SMURTHWAITE ARCHITECTS

40 King Street, Manchester, M2 6BA

T 0161 883 0838

F 0161 883 0839

E mail@olliersmurthwaite.com



PROPOSED SITE PLAN
1:250@A1

0 5 10 15 20 25 M

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IMPORTANT NOTES:

REVISION	DATE	DESCRIPTION
E	13/01/25	AMENDED PATHS AND BIN AND BIKE LOCATIONS
D	23/12/24	GENERAL AMENITIES
C	06/12/24	GENERAL AMENDMENTS
B	11/11/24	ADDED AREA SCHEDULE
A	05/11/24	EXTENDED ADOPTED ROAD

CLIENT: VIEWS

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT

ADDRESS: BURNAGE CRICKET CLUB, M19 1AX

DRAWING TITLE: PROPOSED SITE PLAN

SCALE: 1:250@A1

DATE: AUGUST 2024

DRAWING NO: A815_P_100E

OLLIER SMURTHWAITE ARCHITECTS

40 King Street, Manchester, M2 6BA

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Appendix B – Topographic Survey

Appendix C – Environment Agency Data

Matt Bell

From: Get flood risk information for planning
<get.flood.risk.information.for.planning@notifications.service.gov.uk>
Sent: 27 November 2024 17:04
To: Matt Bell
Subject: Ordered flood risk data not available. Your reference number PK35T1GCCBWP



Dear Matthew Bell,

Thank you for ordering flood risk data.

Location searched for: M19 1AB.

Location data requested for: 386377,392914 easting and northing coordinates.

We do not have any flood risk data for this location.

However, flooding may have happened here in the past, as our records are not comprehensive.

Why do we not have data for this location?

We do not hold any detailed flood modelling data for your site, as it is not within 150 metres of an area at risk of flooding from rivers or the sea.

We do not hold records of historical flood events from rivers or the sea affecting the area local to this site.

Help with flood risk assessments

If you have requested this information to help inform a development proposal, you can find out more about the use of Environment Agency information for flood risk assessments on GOV.UK:

- flood risk assessments for planning applications:
<https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>
- pre-planning application enquiry form:
<https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>

View surface water flood maps online at:

<https://www.gov.uk/check-long-term-flood-risk>

View information on climate change allowances:

<https://www.gov.uk/government/publications/peak-river-flow-climate-change-allowances-by-management-catchment>

This information is provided subject to the Open Government Licence:

<https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR). If you need information for insurance purposes, you should send an insurance related request by email to enquiries@environment-agency.gov.uk

Data available online

Many of our flood datasets are available online.

You can view and download flood risk maps on flooding from surface water, reservoirs, and rivers and the sea (accounting for existing defences) from our website at:

<https://www.gov.uk/check-long-term-flood-risk>

Flood map for planning:

- flood zone 2: <https://data.gov.uk/dataset/cf494c44-05cd-4060-a029-35937970c9c6/flood-map-for-planning-rivers-and-sea-flood-zone-2>

- flood zone 3: <https://data.gov.uk/dataset/bed63fc1-dd26-4685-b143-2941088923b3/flood-map-for-planning-rivers-and-sea-flood-zone-3>
- water storage areas: <https://data.gov.uk/dataset/cae4e24c-0342-48aa-8a93-d727ce582b3c/flood-map-for-planning-rivers-and-sea-flood-storage-areas>
- flood defences: <https://data.gov.uk/dataset/76828b72-3c9c-4700-83c7-d7c36047d322/flood-map-for-planning-rivers-and-sea-spatial-flood-defences-without-standardised-attributes>
- areas benefiting from defences: <https://data.gov.uk/dataset/ea328e7-2eea-4cbf-bd6b-c66121981ba1/flood-map-for-planning-rivers-and-sea-areas-benefiting-from-defences>

Other online data:

- historic flood map: <https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map>
- assets and defences: <https://environment.data.gov.uk/asset-management/index.html>
- current flood warnings: <https://check-for-flooding.service.gov.uk/>
- open data: <https://data.gov.uk/>

Contact us

Do not reply to this email. This inbox is not checked regularly.

If you have any questions about your request, contact the Greater Manchester Merseyside and Cheshire area team at inforequests.gmmc@environment-agency.gov.uk. Make sure you include your reference number.

Regards,

Flood map for planning service

Environment Agency

<https://flood-map-for-planning-service.gov.uk/>

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
386378/392911

Created
23 Dec 2024 17:01

Your selected location is in flood zone 1, an area with a low probability of flooding.

You will need to do a flood risk assessment if your site is **any of the following:**

- bigger than 1 hectare (ha)
- In an area with critical drainage problems as notified by the Environment Agency
- identified as being at increased flood risk in future by the local authority's strategic flood risk assessment
- at risk from other sources of flooding (such as surface water or reservoirs) and its development would increase the vulnerability of its use (such as constructing an office on an undeveloped site or converting a shop to a dwelling)

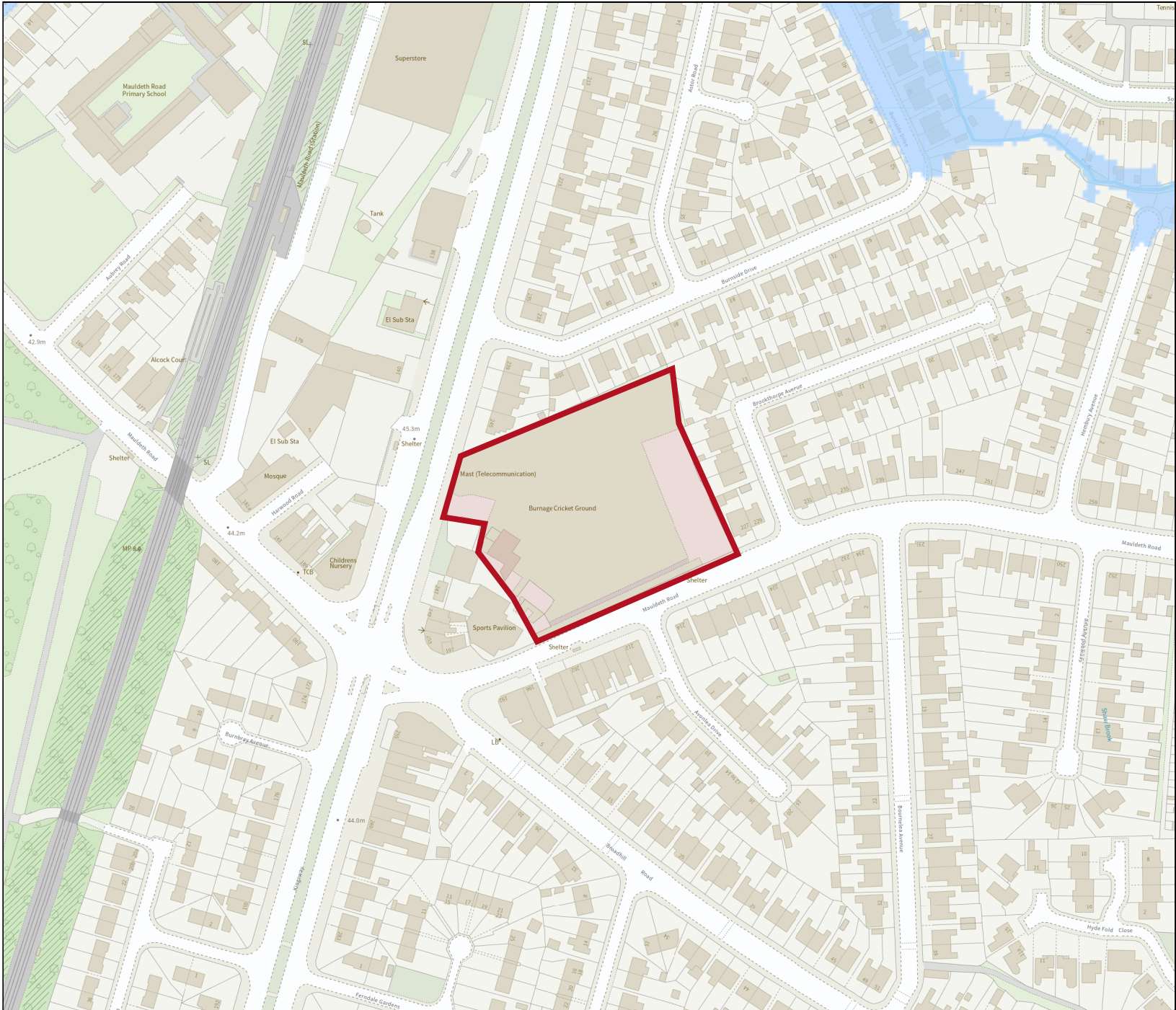
Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence **which** sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Use of the address and mapping data is subject to Ordnance Survey public viewing terms under Crown copyright and database rights 2024 OS AC0000807064. <https://flood-map-for-planning.service.gov.uk/os-terms>



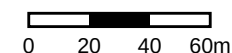
Your reference
<Unspecified>

Location (easting/northing)
386378/392911

Scale
1:2500

Created
23 Dec 2024 17:01

-  Selected area
-  Flood zone 3
-  Flood zone 2
-  Flood zone 1
-  Flood defence
-  Main river
-  Water storage area



Appendix D – LLFA and UU Data

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: FRA241110
Our Ref: UUPS-ORD-614692
Date: 26/11/2024****Dear Sirs****Location: Burnage Cricket Club**

I acknowledge with thanks your request dated 20/11/2024 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,



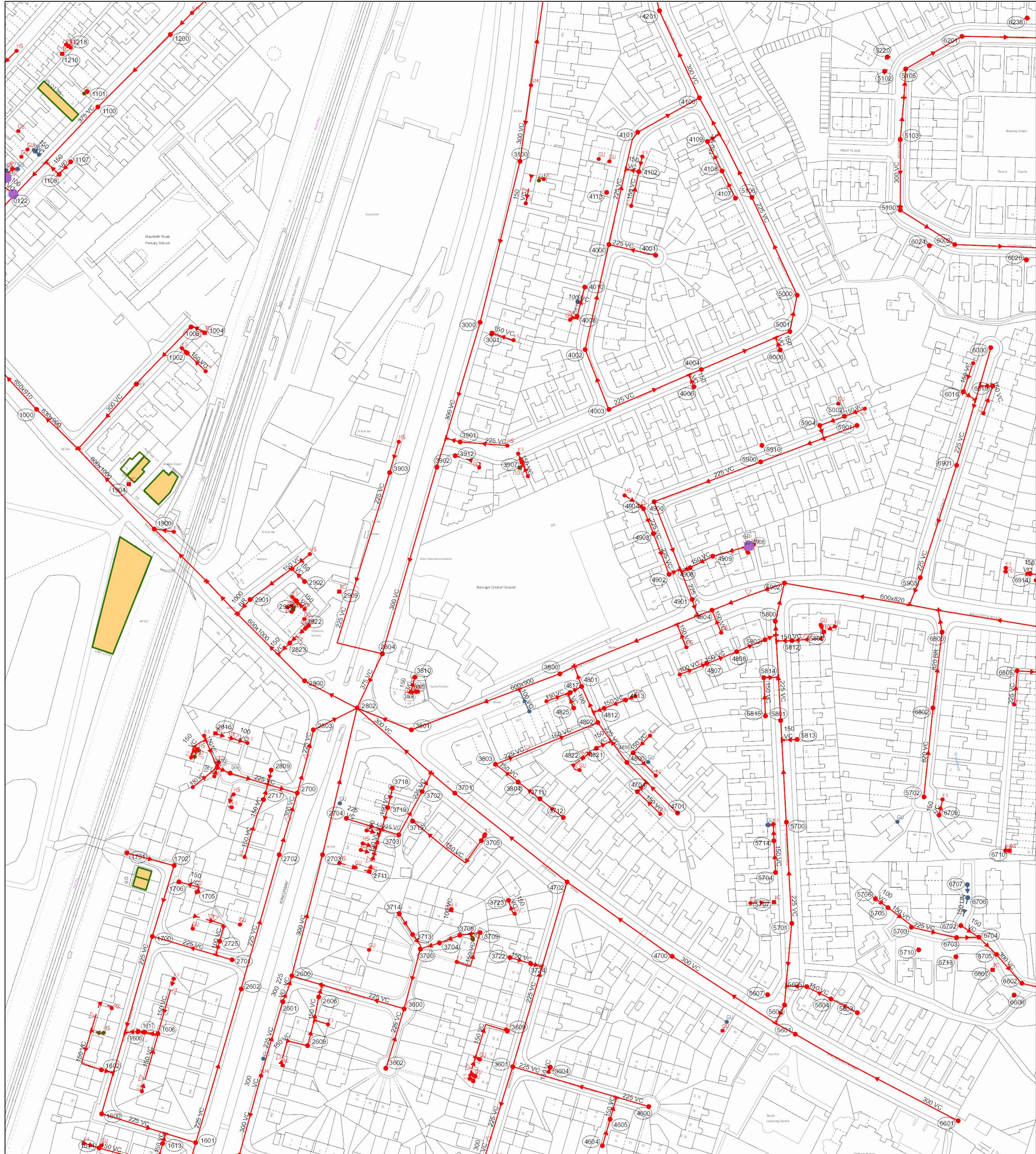
Karen McCormack
Property Searches Manager

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.



Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4107		VC		16	8.531		VC	20.67184	
5908		VC		150			VC	102.017	
6601		CO	0	300			VC	7.89893	
2725		VC		225			VC	28.83282	1 in 89
1107	44.55	VC	39.29	225			VC	8.447516	1 in 27
1600	43.78	CO	41.96	225			VC	54.45588	1 in 155
3601	44.47	CO	42.6	225			VC	34.46188	1 in 37
4808		VC		150			VC	17.1675	
4808		VC		150			VC	12.84488	
5800	46.29	CO	40.03	225			VC	21.58703	1 in 27
4109		VC		150			VC	7.840169	
2717		VC		150			VC	8.594174	
3719		VC		150			VC	12.64163	
4702	45.29	CO	41.7	225			VC	70.02531	1 in 118
3903	45.37	CO	41.67	225			VC	124.0817	1 in 53
4003	45.24	CO	43.09	225			VC	36.4963	1 in 83
3800	45.97	CO	38.33	600			BR	87.66413	1 in 266
4600	46.54	CO	44.6	225			VC	78.1601	1 in 24
2801	43.15	CO	40.4	225			VC	21.6202	
4001	44.28	CO	42.36	225			VC	26.68333	1 in 111
5901	47.62	CO	43.96	225			VC	66.64024	1 in 63
4003	45.24	CO	43.3	225			VC	55.54278	1 in 174
4802	45.83	CO	42.73	225			VC	21.93171	1 in 76
4101	43.82	CO	41.44	225			VC	38.94888	1 in 111
4102		VC		150			VC	7.444826	
5904	46	CO	38.78	150			VC	7.350288	
4817		VC		150			VC	7.203305	
4808		VC		150			VC	8.609255	
5103	44.65	CO	42.31	300			VC	37	
3718		VC		150			VC	10.80218	
5604		VC		150			VC	14.88668	
2802	42.98	CO		225			VC	78.52204	
3703	44.47	CO	42.53	225			VC	27.29469	1 in 248
4812		VC		150			BR	6.460044	
6800	46.22	CO	0	620			VC	12.10553	
4108		VC		150			VC	18.14207	
2701	45.01	CO	43.16	150			VC	45.86028	1 in 153
4804	46.25	CO	39.04	600			BR	91.02738	1 in 128
2804	44.99	CO	39.19	375			VC	33.10599	1 in 30
5106	43.64	CO	41.85	225			VC	31.30495	1 in 108
3601	44.01	CO	41.4	225			VC	106.3203	1 in 74
1602		VC		150			VC	8.802975	
3700	46.3	CO	43.71	225			VC	56.9803	1 in 100
4801	46	CO	38.78	225			VC	11.7047	
2809		VC		150			VC	8.128884	
4000	44.3	CO	42.1	225			VC	64.43904	1 in 101
5000	44.02	CO	42.28	225			VC	59.5063	1 in 98
1100	42.34	CO	37.69	375			VC	103.2763	1 in 100
4902		VC		225			VC	6.820259	
5605		VC		150			VC	11.29119	
3702	45.09	CO	41.41	225			VC	11.18034	
3703	45.08	CO	40.9	225			VC	25.65403	1 in 60
4201	42.96	CO	40.6	300			VC	54.57106	1 in 130
1108		VC		150			VC	9.98044	
6703	47.99	CO	45.47	225			VC	12.28395	
4816		VC		150			VC	17.60109	
3711		VC		150			VC	16.16515	
2704	44.19	CO	42.91	225			VC	30.36445	1 in 84
6705	46.28	CO	45.12	300			VC	21.26029	1 in 64
4700	45.27	CO	41.92	300			VC	71.02816	1 in 418
1001	43.79	CO	41.68	300			VC	46.16538	
4807		VC		150			VC	17.61241	
4800	45.61	CO	43.02	225			VC	27.2336	1 in 118
2703	43.83	CO	39.45	300			VC	63.19855	
6702		VC		150			VC	11.91225	
1614		VC		150			VC	33.10773	
3709		VC		150			VC	11.28743	
3705		VC		150			VC	4.07566	
2609		VC		150			VC	14.56796	
3801	45.12	CO	0	600			BR	32.31998	
3708		VC		150			VC	11.81277	
6602	48.21	CO	44.79	300			VC	45.12206	1 in 76
5006		VC		150			VC	7.419191	
1601	44.14	CO	41.5	300			VC	12.613	
4002	44.85	CO	42.7	225			VC	80.52071	1 in 29
1613		VC		150			VC	59.43904	1 in 102
2908		VC		150			VC	5.752105	
5814		VC		150			VC	3.344552	
3722		VC		150			VC	8.030302	
6802	46.42	CO	0	620			BR	11.83881	
2701	46.31	CO	44.28	225			VC	42.2987	1 in 110
2700	44.15	CO	38.43	300			VC	45.17743	1 in 374
5600	45.88	CO	45.11	225			VC	18.68154	
5601	45.83	CO	42.71	300			VC	11.36304	1 in 109
4100	42.31	CO	38.02	150			VC	80.48583	
2601	43.02	CO	39.92	300			VC	16.5782	1 in 195
5105	44.72	CO	42.11	300			VC	56.6954	
5100	44.6	CO	42.08	300			VC	7.615773	1 in 358
6002	45.02	CO	41.93	300			VC	35.5469	1 in 254
3804		VC		150			VC	35.51056	1 in 1021
3801	47.4729	CO	43.14	225			VC	51.0392	
4904	46.27	CO	43.14	225			VC	15.90959	
2802	44.64	CO	37.56	600			VC	47.4729	
4901	46.16	CO	40.45	225			VC	14.74655	
5812		VC		150			BR	32.4965	
1002		VC		150			VC	8.486833	
3600	44.02	CO	41.66	225			VC	8.700788	
4006		VC		150			VC	4.137177	1 in 35
5706		VC		100			VC	32.28003	
2902	44.44	CO	42.61	150			VC	7.1701	
3100	44.32	CO	40.47	300			VC	8.517278	
1601	44.14	CO	41.5	225			VC	9.89495	1 in 340
5001	44.24	CO	42.47	150			VC	91.67879	
3803		VC		150			VC	86.60023	1 in 120
2901	45.03	CO	0	1000			VC	20.36958	
3604		VC		150			VC	7.989614	
4604		VC		150			VC	18.6851	
5603		VC		150			BR	10.63015	
6704	46.18	CO	45.56	150			VC	2.887422	
3701	44.83	CO	40.99	300			VC	15.34343	1 in 31
4821		VC		150			VC	15.67385	1 in 37
2702	43.9	CO	38.68	225			VC	13.440784	
4701	45.41	CO	43.37	225			VC	71.59128	1 in 107
1000	42.78	CO	38.3	600			VC	9.035205	
4100	43.26	CO	41.06	300			VC	17.72005	1 in 148
5903	46.22	CO	40.19	225			VC	39.59798	1 in 118
1005		VC		300			BR	46.01987	1 in 1150
4900	45.73	CO	42.63	225			VC	52.80151	1 in 120
5702	46.71	CO	0	620			VC	16.15546	
4908		VC		150			VC	43.80204	1 in 161
5705		VC		150			VC	67.84017	
1701	44.43	CO	43.18	225			VC	49.25444	
6805		VC		225			VC	5.35551	
5902		VC		150			VC	17.13506	
3907		VC		150			VC	26.92582	1 in 142
5002		VC		150			VC	16.5013	
2801	43.15	CO	40.86	225			VC	5.36542	
3601	44.01	CO	41.37	225			VC	14.39733	
5103	44.65	CO	42.3	300			VC	15.96032	
5900	45.86	CO	43.26	225			VC	43.9559	1 in 85
5902	46.25	CO	38.91	600			VC	23.08679	
2600	43.06	CO	38.84	600			VC	62.86925	1 in 102
4704		VC		150			BR	21.19962	
3724		VC		150			VC	69.12308	1 in 182
6201	45.15	CO	42	150			VC	7.304186	
2606	43.8	CO	36.9	600			VC	6.524824	1 in 350
4004	44.69	CO	42.97	225			VC	6.960272	
4803		VC		42.97	225		VC	49.0102	
3801	45.55	CO	40.43	225			VC	6.960272	
5813		VC		150			VC	53.31041	1 in 111
3000	45.29	CO	40.17	150			VC	24.12881	
3902	45.38	CO	38.66	300			VC	8.248211	
3712		VC		150			VC	8.374454	
6019		VC		150			VC	63.52982	1 in 174
1608		VC		150			VC	107.28	1 in 275
3700	44.72	CO	42.61	225			VC	16.65009	
1617		VC		150			VC	7.069016	
6016		VC		150			VC	3.40548	
6914		VC		150			VC	34.2028	1 in 37
6000	45.03	CO	43.07	225			VC	3.707443	
4825		VC		100			VC	8.202732	1 in 67
6707		VC		150			VC	1.57038	
5704		VC		150			VC	67.22091	
3713		VC		150			VC	8.636426	
3001		VC		150			VC	17.46865	
6706		VC		150			UN	7.236048	
5815		VC		150			VC	9.180384	
2800	44.53	CO	37.6	600			VC	8.41981	
1702	44.45	CO	42.97	225			VC	0.9210553	
3704		VC		150			VC	15.75751	
6709		VC		150			VC	21.08898	
6901	45.55	CO	42	225			BR	52.2559	1 in 170
2701	46.31	CO	44.24	225			VC	40.80441	
3									

Matt Bell

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 21 November 2024 15:42
To: Matt Bell
Subject: RE: 06663660 - PDE - Land at Burnage Cricket Club, Mauldeth Road, Manchester, M19 1AB

Good Afternoon Matt,

Thank you for your WW PDE application, please see our reply below:

UU REF 0666360 - WW PDE – Burnage Cricket Club, Manchester

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

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:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public combined 600x900 sewer located adjacent to the site

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

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).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Should the above be exhausted and a connection to the public sewerage system is required we have no objections in principal to 5 l/s communicating with the public combined 600x900 sewer located adjacent to the site

Sewer Data:

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

Please note that United Utilities Water Limited (Uuw) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events.

Our response does not include:

- 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 as a result of investment in our infrastructure.

As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.

<https://www.unitedutilities.com/services/builders-developers/>

Should you require any further information please do not hesitate to contact me.

Regards

Anthony



Anthony Laithwaite
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

----- Original Message -----

From: wastewaterdeveloperservices@uuplc.co.uk [wastewaterdeveloperservices@uuplc.co.uk]
Sent: 21/11/2024 13:46
To: m.bell@thelkgroup.com
Subject: 06663660 - PDE - Land at Burnage Cricket Club, Mauldeth Road, Manchester, M19 1AB

Good Afternoon,

PRE DEVELOPMENT APPLICATION AT LAND AT BURNAGE CRICKET CLUB: – UU Ref 06663660

Please accept this email as receipt of your application received on 20/11/2024 for the above development. This has now been logged on our system and the job reference is 06663660 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Anthony Laithwaite for technical assessment. You will receive their response on or before 11/12/2024.

Kind regards



Freya Littlemore
Customer Advisor Advanced
Developer Services & Metering
Customer Services
T: 0345 026 8989 option 4
unitedutilities.com

If you feel you have received a good service from myself, please can you take two minutes to fill in the survey below. This will be much appreciated



Visit: <https://unitedutilities.thewowawards.co.uk/nominate>

----- Original Message -----

From: Matt Bell [m.bell@thelkgroup.com]
Sent: 20/11/2024 15:22
To: wastewaterdeveloperservices@uuplc.co.uk; seweradoptions@uuplc.co.uk
Subject: Pre-development Enquiry - Land at Burnage Cricket Club, Mauldeth Road, Manchester, M19 1AB - FRA

Dear Sir/Madam

LK Consult Ltd. has been commissioned to undertake a Flood Risk Assessment and Sustainable Drainage Systems (SuDS) Strategy, for a site located at Burnage Cricket Club, Mauldeth Road, Manchester, M19 1AB, centered at approximate National Grid Reference 386401,392939.

The area of interest appears to be within Flood Zone 1.

The site location and Wastewater Pre-Development Enquiry form are attached to this email.

To complete the SuDS Strategy, we would be grateful if you could supply us with the following, if available, for the vicinity of the site:

1. Records of any historic flood events and potential sources of flooding from foul and surface water sewers on site and in the area.
2. Any restrictions to discharge into the sewers

If you have any queries, please do not hesitate to get in touch.

We understand that at present UU complete pre-development enquiries without charge. If any fees are applicable to this request, please confirm in writing.

Any advice or recommendations you may have regarding the potential discharges from the development of this site would also be appreciated.

We will be in contact with all other relevant authorities to get a more complete understanding of the issues in the area.

Best regards

Matt

[Image is no longer available]

Matthew Bell
Associate Director - Flood Risk and Drainage
0161 763 7200 | 07350 395924
Manchester | London | Swindon | Liverpool | Glasgow
www.thelkgroup.com

[Image is no longer available]

I N C R E A S I N G L A N D V A L U E

[Image is no longer available]



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United Utilities Group PLC, Haweswater House, Lingley Mere
Business Park, Lingley Green Avenue, Great Sankey,
Warrington, WA5 3LP
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www.unitedutilities.com
www.unitedutilities.com/subsidiaries

Appendix E – Greenfield and Attenuation Calculations



MasterDrain
HY 11.0

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.		
Sheet no. 1		
Date 05/12/24		
By	Checked	Reviewed

Project	Burnage CC
Title	Greenfield Runoff

Hydrological Data:-

FSR Hydrology:-

Location	= Burnage CC	Grid reference	= SJ8692
M5-60 (mm)	= 18	r	= 0.37
Soil runoff	= 0.45	SAAR (mm/yr)	= 825
WRAP	= 4	Area	= England & Wales
Hydrological area	= 10	Hydrological zone	= 5

Soil classification for WRAP type 4

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Design data:-

Area = 0.0098 Km² - 0.98 Ha - 9800 m²

Calculation method:-

Runoff is calculated from:-

$$Q_{\text{BAR(rural)}} = 0.00108 \text{ AREA}^{0.89} \cdot \text{SAAR}^{1.17} \cdot \text{SOIL}^{2.17}$$

where

AREA = Site area in Km²
 SAAR = Standard Average Annual Rainfall (mm/yr)
 SOIL = Soil value derived from Winter Rainfall Acceptance Potential
 $Q_{\text{BAR(rural)}}$ = Runoff (cumecs)

$Q_{\text{BAR(rural)}}$ is then multiplied by a growth factor - GC(T) - for different storm return periods derived from EA publication W5-074/A.

Calculated data:-

For areas less than 50Ha, a modified calculation which multiplies the 50Ha runoff value by the ratio of the site area to 50Ha is used
 Reducing factor used for these calculations is 0.020

Mean Annual Peak Flow $Q_{\text{BAR(rural)}}$ = 5.22 l/s



MasterDrain
HY 11.0

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.		
Sheet no. 2		
Date 05/12/24		
By	Checked	Reviewed

Project	Burnage CC
Title	Greenfield Runoff

Values for $Q_{BAR(rural)}$

Ret. per.	m ³ /hr	l/s	l/s/ha	Ret. per.	m ³ /hr	l/s	l/s/ha
1yr	15.966	4.435	4.526	100yr+20%	47.336	13.149	13.417
2yr	17.469	4.853	4.952	100yr+30%	51.280	14.245	14.535
5yr	22.729	6.314	6.442	100yr+40%	55.225	15.340	15.653
10yr	25.922	7.201	7.347	200yr	45.082	12.523	12.778
30yr	31.557	8.766	8.945	200yr + 30%	58.606	16.279	16.612
50yr	34.750	9.653	9.850	500yr	51.280	14.245	14.535
100yr	39.446	10.957	11.181	1000yr	57.103	15.862	16.186

Growth factors -

1yr	2yr	5yr	10yr	30yr	50yr	100yr	200yr	500yr	1000yr
0.85	0.93	1.21	1.38	1.68	1.85	2.10	2.40	2.73	3.04

The above is based on the Institute of Hydrology Report 124
to which you are referred for further details (see Sect 7).
Note that the 200 and above year growth curves were taken from W5-074.



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.		
Sheet no. 1		
Date 05/12/24		
By	Checked	Reviewed

Project Burnage CC	By	Checked	Reviewed
Title 1 in 30 yr + 40% CC			

Data:-

FSR Hydrology:-

Location = Burnage CC

M5-60 (mm) = 18

Soil index = 0.45

Return period = 30

UCWI = 88.6

Grid reference = SJ8692

r = 0.37

SAAR (mm/yr) = 825

WRAP = 4

Climate change = 40

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Runoff factor (RF) = 61.0, 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 = 7482 m²

Total area (TA) = 9818 m²

Mean pump disch. rate = 5.000 l/s

Additional flow = 0.00 l/s

Pervious area = 2336 m²

Equiv area = 5989 m² (TA x RF).

Areal reduction factor = 1.000

Climate change factor = 40

Calculated data:-

Time to max = 289.0 mins

Rainfall at max = 12.47 mm/hr

Pipeline storage = 0.0 m³

Offline storage = 0.0 m³

Calculated storage volume = 267.1 m³

Allowed discharge rate = 5.000 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 = 264.5 m³

Allowed discharge rate = 5.000 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	34012.1	1125	268.7	400 x 600	1483.8	500 x 500	1068.3
150	15116.5	1200	236.2	600 x 900	646.1	500 x 750	712.2
225	6718.4	1275	209.2	800 x 1200	363.4	500 x 1000	534.2
300	3779.1	1350	186.6			750 x 1000	356.1
375	2418.6	1425	167.5			750 x 1200	296.8
450	1679.6	1500	151.2			750 x 1500	237.4
525	1234.0	1575	137.1			1000 x 1000	267.1
600	944.8	1650	124.9			1000 x 1200	222.6
675	746.5	1725	114.3			1000 x 1500	178.1
750	604.7	1800	105.0			1000 x 1800	148.4
825	499.7	1875	96.7			1000 x 2000	133.5
900	419.9	1950	89.4			1500 x 1500	118.7
975	357.8	2025	82.9			1500 x 1800	98.9
1050	308.5	2100	77.1			1500 x 2000	89.0



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Sheet no.

2

Date

05/12/24

Project
Burnage CC

Title
1 in 30 yr + 40% CC

By

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Time (mins)	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)
10	115.0	112.634	3.000	109.634
20	79.0	154.221	6.000	148.221
30	61.0	180.265	9.000	171.265
40	51.0	199.576	12.000	187.576
50	44.0	215.061	15.000	200.061
60	39.0	228.061	18.000	210.061
70	35.0	239.305	21.000	218.305
80	32.0	249.239	24.000	225.239
90	29.0	258.153	27.000	231.153
100	27.0	266.249	30.000	236.249
110	25.0	273.671	33.000	240.671
120	24.0	280.529	36.000	244.529
130	22.0	286.906	39.000	247.906
140	21.0	292.868	42.000	250.868
150	20.0	298.468	45.000	253.468
160	19.0	303.748	48.000	255.748
170	18.0	308.744	51.000	257.744
180	18.0	313.485	54.000	259.485
190	17.0	317.998	57.000	260.998
200	16.0	322.302	60.000	262.302
210	16.0	326.416	63.000	263.416
220	15.0	330.358	66.000	264.358
230	15.0	334.139	69.000	265.139
240	14.0	337.773	72.000	265.773
250	14.0	341.271	75.000	266.271
260	14.0	344.643	78.000	266.643
270	13.0	347.896	81.000	266.896
280	13.0	351.039	84.000	267.039
290	12.0	354.079	87.000	267.079
300	12.0	357.022	90.000	267.022
310	12.0	359.874	93.000	266.874
320	12.0	362.640	96.000	266.640
330	11.0	365.324	99.000	266.324
340	11.0	367.932	102.000	265.932
350	11.0	370.467	105.000	265.467
360	11.0	372.932	108.000	264.932
370	10.0	375.464	111.000	264.464
380	10.0	377.932	114.000	263.932
390	10.0	380.348	117.000	263.348
400	10.0	382.715	120.000	262.715
410	10.0	385.035	123.000	262.035
420	9.0	387.310	126.000	261.310
430	9.0	389.542	129.000	260.542
440	9.0	391.732	132.000	259.732
450	9.0	393.883	135.000	258.883
460	9.0	395.996	138.000	257.996
470	9.0	398.073	141.000	257.073
480	8.0	400.114	144.000	256.114
490	8.0	402.121	147.000	255.121
500	8.0	404.096	150.000	254.096
510	8.0	406.040	153.000	253.040
520	8.0	407.953	156.000	251.953
530	8.0	409.837	159.000	250.837
540	8.0	411.693	162.000	249.693
550	8.0	413.521	165.000	248.521
560	8.0	415.323	168.000	247.323
570	7.0	417.100	171.000	246.100
580	7.0	418.851	174.000	244.851
590	7.0	420.579	177.000	243.579
600	7.0	422.283	180.000	242.283

Storage volume (m³) = 267.1 m³



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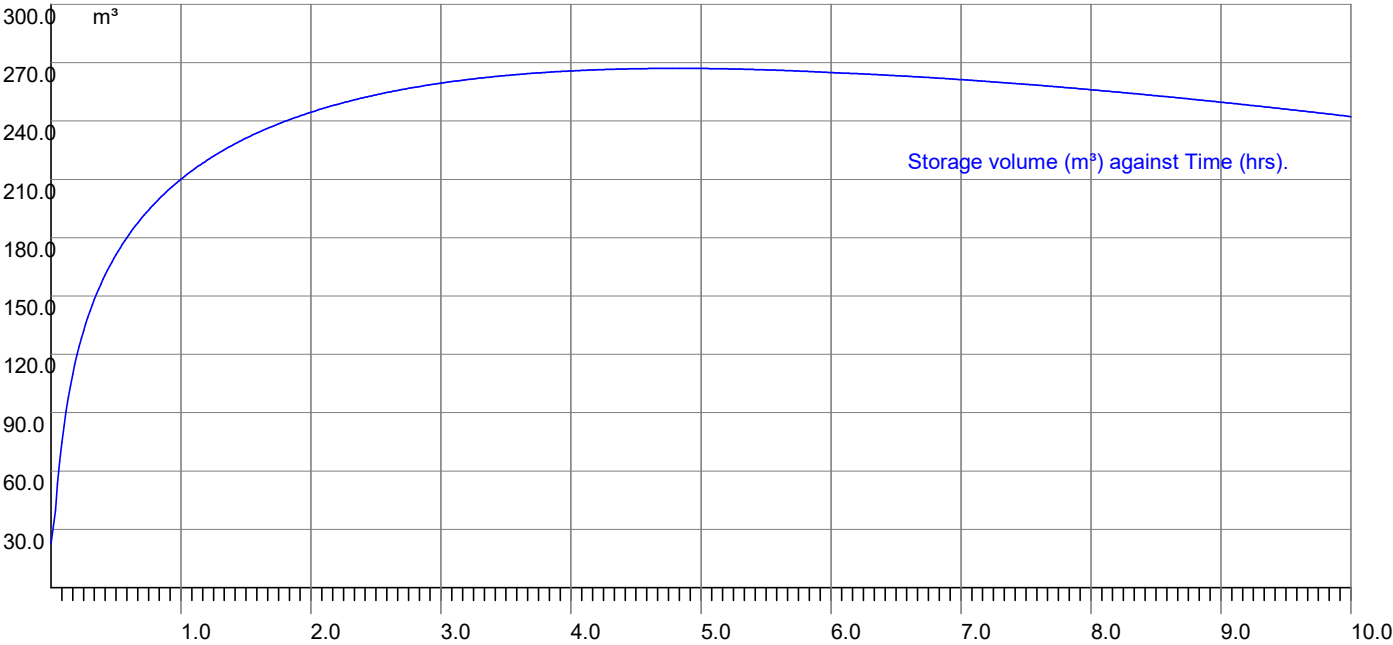
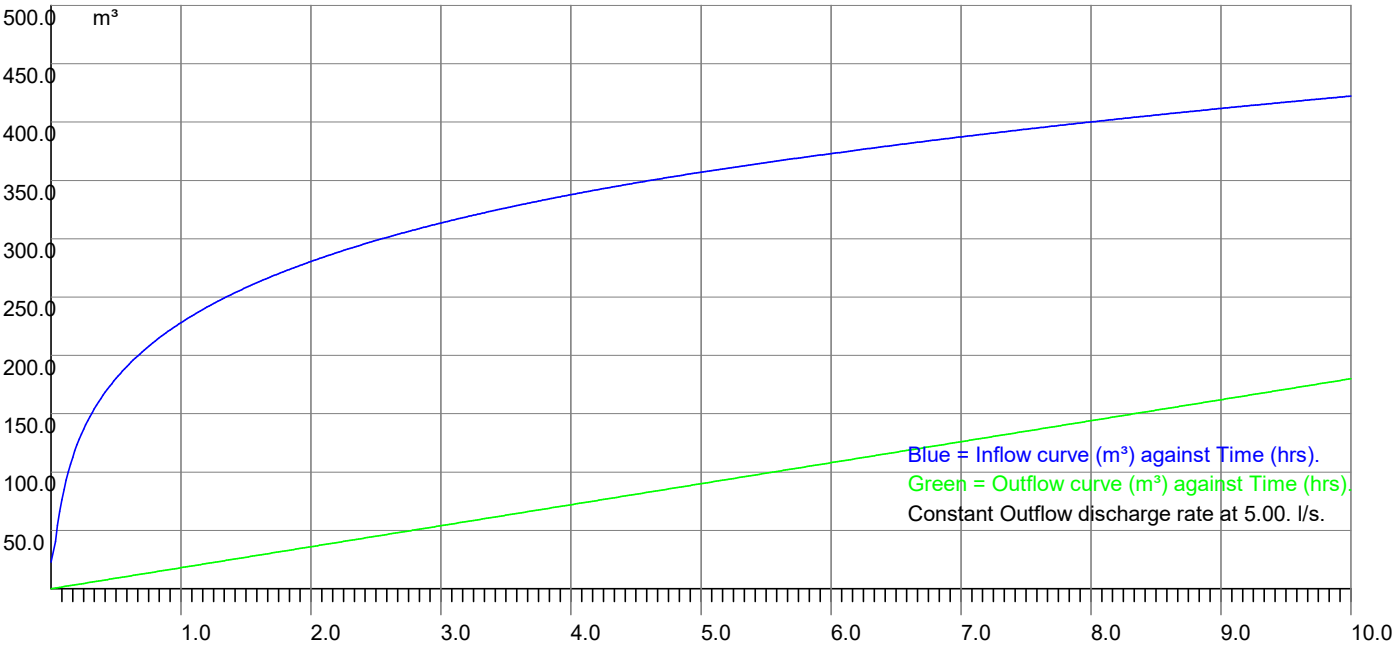
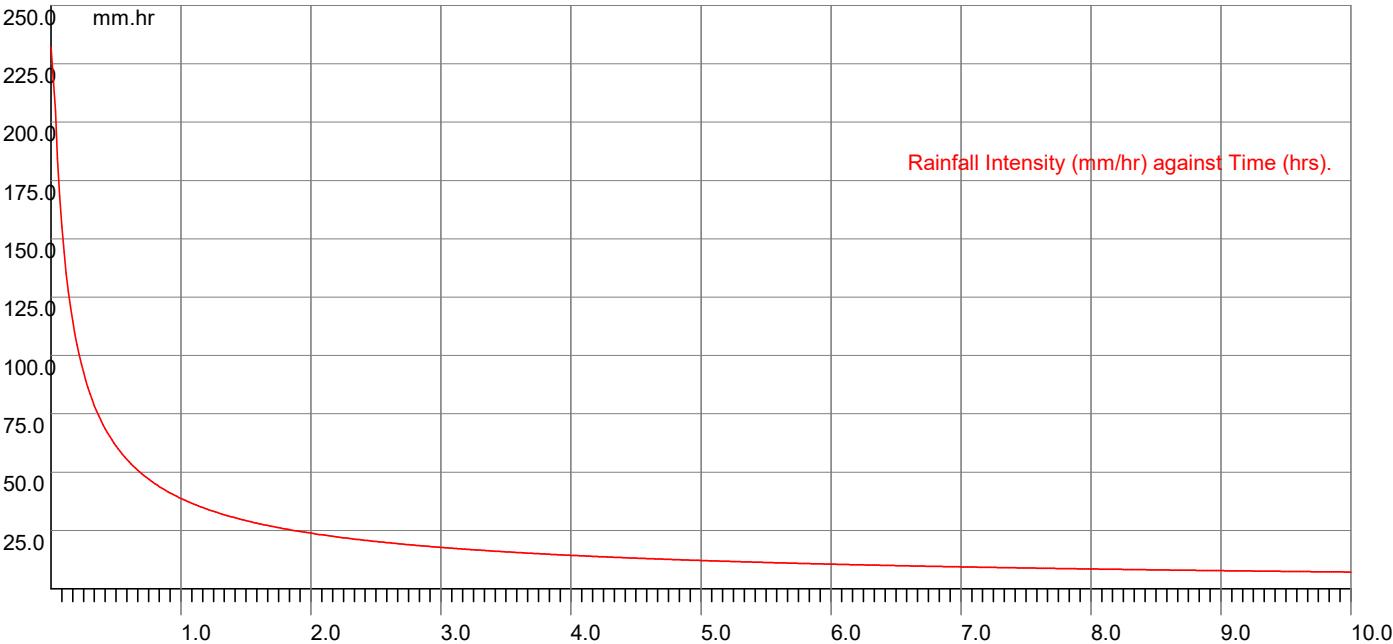
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Project	Burnage CC	
Title	1 in 30 yr + 40% CC	





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Project	Burnage CC	By	Checked	Reviewed
Title	1 in 30 yr + 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.

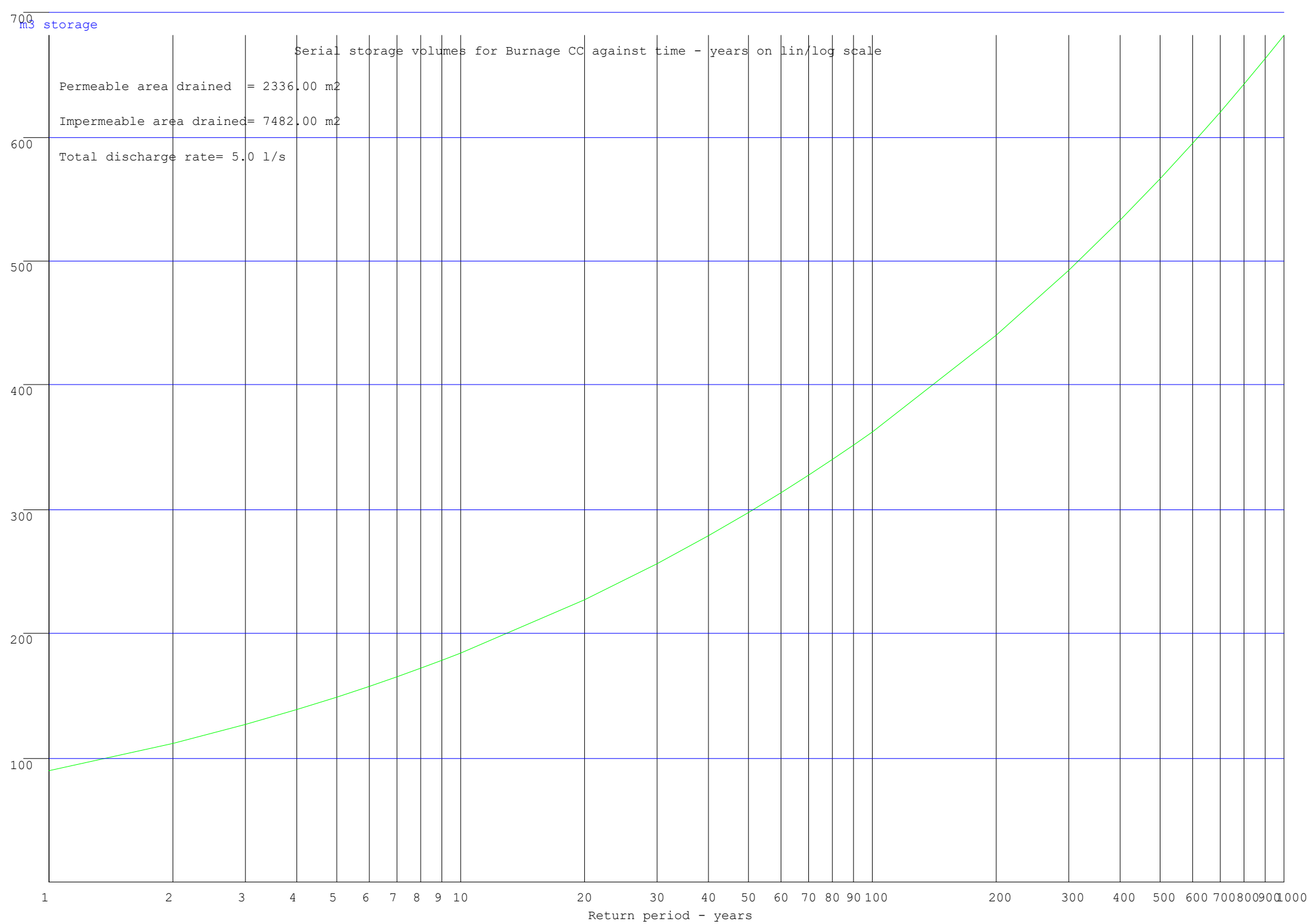
Why do the two methods give different results?

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 outflow volume is constant throughout the process at the specified discharge rate.

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. The outflow volume varies with the hydraulic head on the control device using flow equations provided by the control manufacturer. This is a far more accurate method than the peak flow method and often results in bigger storage volumes.

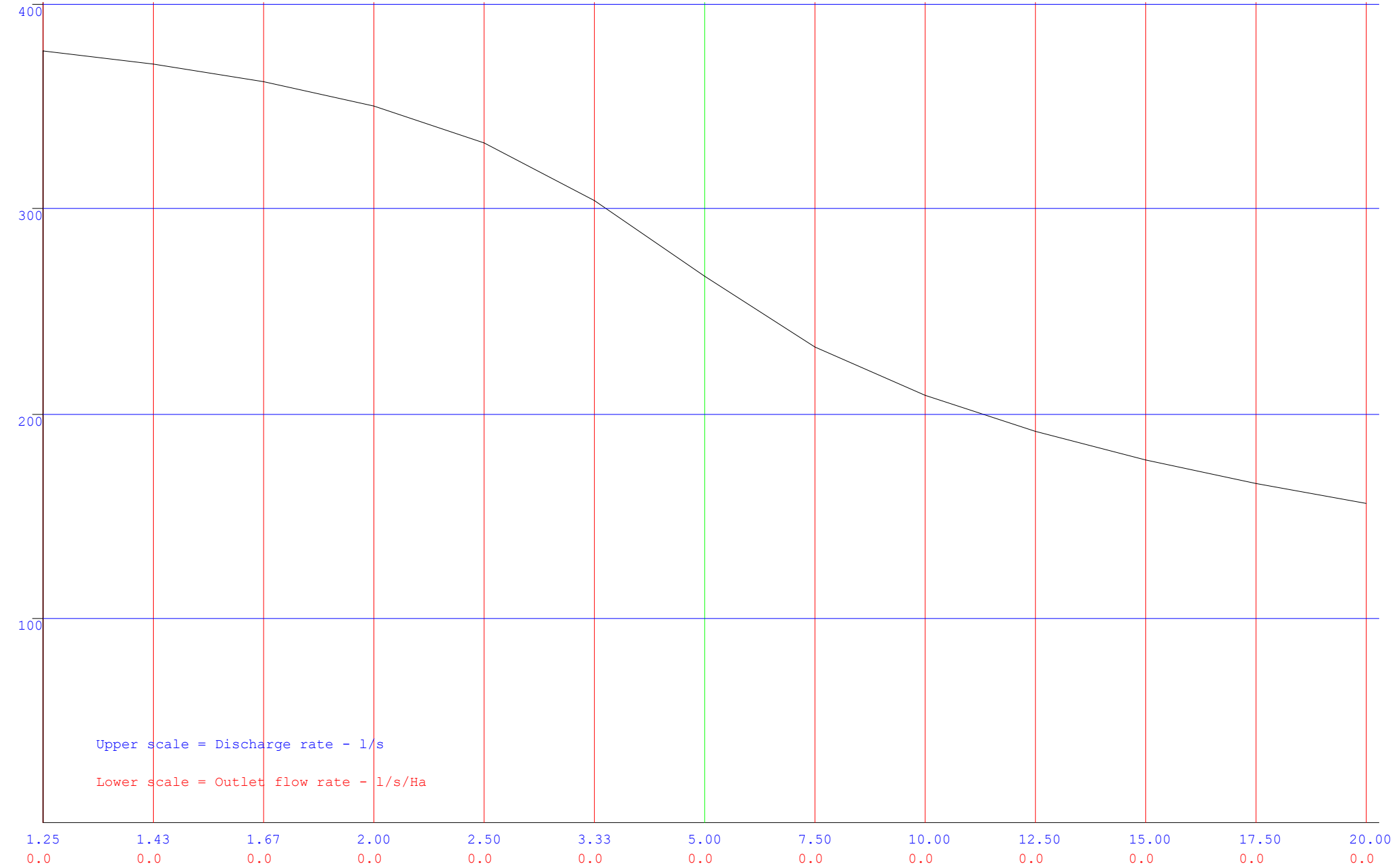
It can be seen that these two methods are very different, and the user may have the choice of which result to use. This is not an exact science, though is often treated as such by those that do not understand the principles of the calculations.



Storage volumes for Burnage CC against varying discharge rates

m3 storage

Design discharge rate= 5.0





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Project Burnage CC	By	Checked	Reviewed
Title 1 in 100 yr + 45% CC			

Data:-

FSR Hydrology:-

Location = Burnage CC

M5-60 (mm) = 18

Soil index = 0.45

Return period = 100

UCWI = 88.6

Grid reference = SJ8692

r = 0.37

SAAR (mm/yr) = 825

WRAP = 4

Climate change = 45

Clayey, or loamy over clayey soils with an impermeable layer at shallow depth.

Runoff factor (RF) = 61.0, 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 = 7482 m²

Total area (TA) = 9818 m²

Mean pump disch. rate = 5.000 l/s

Additional flow = 0.00 l/s

Pervious area = 2336 m²

Equiv area = 5989 m² (TA x RF).

Areal reduction factor = 1.000

Climate change factor = 45

Calculated data:-

Time to max = 396.0 mins

Rainfall at max = 13.22 mm/hr

Pipeline storage = 0.0 m³

Offline storage = 0.0 m³

Calculated storage volume = 395.1 m³

Allowed discharge rate = 5.000 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 = 394.9 m³

Allowed discharge rate = 5.000 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	50318.7	1125	397.6	400 x 600	2195.2	500 x 500	1580.5
150	22363.9	1200	349.4	600 x 900	955.8	500 x 750	1053.7
225	9939.5	1275	309.5	800 x 1200	537.6	500 x 1000	790.3
300	5591.0	1350	276.1			750 x 1000	526.8
375	3578.2	1425	247.8			750 x 1200	439.0
450	2484.9	1500	223.6			750 x 1500	351.2
525	1825.6	1575	202.8			1000 x 1000	395.1
600	1397.7	1650	184.8			1000 x 1200	329.3
675	1104.4	1725	169.1			1000 x 1500	263.4
750	894.6	1800	155.3			1000 x 1800	219.5
825	739.3	1875	143.1			1000 x 2000	197.6
900	621.2	1950	132.3			1500 x 1500	175.6
975	529.3	2025	122.7			1500 x 1800	146.3
1050	456.4	2100	114.1			1500 x 2000	131.7



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Data:-

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Project	Burnage CC
Title	1 in 100 yr + 45% CC

Time (mins)	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)
10	152.0	149.405	3.000	146.405
20	106.0	207.184	6.000	201.184
30	83.0	243.460	9.000	234.460
40	69.0	270.384	12.000	258.384
50	59.0	291.949	15.000	276.949
60	53.0	310.013	18.000	292.013
70	47.0	325.595	21.000	304.595
80	43.0	339.318	24.000	315.318
90	40.0	351.590	27.000	324.590
100	37.0	362.695	30.000	332.695
110	35.0	372.840	33.000	339.840
120	32.0	382.177	36.000	346.177
130	31.0	390.826	39.000	351.826
140	29.0	398.880	42.000	356.880
150	28.0	406.415	45.000	361.415
160	26.0	413.491	48.000	365.491
170	25.0	420.159	51.000	369.159
180	24.0	426.461	54.000	372.461
190	23.0	432.434	57.000	375.434
200	22.0	438.108	60.000	378.108
210	22.0	443.509	63.000	380.509
220	21.0	448.661	66.000	382.661
230	20.0	453.584	69.000	384.584
240	19.0	458.295	72.000	386.295
250	19.0	462.810	75.000	387.810
260	18.0	467.143	78.000	389.143
270	18.0	471.306	81.000	390.306
280	17.0	475.311	84.000	391.311
290	17.0	479.168	87.000	392.168
300	16.0	482.885	90.000	392.885
310	16.0	486.472	93.000	393.472
320	16.0	489.935	96.000	393.935
330	15.0	493.282	99.000	394.282
340	15.0	496.518	102.000	394.518
350	15.0	499.651	105.000	394.651
360	14.0	502.684	108.000	394.684
370	14.0	505.913	111.000	394.913
380	14.0	509.049	114.000	395.049
390	13.0	512.118	117.000	395.118
400	13.0	515.121	120.000	395.121
410	13.0	518.063	123.000	395.063
420	13.0	520.946	126.000	394.946
430	12.0	523.772	129.000	394.772
440	12.0	526.544	132.000	394.544
450	12.0	529.264	135.000	394.264
460	12.0	531.934	138.000	393.934
470	12.0	534.556	141.000	393.556
480	11.0	537.132	144.000	393.132
490	11.0	539.664	147.000	392.664
500	11.0	542.153	150.000	392.153
510	11.0	544.602	153.000	391.602
520	11.0	547.010	156.000	391.010
530	11.0	549.380	159.000	390.380
540	10.0	551.714	162.000	389.714
550	10.0	554.011	165.000	389.011
560	10.0	556.274	168.000	388.274
570	10.0	558.504	171.000	387.504
580	10.0	560.702	174.000	386.702
590	10.0	562.868	177.000	385.868
600	10.0	565.003	180.000	385.003

Storage volume (m³) = 395.1 m³



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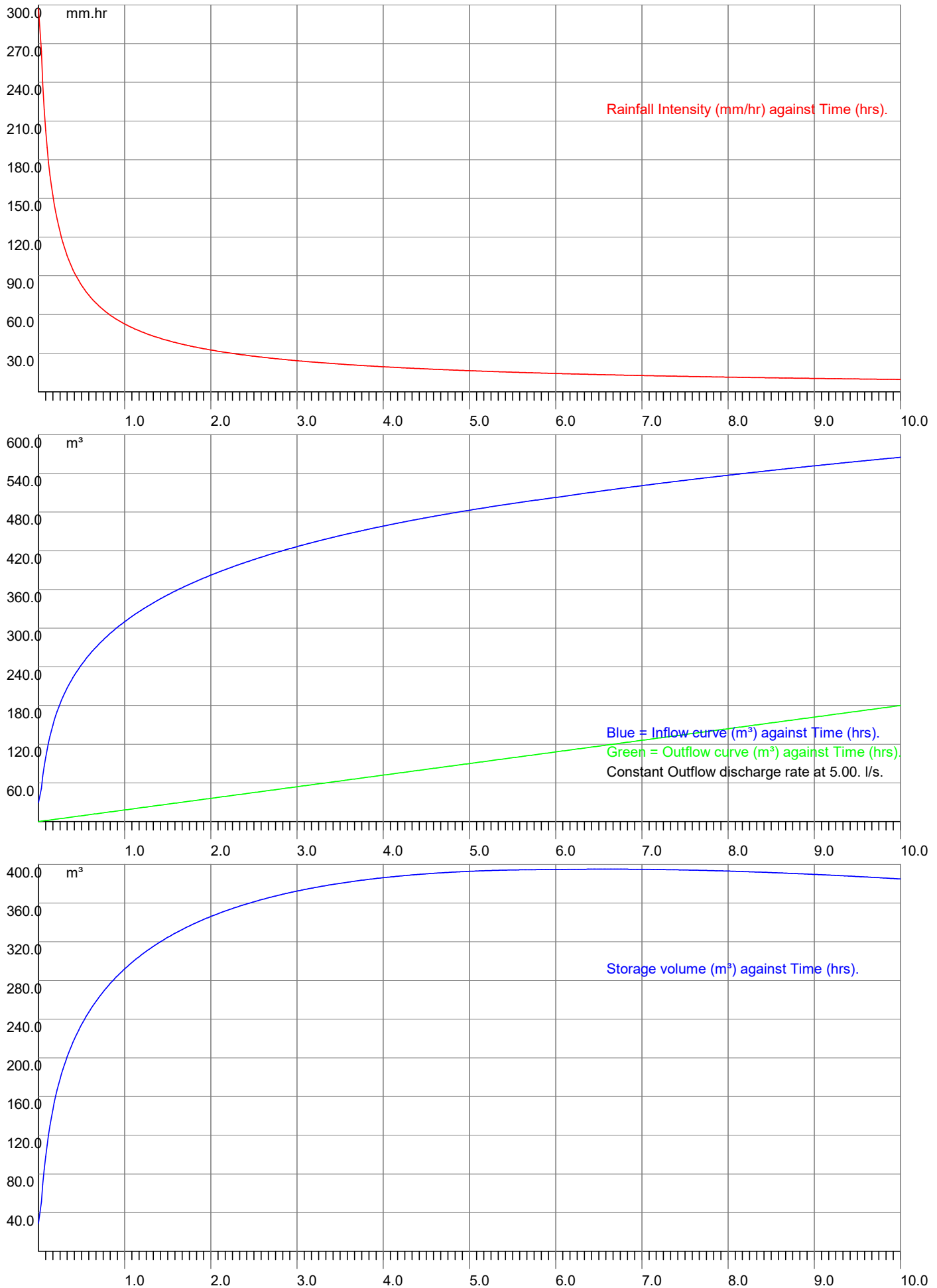
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Project	Burnage CC
Title	1 in 100 yr + 45% CC





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				Sheet no. 4		
				Date 05/12/24		
Project Burnage CC				By	Checked	Reviewed
Title 1 in 100 yr + 45% 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?

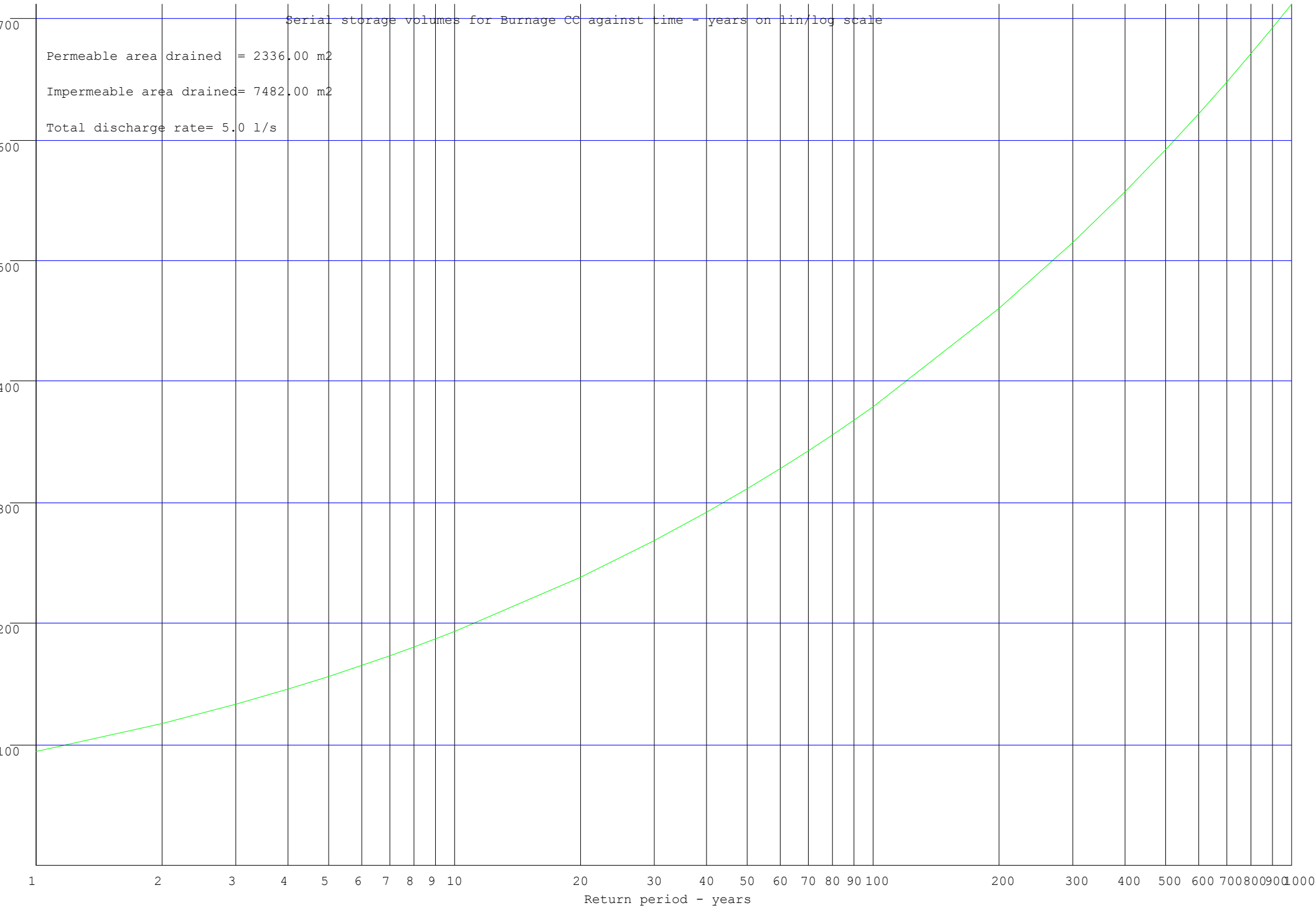
The rainfall characteristics for each method are very different.

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 outflow volume is constant throughout the process at the specified discharge rate.

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. The outflow volume varies with the hydraulic head on the control device using flow equations provided by the control manufacturer. This is a far more accurate method than the peak flow method and often results in bigger storage volumes.

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.

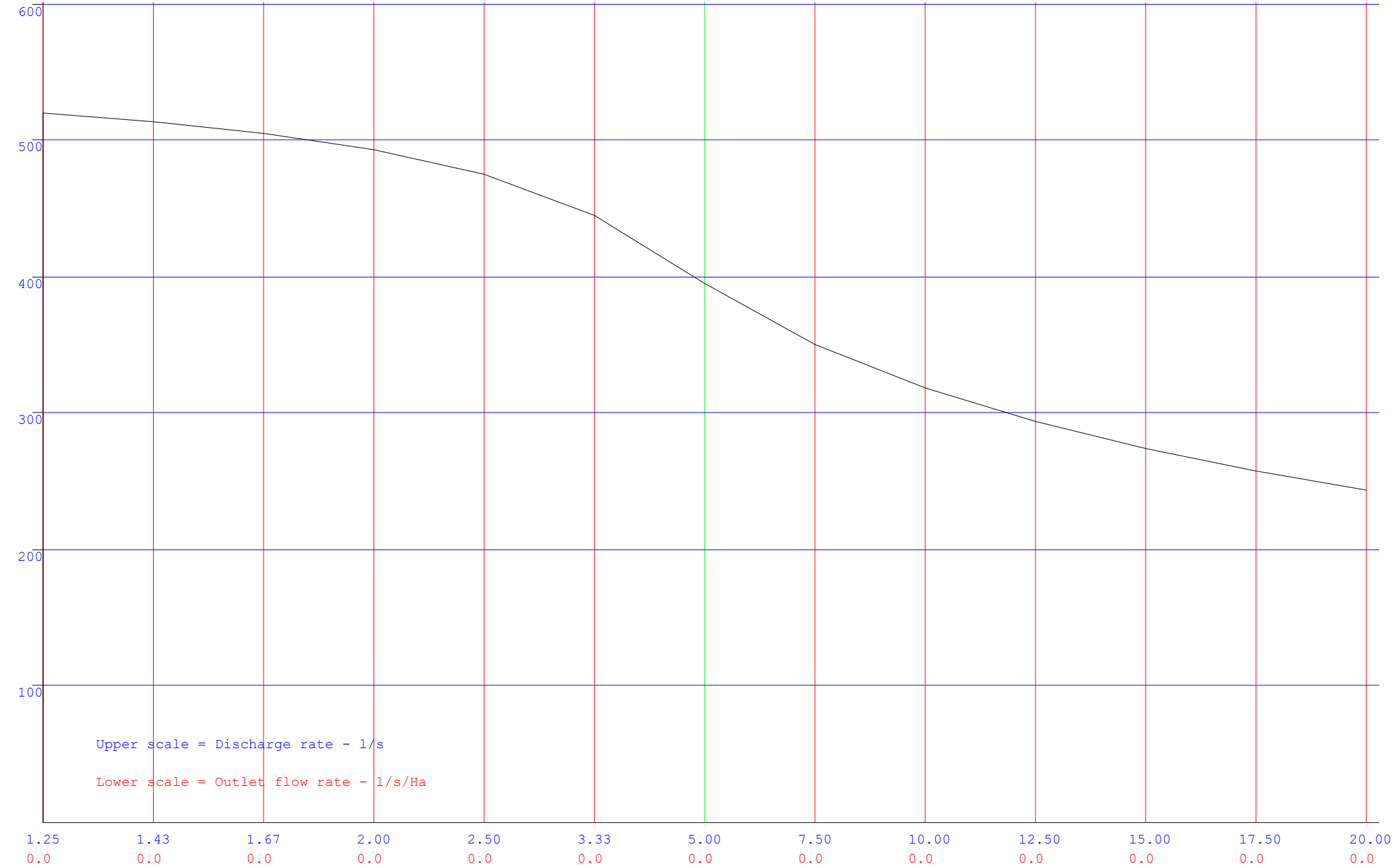
m3 storage



Storage volumes for Burnage CC against varying discharge rates

m3 storage

Design discharge rate= 5.0



Appendix F – Maintenance Plan

MAINTENANCE PLAN FOR SURFACE WATER SuDS

OPERATION AND MAINTENANCE ACTIVITY

There are likely to be three categories of maintenance activities:

1. Regular maintenance (including inspections and monitoring).
2. Occasional maintenance.
3. Remedial maintenance.

Regular maintenance consists of basic tasks done on a frequent and predictable schedule, including, inspections of silt traps and litter and debris removal. Typically, this would be once a year or when required following construction and maintenance activities are undertaken.

Occasional maintenance comprises tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example). This would generally be as indicated following the inspection and monitoring.

Remedial maintenance comprises intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict. Remedial maintenance items can comprise items such as:

- Inlet/outlet repairs
- Replacement of damaged/blocked filter fabrics
- Construction stage sediment removal (although this activity should have been undertaken before the maintenance contract)
- System rehabilitation immediately following a pollution event.

Typical routine inspection will indicate when occasional or remedial maintenance activities are required, and/or when water quality requires investigation include:

- Are inlets or outlets blocked?
- Does any part of the system appear to be leaking?
- Is there evidence of sediment build-up?
- Is there evidence of ponding above an infiltration surface?
- Is there any evidence of structural damage that requires repair?

Inspections of the construction of a SuDS scheme by the building inspector (or a suitably experienced installer) pre-handover is vital to ensure that the system has been constructed correctly and that design assumptions and criteria are not invalidated, for example, by construction methods, by changes made on site or by variations in ground conditions. Inspections should be undertaken through the construction as necessary but as a minimum would generally be expected to include the following:

1. Pre-excavation inspection to ensure that construction runoff is being adequately dealt with on site and will not cause clogging of the drainage system.
2. Inspections of excavations for the construction.
3. Inspections during laying of any pipework.

4. Inspections and testing during the placing of earthworks materials or filter materials.
5. Final inspection before handover to client.

When construction is completed, the inspector should provide a validation report that discusses the inspections, the reasons for any variations made to the design, any identified non-compliances and how they were rectified.

The scope of the monitoring will be site-specific and depends on the sensitivity of the design and the consequences of the permeable pavement not performing as expected.

It is recommended that an annual maintenance report and record should be prepared by the maintenance contractor which should be retained with the owner's manual. The report should provide the following information:

- observations resulting from inspections
- maintenance and operation activities undertaken during the year
- recommendations for inspection and maintenance programme for the following year.

To ensure long-term effectiveness, the silt that accumulates on the playing surface should be removed periodically.

Silt and leaf accumulation will typically be rapid for the entire construction period including time required for the building, turfing and landscaping. Once a development is completed and all vegetation is well-established, silt mobility and accumulation is likely to drop significantly.

REMEDIAL MAINTENANCE

There will come a time with most surfaces when a major overhaul of the system is required to remove clogged drains, geotextiles, gravel etc. This will typically be between 10 and 25 years, depending on use and the sediment load. The layout of the development should allow for vehicle access to undertake this work and consider the need for the overhaul without causing major disruption. For example, the use of trapped gullies and inspection chambers will collect the majority of the sediment before it enters the drainage system extending the period between the major overhauls.

Sustainable Drainage Systems	Inspection for litters, clogging, weeds, and water puddles	Immediately before handover to owner, then Monthly and 48 hours after heavy rainfall.
	Sweeping of dead leaves and grass clippings, vacuum cleaning of litters and weed removal from channels and gullies.	Vacuum clean about twice a year and three surface sweeps a year (end of winter, mid-summer and after Autumn leaf fall).

	Permeable pavement reconstruction (Relaying)	As required and about every 15 to 25 years depending upon use. Some materials will still be acceptable for re-use.
	Flow Control	Immediately before handover to owner, then Monthly and 48 hours after heavy rainfall.
	Pipework (including oversized pipes)	Inspect if operational problems are indicated.

INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS

- Inlets and outlets structures may be surface structures or conveyance pipes with guards or headwalls. They must be free from obstruction at all times.
- SuDS flow control structures can be protected orifices, slots weirs or other controls at or near the surface to be accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- Inspection Chambers and rodding eyes are used on bends or where pipes come together and allow cleaning of the system if necessary. They should be designed out of the system where possible.

Regular Maintenance	Frequency
Inlets, outlets, and surface control structures	
Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Strim vegetation 1m min. surround to structures and keep hard aprons free from silt and debris.	Monthly
Inspection chambers and below ground control chambers	
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt.	Annually
Undertake inspection after leaf fall in autumn.	
Occasional Maintenance	Frequency
Check topsoil levels are 20mm above edges of linear drains and chambers to avoid mower damage.	As necessary
Remedial Work	Frequency
Repair physical damage if necessary.	As required