BASEMENT IMPACT ASSESSMENT & SUDS REPORT

FOR 47 SWEETCROFT LANE, HILLINGDON, UB10 9LE

DOCUMENT NO: C3407-R1-REV-C

PREPARED BY

Nimbus
ENGINEERING CONSULTANTS

Contents

APPENDICES

1. SITE DETAILS

Site Name	47 Sweetcroft Lane
Site Address	47 Sweetcroft Lane, Hillingdon, UB10 9LE
Purpose of Development	Residential
Existing Land Use	Brownfield
County	Greater London
Country	England
Local Planning Authority	London Borough of Hillingdon

1.1 Development Proposals

A set of drawings showing the existing and proposed site layouts and floor plans are included in Appendix A. These show that the proposals involve a basement and a three storey, new build house consisting of 6 bedrooms.

1.2 Geology of The Area

According to the British Geological Survey, the superficial deposits at the site are unknown, as shown in Figure 1, below. The bedrock at the area is of the London Clay Formation, shown in Figure 2, below.

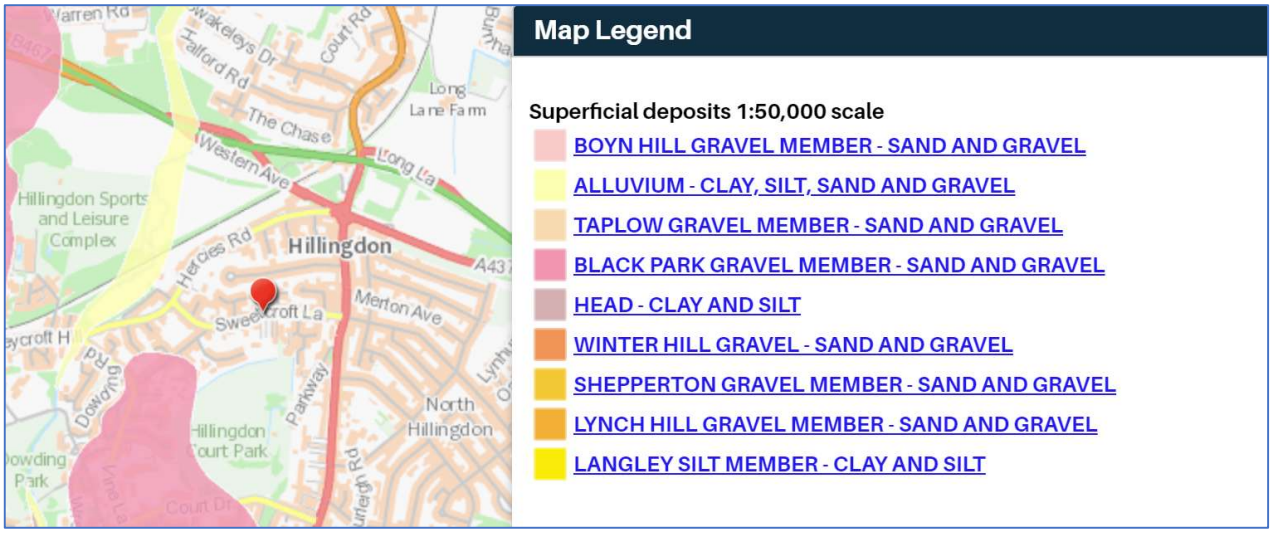


Figure 1- Superficial deposits at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2024)).

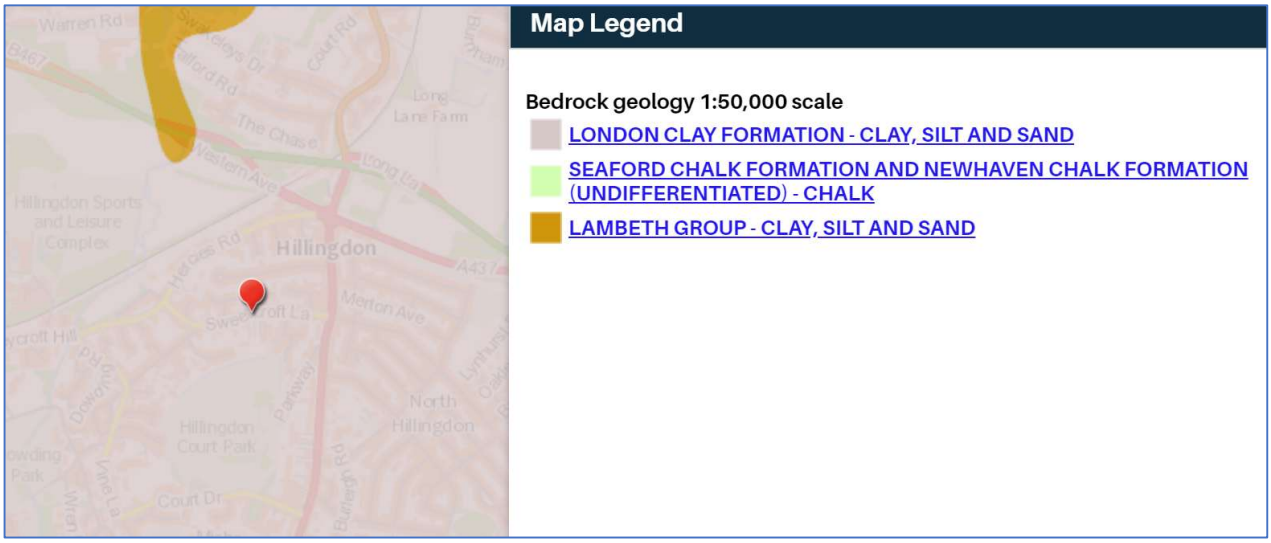


Figure 2 - Bedrock at the site. (Source: British Geological Society Website (contains British Geological Survey materials © NERC2024)).

Historic boreholes within the vicinity of the site were consulted in order to determine groundwater levels within the vicinity of the site. The location of these boreholes can be found in figure 3 below, and these boreholes can be found in Appendix B.

Figure 3 - Historic Boreholes at the site. (Source: British Geological Society Website (Contains British Geological Survey materials © URKI [2024]. Base mapping is provided by ESRI)).

The results of these historic boreholes show that although groundwater was encountered, in some of these boreholes it is below the proposed basement level and the Groundwater vulnerability MAGIC maps from DEFRA shown below, also show the site to be in an area of unproductive strata.

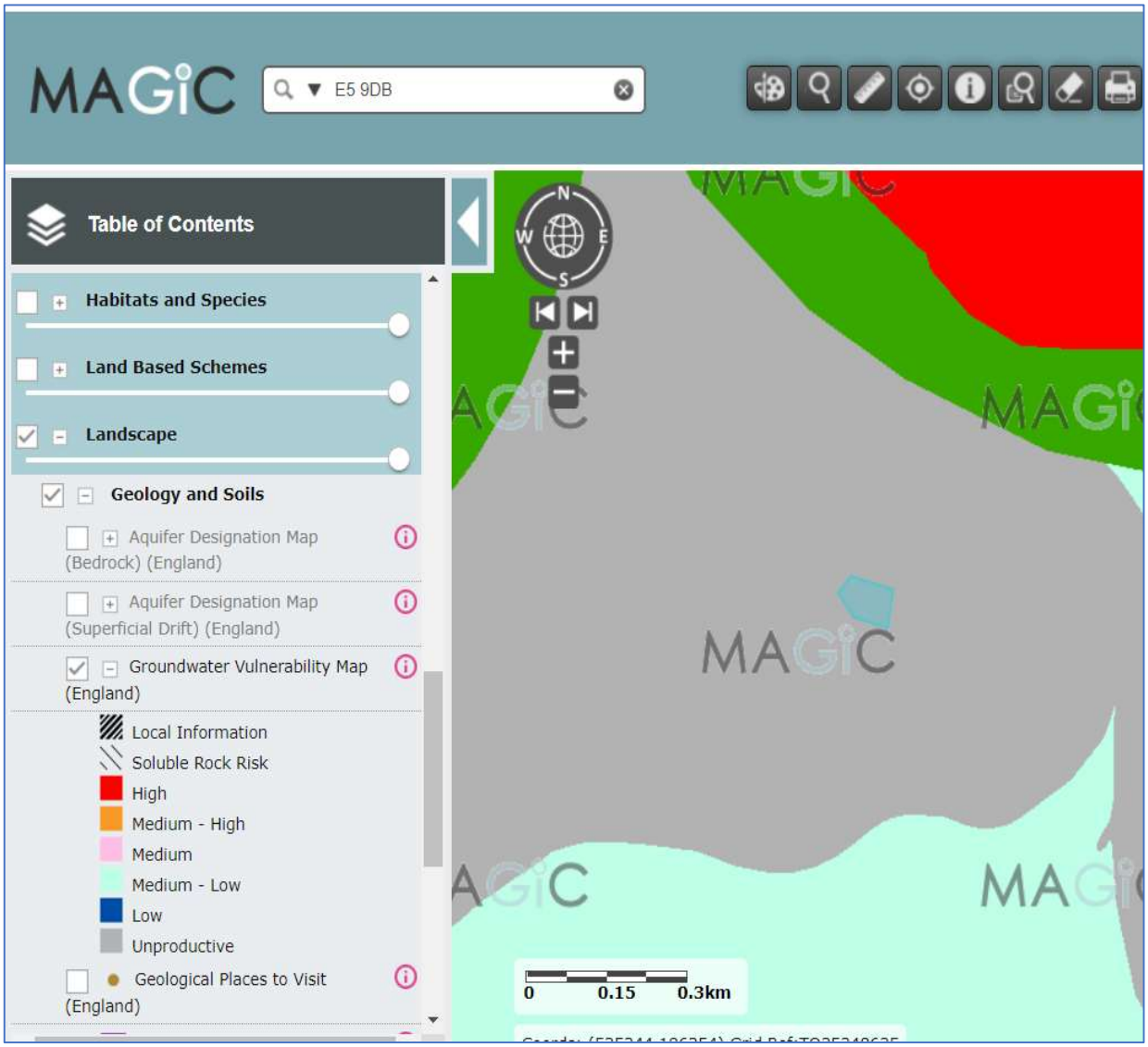


Figure 4 – Groundwater Vulnerability Map – Magic Maps (DEFRA)

2. FLOOD RISK ASSESSMENT

The possible causes of flooding set out in NPPF's technical guidance are considered in this section in relation to the flood risk to the site itself and the effects of the development of the site on flood risk elsewhere.

2.1 Fluvial or Tidal Flooding

The Environment Agency's Flood Map for Planning (Rivers and Sea), shown below, indicates the site is in Flood Zone 1, and not at risk of flooding from rivers or the sea.

The site is also not at risk of tidal flooding, this can also be confirmed by the Environment Agency's Flood map, below.

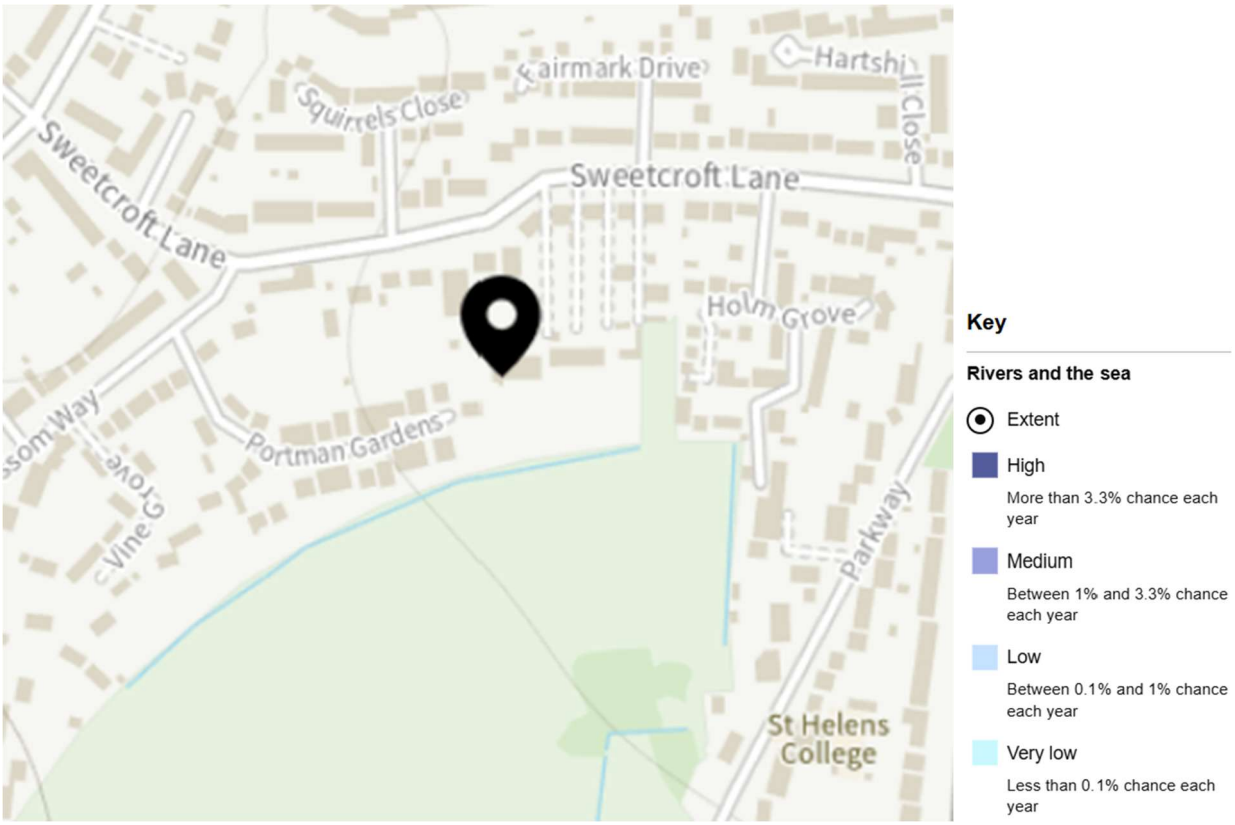


Figure 5 – Environment Agency Flood Map (from Rivers and the Sea) for the proposed development

2.2 Flooding from Land (Overland Flow)

The proposed development site is not at risk of surface water flooding, this can be confirmed by the Environment Agency's Flood map shown below, however there is a low risk of surface water flooding on the path out of the site, however this is caused by ponding in natural low lying areas and is unlikely to be less than 300mm in depth, therefore residents need to ensure that care is taken during access and egress to their building during an extreme surface water flooding event.

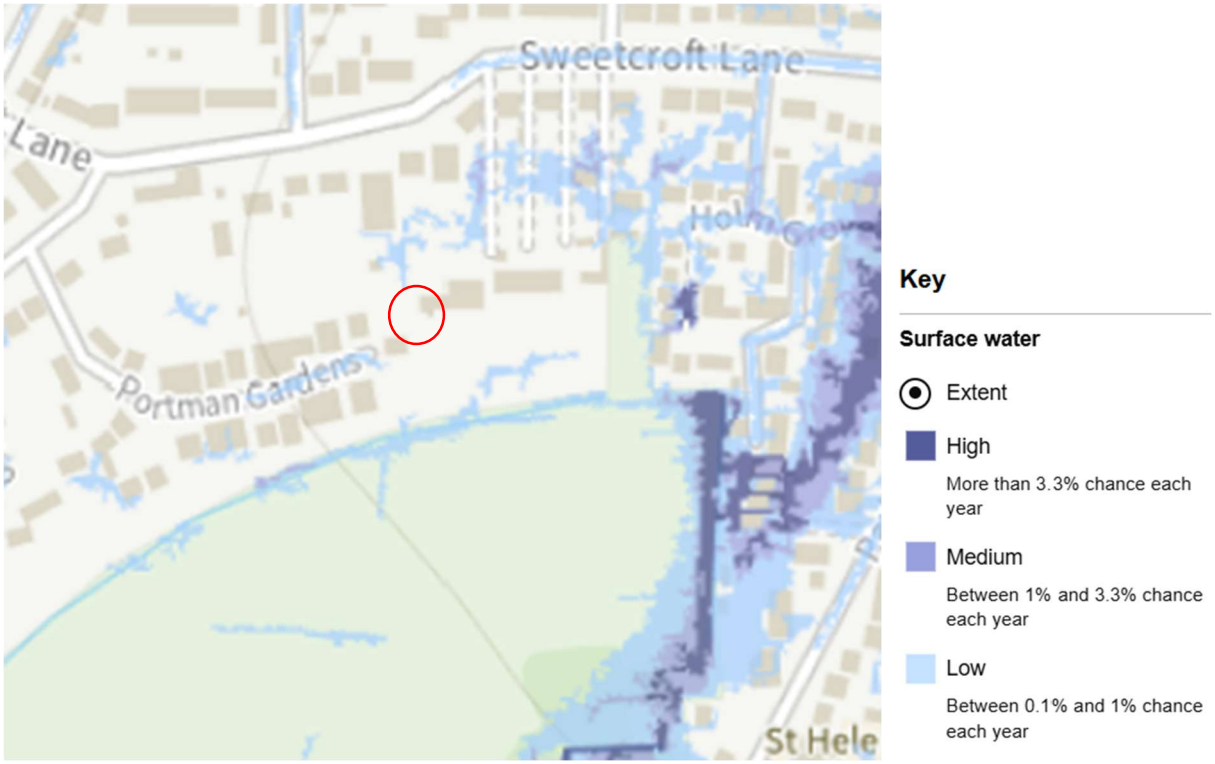


Figure 6 – Environment Agency Flood Map (from surface water) for the proposed development.

2.3 Flooding from Groundwater

We have consulted historic boreholes at the site and have also consulted the DEFRA Magic Maps and both show that the groundwater is very low at this site and there is no risk of groundwater flooding.

Furthermore, we have consulted the West London, Strategic Flood Risk Assessment's Groundwater flooding map, as shown in figure 7 overleaf, and this shows the proposed development site to be in an area with a less than 25% susceptibility to groundwater flooding.

However the client will undertake long term groundwater monitoring to ensure that they are aware of any over pumping that may be required during the construction process.

The client will also provide a waterproofing membrane to ensure that any perched water has been dealt with and therefore the basement will be waterproof and will be designed as a watertight element. It should be noted that as the groundwater levels will be well below the basement level, that the basement structure will not be adversely affected, and other than the waterproofing membrane, no other mitigation measures are required. As it is likely that the soils at likely foundation/basement depth will deteriorate rapidly in the prolonged presence of water, although there will be no groundwater ingress, other than the unlikely possibility of perched water, a waterproof membrane such as delta membrane or equivalent has been proposed.

Consequently, a blinding layer of lean-mix concrete will be applied to all excavations if continuous working cannot be achieved. Fixtures and fittings for the basement will be located to ensure that if any flood water does enter the building, the impact of floodwater on the property will be minimal.

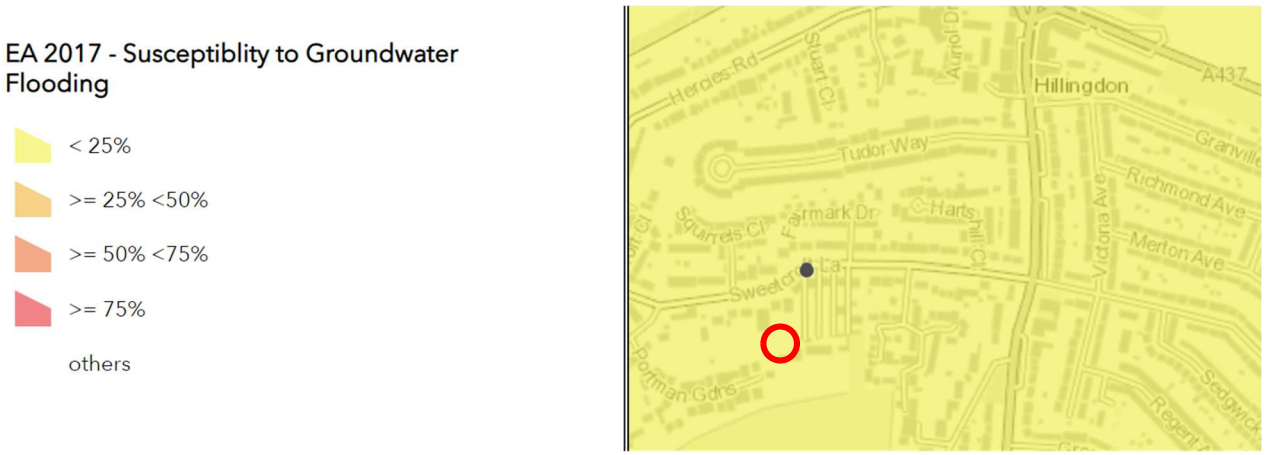


Figure 7 – Groundwater Flood Risk Map – Extracted from the from West London Strategic Flood Risk Assessment

2.4 Flooding from Sewers

There has been no history of sewer flooding at the site, or in the vicinity, this is confirmed by the SFRA report.

2.5 Flooding from Reservoirs, Canals, or Other Artificial Sources

The Environment Agency's Flood map shown overleaf, shows the site not to be at risk of reservoir flooding.

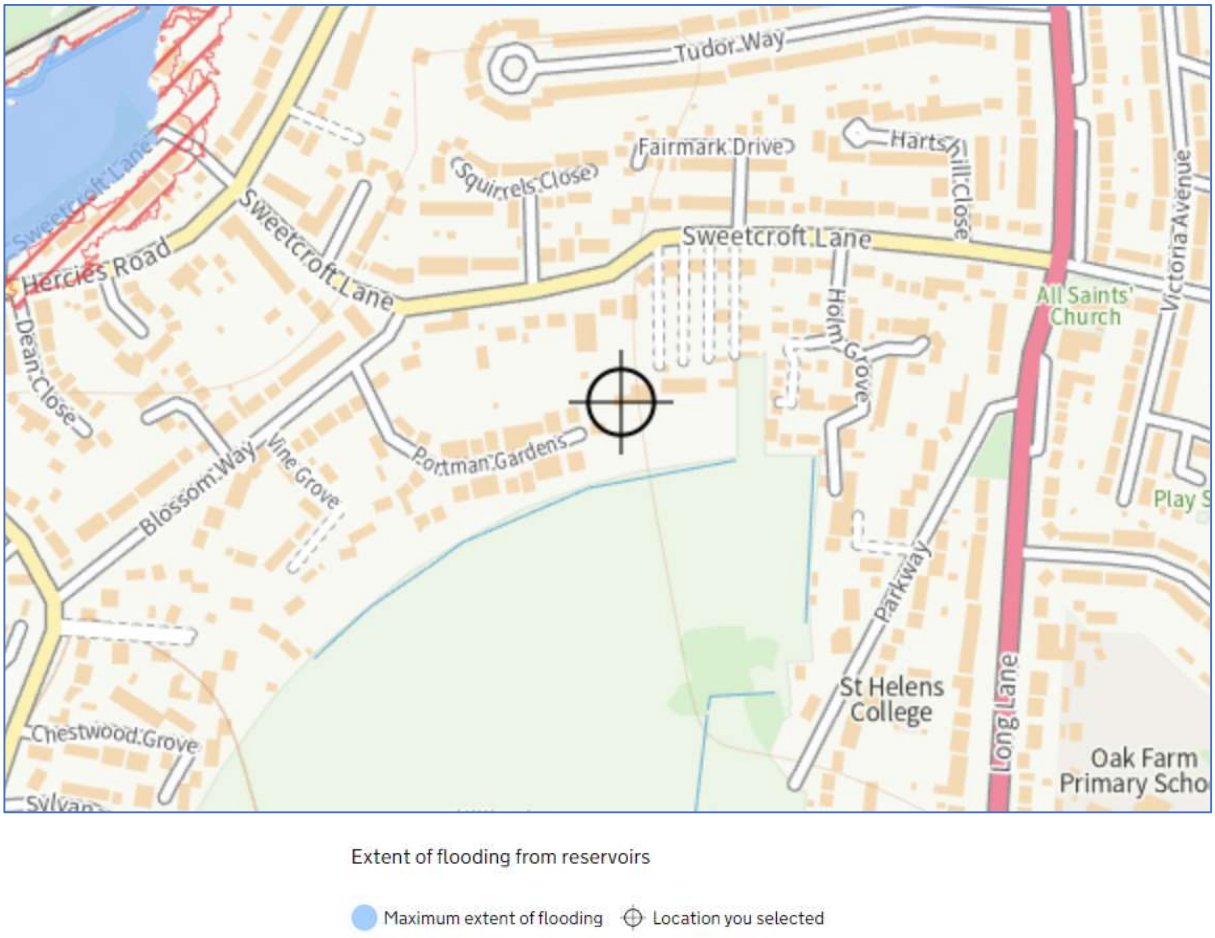


Figure 8 – Environment Agency Flood Map (from reservoirs) for the proposed development

3. SUSTAINABLE URBAN DRAINAGE SYSTEMS

Surface water arising from a developed site should, as far as is 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.

Reducing the rate of surface water discharge from urban sites is one of the most effective ways of reducing and managing flood risk.

Traditional piped surface water systems work by removing surface water from our developments as quickly as possible, however this can cause various adverse impacts:

- Increased downstream flooding, and sudden rises in flow rates and water levels in local water courses.

- Reduction in groundwater levels and dry weather flows in watercourses.

- Reduce amenity and adversely affect biodiversity due to the surface water run-off containing contaminants such as oil, organic matter and toxic materials

SuDS are defined as a sequence of management principles and control structures designed to drain surface water in a more sustainable fashion than conventional piped drainage techniques. SuDS should utilise the natural landscape of an area which as well as slowing down the rate of runoff provides a number of environmental, ecological and social benefits.

These include:

- Protection and enhancement of water quality. As well as providing on-site attenuation, SuDS treat the water, resulting in an improved quality of water leaving the site. This is achieved when the water passes through fine soils and the roots of specially selected plants. Pollutants washed off the hard landscaping by rainfall will be safely removed before the water reaches the natural receiving water course.

- A sympathetic approach to the environmental setting by providing opportunities to create habitats for flora and fauna in urban watercourses and open spaces.

- Meeting the amenity and social needs of the local community and residents in the creation of attractive green spaces.

The various types of SuDS include:

Permeable paving	
Soakaways;	
Swales and basins;	
Bioretention/ rain gardens;	
Green roofs and rainwater re-use;	

Preferably a combination of these techniques should be used as part of the surface water management train, and it is important for all stakeholders, such as developers, architects, landscape architects and engineers to work in order to determine a feasible solution.

The SuDS management train is shown below, and this has been followed when proposing the proposed Sustainable Urban Drainage Systems for this site.

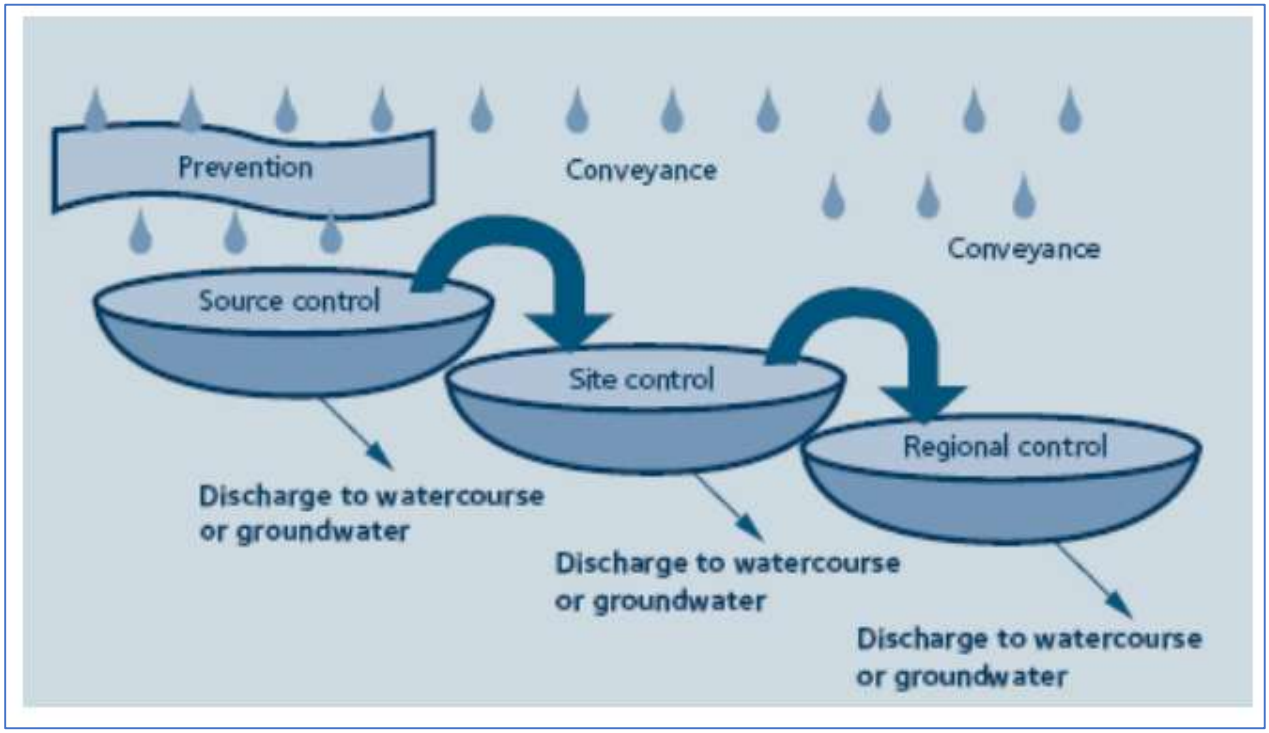


Figure 3 – SuDS Management Train

4. PROPOSED SOLUTION

The total site area is 2230m^2, and this area consists of the existing dwelling to be demolished and the landscaped areas. However the driveway will remain the same, therefore for we have calculated the existing impermeable area to be 229m^2, and the proposed impermeable areas will be 421m^2, which is the area we have used for all calculations as opposed to including the existing driveway and entrance road, which will essentially not change.

Pre and post development surface water run off calculations prior to the inclusion of SuDS have been provided in Appendix B, and for this we have included the existing driveway area for the calculations.

The underlying geology consists of clay therefore infiltration forms of SuDS will not be feasible.

Due to the roofs being sloped and not flat, green or sedum roofs are not feasible, however in order to follow the SuDS management train, two wall mounted rainwater harvesting tanks and a SuDS Pond will be provided. The proposed system can be seen in the drawings provided located in Appendix A.

The remaining surface water run off will be conveyed into a below ground attenuation tank, with the restricted discharge set to 1 l/s, in order to avoid blockages, as provided in Appendix B.

The restricted surface water run off is to be conveyed to an existing surface water manhole at the site.

Hydrograph storage calculations were carried out for a 1 in 100 year plus 45% climate change storm event, and these show that 23.2 m^3 of storage is required in the proposed crate systems. All surface water run off calculations have been provided in Appendix B.

This proposed SuDS solution is proportionate to the nature and scale of the development.

5. SuDS PROPOSALS FOR DEVELOPMENT

In accordance with the CIRIA SuDS Manual C753, the SuDS hierarchy has been considered in relation to the site-specific constraints and its surroundings. Table 1 below outlines the hierarchical approach considered for the development at 47 Sweetcroft Lane, Hillingdon, UB10 9LE.

Sustainable Drainage Proposal	Description	Constraints/Comments	Appropriate
Rainwater Use as a Resource	Use of rainwater runoff for reuse, e.g. Rainwater harvesting tanks, Blue Roofs for irrigation	Two wall mounted rainwater harvesting tanks	Yes
Rainwater Full Infiltration to Ground (Source Control)	Infiltration devices and/or soakaways. Surface water runoff stored on site and gradually percolating into receiving ground	The underlying geology consists of clay therefore infiltration will not be feasible	No
Rainwater Partial Infiltration to Ground (Source Control)	Installation of permeable/porous surfacing	All proposed hardstanding areas, will be formed of porous surfacing	Yes
Rainwater attenuation in green infrastructure features for gradual release	The onsite storage of all surface water runoff which can then be gradually conveyed to a nearby watercourse, sewer or infiltration into the ground. Forms of green infrastructure features: Green Roofs, Raingardens,	The roofs are sloped therefore sedum or green roofs are not feasible. A SuDS pond has also been proposed.	Yes

	Ponds, Swales, Detention basins, Infiltration Trenches and raingarden planters		
Rainwater discharge direct to a watercourse	All surface water runoff on site discharged at a restricted rate to a nearby watercourse	N/A	N/A
Controlled rainwater discharge to a surface water sewer or drain	All surface water runoff on site discharged at a restricted rate to a nearby surface water sewer or drain, all rainwater runoff stored in below ground attenuation features. E.g. oversized pipes or geo-cellular tanks	The surface water run off will be attenuated, in a crate system attenuation tank for a 1 in 100 year plus 45% climate change event, and released back into the surface water network at 1 l/s	Yes
Controlled rainwater discharge to a combined sewer	All surface water runoff on site discharged at a restricted rate to a nearby combined sewer all rainwater runoff stored in below ground attenuation features. E.g. oversized pipes or geo-cellular tanks	N/A	N/A

Table 1: SuDS Control Measures for Development

6. TIMESCALE AND MAINTENANCE OF WORKS

All drainage works shall be completed prior to first occupation and there shall be no adoption of any of the drainage works within the site, the managers of the site will be responsible to oversee the long-term maintenance of the drains. The following outline maintenance strategy sets out recommended timescales for maintenance of the proposed drainage works, in line with CIRIA SuDS Design Guide:

- Regular inspection will comprise the inspection and cleaning of catchment, gutters, filters and tanks to reduce the likelihood of contamination, this is recommended to be carried out every 3 to 6 months.

Maintenance schedule	Required action	Typical Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdraw devices, overflow areas, pumps, filters	Annually (and following poor performance)
	Cleaning of tank, inlets, outlets, gutters. Withdrawal devices and roof drain filters of silts and other debris	Annually (and following poor performance)
Occasional maintenance	Cleaning and/ or replacement of any filters	Three monthly (or as required)
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Table 2: Operation and maintenance requirement for RWH systems.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that re not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
	Inspect slit accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3: Operation and maintenance requirements for attenuation storage tanks

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations or clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this is the most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in six months
	Inspect slit accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 4: Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass- public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structure, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May-October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. Penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base, include max 25% of pond surface	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually

	Tidy all dead growth (scrub clearance) before start of growing season (note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay	Every 1-5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. every 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap of repair other damage	As required
	Repair/ rehabilitate inlets, outlets and overflows	As required

Table 5: Operation and maintenance requirements for ponds and wetlands.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect from surface and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then 6 monthly intervals
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Orifice plates within plastic chambers or vortex controls to be jetted from the surface after heavy rainfall events to remove any debris or silt	As required
	Empty catchpits upstream of SuDS features to ensure no debris is passed downstream	3 months or as required
Remedial actions*	In the event of a blockage, a vortex flow control can be removed from the chamber via the lifting cabled located at the access, this will be cleaned at surface level and reinstalled into its original location	As required
	In the event of a blockage, the orifice plate should be jetted from surface, and if blockage is not cleared the orifice plate can be removed by removing fixing bolts. These fixing bolts should be checked and replaced if needed.	As required
Monitoring	Following installation it is important that any extraneous materials i.e. building materials: granular backfill, in-situ pour concrete etc are removed from the unit and the new flow control chamber is fully jetted down	Upon installation
	Inspect/check chamber channel for any debris or silt build-up. Upstream chambers should be checked at the same time as these monitoring works to ensure network is operating at full capacity.	Annually

Table 6: Operation and maintenance requirements for flow control chambers

*All Remedial Works should be carried out by a competent and certified contractor, with no access to chambers or removal of parts to be undertaken by homeowners

If upstream network of flow control chamber is regularly maintained, little maintenance is required within the chamber as there are no moving parts.

7. SUMMARY AND CONCLUSIONS

The site is at a very low risk from flooding from groundwater, tidal, fluvial, surface water, sewer and reservoir flooding.

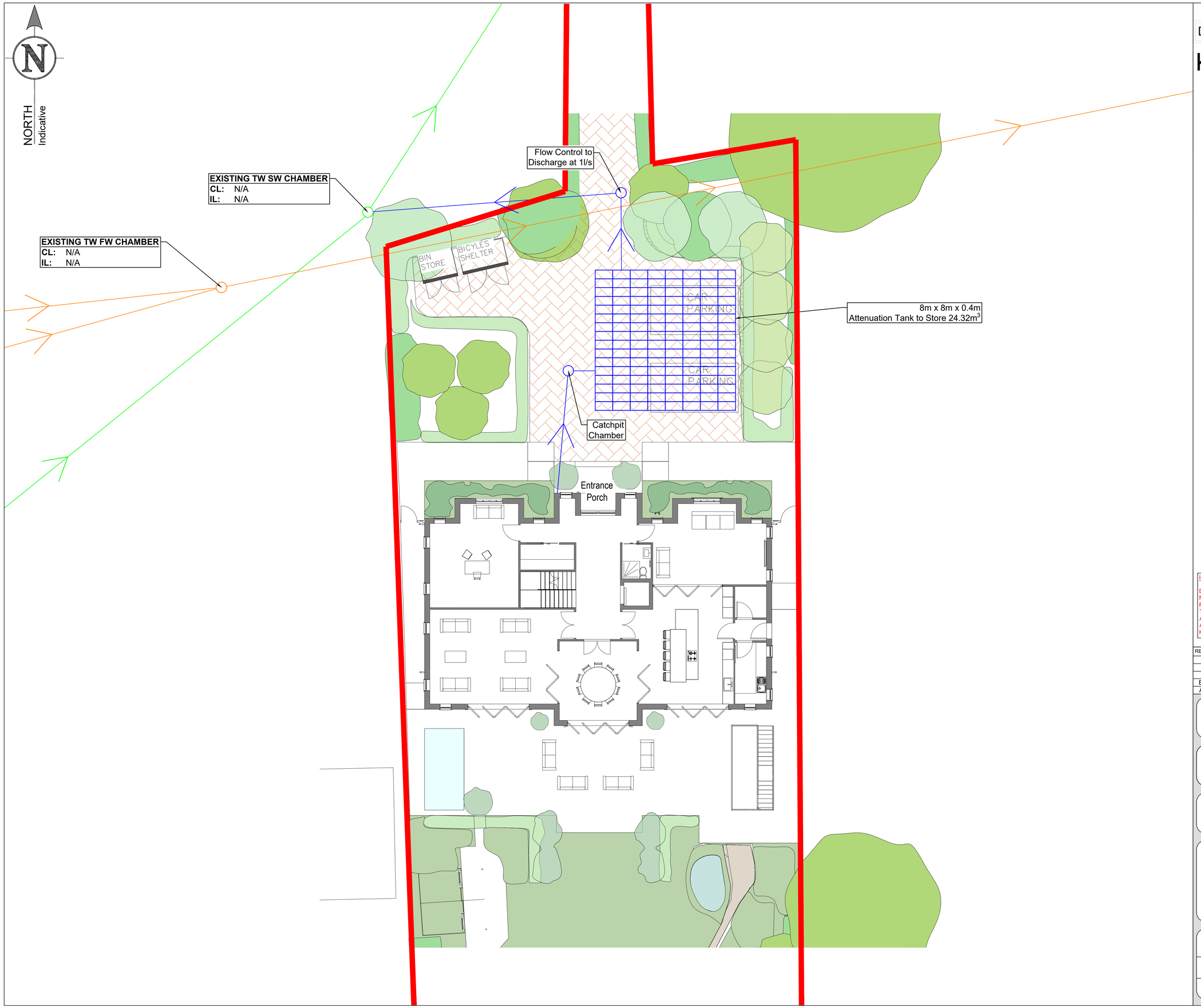
The groundwater levels are well below the proposed basement level; however the basement will still be designed as a watertight element in the unlikely event that there is any groundwater ingress from perched water.

The proposals will not impact on any known flood flow route or flood storage area.

A SuDS solution which follows the SuDS hierarchy has been proposed and the surface water run off leaving the site will be reduced to 1 l/s. The proposed solution involves:

- Two wall-mounted rainwater harvesting tanks;
- Any new hardstanding areas to be formed of porous surfacing, and;
- A SuDS Pond

APPENDIX A – DRAWINGS



DRAWING TO BE PRINTED IN COLOUR.

KEY:

- Proposed Permeable Paving
- Surface Water UPVC Pipes
- Foul Water Pipe
- Surface Water Pipe

NOT FOR CONSTRUCTION

REV	DATE	DRAWN	DESCRIPTION	CHECK	APPR.
B	06-03-25	M.HAM	Updated Layout.	S.L	S.L
A	19-02-25	M.HAM	For Information.	S.L	S.L

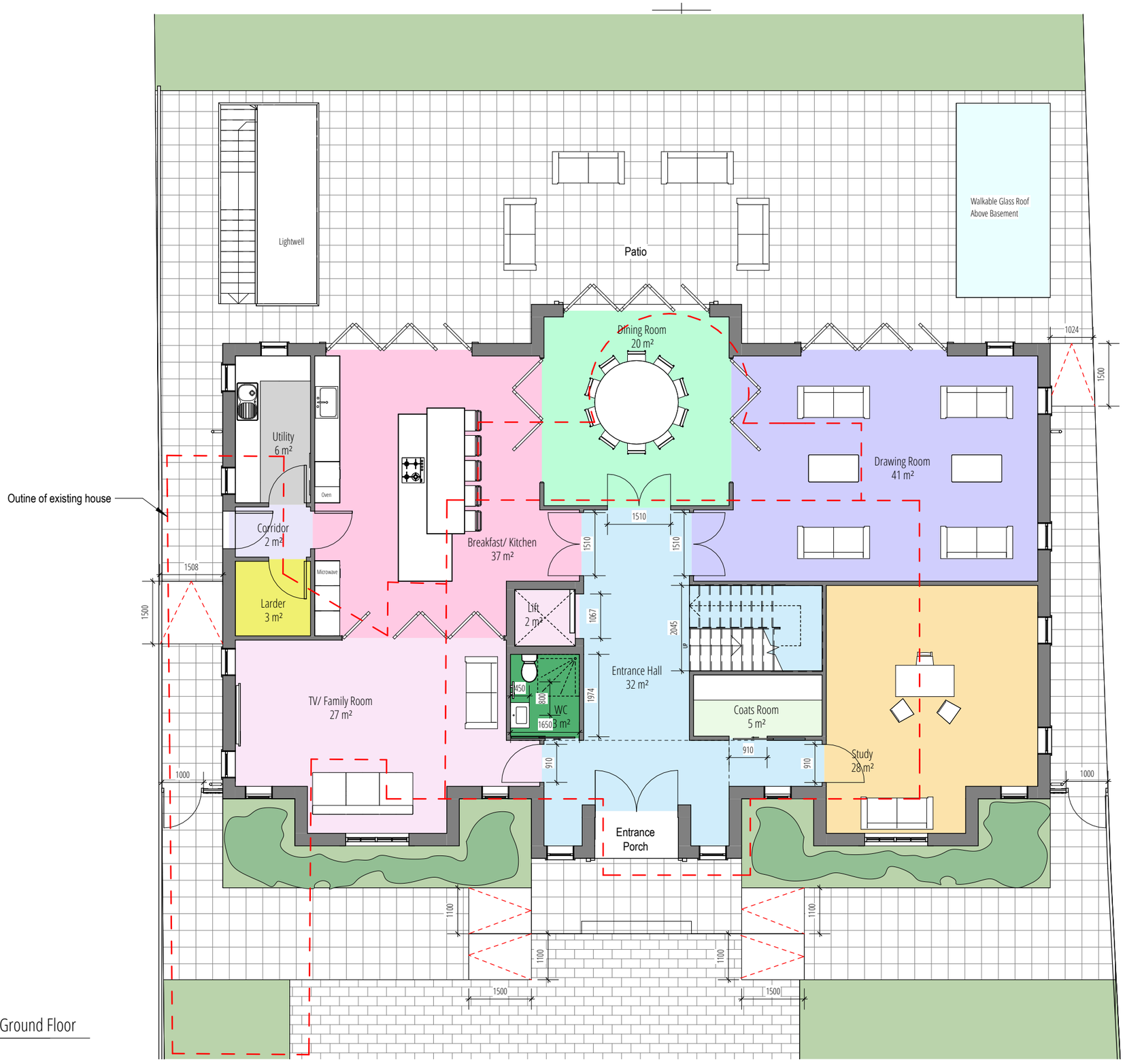
47 Sweetcroft Lane, Hillingdon, UB10 9LE

SuDS Layout & Location Plan

Kiran Textiles Group Ltd

Nimbus ENGINEERING CONSULTANTS

S.L	06-03-25	S.L	06-03-25
M.HAM	1:100	C3407-01	B
19-02-25	A1		



By Room Name Legend

- Breakfast/ Kitchen
- Coats Room
- Corridor
- Dining Room
- Drawing Room
- Entrance Hall
- Larder
- Lift
- Study
- TV/ Family Room
- Utility
- WC

Note: All ramps with 1:15 slope

1 Proposed Ground Floor
1 : 100

0m 1m 2m 3m 4m 5m
SCALE 1:100 @ A3

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MODEL REV. / SUITABILITY CODE - DESCRIPTION: A2 - Authorized and accepted for Concept work stage	DOCUMENT NO.: 21060-GAA-ZZ-00-DR-T-2002	REV. NO.: C03		

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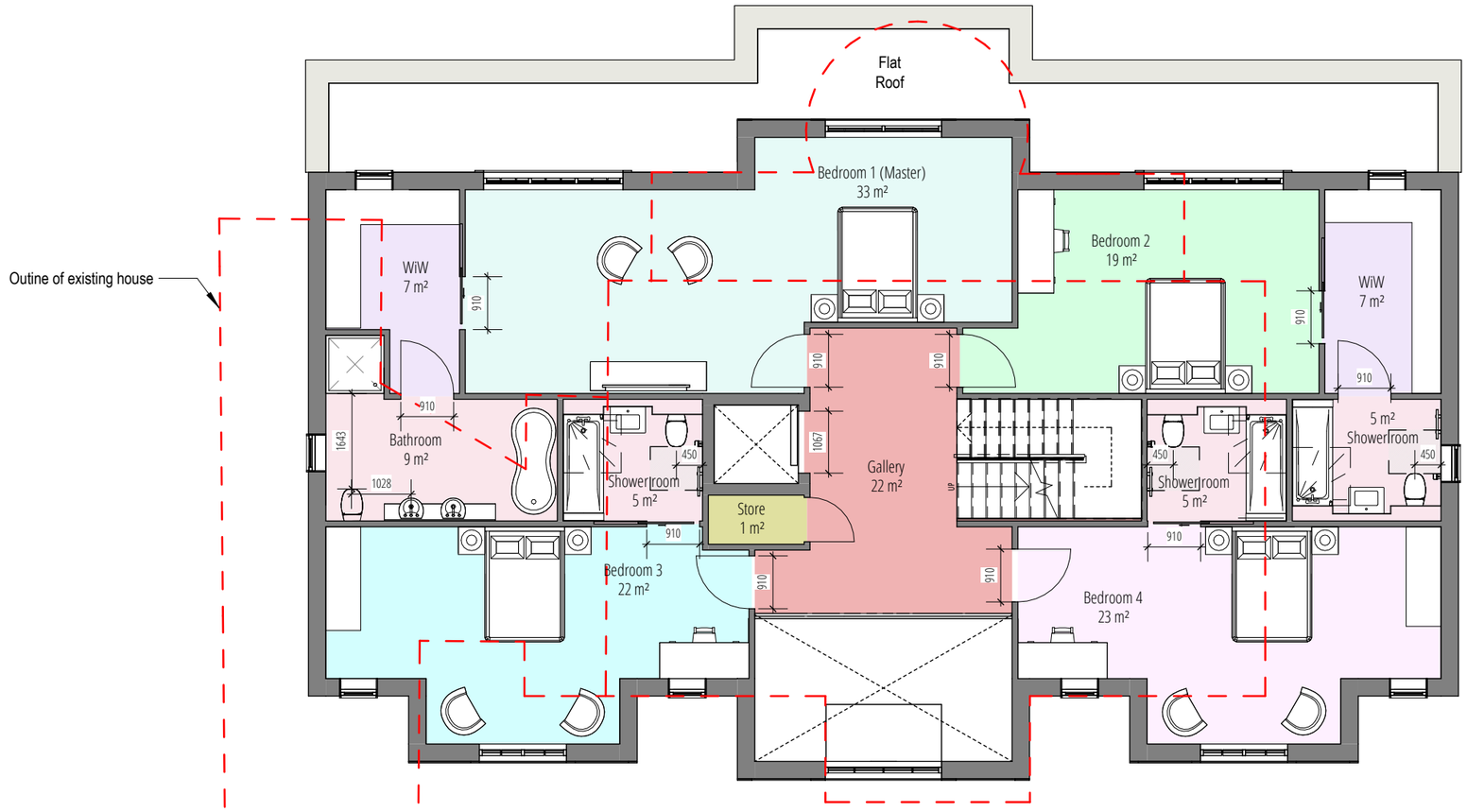

1 Proposed First Floor
1 : 100

By Room Name Legend

- Bathroom
- Bedroom 1 (Master)
- Bedroom 2
- Bedroom 3
- Bedroom 4
- Gallery
- Shower room
- Store
- WiW

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SCALE 1:100 @ A3

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MODEL REV: | SUITABILITY CODE - DESCRIPTION: A2 - Authorized and accepted for Concept work stage | DOCUMENT NO.: 21060-GAA-ZZ-01-DR-T-2003 | REV. NO.: C02

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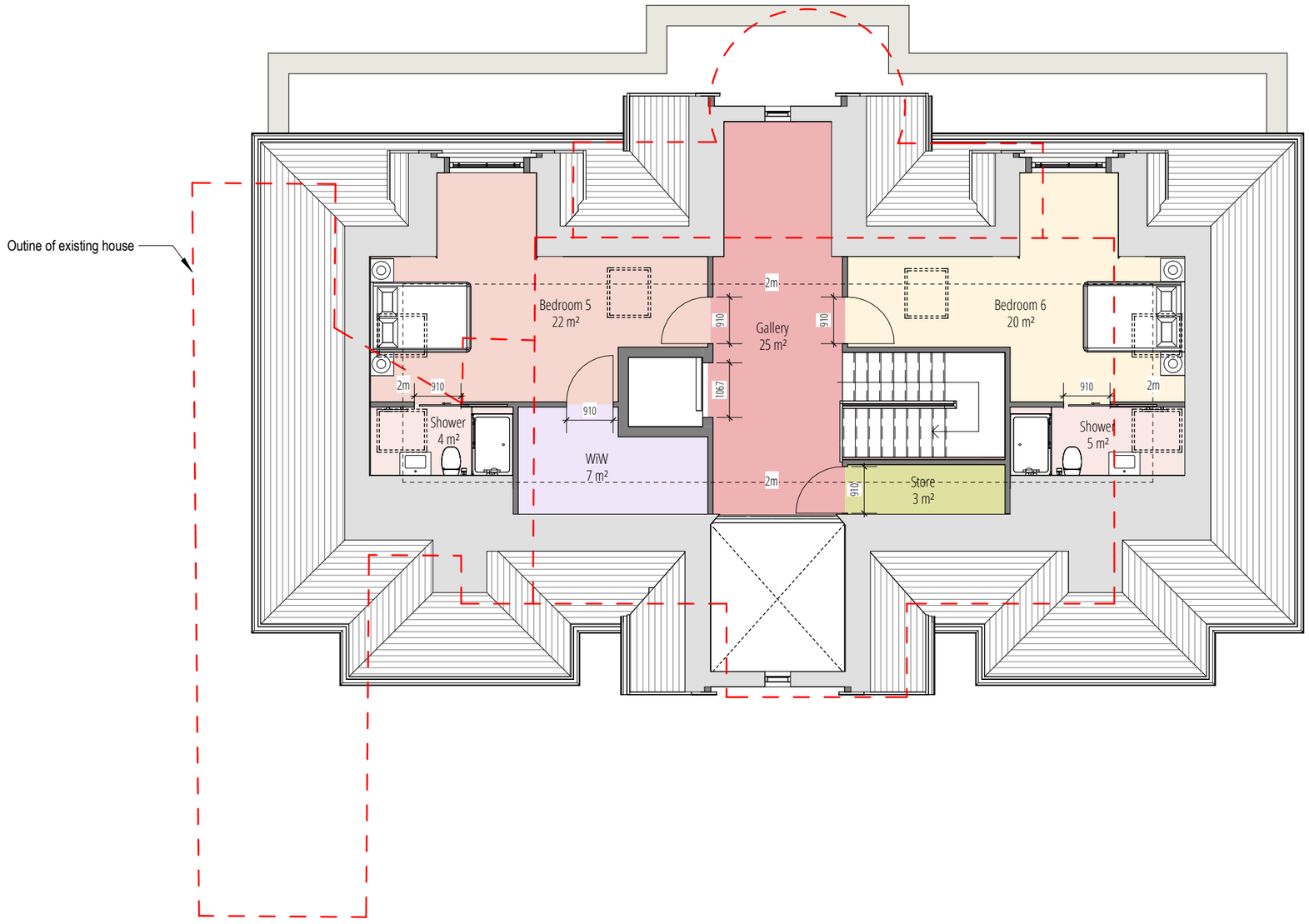

1 Proposed Second Floor
1 : 100

By Room Name Legend

- Bedroom 5
- Bedroom 6
- Gallery
- Shower
- Store
- WiW

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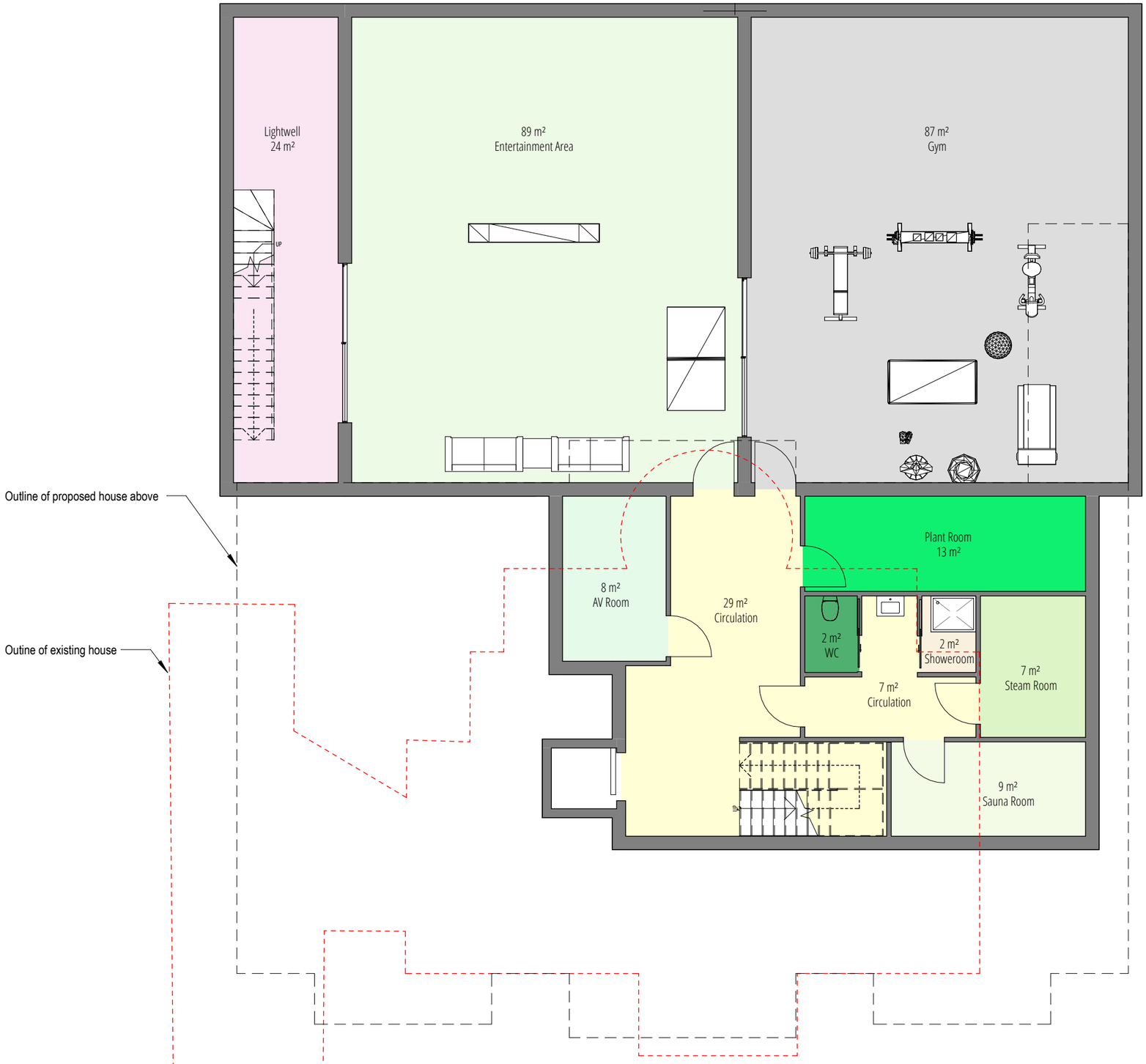

By Room Name Legend

- AV Room
- Circulation
- Entertainment Area
- Gym
- Lightwell
- Plant Room
- Sauna Room
- Showeroom
- Steam Room
- WC

1 Proposed Basement Floor

1 : 100

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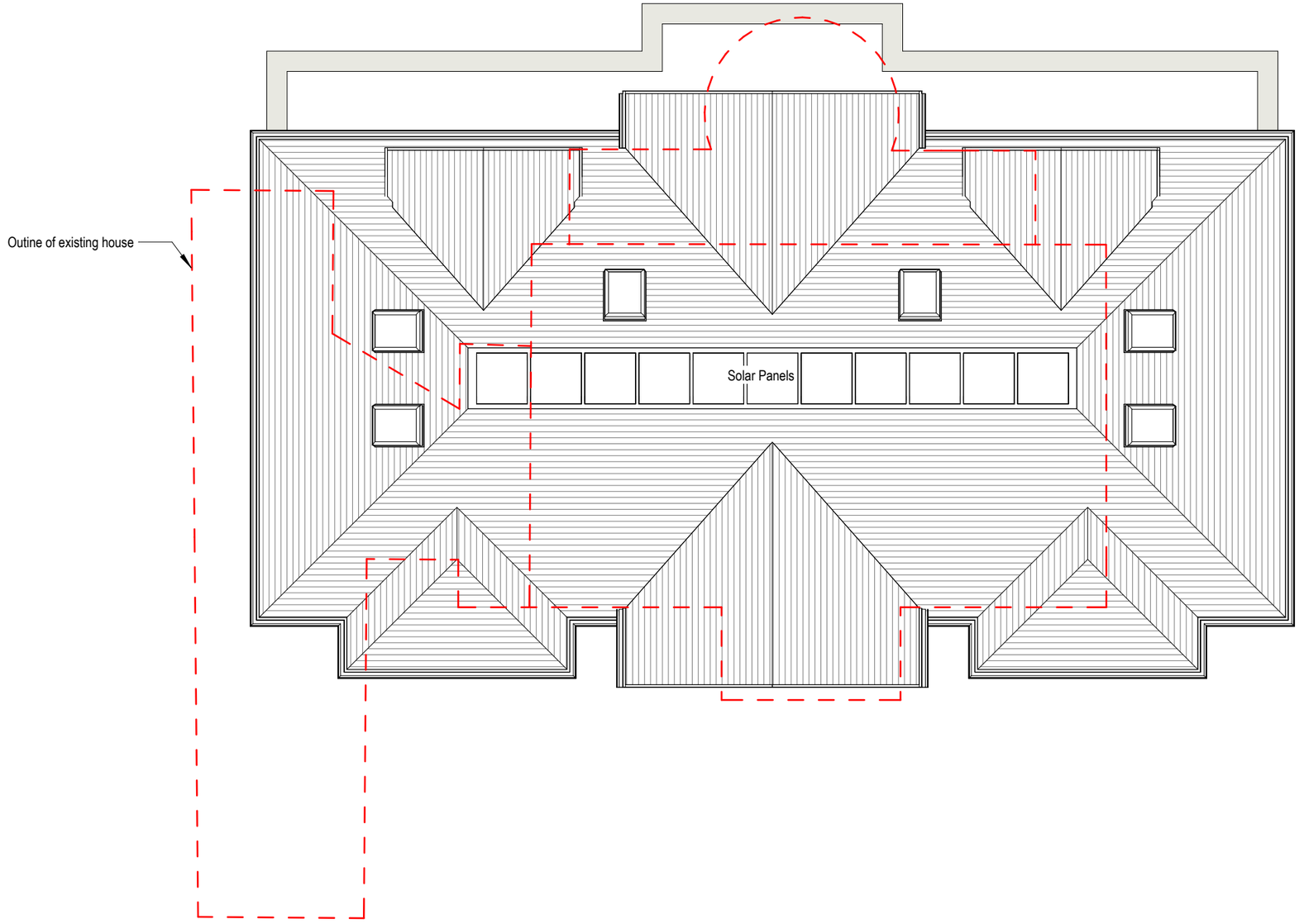

1 Proposed Roof Plan

1 : 100

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05/03/2025 15:53:23

0m 1m 2m 3m 4m 5m

SCALE 1:100 @ A3

PROJECT NAME: 47 Sweetcroft Lane UB10 9LE	PROJECT CODE: 21060	GAA PROJECT NO.: 21060	DRAWN: VT	CHECK: SW	
DRAWING TITLE: Roof Plan	DATE: 05/03/2025	SCALE: 1 : 100	REVIEWED: VT	APPROVED: AS	
MODEL REV: SUITABILITY CODE - DESCRIPTION: A2 - Authorized and accepted for Concept work stage	DOCUMENT NO.: 21060-GAA-ZZ-RF-DR-T-2005	REV. NO.: C02			

GAA DESIGNING RESIDENTIAL COMMUNITIES

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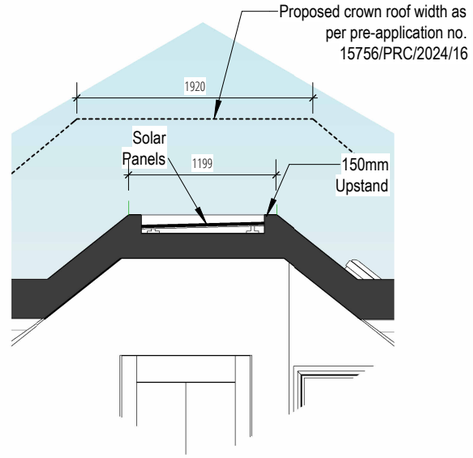
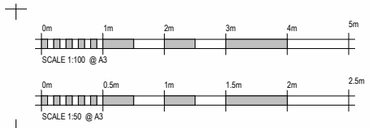
A3

1 Section AA
1 : 100



2 Section AA - Crown Roof Blowup
1 : 50



PROJECT NAME: 47 Sweetcroft Lane UB10 9LE	PROJECT CODE: 21060	GAA PROJECT NO.: 21060	DRAWN: VT	CHECK: SW	
DRAWING TITLE: Section A-A	DATE: 05/03/2025	SCALE: As indicated	REVIEWED: VT	APPROVED: AS	
MODEL REV. / SUITABILITY CODE - DESCRIPTION: A2 - Authorized and accepted for Concept work stage	DOCUMENT NO.: 21060-GAA-ZZ-XX-DR-T-2201	REV. NO.: C02			

DESIGNING RESIDENTIAL COMMUNITIES

A3

INDICATIVE GRASSWORKS SCHEDULE - TURF

GENERAL LANDSCAPE TURF

Pro Turf 3 (With Rye economy) - DLF TRIFOLIUM - or approved similar

30%	Stravinsky	- perennial ryegrass
45%	Rossinante	- strong creeping red fescue
25%	Wagner	- chewings fescue

Existing retained private driveway surface treatment

Existing retained mature laurel hedge at boundary of driveway

Existing retained private driveway surface treatment

Proposed evergreen hedge clipped & maintained at @ 3.0m

Proposed evergreen specimen Full Std large shrub offered to increase screening on boundary
Proposed Prunus Lusitanica Angustifolia @ Full Std 300-350cm 14-16cmg CG Clear stem of 1.5m

Proposed evergreen hedge clipped & maintained at @ 3.0m
Proposed Prunus laurocerasus 'Rotundifolia'

Proposed replacement boundary fence system of 1.8m treated timber closeboard

Proposed group of specimen ornamental trees as feature / focal landscape point with understory planting.
Proposed Betula albosinensis 'Fascination' @ 12-14cm Std 350-400 CG

Proposed evergreen hedge clipped & maintained at @ 0.6m
Proposed Ilex Crenata clipped hedge

Mixed shrub planting with architectural / clipped specimens

Proposed sequence of specimen trees edging driveway offering screening and structure year round.
Proposed 3 No. Ligustrum japonicum @ 350-400 12-14 Std - Clear stem 2.1-2.3m

Proposed evergreen hedge clipped & maintained at @ 0.6m
Proposed Ilex Crenata clipped hedge

Proposed sequence of Pleached trees edging driveway offering screening and structure from neighboring windows.
Proposed 5 No. Ilex Nellie Stevens - [PLEACHED] @ 180cm clear stem height. Frame 150 x 150cm 14-16cmg

Proposed evergreen hedge clipped & maintained at @ 1.6m
Proposed Prunus laurocerasus 'Rotundifolia' hedge

Proposed replacement boundary fence system of 1.8m treated timber closeboard

Proposed Block Paving private driveway in front of house

Proposed Natural Stone Paving

Proposed Large Planters [pair] at entrance with architectural / clipped planting

Mixed shrub planting with architectural / clipped specimens

Proposed replacement boundary fence system of 1.8m treated timber closeboard

Outline of existing house

Proposed Large Planters [pair] at rear entrance with architectural / clipped planting

Proposed Natural Stone Paving

Proposed replacement boundary fence system of 1.8m treated timber closeboard

Proposed Large Planter on rear terrace with architectural specimen multi-stem shrub

Proposed evergreen hedge clipped & maintained at @ 0.6m
Proposed Ilex Crenata clipped hedge

Mixed shrub planting with specimen trees and shrubs offering punctuation through bed

Proposed evergreen hedge clipped & maintained at @ 0.6m
Proposed Ilex Crenata clipped hedge

Proposed group of Boxhead / stilted hedge clipped trees as feature from main rear terrace at garden transition
Proposed Carpinus betulus @ 25-30cm Boxhead: 100 W&D x 120 H cm [Boxhead Tree] 210cm clear stem 300-350lt CG

Mixed shrub planting with specimen trees and shrubs offering punctuation through bed with rejuvenated pond edge planting

Existing / Retained boundary mature shrub / hedge planting

Existing / Retained / Rejuvenated garden lawn with existing garden features and pathways retained

Existing / Retained boundary mature shrub / hedge planting

Existing / Retained boundary mature shrub / hedge planting

Existing / Retained / Rejuvenated orchard tree planting to be pruned to shape for future health of mature orchard stock

Scale (m)
0 1 2 3 4 5 6 7 8 9 10 15 20

INDICATIVE PLANT SCHEDULE

TREES

QUANTITY	SPECIES	GIRTH cm	FORM	TYPE
4 No.	Carpinus betulus [Boxhead Tree]	25-30cm	Boxhead: 100 W&D x 120 H cm 210cm clear stem 300-350lt CG	
5 No.	Ilex Nellie Stevens	14-16cmg	Pleached Frame 150 x 150cm 180cm Clear stem	CG
3 No.	Betula albosinensis 'Fascination'	12-14cm	Std 350-400	CG
1 No.	Prunus Lusitanica Angustifolia	14-16cmg	Full Std 300-350cm Clear stem of 1.5m	CG

SPECIMEN SHRUB

SPECIES	FORM	HEIGHT cm	TYPE	SIZE
Amelanchier lamarckii	Shrub / Multi-stem	150-175	CG	90lt
Osmanthus burkwoodii	Shrub / Multi-stem	150-175	CG	170lt
Heptacodium miconioides	Shrub / Multi-stem	125-150	CG	50lt
Photinia x fraseri 'Red Robin'	Shrub / Multi-stem	150-175	CG	90lt
Viburnum tinus 'Eve Price'	Shrub / Multi-stem	150-175	CG	90lt

HEDGES

SINGLE SPECIES HEDGE PLANTING
Staggered rows. 3 plants per linear metre for container grown stock subject to size.

SPECIES	HEIGHT cm	SIZE	TYPE	SPACING
Ilex Crenata	20-30	2lt	CG	(Staggered row - 3 per m)
Prunus laurocerasus 'Rotundifolia'	40-60	3lt	CG	(Staggered row)
Lavandula angustifolia 'Hidcote'	20-30	2lt	CG	(Staggered row - 3 per m)

SHRUBS & HERBACEOUS PERENNIALS

Ornamental planting of shrub structure with herbaceous perennial mix to include species of value to wildlife and pollinators.

SPECIES	HEIGHT cm	SIZE	TYPE	SPACING
Acer palmatum 'Bloodgood'	80-120	5lt	CG	800
Acer palmatum 'Sango-kaku'	80-120	5lt	CG	800
Agapanthus 'Headbourne hybrids'	20-30	2lt	CG	800
Anemone × hybrida 'Honorine Jobert'	20-30	2lt	CG	400
Ajuga reptans 'Atropurpurea'	15-20	1lt	CG	400
Aquilegia vulgaris var. stellata 'Ruby Port'	20-30	2lt	CG	800
Aucuba japonica 'Crotonifolia'	30-40	3lt	CG	800
Bergenia cordifolia 'Silberlicht'	15-20	2lt	CG	400
Choisya ternata	30-40	3lt	CG	800
Cornus sanguinea 'Midwinter Fire'	60-80	10lt	CG	800
Crocosmia × crocosmiiflora 'Emily Mckenzie'	30-40	2lt	CG	800
Erysimum bicolor 'Bowles's Mauve'	20-30	2lt	CG	400
Epimedium × rubrum	20-30	2lt	CG	400
Euphorbia amygdaloides	15-30	2lt	CG	800
Geranium hybrid Johnsons Blue	20-30	2lt	CG	400
Geranium orion	20-30	2lt	CG	600
Hebe Red Edge	20-30	2lt	CG	400
Hebe 'Mrs Winder'	20-30	2lt	CG	800
Heuchera 'Lime Marmalade' (PBR)	20-30	2lt	CG	600
Heuchera 'Plum Pudding'	15-20	2lt	CG	400
Hydrangea paniculata 'Limelight' (PBR)	40-60	5lt	CG	800
Lavandula angustifolia 'Hidcote'	20-30	2lt	CG	400
Libertia grandiflora	30-40	3lt	CG	800
Liriope muscari	15-20	2lt	CG	400
Pachysandra terminalis 'Green Carpet'	15-20	2lt	CG	400
Persicaria affinis Darjeeling Red	20-30	2lt	CG	400
Phormium Jester	60-80	5lt	CG	800
Pinus mugo 'Mughus'	30-40	10lt	CG	800
Pittosporum tenuifolium Tom Thumb	30-40	3lt	CG	800
Pittosporum tenuifolium 'Golf Ball' (PBR)	40-60	5lt	CG	800
Potentilla fruticosa 'Abbotswood'	40-60	2lt	CG	800
Potentilla fruticosa 'Tangerine'	40-60	2lt	CG	800
Rosa Kent	30-40	3lt	CG	800
Rudbeckia fulgida var. sullivantii 'Goldsturm'	30-40	3lt	CG	800
Sarcococca hookeriana winter gem	30-40	3lt	CG	800
Sedum Autumn Joy	20-30	2lt	CG	400
Skimmia × confusa 'Kew Green'	30-40	5lt	CG	800
Skimmia japonica 'Rubella'	20-30	2lt	CG	400
Tiarella 'Spring Symphony'	20-30	2lt	CG	400
Verbena bonariensis 'Lollipop'	30-40	2lt	CG	600
Verbena officinalis var. grandiflora 'Bampton'	15-20	2lt	CG	800
Viburnum tinus	40-60	3lt	CG	800
Viburnum tinus 'Eve Price'	30-40	5lt	CG	800
Vinca minor f. alba 'Gertrude Jekyll'	10-15	2lt	CG	400
Vinca major 'Variegata'	20-30	2lt	CG	400

GRASSES

SPECIES	HEIGHT	SIZE	TYPE	SPACING
Carex Everglow	15-20	2lt	CG	400
Anemanthele lessoniana	30-40	3lt	CG	600
Hakonechloa macra	20-25	3lt	CG	400
Hakonechloa macra 'Alboaurea'	20-25	3lt	CG	400
Luzula Snowflake	20-30	2lt	CG	600
Molinia caerulea 'Poul Petersen'	40-60	2lt	CG	600
Stipa tenuissima	20-30	2lt	CG	400

FERNS

SPECIES	HEIGHT	SIZE	TYPE	SPACING
Asplenium scolopendrium	20-30	2lt	CG	600
Dryopteris erythrosora 'Brilliance'	20-30	2lt	CG	600
Dryopteris filix-mas	30-40	5lt	CG	800
Polypodium vulgare	10-20	2lt	CG	400

KEY
soft landscape

EXISTING RETAINED TREES
Retained trees and canopy boundary of existing trees as positioned following topographical survey of the existing site & Arboricultural Impact Assessment & Method Statement [TPP] by PJC Consultancy Ltd. Ref. PJC/6711/24/D Rev 01 Dated 11th Nov. 24

EXISTING TREES & VEGETATION TO BE REMOVED
Canopy boundary of existing trees & vegetation to be removed as positioned following topographical survey of the existing site & Arboricultural Impact Assessment & Method Statement [TPP] by PJC Consultancy Ltd. PJC/6711/24/D Rev 01 Dated 11th Nov. 24

PROPOSED SPECIMEN TREES
Specimen tree & large shrub planting proposed. Minimum 400mm depth of specific purpose free draining topsoil to BS 3882:2015 for tree planting
[see INDICATIVE PLANTING SCHEDULE]

PROPOSED PLEACHED TREES
Pleached tree planting proposed. Minimum 400mm depth of specific purpose free draining topsoil to BS 3882:2015 for tree planting
[see INDICATIVE PLANTING SCHEDULE]

PROPOSED TREE PLANTING
Minimum 900mm depth of specific purpose free draining topsoil to BS 3882:2015 for tree planting.
[see INDICATIVE PLANTING SCHEDULE]

PROPOSED SPECIMEN MULTI-STEM SHRUB PLANTS
Minimum 600mm depth of specific purpose free draining topsoil to BS 3882:2015 for large specimen shrub planting.
[see INDICATIVE PLANTING SCHEDULE]

PLANTING BEDS
Minimum 400mm depth of specific purpose free draining topsoil to BS 3882:2015 for shrub & mixed herbaceous perennial planting. Plant species to provide pollen, nectar and fruit.
[see INDICATIVE PLANTING SCHEDULE]

HEDGE PLANTING - ORNAMENTAL SHRUB HEDGE
Staggered double rows. 3 plants per linear metre for container grown stock. Minimum 400mm depth of specific purpose free draining topsoil to BS 3882:2015 for hedge planting
[see INDICATIVE PLANTING SCHEDULE]

GRASSWORKS - PROPOSED LANDSCAPE TURF
Areas of proposed amenity grass turf installed upon a minimum of 150mm depth of specific purpose free draining topsoil to BS 3882:2015. Soil leveled and prepared to a fine tilth prior to turf laying.
[see INDICATIVE PLANTING SCHEDULE]

hard landscape

HARD LANDSCAPE - PROPOSED NATURAL STONE PAVING
Laid: Staggered
Build-ups & Specification to project engineers specification and Local Conservation Area guidance.

HARD LANDSCAPE - PROPOSED BLOCK PAVING
Proposed mixed size block paving units laid randomly.
Build-ups & Specification to project engineers specification

boundary treatment

1.8m treated timber Closeboard fence system with timber post & gravel board

All works to conform to
BS 5837:2012 Trees in relation to design, demolition and construction. Plus conforming to arboricultural method statements.
BS 4428:1989 Code of practice for general landscape operations (excluding hard surfaces)
BS 8545:2014 Trees: from nursery to independence in the landscape. Recommendations
ASTM D5268 - 13
Standard Specification for Topsoil Used for Landscaping Purposes

NOTE:
This drawing indicates design arrangement only. All works to be undertaken in accordance with best practice and all current BS & Building Regulations. Do not scale from drawing. Use figured dimensions only after checking.

B	Amendments to include evergreen screening	04.03.25
A	Minor amendments to proposed landscape arrangement	19.11.24

Client: ROMIN KUMAR

Project Name:
47
SWEETCROFT LANE
UXBRIDGE
UB10 9LE

Drawing title: Proposed Landscape Plan

Drawing no: PJC.1235.001 *Rev: B*

Scale: 1:200 *at* A2 *Date:* 27.06.2023

Drawn by: TR *Designed by:* TR

PJC Consultancy
Rocks Yard, Victoria Road,
Herstmonceux, Hailsham, East Sussex,
BN27 4TQ.

t: 01323 832120
e: contact@pjcconsultancy.com
w: www.pjcconsultancy.com

APPENDIX B – HISTORIC BOREHOLES

bre Civil Engineering Laboratory
Building Research Establishment

Figure A
BOREHOLE No: B1
Sheet 1 of 1

Client: Property Services Agency / DCES
Investigation No: FGE / 2388 (Part 1)
Location: RAF UXBRIDGE (Site B: Honey Hill)
Project: Disposal of Land

BOREHOLE LOG

TQ08SE/45a

Date: 10th & 11th January 1985
Ground Level: (m. AOD)
Logged By: D. G. F.
Scale: 1:50
Equipment: Light Cable Percussion Boring Rig
Diameter: 200mm

S'pipe Piezo	Description of Strata	Legend	Depth (m)	O.D. Level (m)	Samples/Tests: Depth (m)	Type	Test	Remarks
	CLAY, Black organic, becoming brown, sandy and gravelly, gravel content comprises flint & brick fragment frequent roots (MADE GROUND)		GL		0.2-0.7	B		Water added in small amounts to assist boring
	CLAY, Brown, lightly fissured, silty, occasional orange brown sandy pockets, frequent roots and root traces - Soft to Firm		0.7		0.7-1.2	U	36	
					1.2	D		
	CLAY, Brown, lightly mottled grey, heavily fissured, silty with occasional very thin layers of buff silt, fairly frequent roots and root traces - Very Stiff		1.5		0.7-1.2	B		No water entries observed, borehole dry throughout
					2.0-2.5	U	37	
					2.5	D		
	CLAYSTONE, Brown calcareous claystone with occasional sandy pockets		2.9		2.8	B		
			3.1		3.0	D		
	CLAY, Brown, mottled and streaked grey, heavily fissured, silty, with occasional thin layers and nodules of calcareously cemented buff sand, contains occasional sulphate and root traces - Very Stiff				3.5-4.0	U	31	
					4.0	D		
	CLAY, Brown, heavily fissured, silty, occasional sulphate traces - Stiff to Very Stiff		4.8		5.0-5.5	U	27	
					5.5	D		
	CLAY, Grey brown, heavily fissured silty with frequent thin bands and pockets of buff silt, occasional small nodules of brown calcareous claystone, frequent sulphate traces - Stiff to Very Stiff (WEATHERED LONDON CLAY)		6.0		6.5-7.0	U	34	
					7.0	D		
	CLAY, Grey, heavily fissured, silty, some fissures lightly dusted with light grey brown silt, infrequent sulphate traces - Stiff (LONDON CLAY)		7.5		8.0-8.5	U	32	
					8.5	D		
					9.5-10.0	U	40	
	End of borehole		10.0		10.0	D		

bre Civil Engineering Laboratory
Building Research Establishment

Figure A
BOREHOLE No: B2
Sheet 1 of 1

Client: Property Services Agency / DCES
Location: RAF UXBRIDGE (Site B: Honey Hill)
Investigation No: FGE/2338 (Part 1)
Project: Disposal of Land

BOREHOLE LOG

TQ 08 SE/45b

Date: 12th - 14th January 1985
Ground Level: (m. AOD)
Logged By: D. G. F.
Scale: 1:50
Equipment: Light Cable Percussion Boring Rig
Diameter: 200 mm

S'pipe	Description of Strata	Legend	Depth (m)	O.D. Level (m)	Samples/Tests: Depth (m)	Type	Test	Remarks
	CLAY, Black, organic, becoming brown sandy and gravelly, gravel content comprises flint and brick fragments frequent roots (MADE GROUND)		GL		0·2 - 0·7	B		Water added in small amounts to assist boring
	CLAY, Brown, lightly fissured, silty, with occasional small orange brown sandy pockets, frequent roots and root traces - Soft to Firm		1·0		0·7 - 1·2	U	24	
					1·2	D		
	CLAY, Brown, lightly mottled grey, heavily fissured, silty, occasional small orange brown sandy pockets, fairly frequent roots and root traces - Very Stiff		1·7		1·7 - 2·0	B		No water entries observed, borehole dry throughout and has remained dry up to 25·1·85
					2·0 - 2·5	U	34	
					2·5	D		
	CLAYSTONE, Alternating layers of brown calcareous claystone and brown clay; chisel required to advance borehole		2·8		2·85	B		
					2·85 - 3·35	D	S N=30	
	CLAY, Brown mottled grey, heavily fissured, silty, occasional nodules of calcareously cemented buff sand - Stiff to Very Stiff		3·6		3·55	B		
					4·4 - 4·9	U	42	
					4·9	D		
	CLAY, Grey brown heavily fissured, silty with occasional thin layers of buff brown silt which on occasion are calcareously cemented, frequent sulphate traces - Stiff to Very Stiff (WEATHERED LONDON CLAY)		5·9		5·9 - 6·4	U	38	
					6·4	D		
					7·4 - 7·9	U	51	
					7·9	D		
	CLAY, Grey, heavily fissured, silty, some fissures lightly dusted with light grey brown silt - Stiff		8·4		8·9	B		
					8·9 - 9·4	U	39	
					9·4	D		
					9·5 - 10·0	U	54	
					10·0	D		
	End of borehole		10·0					

LOCATION: 143 Hercies Road, Hillingdon **BOREHOLE No:** One

DATE OF BORING: 23-24.09.1991

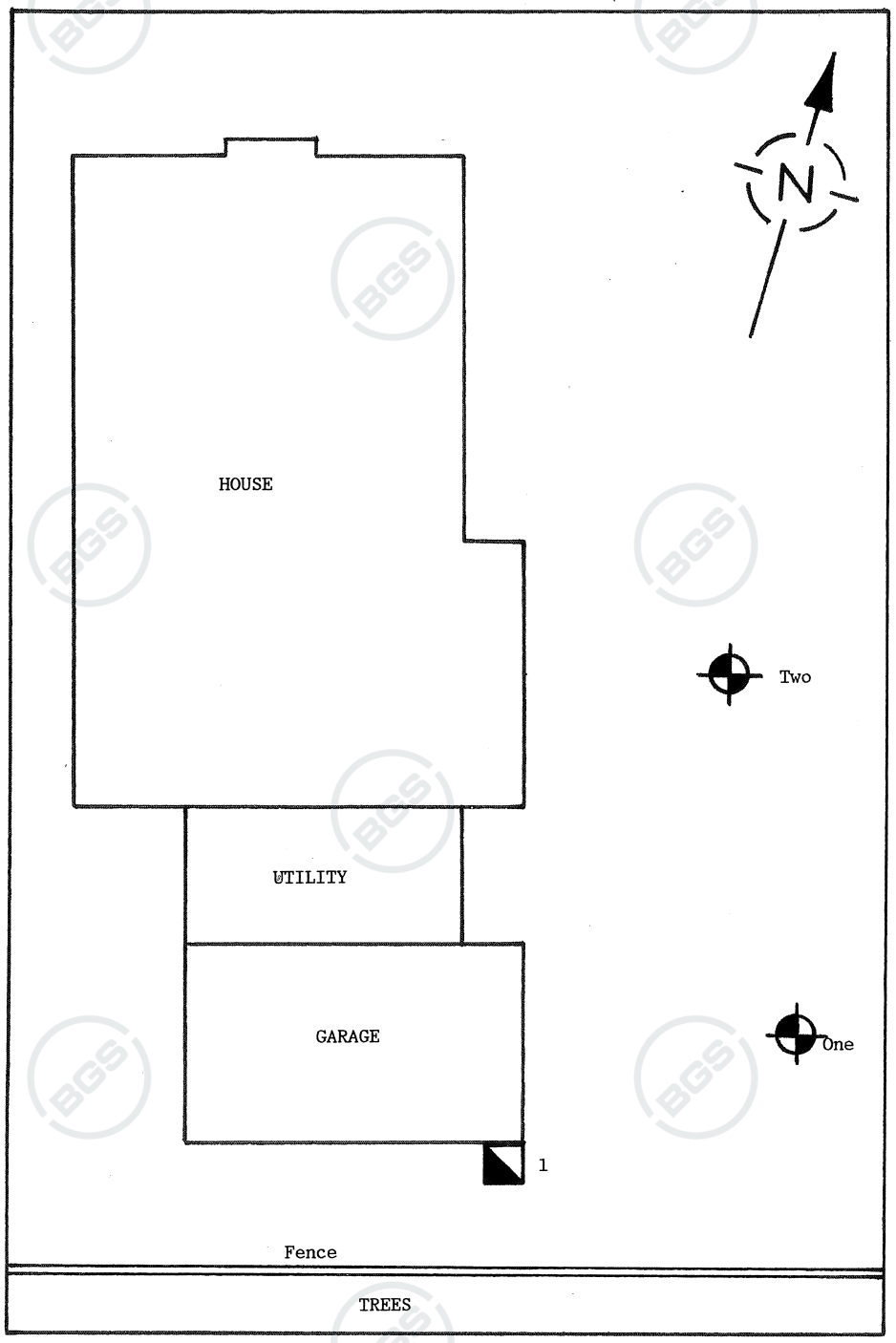
Description of Strata	Strata Change: Legend	Strata Change: Depth -m	Strata Change: O.D. Level -m	Samples: Depth -m	Samples: Type	SPT CPT N-Value	Water Level -m
MADE GROUND CONCRETE over flint GRAVEL over light grey brown and black mottled silty CLAY with gravel, red brick and roots.				1.00	U100	(5)	
Soft, dark grey black FILL with red bricks, glass, wire, ash, pottery, slate, gravel and roots - odorous.		1.00		1.50	B	3	1.68
				2.00	B		1.80
		2.00		2.60	B	5	
LONDON CLAY Firm, mid grey and mid brown slightly silty CLAY with occasional rootlets at 3.00m.		3.00		3.00 3.15	J U100	(11)	
				3.65	U100	(15)	
Stiff, mid grey fine sandy clayey SILT with some shell debris.		4.00		4.15	J		4.20
				4.50	U100	(18)	
		5.00		5.00	J		
				5.50	U100	(31)	
READING BEDS Stiff, light blue grey mottled olive brown fissured silty CLAY.		6.00		6.00	J		
- red brown light grey becoming mid orange brown grey.		7.00		7.00	U100	(43)	
				7.50	J		
		8.00		8.00	J		
				8.50	U100	(38)	
		9.00		9.00	J		
				9.50	U100	(34)	
		10.00		10.00	J		

BOREHOLE DIAMETER: 200mm to 3.00m, then 150mm
LINING TUBES : 150mm to 6.50m
CHISELLING : From G.L. to 0.10m for 0.25 hours
REMARKS : Borehole drilled from existing ground level

GROUND LEVEL:
PIEZOMETER :

▽ - Water Strike
▼ - Water (Standing Level)
W - Water Sample
B/J - Bulk/Jar Sample
SPT - Standard Penetration Test
CPT - Cone Penetration Test
* - extrapolated value
(U) - Undisturbed sample
no. of blows shown in brackets

DATE	BOREHOLE LOG	REPORT No.
September 1991		S.1980



Date	BOREHOLE / TRIAL PIT LOCATION PLAN	Report No.
September 1991	TYRONE	S.1980

LOCATION: 143 Hercies Road, Hillingdon **BOREHOLE No:** Two

DATE OF BORING: 25-26.09.1991

Description of Strata	Strata Change: Legend	Strata Change: Depth -m	Strata Change: O.D. Level -m	Samples: Depth -m	Samples: Type	SPT CPT N-Value	Water Level -m
MADE GROUND TOPSOIL over soft, light grey brown dark grey red silty CLAY with gravel and roots.				1.00	U100	(8)	
Very soft, dark red brown grey FILL with red bricks, metal, wire, pottery, glass, slate, gravel, black organic material and roots - odorous.		1.00		1.30 1.40 1.50	B B B	5	
		2.00		2.00	B		
LONDON CLAY Firm to stiff, brown grey mottled silty CLAY with decayed rootlets and selenite crystals.				2.50	U100	(13)	
		3.00		3.00	J		
- fissured.				3.50	U100	(18)	
		4.00		4.00	J		
Stiff, grey brown fissured clayey SILT with shell debris.				4.50	U100	(22)	
		5.00		5.00	J		
READING BEDS Stiff, red purple mottled blue grey slightly silty fissured CLAY.				5.50	U100	(34)	5.40
		6.00		6.00	J		
				6.50	U100	(34)	
- with fine sand pockets.		7.00		7.00	J		
				7.45	J		
		8.00		8.00	U100/W	(27)	8.00
				8.50	J		
		9.00		9.00	J		
				9.50	U100	(38)	
		10.00		10.00	J	49	

BOREHOLE DIAMETER: 200mm to 1.50m, then 150mm
LINING TUBES : 150mm to 1.50m
CHISELLING :
REMARKS : Borehole drilled from existing ground level

GROUND LEVEL:
PIEZOMETER :

▽ - Water Strike
▼ - Water (Standing Level)
W - Water Sample
B/J - Bulk/Jar Sample
SPT - Standard Penetration Test
CPT - Cone Penetration Test
* - extrapolated value
(U) - Undisturbed sample
no. of blows shown in brackets

DATE	BOREHOLE LOG	REPORT No.
September 1991		S.1980

LOCATION: 143 Hercies Road, Hillingdon BOREHOLE No: Two

DATE OF BORING: 25-26.09.1991

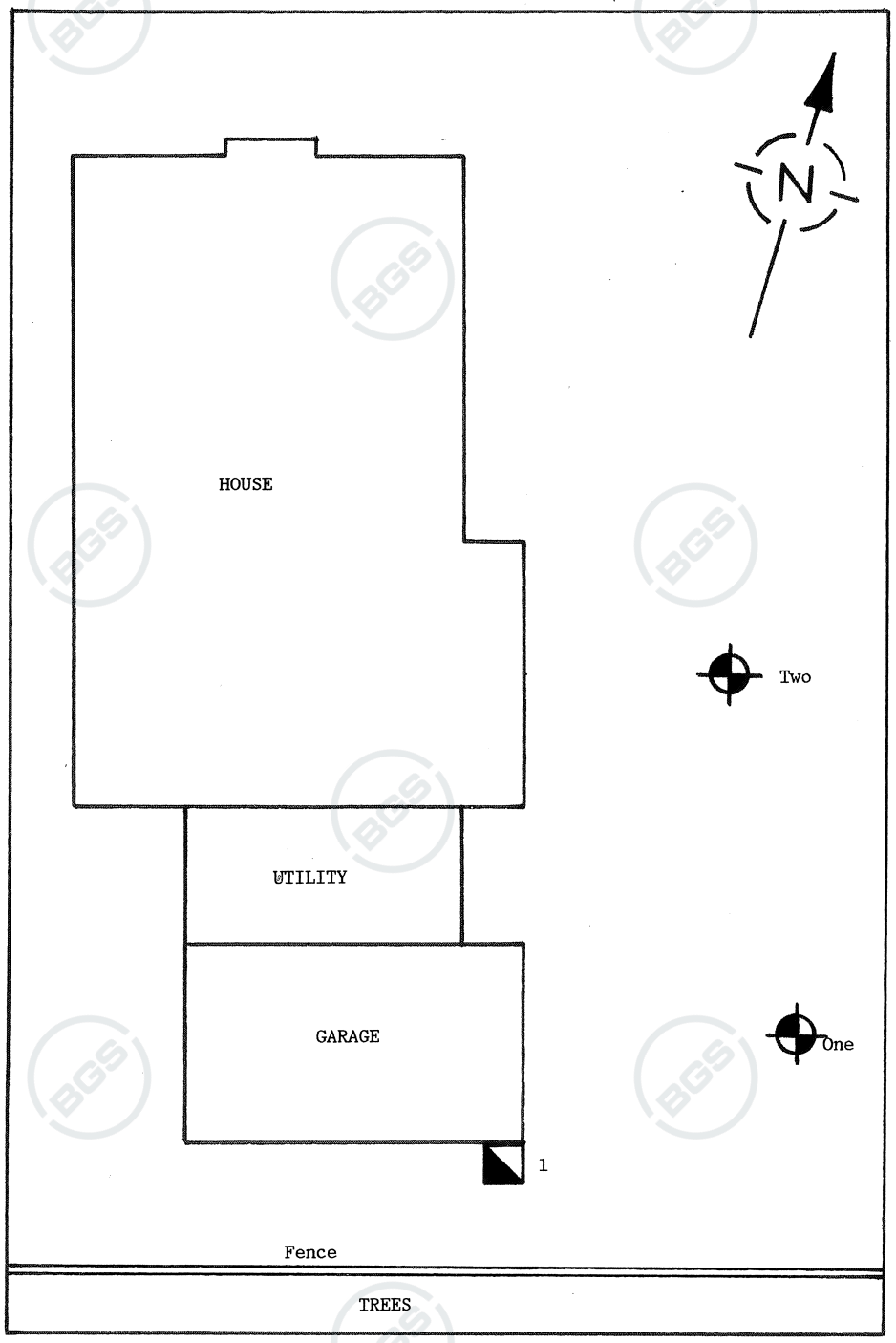
Description of Strata	Strata Change: Legend	Strata Change: Depth -m	Strata Change: O.D. Level -m	Samples: Depth -m	Samples: Type	SPT CPT N-Value	Water Level -m
READING BEDS (Continued)...							

11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00
19.00
20.00

BOREHOLE DIAMETER: 200mm to 1.50m, then 150mm
LINING TUBES : 150mm to 1.50m
CHISELLING :
GROUND LEVEL:
PIEZOMETER :
REMARKS : Borehole drilled from existing ground level

▽ - Water Strike
▼ - Water (Standing Level)
W - Water Sample
B/J - Bulk/Jar Sample
SPT - Standard Penetration Test
CPT - Cone Penetration Test
* - extrapolated value
(U) - Undisturbed sample
no. of blows shown in brackets

DATE	BOREHOLE LOG	REPORT No.
September 1991		S.1980



Date	BOREHOLE / TRIAL PIT LOCATION PLAN	Report No.
September 1991	TYRONE	S.1980

LOCATION : 21 Sweet Croft Lane, Hillingdon **BOREHOLE No.** One

DATE OF BORING : 01.12.1988

Description of Strata	STRATA CHANGE LEGEND	STRATA CHANGE DEPTH M	STRATA CHANGE O.D. LEVEL M	SAMPLES DEPTH M	SAMPLES TYPE	S P T C P T N-VALUE	WATER LEVEL M
MADE GROUND Concrete over medium, brown orange CLAY with red brick, black coal ash, rootlets and flint fragments		1.00		1.00	J	(U100 blows) 5	
LONDON CLAY Stiff, light brown grey fissured CLAY with sand pockets and abundant selenite crystals.		2.00		2.00	U100	(35)	
				2.50	J		
- mottled yellow, slightly sandy		3.00		3.00	J	10	
- slightly silty, dark brown grey		4.00		4.00	U100	(25)	
				4.50	J		
- very stiff with dark grey sand pockets		5.00		5.00	J	20	
- claystone fragments.		6.00					
				6.50	U100/J	(45)	
READING BEDS Very stiff, dark grey blue olive, sandy CLAY with abundant shell fragments.		7.00		7.00	J		
		8.00		8.00	B	34+	
Dense yellow, brown clayey SAND.		9.00					
				9.50	U100	(60)	
- yellow olive		10.00		10.00	B		

BOREHOLE DIAMETER : 150mm

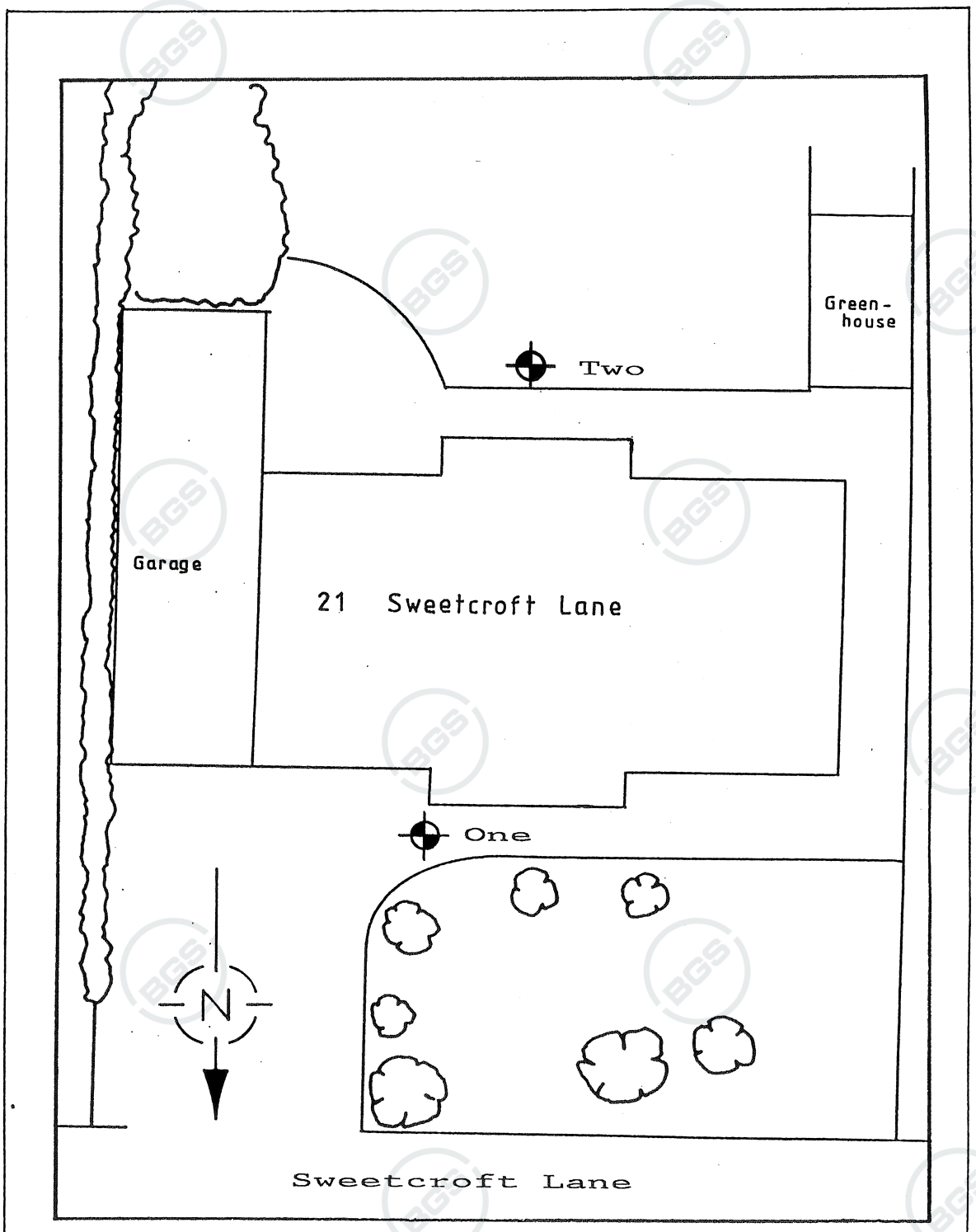
LINING TUBES : 150mm to 1.50m

GROUND LEVEL :

REMARKS : Borehole drilled from existing ground level

▽ - Water strike
▼ - Water (standing level)
W - Water Sample
B/J - Bulk/Jar Sample
S.P.T. - Standard Penetration Test
C.P.T. - Cone Penetration Test
(U) - Undisturbed Sample (38mm & 100mm)

Date.	BOREHOLE LOG	Report No.
January 1989		S.1016(i)



Borehole Location

Not To Scale

Date	BOREHOLE LOCATION PLAN	Report No.
January 1989	TYRONE	S.1016(i)

APPENDIX C – SURFACE WATER RUN OFF

CALCULATIONS

Nimbus Engineering Consultants Ltd
www.nimbusengineering.co.uk

Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

Job No.	C3407
Sheet no.	1
Date	06/03/25

MasterDrain
HY 10.01

Project	By	Checked	Reviewed
47 Sweetcroft Lane, Hillindon, UB10 9LE	MH		

Title: **Pre & Post Development SW Calcs prior to SuDS**

Data:-

Hydrology (FSR):-

Location = UXBRIDGE		WRAP	= 4
Long reference = 505183		Grid reference	= TQ0583
M5-60 (mm)	= 20	SAAR (mm/yr)	= 675
r	= 0.43	Soil	=0.47
Hyd. area	= 6	Hyd. zone	= 8
Hydrograph	= Winter	Area = England & Wales	

Site values used in design:-

Total site area	= 0.0421 ha	Climate change factor	= 45%
Pre-dev area drained	= 0.0229 ha	Post-dev area drained	= 0.0421 ha
Imperm runoff factor	= 100%	Perm runoff factor	= 20%
Pre-development			
Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Pre-dev flow to drain	= 0.00 l/s
Post-development			
Area to soakaways	= 0.0000 ha	Area to other SUDS	= 0.0000 ha
Perv. area to SUDS	= 0.0000 ha	Post-dev flow to drain	= 0.00 l/s

Calculations:-

Revised Post-dev Imperm. area = 0.042 ha
Equiv. Post-dev Imperm. area = 0.042 ha
Equiv. Post-dev Perm. area = 0.000 ha
Total Pre-dev equiv. area ha = 0.027 ha
Total Post-dev equiv. area ha = 0.042 ha
100 yr 6 hour mean intensity = 10.13mm/hr

Results:-

Pre-dev peakflow runoff (l/s) (m^3/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	5.9	3.9	2.4	1.5	0.9	0.7	0.5	0.5	5.9	N/A	5.9	1
30	14.5	9.3	5.7	3.4	2.0	1.4	1.2	1.0	14.5	N/A	14.5	30
100	18.8	12.2	7.5	4.5	2.6	1.9	1.5	1.2	18.8	N/A	18.8	100

Post-dev peakflow runoff (l/s)

R.P.	15	30	60	120	240	360	480	600	Max	CCF	Final	R.P.
1	9.3	6.1	3.7	2.3	1.4	1.1	0.8	0.7	9.3	45	13.5	1
30	22.8	14.7	9.0	5.4	3.1	2.3	1.8	1.5	22.8	45	33.0	30
100	29.6	19.2	11.8	7.1	4.1	3.0	2.3	2.0	29.6	45	42.9	100

100 year 6 hour (x Climate Change Factor) storm gives:-
Pre-dev runoff volume m^3 = 16.2m^3
Post-dev rainfall volume = 37.1m^3
Post-dev volume m^3 (excess above SUDS) = 37.1m^3
100 yr 6 hour mean intensity = 10.13mm/hr
Pre-dev volume to drain at 0 l/s = 0.0 m^3
Post-dev volume to drain at 0 l/s = 0.0 m^3
Post-dev storage volume = 37.1m^3
Post-dev 5mm imperm volume = 2.1 m^3
Post-dev 5mm perm volume = 0.0 m^3

$Q_{BAR(rural)}$ = 0.195 l/s or 4.627 l/s/ha or 0.000 cumecs - from IoH 124.

The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

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Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

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Project	47 Sweetcroft Lane, Hillindon, UB10 9LE	By	MH
Title	Pre & Post Development SW Calcs prior to SuDS	Checked	
		Reviewed	

Data summary.

Use the data below for the SUR1 form

Site areas:-

Total site area =	0.0421 ha ;421.0 m²	[3A]
Pre-development impermeable area =	0.0229 ha	[3B]
Pre-development permeable area =	0.0192 ha	
Post-development impermeable area =	0.0421 ha	[3C]
Post-development permeable area =	0.0000 ha	

Peak runoff:-

Pre-development 1 year storm (15min) =	5.9 l/s	[6A]
Pre-development 100 year storm (15min) =	18.8 l/s	[6C]
Post-development 1 year storm (15min) =	9.3 l/s	[6B]
Post-development 100 year storm (15min)=	29.59 l/s	[6D]

Greenfield runoff:-

$Q_{BAR(rural)}$ = 0.195 l/s or 4.627 l/s/ha or 0.000 cumecs - from IoH 124.

Climate change factor:-
CCF = 45%

Volumes:-
Pre-development 100 yr/6hr storm [12A]= 23.6m³
Post-development 100 yr/6hr storm (add. volume with no SUDS) [12B]= 37.1m³
Post-development 100 yr/6hr storm (add. volume with SUDS) = 37.1m³
Post-development add. predicted volume (No SUDS) [12C] = 13.5m³

You may also require
Data relating to the infiltration test calculations (if applicable)
Evidence to show runoff reduction (if applicable)
Information on calculation methods (if applicable see next sheet)

Note
Numbers in square brackets relate to the
Nov. 2010 v1.1 / issued 11/02/10 copy of SUR1

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Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

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Project	47 Sweetcroft Lane, Hillindon, UB10 9LE	By	MH
Title	Pre & Post Development SW Calcs prior to SuDS	Checked	
		Reviewed	

Definitions and methods

Hydrology

The hydrological constants are derived from the Wallingford maps. They are used to calculate location specific rainfall figures.

Site values and factors

Areas of the site should be entered in hectares (10000 m²). If the Pre-development site is a green field, this box is blank.
Climate Change Factor is initially set at 20% - this may be changed as required.
Greenfield runoff is calculated using the method described in IoH 124.
Runoff factors

The impermeable runoff factor is initially set at 98%
The permeable runoff factor is initially set at 20%

Note: the CCF and the runoff factors may be changed by the user to suit the development
The areas draining to soakaways and other SUDS are entered in the appropriate box (in hectares)

Calculations

The post-development area is reduced by subtracting the areas that drain to soakaways or other SUDS, to give a revised figure.
All areas are then multiplied by the appropriate runoff factor to give an equivalent area with 100% runoff.
These are then summated.
This gives a total pre-development equivalent area, and a similar figure for the post-development area.
The 'Post-dev volume to drain (no SUDS)' gives the total runoff to drain if no SUDS were used.

Results

The pre- and post-development areas are subjected to 1,30 and 100 year return period storms with a duration of 15 to 600 minutes.
The Revised Post-dev Imperm. area is the area (in ha) that is not going to SUDS x impervious runoff factor.
The runoff rates are calculated for the chosen hydrograph (Summer or Winter) as l/s. Figures in red indicate m³/s
The peak value is measured, multiplied by the CCF and the total maximum rate is shown.
The pre- and post-development volumes for a 100 year / 6 hour storm are calculated from the area under the hydrograph curve.
Post-dev volume (i.e. excess above SUDS) is that volume produced by the drained area that does not go to SUDS.
Qbar(rural) is calculated in accordance with the procedure laid down in IoH 124

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Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

Job No.	C3407		
Sheet no.	1		
Date	06/03/25		
By	MH	Checked	Reviewed

MasterDrain SW

Project: 47 Sweetcroft Lane, Hillingdon, UB10 9LE

Title: Hydrograph Storage Calcs with 1l/s discharge

Data:-

Location = UXBRIDGE
M5-60 (mm) = 20
Soil index = 0.45
Return period = 100
UCWI = 0.0

Grid reference = TQ0583
r = 0.43
SAAR (mm/yr) = 675
WRAP = 4
Climate change = 45%

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

Pipeline storage = 0.0 m³
Offline storage = 0.0 m³

Available MH storage = 0.0 m³

Percentage runoff = 100.0% (manual setting)

Imperv. area = 421 m²
Total area = 421 m²
Total runoff = 29.5 m³

Pervious area = 0 m²
Equiv area = 421 m² (Tot. area x % runoff).
Discharge rate = 1.000 l/s

Storage (m³) = 23.2 m³ (Sum of all balance quantities)

Total rainfall depth = 70.1 mm

Calculations :-

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)	Cumulative (m3)
0.020	20.0	7.0	0.059	0.072	0.000	0.000
0.040	20.0	7.0	0.059	0.072	0.000	0.000
0.060	21.0	7.4	0.062	0.072	0.000	0.000
0.080	21.0	7.4	0.062	0.072	0.000	0.000
0.100	22.0	7.7	0.065	0.072	0.000	0.000
0.120	23.0	8.1	0.068	0.072	0.000	0.000
0.140	24.0	8.4	0.071	0.072	0.000	0.000
0.160	26.0	9.1	0.077	0.072	0.005	0.005
0.180	27.0	9.5	0.080	0.072	0.008	0.012
0.200	29.0	10.2	0.086	0.072	0.014	0.026
0.220	31.0	10.9	0.091	0.072	0.019	0.045
0.240	32.0	11.2	0.094	0.072	0.022	0.068
0.260	33.0	11.6	0.097	0.072	0.025	0.093
0.280	34.0	11.9	0.100	0.072	0.028	0.122
0.300	36.0	12.6	0.106	0.072	0.034	0.156
0.320	38.0	13.3	0.112	0.072	0.040	0.196
0.340	39.0	13.7	0.115	0.072	0.043	0.239
0.360	40.0	14.0	0.118	0.072	0.046	0.285
0.380	42.0	14.7	0.124	0.072	0.052	0.337
0.400	45.0	15.8	0.133	0.072	0.061	0.398
0.420	49.0	17.2	0.145	0.072	0.073	0.470
0.440	53.0	18.6	0.156	0.072	0.084	0.555
0.460	57.0	20.0	0.168	0.072	0.096	0.651
0.480	62.0	21.7	0.183	0.072	0.111	0.762
0.500	66.0	23.1	0.195	0.072	0.123	0.885
0.520	71.0	24.9	0.210	0.072	0.138	1.022
0.540	77.0	27.0	0.227	0.072	0.155	1.177
0.560	84.0	29.4	0.248	0.072	0.176	1.353
0.580	91.0	31.9	0.269	0.072	0.197	1.550
0.600	98.0	34.3	0.289	0.072	0.217	1.767
0.620	105.0	36.8	0.310	0.072	0.238	2.005
0.640	114.0	40.0	0.336	0.072	0.264	2.269
0.660	125.0	43.8	0.369	0.072	0.297	2.566
0.680	135.0	47.3	0.398	0.072	0.326	2.893
0.700	143.0	50.1	0.422	0.072	0.350	3.243
0.720	154.0	54.0	0.454	0.072	0.382	3.625
0.740	164.0	57.5	0.484	0.072	0.412	4.037
0.760	173.0	60.6	0.511	0.072	0.439	4.475
0.780	183.0	64.1	0.540	0.072	0.468	4.944
0.800	194.0	68.0	0.572	0.072	0.500	5.444

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www.nimbusengineering.co.uk

Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

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Project	47 Sweetcroft Lane, Hillingdon, UB10 9LE
Title	Hydrograph Storage Calcs with 1l/s discharge

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Calculations (cont.) :-

Time (hrs)	%Mean intens	Rain mm/hr	Inflow (m3)	Outflow (m3)	Balance (m3)	Cumulative (m3)
0.820	204.0	71.5	0.602	0.072	0.530	5.974
0.840	212.0	74.3	0.626	0.072	0.554	6.528
0.860	219.0	76.8	0.646	0.072	0.574	7.102
0.880	226.0	79.2	0.667	0.072	0.595	7.697
0.900	233.0	81.7	0.688	0.072	0.616	8.312
0.920	239.0	83.8	0.705	0.072	0.633	8.946
0.940	244.0	85.5	0.720	0.072	0.648	9.594
0.960	248.0	86.9	0.732	0.072	0.660	10.253
0.980	249.0	87.3	0.735	0.072	0.663	10.916
1.000	250.0	87.6	0.738	0.072	0.666	11.582
1.020	250.0	87.6	0.738	0.072	0.666	12.248
1.040	249.0	87.3	0.735	0.072	0.663	12.910
1.060	248.0	86.9	0.732	0.072	0.660	13.570
1.080	244.0	85.5	0.720	0.072	0.648	14.218
1.100	239.0	83.8	0.705	0.072	0.633	14.852
1.120	233.0	81.7	0.688	0.072	0.616	15.467
1.140	226.0	79.2	0.667	0.072	0.595	16.062
1.160	219.0	76.8	0.646	0.072	0.574	16.636
1.180	212.0	74.3	0.626	0.072	0.554	17.190
1.200	204.0	71.5	0.602	0.072	0.530	17.720
1.220	194.0	68.0	0.572	0.072	0.500	18.220
1.240	183.0	64.1	0.540	0.072	0.468	18.688
1.260	173.0	60.6	0.511	0.072	0.439	19.127
1.280	164.0	57.5	0.484	0.072	0.412	19.539
1.300	154.0	54.0	0.454	0.072	0.382	19.921
1.320	143.0	50.1	0.422	0.072	0.350	20.271
1.340	135.0	47.3	0.398	0.072	0.326	20.598
1.360	125.0	43.8	0.369	0.072	0.297	20.895
1.380	114.0	40.0	0.336	0.072	0.264	21.159
1.400	105.0	36.8	0.310	0.072	0.238	21.397
1.420	98.0	34.3	0.289	0.072	0.217	21.614
1.440	91.0	31.9	0.269	0.072	0.197	21.811
1.460	84.0	29.4	0.248	0.072	0.176	21.986
1.480	77.0	27.0	0.227	0.072	0.155	22.142
1.500	71.0	24.9	0.210	0.072	0.138	22.279
1.520	66.0	23.1	0.195	0.072	0.123	22.402
1.540	62.0	21.7	0.183	0.072	0.111	22.513
1.560	57.0	20.0	0.168	0.072	0.096	22.609
1.580	53.0	18.6	0.156	0.072	0.084	22.694
1.600	49.0	17.2	0.145	0.072	0.073	22.766
1.620	45.0	15.8	0.133	0.072	0.061	22.827
1.640	42.0	14.7	0.124	0.072	0.052	22.879
1.660	40.0	14.0	0.118	0.072	0.046	22.925
1.680	39.0	13.7	0.115	0.072	0.043	22.968
1.700	38.0	13.3	0.112	0.072	0.040	23.008
1.720	36.0	12.6	0.106	0.072	0.034	23.042
1.740	34.0	11.9	0.100	0.072	0.028	23.071
1.760	33.0	11.6	0.097	0.072	0.025	23.096
1.780	32.0	11.2	0.094	0.072	0.022	23.118
1.800	31.0	10.9	0.091	0.072	0.019	23.138
1.820	29.0	10.2	0.086	0.072	0.014	23.152
1.840	27.0	9.5	0.080	0.072	0.008	23.159
1.860	26.0	9.1	0.077	0.072	0.005	23.164
1.880	24.0	8.4	0.071	0.072	0.000	23.163
1.900	23.0	8.1	0.068	0.072	0.000	23.159
1.920	22.0	7.7	0.065	0.072	0.000	23.152
1.940	21.0	7.4	0.062	0.072	0.000	23.142
1.960	21.0	7.4	0.062	0.072	0.000	23.131
1.980	20.0	7.0	0.059	0.072	0.000	23.118
2.000	20.0	7.0	0.059	0.072	0.000	23.106

Storage volume (m^3) = 23.2 m^3 (Sum of all balance quantities)

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Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

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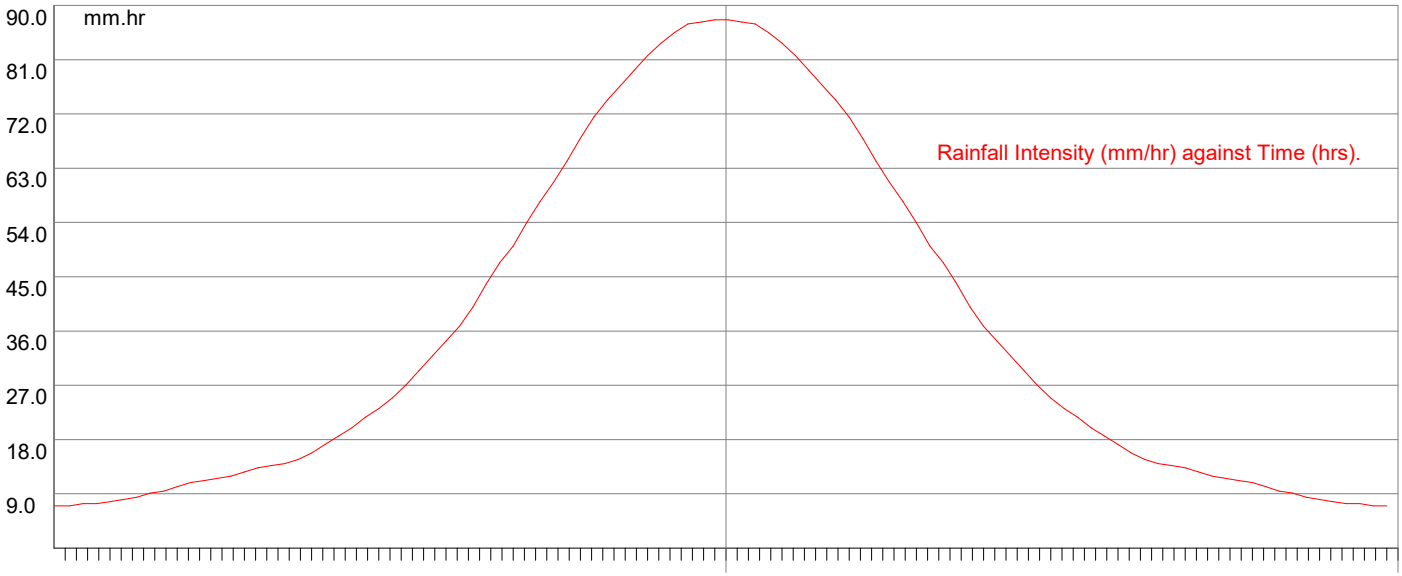
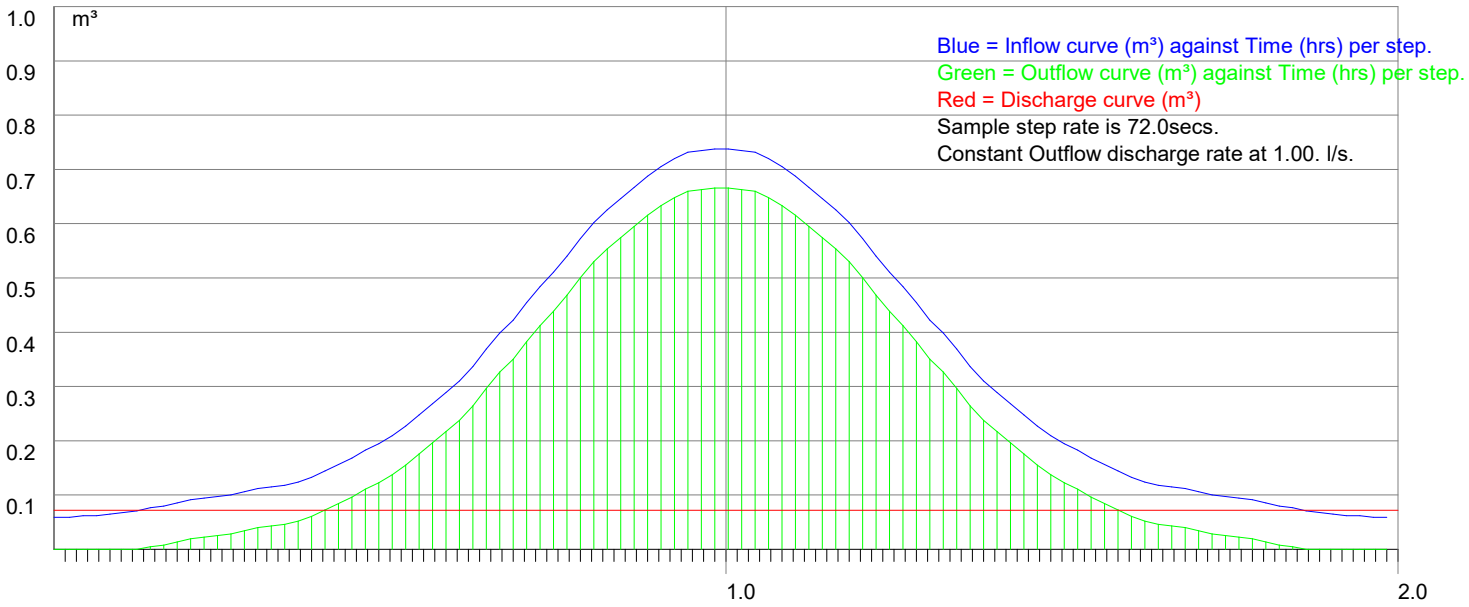
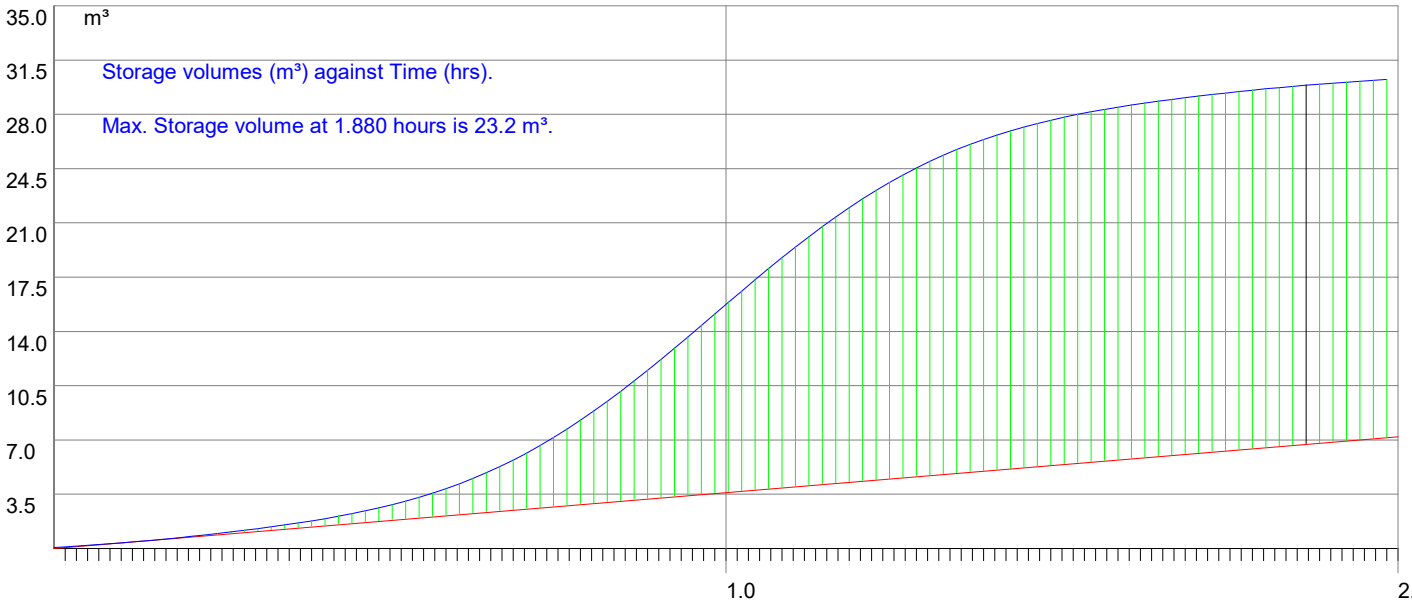
Title: Hydrograph Storage Calcs with 1l/s discharge

By	Checked	Reviewed
MH		







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Kemp House,
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Job No.	C3407
Sheet no.	4
Date	06/03/25
Project	47 Sweetcroft Lane, Hillingdon, UB10 9LE
Title	Hydrograph Storage Calcs with 1l/s discharge

By	Checked	Reviewed
MH		

Maximum storage volumes for varying duration storms.

Storm length (hrs)	Max. Vol (m^3)	Max. Vol time	Mean intens (mm/hr)	Step time. (mins)	Peak found
0.25	14.93	0.25	146.75	0.2	
0.5	18.73	0.50	95.16	0.3	
1	21.75	1.00	58.74	0.6	
2	23.16	2.00	35.05	1.2	Peak found
3	23.00	---	25.59	1.8	
4	22.39	---	20.36	2.4	
5	21.57	---	17.00	3.0	
6	20.70	---	14.68	3.6	
7	19.78	---	12.97	4.2	
8	18.85	---	11.65	4.8	
9	17.91	---	10.59	5.4	
10	16.95	---	9.73	6.0	
12	15.07	---	8.39	7.2	
15	12.36	---	7.00	9.0	
18	9.78	---	6.04	10.8	
20	8.19	---	5.54	12.0	
24	5.33	---	4.77	14.4	
30	1.89	---	3.98	18.0	
36	0.00	---	3.43	21.6	
42	0.00	---	3.02	25.2	
48	0.00	---	2.70	28.8	
54	0.00	---	2.45	32.4	
60	0.00	---	2.25	36.0	
66	0.00	---	2.08	39.6	
72	0.00	---	1.94	43.2	
84	0.00	---	1.70	50.4	
96	0.00	---	1.53	57.6	
120	0.00	---	1.27	72.0	
150	0.00	---	1.05	90.0	
175	0.00	---	0.93	105.0	
200	0.00	---	0.83	120.0	
250	0.00	---	0.69	150.0	
300	0.00	---	0.59	180.0	
375	0.00	---	0.49	225.0	
500	0.00	---	0.39	300.0	
750	0.00	---	0.28	450.0	
1000	0.00	---	0.22	600.0	
1250	0.00	---	0.18	750.0	
1500	0.00	---	0.16	900.0	
1570	0.00	---	0.15	942.0	
2000	0.00	---	0.12	1200.0	
2500	0.00	---	0.10	1500.0	
3000	0.00	---	0.09	1800.0	
3500	0.00	---	0.08	2100.0	
4000	0.00	---	0.07	2400.0	

MasterDrain SW

Nimbus Engineering Consultants Ltd
www.nimbusengineering.co.uk

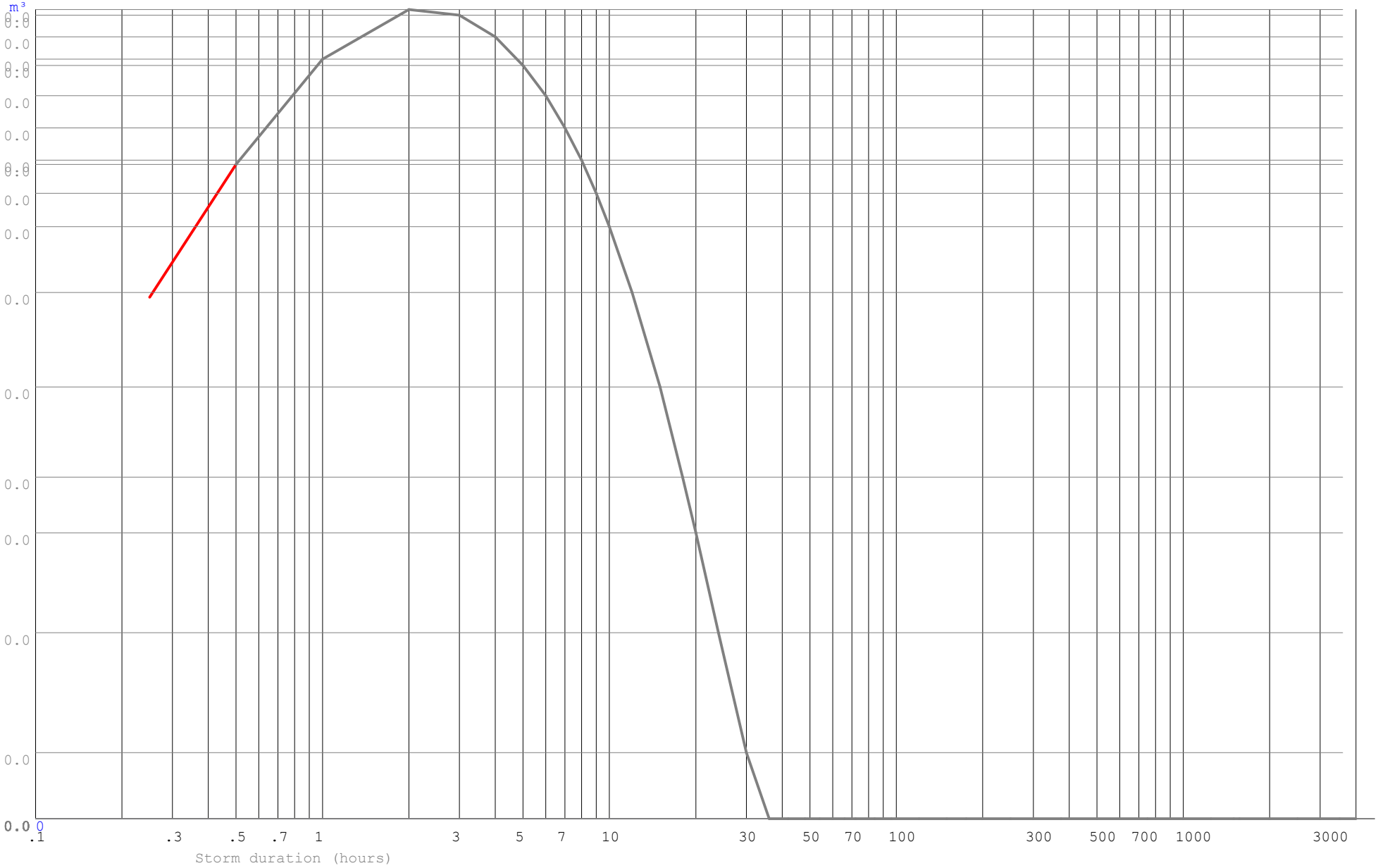
Kemp House,
152 City Road,
London, EC1V 2NX
Mob:0772 339 3155
email: info@nimbusengineering.co.uk

Job No.	C3407
Sheet no.	5
Date	06/03/25
By	MH
Checked	
Reviewed	

Project: **47 Sweetcroft Lane, Hillingdon, UB10 9LE**

Title: **Hydrograph Storage Calcs with 1l/s discharge**

Sequential storage volume at specific storm durations.



Explanatory notes for Peak Flow Storage

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

Explanatory notes for Hydrograph Storage

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

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

Why do the two methods give different results?

The rainfall characteristics for each method are very different.

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

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

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