

MERIDIAN

CIVIL ENGINEERING CONSULTANCY

45 MORLEY HILL

ENFIELD

EN2 0BL

SURFACE WATER DRAINAGE DESIGN

JANUARY 2024

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Client : J&L Build

| Rev | Date | Prepared by | Checked by | Approved by |
|-----|----------|-------------|------------|-------------|
| - | 20/12/23 | SD | MN | MN |

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1.0 INTRODUCTION

- 1.1 Meridian Civil Engineering Consultancy LTD (MCEC) has been instructed by J&L Build to prepare a site-specific Surface Water Drainage Design for the development at 45 Morley Hill, Enfield, EN2 0BL.
- 1.2 The proposed development is for the sub-division of site and conversion of single-family dwelling house into 2 dwelling houses with a rear extension to the property to provide additional living space.. The total post-development impermeable area would be approximately 0.028ha.
- 1.3 The Environment Agency (EA) mapping for Flood Risk, shows the site located within Flood Zone 1 (low risk of fluvial or tidal flooding). Flood zone 1 is described as land having a less than 1 in 1,000 annual probability of river or sea flooding.
- 1.4 The EA Long Term Flood risk online service shows that the site address is at a 'Very Low' risk of flooding (>0.1%AEP storm event) with no flooding occurring within the site's boundaries during the 1 in 1000 year storm event.
- 1.5 Based on BGS online soil geology data, the site is sitting on a London Clay bedrock consisting mainly of silt and clay. Nearby borehole logs indicate a similar superficial geology and, as such, infiltration SuDS are not deemed suitable for the site.
- 1.6 In accordance with local and national SuDS policy and London Plan, developments are required to use SuDS to reduce both the volume and runoff rates as close as possible to the respective greenfield runoff rates.
- 1.7 The proposed SuDS scheme is for the use of shallow high strength geocellular crates with permeable paving, filter drains and orifice plate flow control to reduce post-development runoff rate to the lowest feasible rate.
- 1.8 Given there is an existing storm sewer shown in Morley Hill Road, a new connection to the surface water sewer is currently proposed.
- 1.9 The post-development discharge rate to the surface water sewer would be limited by a 20mm diameter orifice plate, the smallest recommended in the SuDS Manual, controlling rates to 0.6l/s during the 1 in 100 year + 40%CC storm event.

2.0 POLICY COMPLIANCE

- 2.1 The purpose of this assessment is to demonstrate that the development proposal outlined above can be satisfactorily accommodated without worsening flood risk for the area and without placing the development itself at risk of flooding, as per the:
 - National Planning Policy Framework
 - The London Plan 2021
 - Enfield Council SuDS Guidelines
 - DEFRA Sustainable drainage systems: non-statutory technical standards
 - Ciria SuDS Manual C753

3.0 SITE LOCATION

- 3.1 The proposed development location is at 45 Morley Hill, Enfield, EN2 0BL. The approximate site location is outlined within Figure 1 below. The site is partially built, consisting of a dwelling and associated hardstanding. The existing impermeable area is approximately 0.011ha.

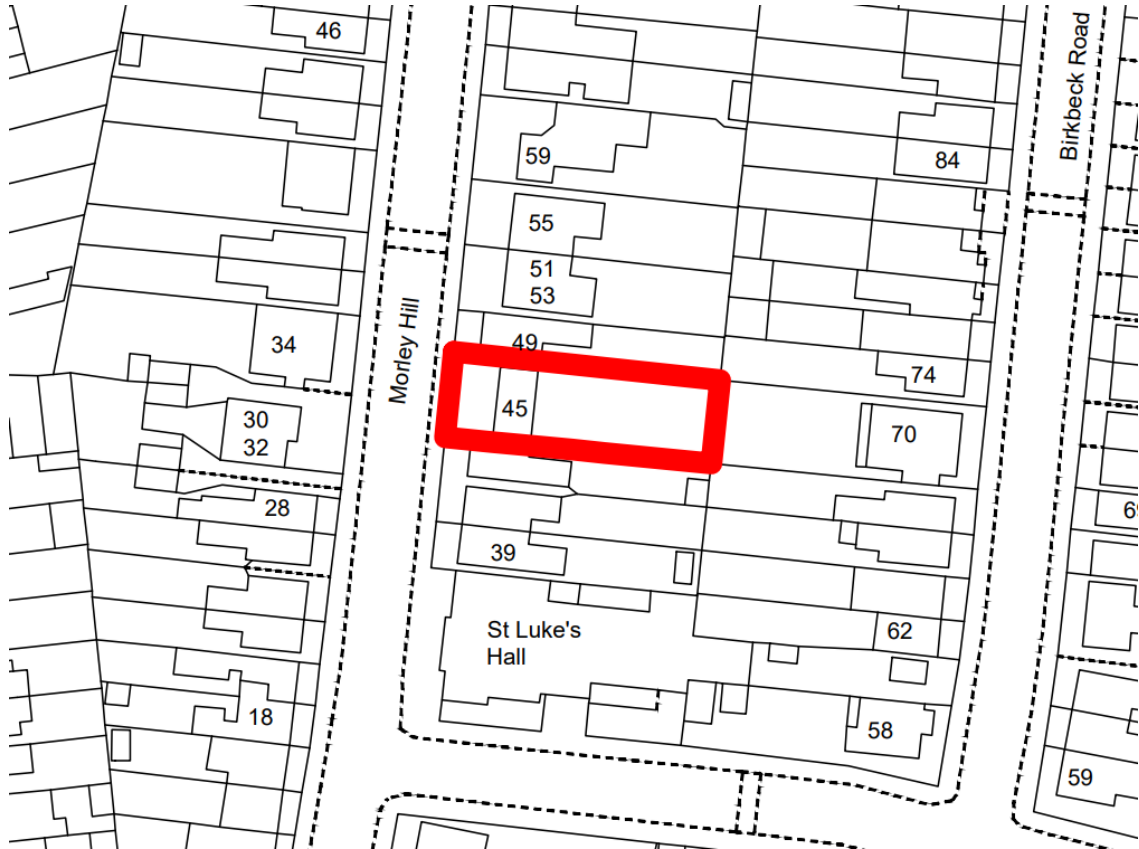


Figure 1: Site location with approximate redline boundary (Source: Google Maps)

- 3.2 The proposed development is for the sub-division of site and conversion of single-family dwelling house into 2 dwelling houses and a rear extension to increase living space. The total post-development impermeable area would be approximately 0.028ha.
- 3.3 Topographic levels fall toward the east, from 37.3mAOD at the site boundary on Morley Hill road to 36.41mAOD at eastern site boundary. The site levels would remain largely unchanged post-development.

4.0 EXISTING DRAINAGE ARRANGEMENTS

- 4.1 According to the topographic survey (see attached in Appendix I), existing private drainage infrastructure is located at the rear of the existing dwelling and likely draining to the sewers in Morley Hill road. No further information about the type or other details of the existing drains has been provided at the time of writing. It is suggested to conduct a CCTV drain survey at the site

to reveal if the existing drains can be used post-development to avoid new connections to the sewers.

- 4.2 The Thames Water sewer asset plan indicates both surface and foul water sewers in Morey Hill road, at the front of the property. Currently a new surface water connection to the surface water sewer is proposed.



Figure 2: Thames Water Sewer record extract

5.0 GEOLOGY, INFILTRATION POTENTIAL AND GROUNDWATER

- 5.1 The British Geological Survey (BGS) Geology of Britain Viewer describes the bedrock beneath the site as London Clay – clay, silt and sand.
- 5.2 Nearby borehole logs indicate a clay and silt superficial geology and, as such, infiltration SuDS are not deemed suitable for the site.

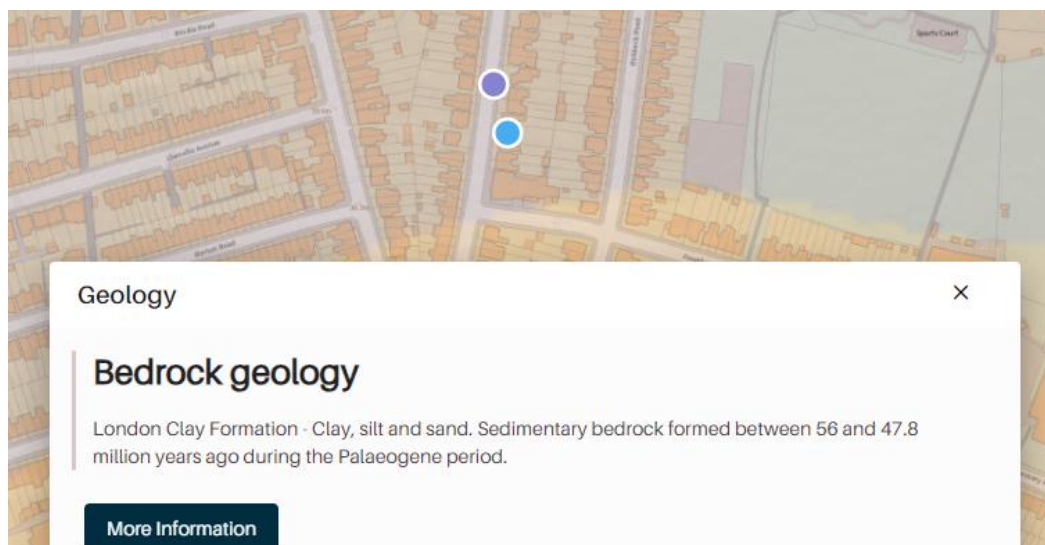


Figure 3: BGS map extract

6.0 CLIMATE CHANGE ALLOWANCES

- 6.1 Making an allowance for climate change in the design of surface water drainage systems will help to minimise vulnerability and provide resilience to flooding and coastal change in the future. Climate Change allowances vary across the UK subject to catchment conditions and are based on climate change projections and different scenarios of carbon dioxide (CO2) emissions to the atmosphere.
- 6.2 Climate change allowances were recently updated by the EA and the climate change allowances are now defined by River Catchment peak rainfall allowances.
- 6.3 The data published on the DEFRA database shows the site located within the London Management Catchment and for residential development (lifespan 100yrs) an upper end allowance of 40% should be applied to rainfall events as the climate change allowance within this region.

7.0 SUSTAINABLE URBAN DRAINAGE (SUDS) ASSESSMENT

- 7.1 In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development.
- 7.2 The management of surface water has been considered in respect to the SuDS hierarchy below as detailed in the CIRIA 753 'The SUDS Manual', Section 3.2.3:

| SUDS DRAINAGE HIERARCHY | | | | |
|-------------------------|----|--|-------------|--|
| | | | Suitability | Comment |
| | 1. | Store rainwater for later use | ✓ | Water butts should be provided to each household to collect rainwater for reuse in gardening activities. |
| | 2. | Use infiltration techniques, such as porous surfaces in non-clay areas | x | Nearby borehole logs indicate a clay and silt superficial geology and, as such, infiltration SuDS are not deemed suitable for the site and further testing is not recommended. |
| | 3. | Attenuate rainwater in ponds or open water features for gradual release | x | Not feasible due to limited site space for such drainage elements. |
| | 4. | Attenuate rainwater by storing in tanks or sealed water features for gradual release | ✓ | Below-ground attenuation proposed. |
| | 5. | Discharge rainwater direct to a watercourse | ✓ | No watercourses are located near the site. |
| | 6. | Discharge rainwater to a surface water sewer/drain | ✓ | Discharges to the Thames Water surface water sewer in Morey Hill road is proposed. |
| | 7. | Discharge rainwater to Combined Sewer | x | |

Table 2: SuDS Drainage Hierarchy

- 7.3 The suitability of SuDS components has been assessed in order to provide a sustainable means of providing the required attenuation volumes. The following components have been assessed as follows in Table 3, below.

| SUITABILITY OF SUDS COMPONENTS | | |
|---------------------------------|---|-------------|
| SuDS Component | Comment | Suitability |
| Infiltrating SuDS | Nearby borehole logs to the site indicate a clay and silt superficial geology and, as such, infiltration SuDS are not deemed suitable for the site. | x |
| Permeable Pavement | Permeable paving is proposed. | ✓ |
| Green / Blue Roofs | Green and/or blue roofs could not be considered for the proposed houses due to the assumed pitched roof type proposed. | x |
| Rainwater Harvesting | Rainwater harvesting could be implemented on site. It is recommended that water butt is provided and water reused in gardening activities. | ✓ |
| Swales | Insufficient space to implement such conveyancing SuDS techniques and not needed. | x |
| Rills and Channels | Such conveyancing SuDS techniques would provide little benefit. | x |
| Bioretention Systems | Bioretention systems or Rain Gardens could be provided for biodiversity and amenity purposes in specific locations around the proposed dwelling, as indicated on the proposed drainage layout. The details should be provided by the landscaping architect to suit the planting requirements of each region. The raingardens surface water attenuation potential was not taken into account in calculations and should be solely provided for biodiversity/amenity reasons. | ✓ |
| Retention Ponds and Wetlands | Insufficient space to implement such SuDS techniques. | x |
| Detention Basins | Insufficient space to implement such SuDS techniques. | x |
| Geocellular Systems | Geocellular crates are proposed to be fitted as a sub-base for the permeable paving at the rear of the dwellings, to increase the overall attenuation capacity of the pavement. | ✓ |
| Proprietary Treatment Systems | Roof runoff from roofs and trafficked roads would receive adequate treatment within the permeable paving structures. | x |
| Filter Drains and Filter Strips | Proposed mainly for runoff interception, treatment and attenuation. | ✓ |

Table 3: Suitability of SuDS Components

8.0 SURFACE WATER DRAINAGE STRATEGY

- 8.1 In accordance with the London Plan, developments are required to use SuDS to reduce both the volume and runoff rates to the sewers, and be as close to the greenfield runoff rates from the equivalent site area.
- 8.2 In order to achieve the lowest off-site runoff rates, the smallest orifice opening of 20 mm, as per the SuDS Manual, has been used in calculations. Filtration has been provided on the drainage network (within the proposed rain gardens) prior to the orifice plate to reduce blockage risk.
- 8.3 Proposed Surface water discharge rates have been calculated below and supporting calculations are included in Appendix II.

| Surface Water Discharge Rates Summary | | | | |
|---------------------------------------|-----------|-----------------------|---------|----------|
| | Area (ha) | Discharge Rates (l/s) | | |
| | | 2 year | 30 year | 100 year |
| Greenfield Runoff Rates | 0.028 | 0.1 | 0.3 | 0.4 |
| Brownfield Runoff Rates | 0.011 | 1.8 | 5.0 | 6.5 |
| Proposed Runoff Rates + 40%CC | 0.028 | 0.5 | 0.5 | 0.6 |

Table 5: Calculated Runoff rates

- 8.4 The proposed drainage scheme uses permeable paving in the patio area (27m²) at the rear of the dwellings. The sub-base of the pavement should be built with high strength geocellular crates (Permavoid or similar), with a depth of 0.3m and 0.95 void ratio, providing 7.7m³ attenuation capacity.
- 8.5 The front gardens of the dwellings should be built as rain gardens with specific soil to suit the vegetation type, as specified by the landscaping architect. The rain gardens have not been included in calculations and should be provided, if possible, to increase the biodiversity/amenity value of the site.
- 8.6 Filter drains have been included in the respective rain gardens to intercept flows, treat runoff and facilitate the use of the 20mm orifice plate flow control. The filter drains should be built with 6-20mm clean crushed stone, trapping all sediments with diameters larger than 20mm. Furthermore, the respective aggregate would provide some additional runoff attenuation capacity to the properties.
- 8.7 Runoff discharges offsite would be controlled by a 20mm diameter orifice plate to a maximum of 0.6 l/s during the 1 in 100 year + 40%CC storm event.
- 8.8 Proposed drainage calculations based on FEH22 rainfall model, 40% climate change allowance and CV of 0.95 are included in Appendix II. A proposed storm drainage strategy plan layout is included in Appendix III.

9.0 WATER QUALITY

- 9.1 Runoff from the roofs and the trafficked areas is largely considered to be uncontaminated. However, in order to reduce the silt load on downstream structure and reduce risk of blockage, it is proposed to include a catchpit with a silt traps upstream of the proposed attenuation structures.
- 9.2 The Pollution Hazard Indices are summarised in Table 4 – Summary of Pollution Hazard Indices for different Land Use below (based on Table 26.2 of The SuDS Manual):

| POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS | | | | |
|---|------------------------|------------------------|--------|--------------|
| LAND USE | Pollution Hazard Level | Total Suspended Solids | Metals | Hydrocarbons |
| Residential Roofs | Very Low | 0.2 | 0.2 | 0.05 |
| Individual Property Driveways | Low | 0.5 | 0.4 | 0.4 |

Table 6: Summary of Pollution hazard Indices for different Land Use

9.3 The Mitigation Indices of the proposed SuDS techniques are summarised in Table 6 below.

| INDICATIVE SuDS MITIGATION INDICES FOR DISCHARGES TO SURFACE WATER | | | |
|--|------------------------|--------|--------------|
| SuDS Component | Total Suspended Solids | Metals | Hydrocarbons |
| Geocellular Crates | - | - | - |
| Permeable Paving | 0.7 | 0.6 | 0.7 |
| Filter Drains | 0.4 | 0.4 | 0.4 |

Table 7: Indicative SuDS Mitigation Indices.

9.4 It can be seen that the Total SuDS Mitigation Index \geq Pollution Hazard Index therefore the water treatment provided by this SuDS train is enough to remove the potential pollutants.

10.0 SCHEDULE OF MAINTENANCE

- 10.1 All onsite SuDS and drainage systems will be privately maintained. A long-term maintenance regime should be agreed with the site owners before adoption.
- 10.2 In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction.
- 10.3 The property owner will be responsible for the management and maintenance of SuDS devices.
- 10.4 General maintenance of key SuDS components are provided below.
- 10.5 Maintenance for the geocellular crates and permeable paving is to be in accordance with manufacturer's recommendations.

| PROPOSED SCHEDULE OF MAINTENANCE FOR BELOW GROUND DRAINAGE | | | | |
|--|-------------------|--|-------------|--|
| Item | Visual Inspection | Cleanse / De-sludge | CCTV Survey | Comments |
| Surface Water Drainage System (pipework, chambers etc.) | 5 years | 10 years | 10 years | Cleansing to be carried as necessary |
| Gullies/Channels | 1 year | 1 year | N/A | Cleansing to be carried as necessary |
| Catchpits | 1 year | 1 year | N/A | Cleansing to be carried as necessary |
| Geo-cellular systems | 5 years | 10 years | 10 years | Cleansing to be carried out as necessary, and in accordance with manufacturers specification. |
| Permeable Block Paving | 1 year | 'Swept' clean of debris every 2 years. | N/A | Refer to block manufacturers guidance for long term maintenance requirements. |
| Orifice Plate | 0.5 year | As required | N/A | Following any significant storm event, the chamber and flow control mechanism should be visually inspected to ensure no blockage has occurred. |

Table 6: Schedule of maintenance for below ground drainage

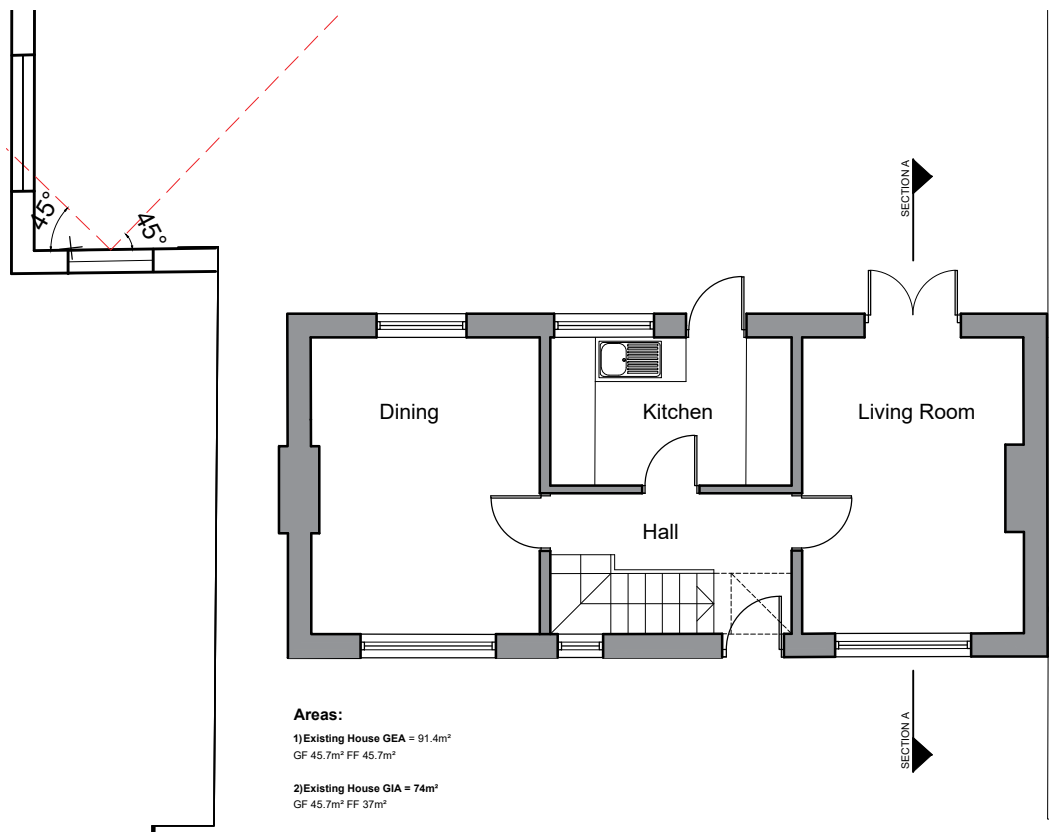
11.0 DESIGNING FOR EXCEEDANCE

- 11.1 Periods of exceedance occur when the rate of surface water runoff exceeds the drainage system capacity. Conveyance within the subbase cannot, generally, be economically or sustainably constructed to the scale required for the most extreme rainfall events. This may result, on occasion, in the surface water runoff exceeding the capacity of the attenuation system.
- 11.2 In situations where extreme rainfall intensity exceeds inlet capacities, or for extreme storm events exceeding the design flood event considered for drainage design, the proposed site levels should direct surface water to the soft landscaped areas within the site and public roads, and away from any existing or proposed building thresholds and neighbouring private properties.
- 11.3 Site levels fall toward the eastern site boundary towards a private property, as per the existing topography. Analysis of the surface water flood maps do not indicate that an accumulation of flows occurs along this boundary and likely runoff flows further to the south along various properties' back gardens and not across the buildings' perimeters. Any flows from the proposed site towards the neighbouring property would be greenfield flows generated in the back gardens.

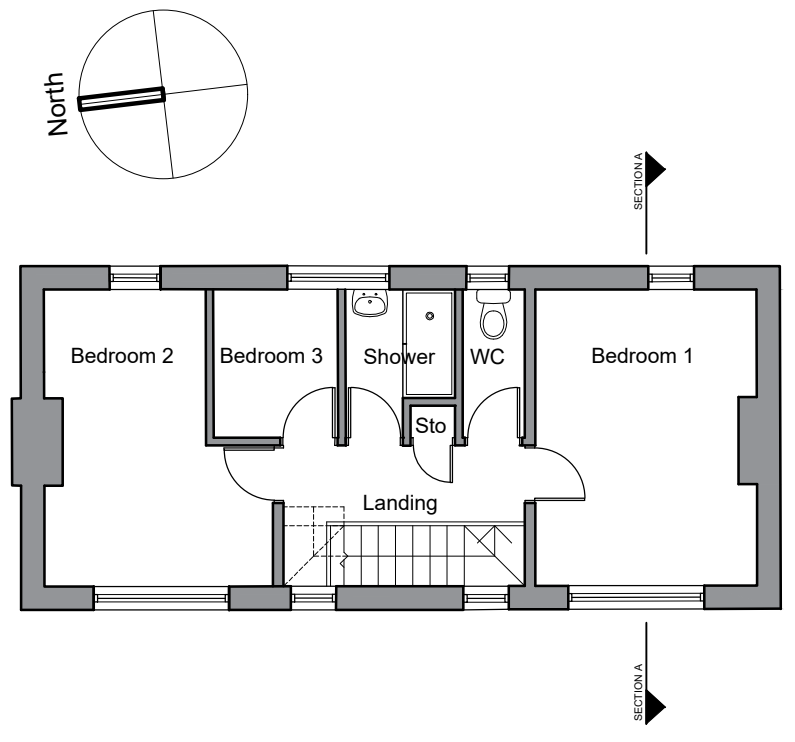
12.0 CONCLUSION

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- 12.10 In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction. The property owner will be responsible for the management and maintenance of SuDS devices. Maintenance for the permeable paving and geocellular crates is to be in accordance with manufacturer's recommendations.

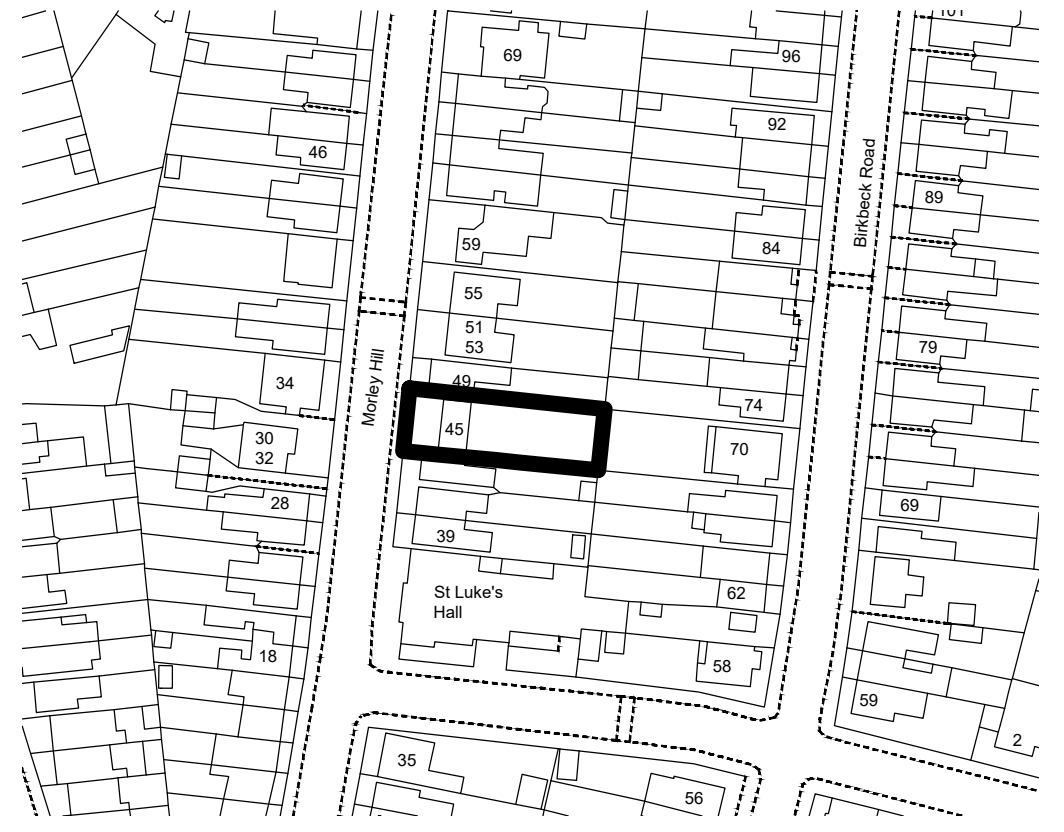
APPENDIX I Architects Plans & Site Informaiton



Ground Floor Plan



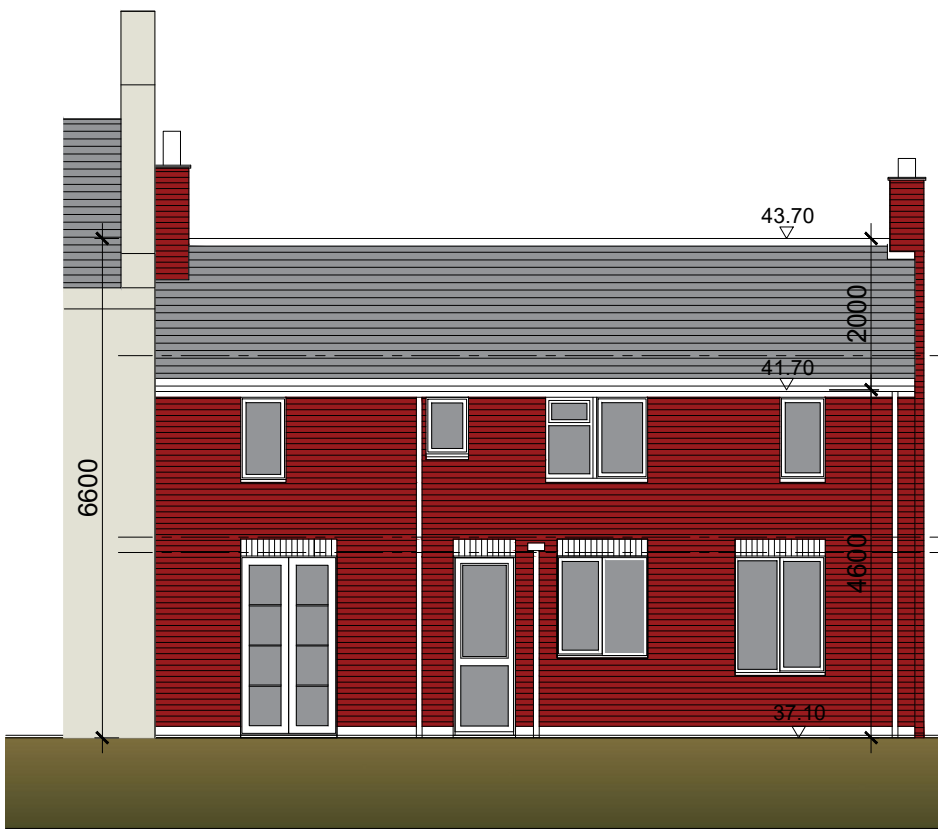
First Floor Plan



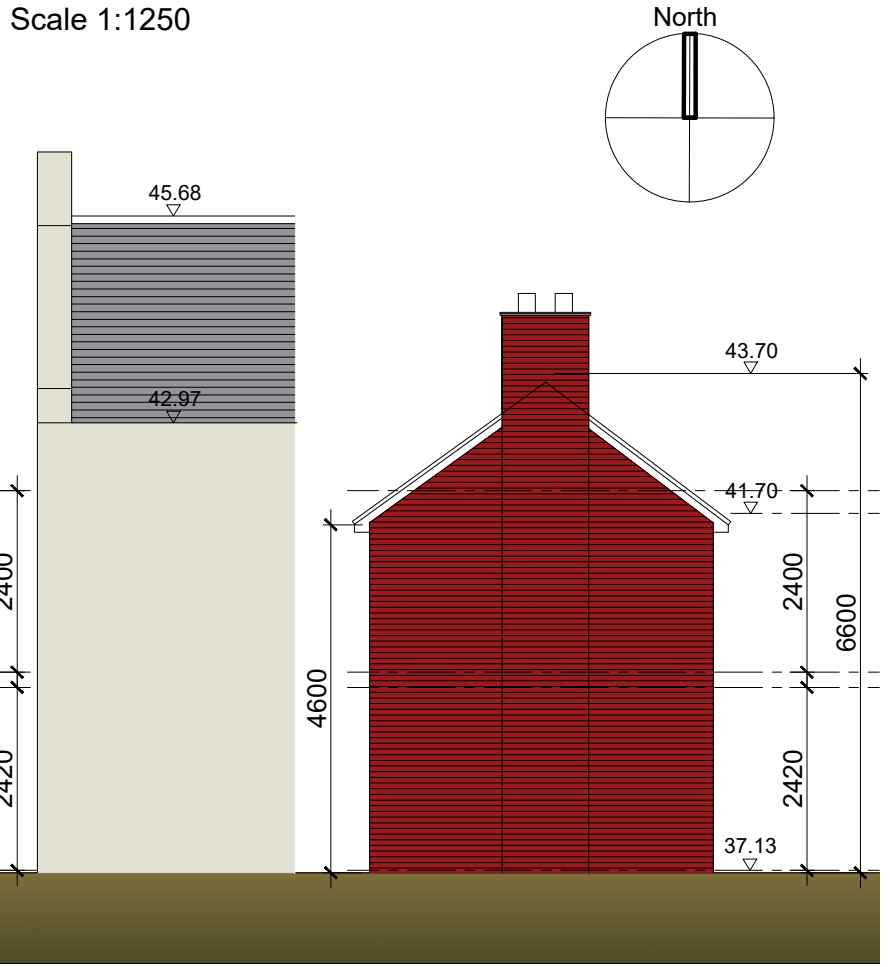
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Front Elevation

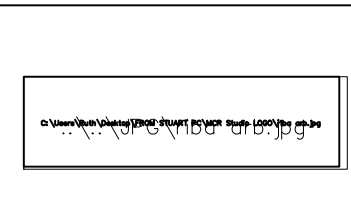


Rear Elevation

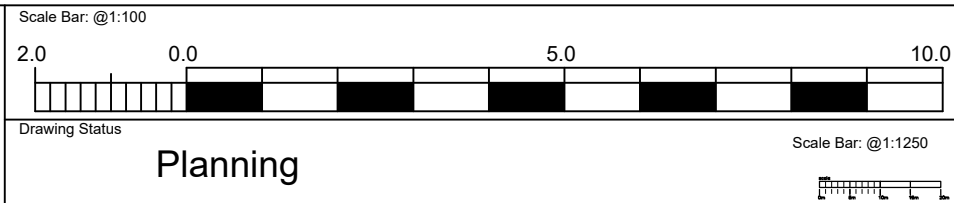


Side Elevation

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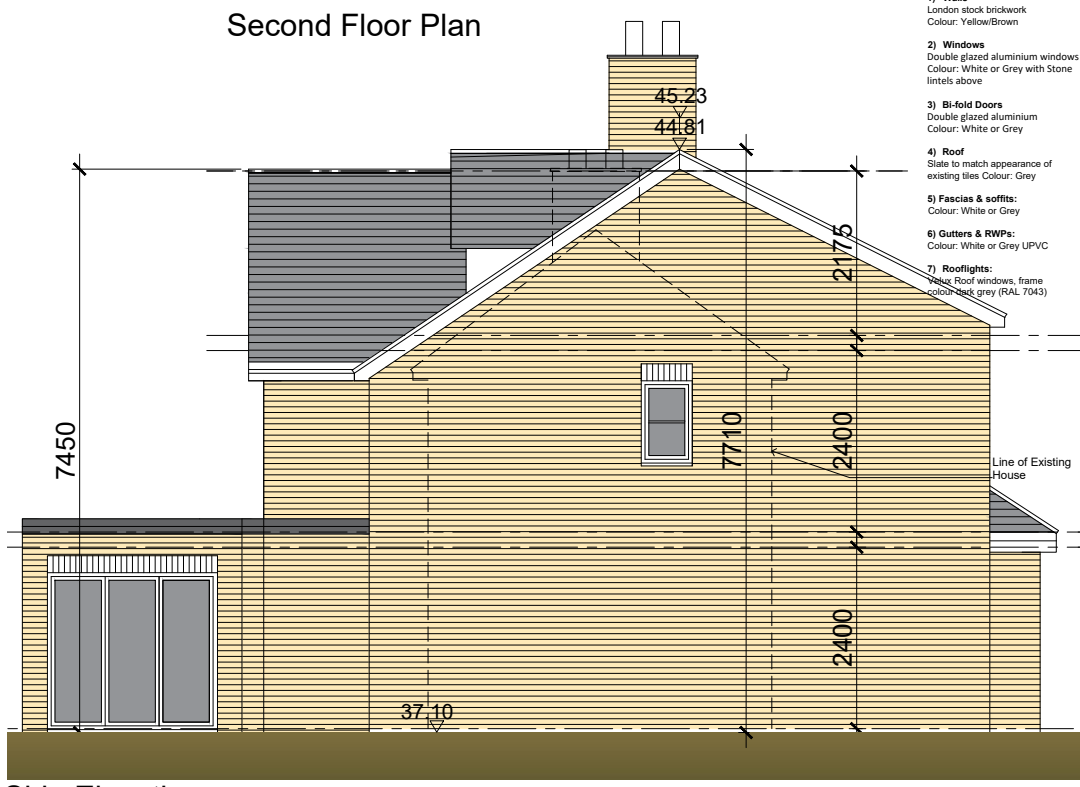
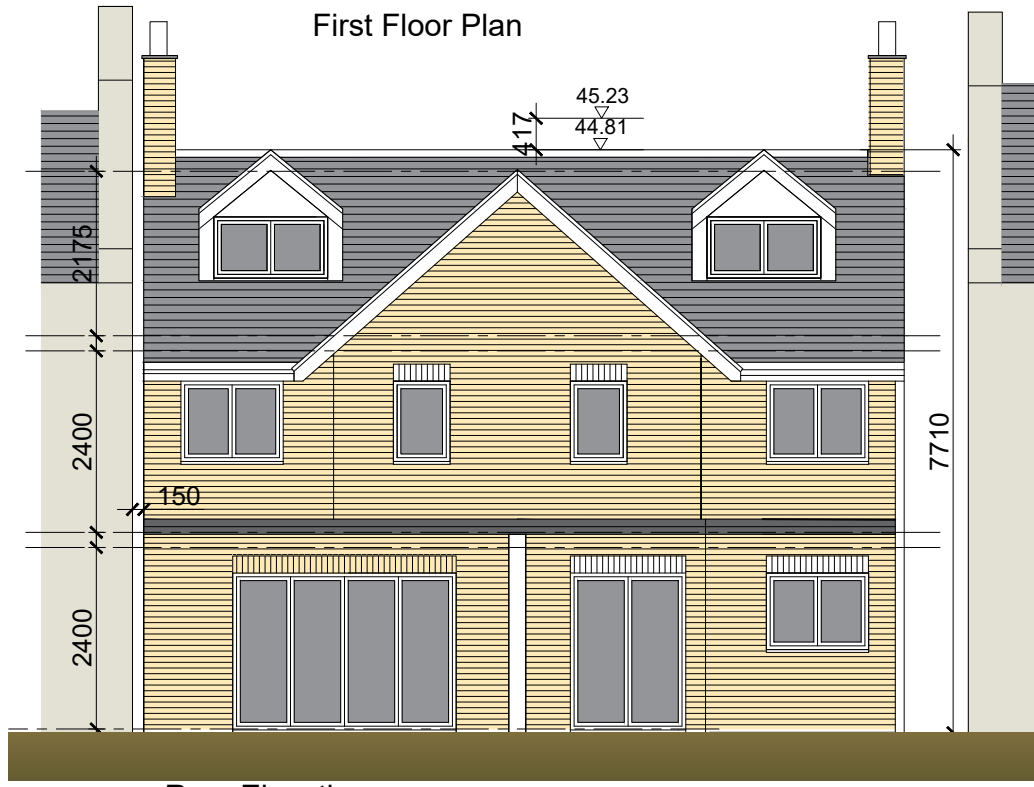
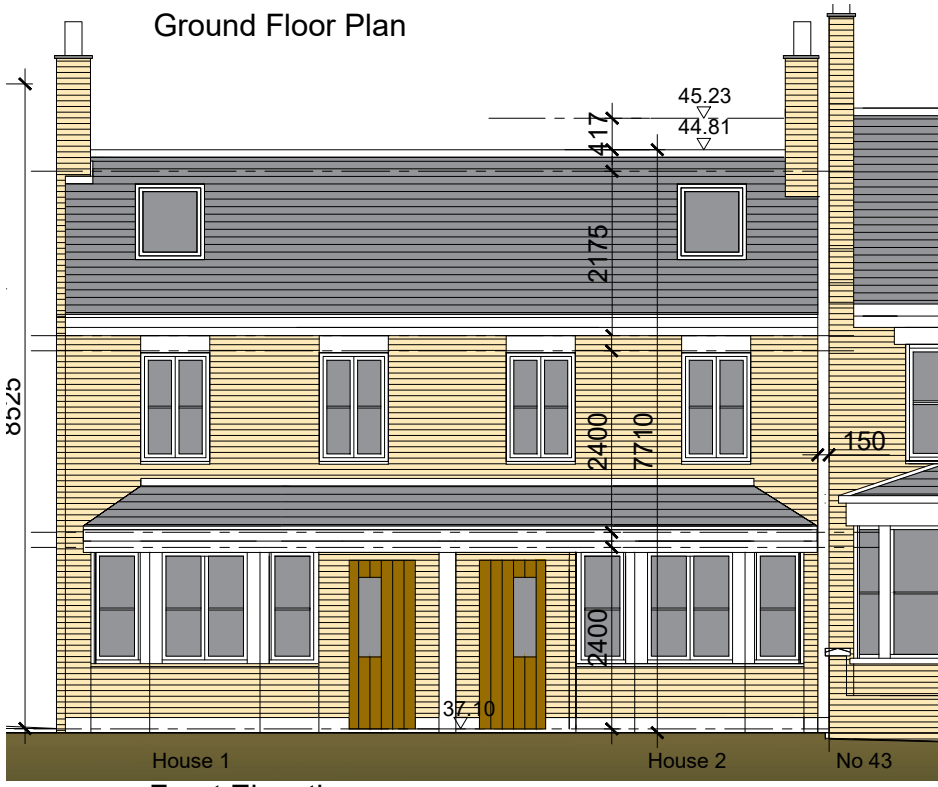
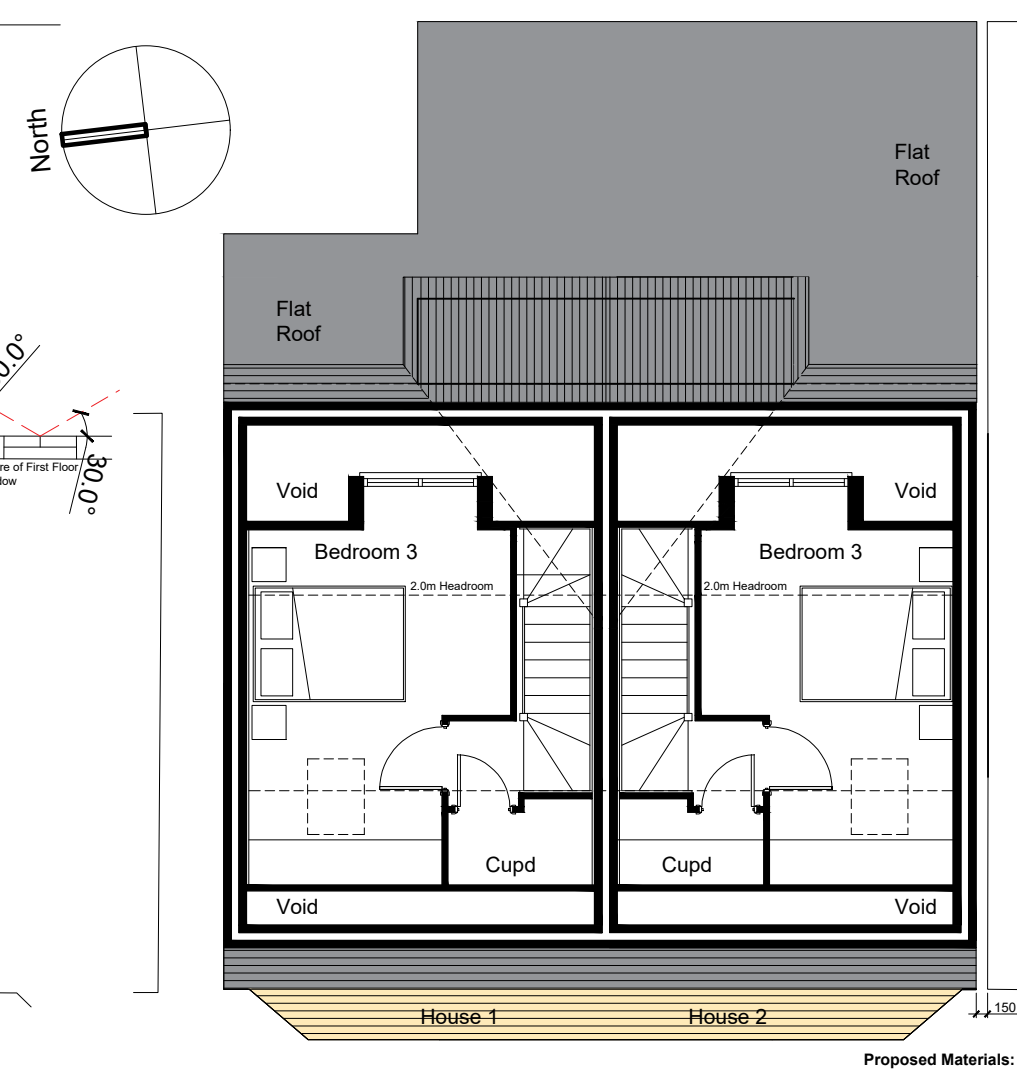
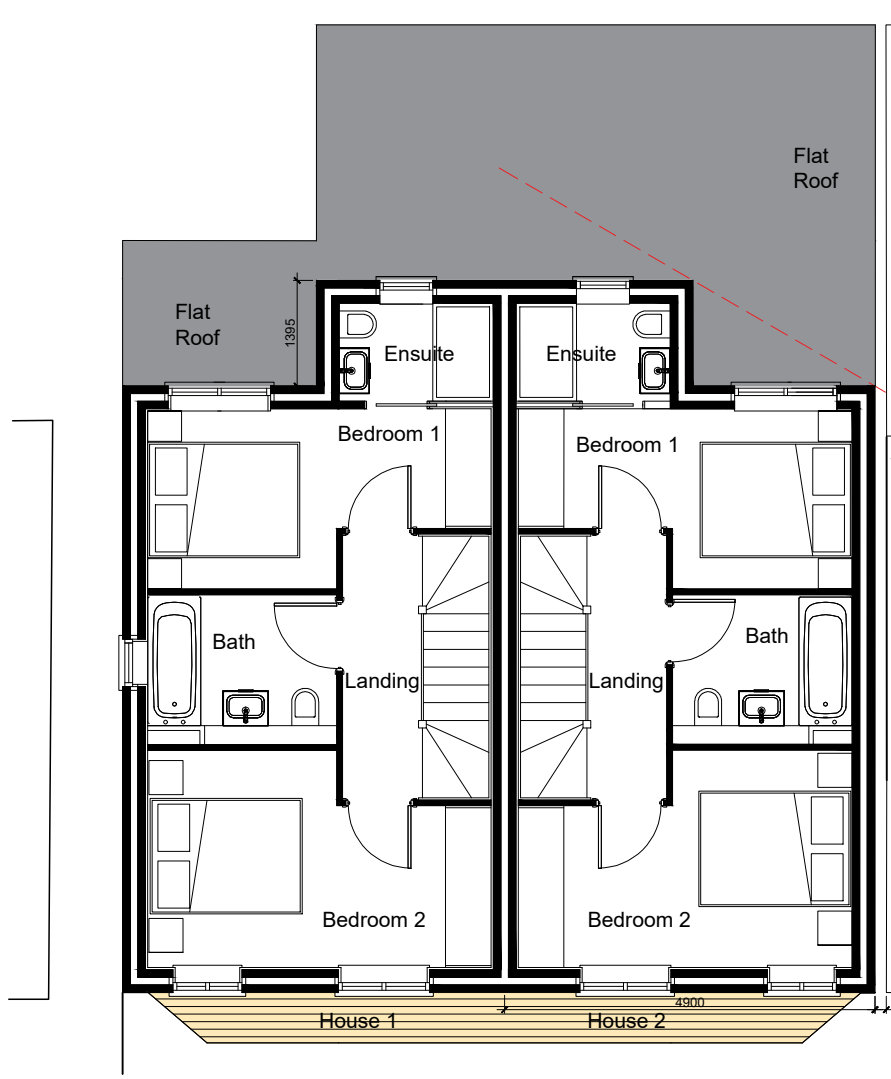
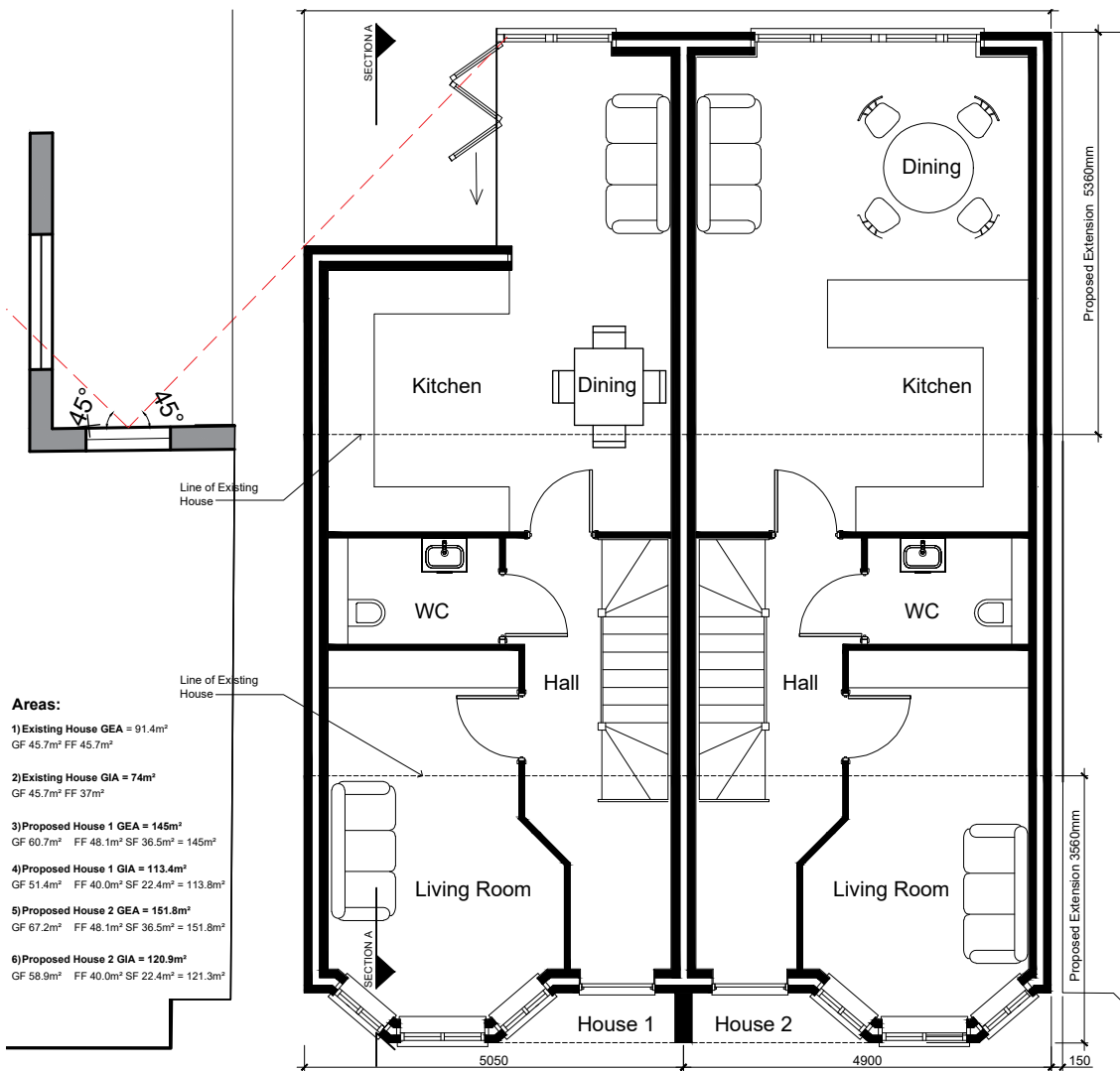
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Proposed Extensions & Alterations to: 45 Morley Hill, Enfield, Hertfordshire EN2 0BL

Sheet Title
Location Plan, Existing Plans and Elevations

Date: July 2022 Scale: 1:1250@A3 1:100@A3

Project No.
149-22

Sheet No.
P01a



- Proposed Materials:**
- 1) Walls: London stock brickwork, Colour: Yellow/Brown
 - 2) Windows: Double glazed aluminium windows, Colour: White or Grey with Stone lintels above
 - 3) Bi-fold Doors: Double glazed aluminium, Colour: White or Grey
 - 4) Roof: Slate to match appearance of existing tiles, Colour: Grey
 - 5) Fascias & soffits: Colour: White or Grey
 - 6) Gutters & RWPs: Colour: White or Grey UPVC
 - 7) Rooflights: New roof windows, frame colour: dark grey (RAL 7043)

Front Elevation

House 1 House 2 No 43

Rear Elevation

Scale Bar: @1:100

2.0 0.0 5.0 10.0

Drawing Status: **Planning**

Side Elevation

Project Title: Proposed Extensions & Alterations to: 45 Morley Hill, Enfield, Hertfordshire EN2 0BL

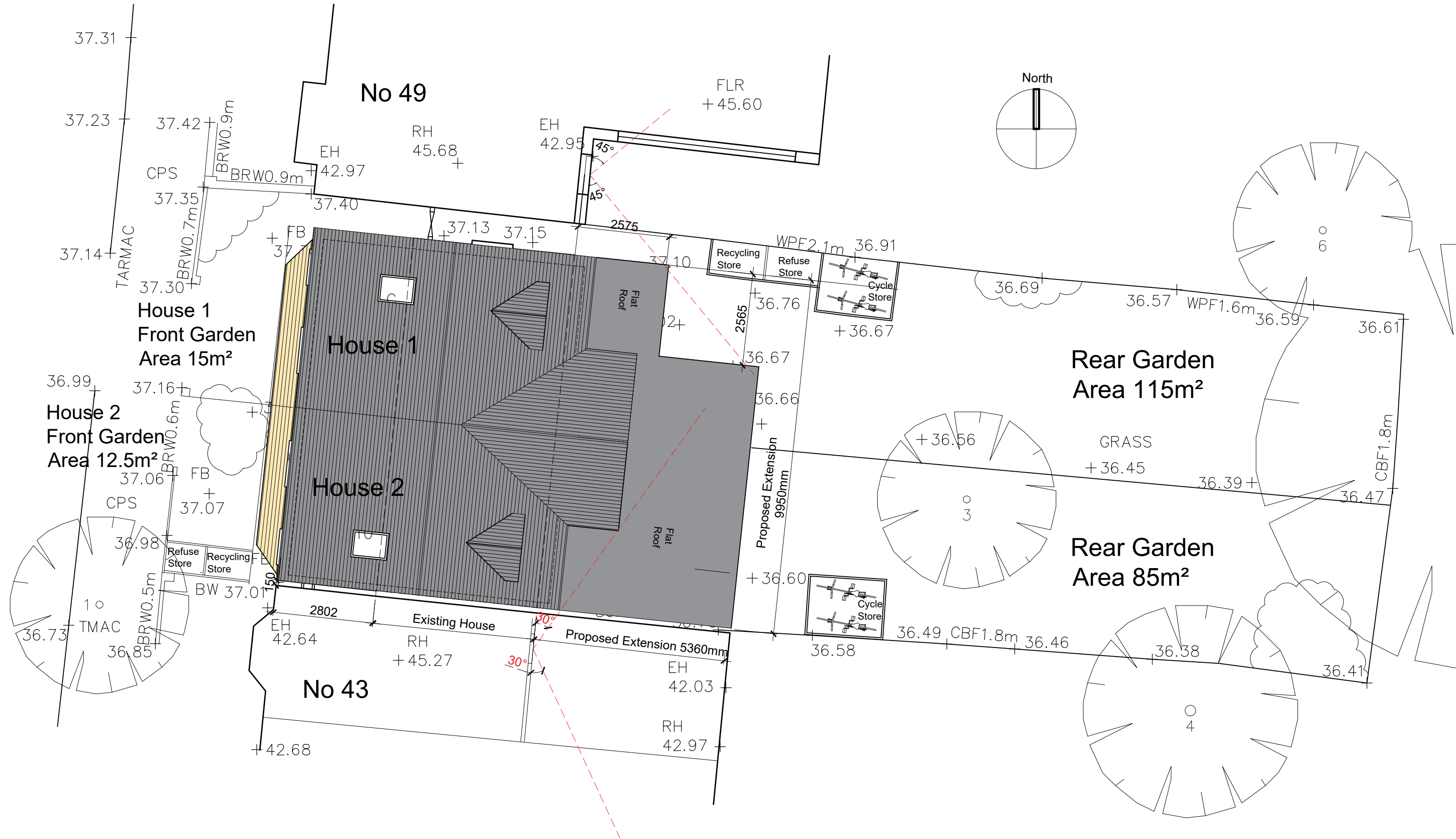
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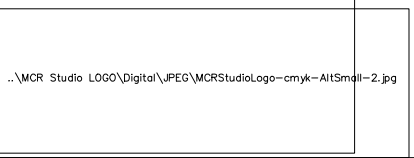
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Project No: 149-22

Sheet No: **P02G**

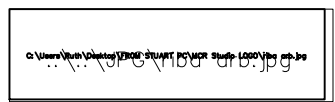
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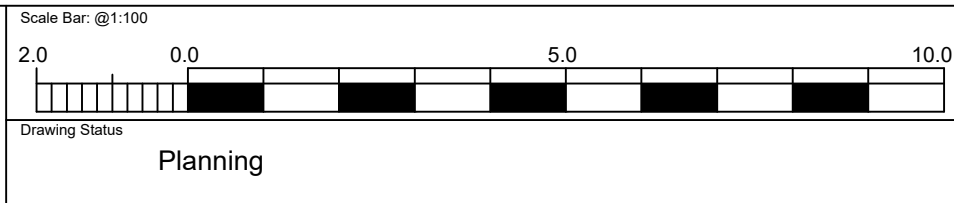


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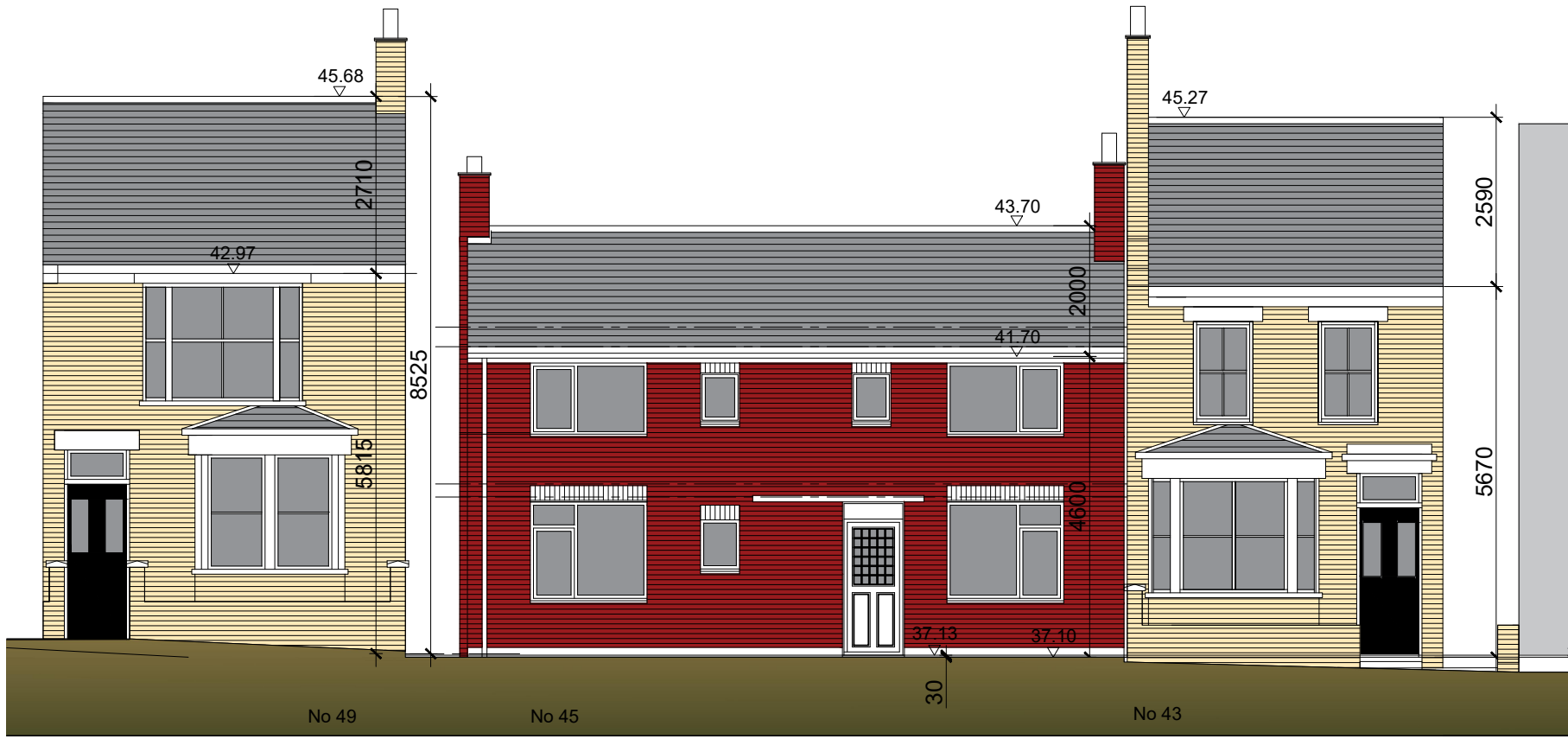
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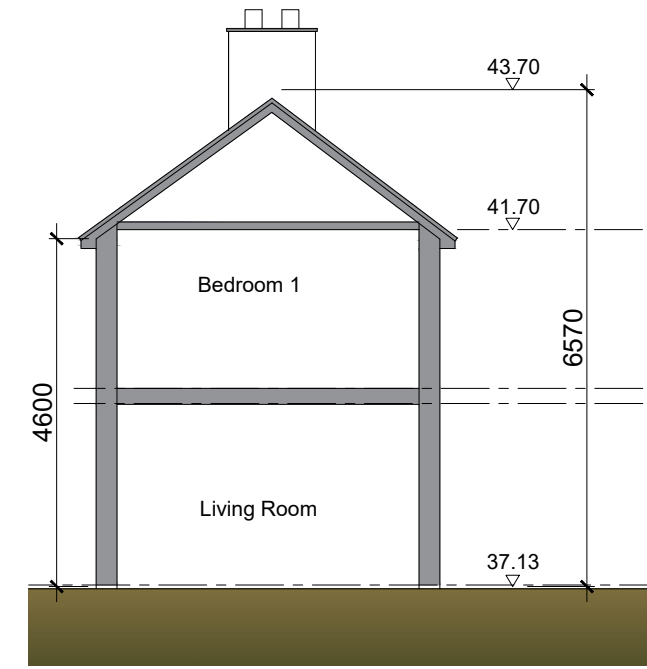
Project Title
Proposed Extensions & Alterations to:
 45 Morley Hill,
 Enfield, Hertfordshire
 EN2 0BL

Sheet Title:
Proposed Site Plan
 Date: July 2022 Scale: 1:100@A3

Project No.
149-22
 Sheet No.
P03B



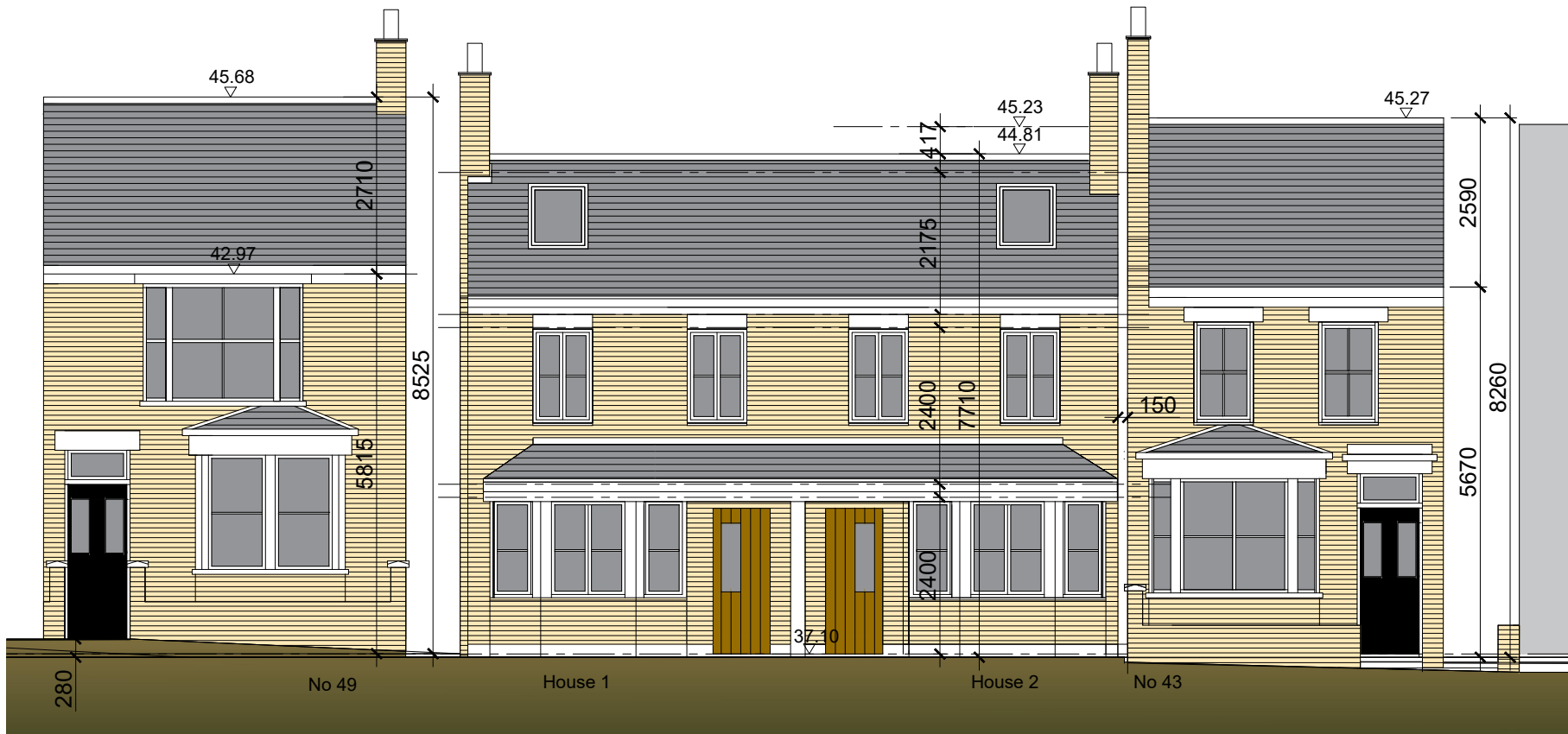
Existing Front Elevation



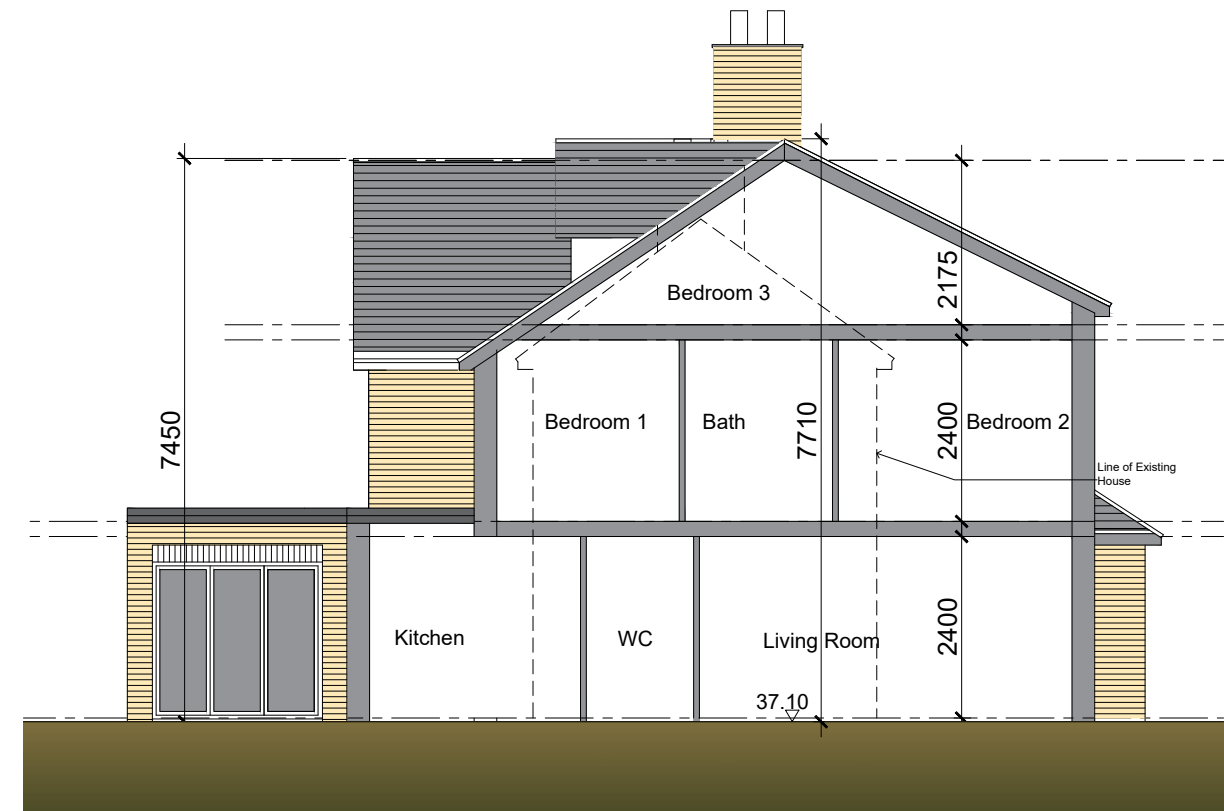
Existing Section

Proposed Materials:

- 1) Walls**
London stock brickwork
Colour: Yellow/Brown
- 2) Windows**
Double glazed aluminium windows
Colour: White or Grey with Stone lintels above
- 3) Bi-fold Doors**
Double glazed aluminium
Colour: White or Grey
- 4) Roof**
Slate to match appearance of existing tiles
Colour: Grey
- 5) Fascias & soffits:**
Colour: White or Grey
- 6) Gutters & RWPs:**
Colour: White or Grey UPVC
- 7) Rooflights:**
Velux Roof windows, frame colour dark grey (RAL 7043)



Proposed Front Elevation



Proposed Section A-A

| | | | | | | |
|---|--|------------------|---|---|--|---|
| <p>T: 01438 352119 E: info@mcrstudio.co.uk Wayside, Rectory Lane, Stevenage, Herts. SG1 4BX</p> | | <p>Revisions</p> | <p>Scale Bar: @1:100</p> <p>Drawing Status: Planning</p> | <p>Project Title Proposed Extensions & Alterations to: 45 Morley Hill, Enfield, Hertfordshire EN2 0BL</p> | <p>Sheet Title: Existing and Proposed Front Elevation in Street Scene & Sections A-A</p> <p>Date: July 2022 Scale: 1:100@A3</p> | <p>Project No. 149-22</p> <p>Sheet No. P05C</p> |
|---|--|------------------|---|---|--|---|

Asset location search



Property Searches

Meridian Civils
62Balsdean Road
BRIGHTON
BN2 6PF

Search address supplied 45 Morley Hill
45
Morley Hill
Enfield
EN2 0BL

Your reference MC0389

Our reference ALS/ALS Standard/2023_4920972

Search date 6 December 2023

Notification of Price Changes

From 1st April 2023 Thames water Property Searches will be increasing the prices of its CON29DW, CommercialDW Drainage & Water Enquiries and Asset Location Searches. Historically costs would rise in line with RPI but as this currently sits at 14.2%, we are capping it at 10%.

Customers will be emailed with the new prices by January 1st 2023.

Any orders received with a higher payment prior to the 1st April 2023 will be non-refundable. For further details on the price increase please visit our website at www.thameswater-propertysearches.co.uk



Thames Water Utilities Ltd
Property Searches, PO Box 3189, Slough SL1 4WW



searches@thameswater.co.uk
www.thameswater-propertysearches.co.uk



0800 009 4540

Search address supplied: 45 Morley Hill, 45, Morley Hill, Enfield, EN2 0BL

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position, size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the address below:

Thames Water Utilities Ltd
Property Searches
PO Box 3189
Slough
SL1 4WW

Email: searches@thameswater.co.uk

Web: www.thameswater-propertysearches.co.uk

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority.

Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners.

This report relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus.

The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

Enclosed is a map showing the approximate positions of our water mains and associated apparatus. Please note that records are not kept of the positions of individual domestic supplies.

For your information, there will be a pressure of at least 10m head at the outside stop valve. If you would like to know the static pressure, please contact our Customer Centre on 0800 316 9800. The Customer Centre can also arrange for a full flow and pressure test to be carried out for a fee.



For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Payment for this Search

A charge will be added to your suppliers account.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. For further information please contact our Customer Centre on Tel: 0845 920 0800. Alternatively, a survey can be arranged, for a fee, through our Customer Centre on the above number.

If you have any questions regarding sewer connections, budget estimates, diversions, building over issues or any other questions regarding operational issues please direct them to our service desk. Which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water operational issues or clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Asset Location Search Sewer Map - ALS/ALS Standard/2023 4920972



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 532774,198121

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2020) with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

| Manhole Reference | Manhole Cover Level | Manhole Invert Level |
|-------------------|---------------------|----------------------|
| 8202 | 39.38 | 37.98 |
| 81CB | n/a | n/a |
| 82CJ | n/a | n/a |
| 8004 | 34.71 | n/a |
| 8003 | 34.82 | n/a |
| 8001 | 34.99 | 33.52 |
| 80DD | n/a | n/a |
| 80DF | n/a | n/a |
| 80DB | n/a | n/a |
| 80EC | n/a | n/a |
| 8101 | 37.06 | 35.15 |
| 60CH | n/a | n/a |
| 6003 | 36.14 | 35.25 |
| 6002 | 36.38 | 34.15 |
| 601A | 36.15 | 33.29 |
| 60CI | n/a | n/a |
| 70CD | n/a | n/a |
| 70CA | n/a | n/a |
| 70CC | n/a | n/a |
| 70CB | n/a | n/a |
| 70BG | n/a | n/a |
| 701A | 34.7 | 33.6 |
| 7003 | 35.8 | 34.58 |
| 71BG | n/a | n/a |
| 71BF | n/a | n/a |
| 71AI | n/a | n/a |
| 71BE | n/a | n/a |
| 71BI | n/a | n/a |
| 71BD | n/a | n/a |
| 71BA | n/a | n/a |
| 70AJ | n/a | n/a |
| 70BE | n/a | n/a |
| 70BB | n/a | n/a |
| 80EB | n/a | n/a |
| 80CD | n/a | n/a |
| 8002 | 34.81 | 32.98 |
| 7104 | n/a | n/a |
| 7103 | n/a | n/a |
| 7102 | n/a | n/a |
| 7101 | n/a | n/a |
| 721G | n/a | n/a |
| 721F | n/a | n/a |
| 7203 | 40.22 | 38.77 |
| 7204 | 41.21 | 40.55 |
| 7205 | 41.18 | 40.14 |
| 7202 | 40.6 | 39.53 |
| 7216 | n/a | n/a |

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Asset Location Search - Sewer Key

Public Sewer Types (Operated and maintained by Thames Water)

- Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
- Surface Water Sewer:** A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.
- Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
- Storm Sewer
- Sludge Sewer
- Foul Trunk Sewer
- Surface Trunk Sewer
- Combined Trunk Sewer
- Foul Rising Main
- Surface Water Rising Main
- Combined Rising Main
- Vacuum
- Thames Water Proposed
- Vent Pipe
- Gallery

Other Sewer Types (Not operated and maintained by Thames Water)

- Sewer
- Culverted Watercourse
- Proposed
- Decommissioned Sewer
- Content of this drainage network is currently unknown
- Ownership of this drainage network is currently unknown

Notes:

- 1) All levels associated with the plans are to Ordnance Datum Newlyn.
- 2) All measurements on the plan are metric.
- 3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow.
- 4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve
- Meter
- Dam Chase
- Vent
- Fitting

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

- Ancillary
- Drop Pipe
- Control Valve
- Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet
- Outfall
- Undefined End

Other Symbols

Symbols used on maps which do not fall under other general categories.

- Change of Characteristic Indicator
- Public / Private Pumping Station
- Invert Level
- Summit

Areas

Lines denoting areas of underground surveys, etc.

- Agreement
- Chamber
- Operational Site

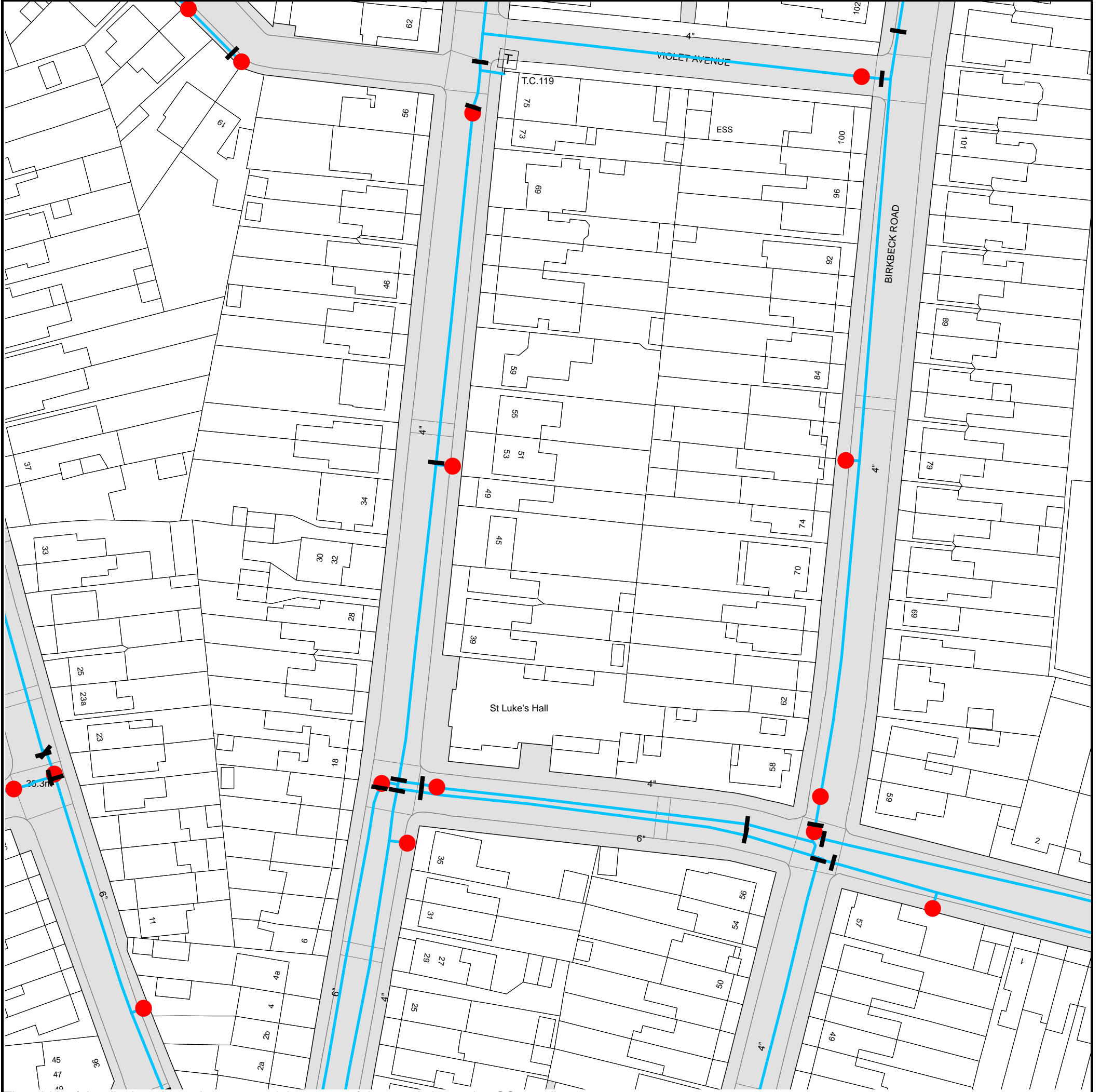
Ducts or Crossings

- Casement
 - Conduit Bridge
 - Subway
 - Tunnel
- Ducts may contain high voltage cables. Please check with Thames Water.

5) 'na' or '0' on a manhole indicates that data is unavailable.

6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology, please contact Property Searches on 0800 009 4540.

Asset Location Search Water Map - ALS/ALS Standard/2023 4920972



The width of the displayed area is 200 m and the centre of the map is located at OS coordinates 532774, 198121.








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Asset Location Search - Water Key

Water Pipes (Operated & Maintained by Thames Water)

-  **Distribution Main:** The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.
-  **Trunk Main:** A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.
-  **Supply Main:** A supply main indicates that the water main is used as a supply for a single property or group of properties.
-  **Fire Main:** Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.
-  **Metered Pipe:** A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.
-  **Transmission Tunnel:** A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.
-  **Proposed Main:** A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

| PIPE DIAMETER | DEPTH BELOW GROUND |
|-----------------------------|--------------------|
| Up to 300mm (12") | 900mm (3') |
| 300mm - 600mm (12" - 24") | 1100mm (3' 8") |
| 600mm and bigger (24" plus) | 1200mm (4') |

Valves

-  General Purpose Valve
-  Air Valve
-  Pressure Control Valve
-  Customer Valve

Hydrants

-  Single Hydrant

Meters

-  Meter

End Items



Symbol indicating what happens at the end of a water main.

-  Blank Flange
-  Capped End
-  Emptying Pit
-  Undefined End
-  Manifold
-  Customer Supply
-  Fire Supply



Operational Sites

-  Booster Station
-  Other
-  Other (Proposed)
-  Pumping Station
-  Service Reservoir
-  Shaft Inspection
-  Treatment Works
-  Unknown
-  Water Tower

Other Symbols

-  Data Logger
-  **Caseament:** Ducts may contain high voltage cables. Please check with Thames Water.

Other Water Pipes (Not Operated or Maintained by Thames Water)

-  **Other Water Company Main:** Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.
-  **Private Main:** Indicates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

Payment Terms and Conditions

All sales are made in accordance with Thames Water Utilities Limited (TWUL) standard terms and conditions unless previously agreed in writing.

1. All goods remain in the property of Thames Water Utilities Ltd until full payment is received.
2. Provision of service will be in accordance with all legal requirements and published TWUL policies.
3. All invoices are strictly due for payment within 14 days of the date of the invoice. Any other terms must be accepted/agreed in writing prior to provision of goods or service or will be held to be invalid.
4. Penalty interest may be invoked by TWUL in the event of unjustifiable payment delay. Interest charges will be in line with UK Statute Law 'The Late Payment of Commercial Debts (Interest) Act 1998'.
5. Interest will be charged in line with current Court Interest Charges, if legal action is taken.
6. A charge may be made at the discretion of the company for increased administration costs.

A copy of Thames Water's standard terms and conditions are available from the Commercial Billing Team (cashoperations@thameswater.co.uk).

We publish several Codes of Practice including a guaranteed standards scheme. You can obtain copies of these leaflets by calling us on 0800 316 9800.

If you are unhappy with our service, you can speak to your original goods or customer service provider. If you are still not satisfied with the outcome provided, we will refer the matter to a Senior Manager for resolution who will provide you with a response.

If you are still dissatisfied with our final response, and in certain circumstances such as you are buying a residential property or commercial property within certain parameters, The Property Ombudsman will investigate your case and give an independent view. The Ombudsman can award compensation of up to £25,000 to you if he finds that you have suffered actual financial loss and/or aggravation, distress, or inconvenience because of your search not keeping to the Code. Further information can be obtained by visiting www.tpos.co.uk or by sending an email to admin@tpos.co.uk.

If the Goods or Services covered by this invoice falls under the regulation of the 1991 Water Industry Act, and you remain dissatisfied you can refer your complaint to Consumer Council for Water on 0300 034 2222 or write to them at Consumer Council for Water, 1st Floor, Victoria Square House, Victoria Square, Birmingham, B2 4AJ.

Ways to pay your bill

| Credit Card | BACS Payment | Telephone Banking |
|--|---|---|
| Please Call 0800 009 4540 quoting your invoice number starting CBA or ADS | Account number 90478703 Sort code 60-00-01 A remittance advice must be sent to: Thames Water Utilities Ltd., PO Box 3189, Slough SL1 4WW. or email ps.billing@thameswater.co.uk | By calling your bank and quoting: Account number 90478703 Sort code 60-00-01 and your invoice number |

Thames Water Utilities Ltd Registered in England & Wales No. 2366661 Registered Office Clearwater Court, Vastern Rd, Reading, Berks, RG1 8DB.

APPENDIX II Hydraulic Calculations

Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Node Type | Manhole Type | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|----------------------------|-----------|---------------|-----------------|-----------|--------------|---------------|-------------|--------------|-----------|
| ✓ SWMH 1 | 0.012 | 5.00 | 37.100 | Manhole | Adoptable | 450 | -28.761 | 35.412 | 0.587 |
| ✓ Existing Rates | 0.011 | 5.00 | 10.000 | Manhole | Adoptable | 1200 | 10.456 | 92.880 | 1.300 |
| ✓ Existing outfall (dummy) | | | 10.000 | Junction | | | 26.616 | 93.020 | 1.576 |
| ✓ SWMH 2 | 0.003 | 5.00 | 37.000 | Junction | | | -40.674 | 36.154 | 0.567 |
| ✓ SWMH 3 | 0.002 | 5.00 | 37.000 | Junction | | | -41.074 | 27.802 | 0.623 |
| ✓ OUFALL TO SW SEWER | | | 36.800 | Manhole | Adoptable | 300 | -46.334 | 27.312 | 0.489 |
| ✓ Patio Permeable Paving | | 5.00 | 37.100 | Junction | | | -28.882 | 34.377 | 0.580 |

Simulation Settings

| | | | | | | | |
|----------------------|--------|------------------------|----------|---|------|------------------------|-----|
| Rainfall Methodology | FEH-22 | Analysis Speed | Detailed | Additional Storage (m ³ /ha) | 20.0 | 30 year (l/s) | 0.3 |
| Summer CV | 0.950 | Skip Steady State | x | Check Discharge Rate(s) | ✓ | 100 year (l/s) | 0.4 |
| Winter CV | 0.950 | Drain Down Time (mins) | 240 | 2 year (l/s) | 0.1 | Check Discharge Volume | x |

Storm Durations

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

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) | Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 2 | 0 | 0 | 0 | 30 | 40 | 0 | 0 |
| 2 | 40 | 0 | 0 | 100 | 0 | 0 | 0 |
| 30 | 0 | 0 | 0 | 100 | 40 | 0 | 0 |

Pre-development Discharge Rate

| | | | | | | | |
|------------------------------|------------|----------------------|------|------------------------|------|------------------|-----|
| Site Makeup | Greenfield | Soil Index | 4 | Growth Factor 30 year | 2.40 | Q 2 year (l/s) | 0.1 |
| Greenfield Method | IH124 | SPR | 0.47 | Growth Factor 100 year | 3.19 | Q 30 year (l/s) | 0.3 |
| Positively Drained Area (ha) | 0.028 | Region | 6 | Betterment (%) | 0 | Q 100 year (l/s) | 0.4 |
| SAAR (mm) | 644 | Growth Factor 2 year | 0.88 | QBar | 0.1 | | |

Node SWMH 3 Online Orifice Control

| | | | | | |
|--------------------------|---|------------------|--------|-----------------------|-------|
| Flap Valve | x | Invert Level (m) | 36.377 | Discharge Coefficient | 0.600 |
| Replaces Downstream Link | ✓ | Diameter (m) | 0.020 | | |

Node Patio Permeable Paving Depth/Area Storage Structure

| | | | | | |
|-----------------------------|---------|---------------|------|---------------------------|--------|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 36.670 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 0.95 | Time to half empty (mins) | 228 |

| Depth (m) | Area (m ²) | Inf Area (m ²) | Depth (m) | Area (m ²) | Inf Area (m ²) |
|-----------|------------------------|----------------------------|-----------|------------------------|----------------------------|
| 0.000 | 27.0 | 0.0 | 0.300 | 27.0 | 0.0 |

Node SWMH 2 Carpark Storage Structure

| | | | | | | |
|-----------------------------|---------|---------------------------|--------|-------------|--------|---------------|
| Base Inf Coefficient (m/hr) | 0.00000 | Porosity | 0.30 | Width (m) | 0.400 | Depth (m) |
| Side Inf Coefficient (m/hr) | 0.00000 | Invert Level (m) | 36.433 | Length (m) | 3.000 | Inf Depth (m) |
| Safety Factor | 2.0 | Time to half empty (mins) | | Slope (1:X) | 9999.0 | |

Node SWMH 3 Carpark Storage Structure

| | | | | | | | |
|-----------------------------|---------|---------------------------|--------|-------------|--------|---------------|-------|
| Base Inf Coefficient (m/hr) | 0.00000 | Porosity | 0.30 | Width (m) | 1.700 | Depth (m) | 0.690 |
| Side Inf Coefficient (m/hr) | 0.00000 | Invert Level (m) | 36.377 | Length (m) | 2.500 | Inf Depth (m) | |
| Safety Factor | 2.0 | Time to half empty (mins) | | Slope (1:X) | 9999.0 | | |

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 120 minute summer | SWMH 1 | 82 | 36.671 | 0.158 | 1.0 | 0.0888 | 0.0000 | SURCHARGED |
| 15 minute summer | Existing Rates | 10 | 8.732 | 0.032 | 1.8 | 0.0422 | 0.0000 | OK |
| 15 minute summer | Existing outfall (dummy) | 10 | 8.456 | 0.032 | 1.8 | 0.0000 | 0.0000 | OK |
| 120 minute summer | SWMH 2 | 82 | 36.671 | 0.238 | 1.0 | 0.0589 | 0.0000 | SURCHARGED |
| 120 minute summer | SWMH 3 | 80 | 36.671 | 0.294 | 1.1 | 0.1344 | 0.0000 | SURCHARGED |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.4 | 0.0000 | 0.0000 | OK |
| 120 minute summer | Patio Permeable Paving | 82 | 36.671 | 0.151 | 0.3 | 0.0372 | 0.0000 | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|---------------|--------------------|
| 120 minute summer | SWMH 1 | 1.001 | SWMH 2 | 0.8 | 0.297 | 0.055 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 1.8 | 0.808 | 0.223 | 0.0353 | 0.8 |
| 120 minute summer | SWMH 2 | 1.002 | SWMH 3 | 0.9 | 0.287 | 0.063 | 0.1472 | |
| 120 minute summer | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.4 | | | | 2.6 |
| 120 minute summer | Patio Permeable Paving | 1.000 | SWMH 1 | -0.3 | -0.077 | -0.022 | 0.0183 | |

Results for 2 year +40% CC Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 180 minute summer | SWMH 1 | 124 | 36.698 | 0.185 | 1.3 | 0.1041 | 0.0000 | SURCHARGED |
| 15 minute summer | Existing Rates | 10 | 8.740 | 0.040 | 2.6 | 0.0514 | 0.0000 | OK |
| 15 minute summer | Existing outfall (dummy) | 10 | 8.463 | 0.039 | 2.5 | 0.0000 | 0.0000 | OK |
| 180 minute summer | SWMH 2 | 124 | 36.698 | 0.265 | 0.8 | 0.0673 | 0.0000 | SURCHARGED |
| 180 minute summer | SWMH 3 | 124 | 36.698 | 0.321 | 0.8 | 0.1552 | 0.0000 | SURCHARGED |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.5 | 0.0000 | 0.0000 | OK |
| 180 minute summer | Patio Permeable Paving | 124 | 36.698 | 0.178 | 1.2 | 0.7388 | 0.0000 | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|---------------|--------------------|
| 180 minute summer | SWMH 1 | 1.001 | SWMH 2 | 0.6 | 0.303 | 0.040 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 2.5 | 0.892 | 0.321 | 0.0460 | 1.1 |
| 180 minute summer | SWMH 2 | 1.002 | SWMH 3 | 0.7 | 0.246 | 0.048 | 0.1472 | |
| 180 minute summer | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.5 | | | | 4.3 |
| 180 minute summer | Patio Permeable Paving | 1.000 | SWMH 1 | -1.2 | -0.070 | -0.085 | 0.0183 | |

Results for 30 year Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 120 minute summer | SWMH 1 | 94 | 36.776 | 0.263 | 2.8 | 0.1480 | 0.0000 | SURCHARGED |
| 15 minute summer | Existing Rates | 10 | 8.759 | 0.059 | 5.1 | 0.0770 | 0.0000 | OK |
| 15 minute summer | Existing outfall (dummy) | 10 | 8.482 | 0.058 | 5.0 | 0.0000 | 0.0000 | OK |
| 120 minute summer | SWMH 2 | 94 | 36.776 | 0.343 | 0.9 | 0.0933 | 0.0000 | FLOOD RISK |
| 120 minute summer | SWMH 3 | 94 | 36.776 | 0.399 | 0.8 | 0.2222 | 0.0000 | FLOOD RISK |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.5 | 0.0000 | 0.0000 | OK |
| 120 minute summer | Patio Permeable Paving | 94 | 36.776 | 0.256 | 2.7 | 2.7408 | 0.0000 | SURCHARGED |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|---------------|--------------------|
| 120 minute summer | SWMH 1 | 1.001 | SWMH 2 | 0.6 | 0.319 | 0.041 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 5.0 | 1.059 | 0.637 | 0.0770 | 2.2 |
| 120 minute summer | SWMH 2 | 1.002 | SWMH 3 | 0.7 | 0.323 | 0.047 | 0.1472 | |
| 120 minute summer | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.5 | | | | 6.9 |
| 120 minute summer | Patio Permeable Paving | 1.000 | SWMH 1 | -2.7 | -0.152 | -0.185 | 0.0183 | |

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|---------------|------------|------------|
| 180 minute summer | SWMH 1 | 140 | 36.853 | 0.340 | 2.9 | 0.1909 | 0.0000 | FLOOD RISK |
| 15 minute summer | Existing Rates | 10 | 8.776 | 0.076 | 7.2 | 0.0989 | 0.0000 | OK |
| 15 minute summer | Existing outfall (dummy) | 10 | 8.498 | 0.074 | 7.1 | 0.0000 | 0.0000 | OK |
| 180 minute summer | SWMH 2 | 140 | 36.853 | 0.420 | 0.6 | 0.1214 | 0.0000 | FLOOD RISK |
| 180 minute summer | SWMH 3 | 140 | 36.853 | 0.476 | 0.7 | 0.2989 | 0.0000 | FLOOD RISK |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.5 | 0.0000 | 0.0000 | OK |
| 180 minute summer | Patio Permeable Paving | 140 | 36.853 | 0.333 | 2.8 | 4.6998 | 0.0000 | FLOOD RISK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m³) | Discharge Vol (m³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|---------------|--------------------|
| 180 minute summer | SWMH 1 | 1.001 | SWMH 2 | 0.5 | 0.252 | 0.037 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 7.1 | 1.126 | 0.893 | 0.1016 | 3.1 |
| 180 minute summer | SWMH 2 | 1.002 | SWMH 3 | 0.6 | 0.354 | 0.043 | 0.1472 | |
| 180 minute summer | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.6 | | | | 10.9 |
| 180 minute summer | Patio Permeable Paving | 1.000 | SWMH 1 | -2.8 | -0.157 | -0.191 | 0.0183 | |

Results for 100 year Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 120 minute winter | SWMH 1 | 112 | 36.830 | 0.317 | 2.4 | 0.1782 | 0.0000 | FLOOD RISK |
| 15 minute summer | Existing Rates | 10 | 8.771 | 0.071 | 6.6 | 0.0922 | 0.0000 | OK |
| 15 minute summer | Existing outfall (dummy) | 10 | 8.493 | 0.069 | 6.5 | 0.0000 | 0.0000 | OK |
| 120 minute winter | SWMH 2 | 112 | 36.830 | 0.397 | 0.8 | 0.1128 | 0.0000 | FLOOD RISK |
| 120 minute winter | SWMH 3 | 112 | 36.830 | 0.453 | 0.9 | 0.2750 | 0.0000 | FLOOD RISK |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.5 | 0.0000 | 0.0000 | OK |
| 120 minute winter | Patio Permeable Paving | 112 | 36.830 | 0.310 | 2.3 | 4.1189 | 0.0000 | FLOOD RISK |

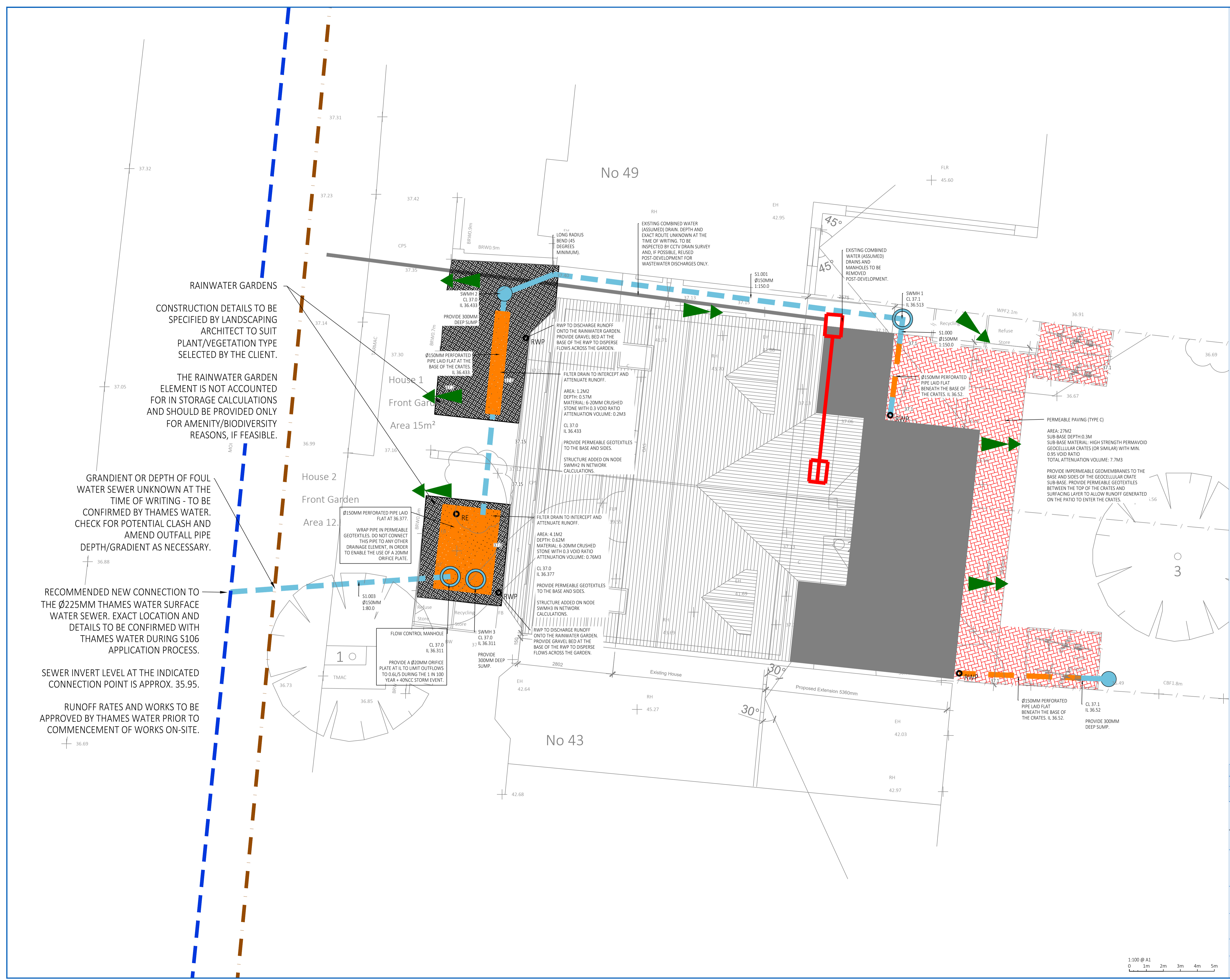
| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) | Discharge Vol (m ³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|----------------------------|---------------------------------|
| 120 minute winter | SWMH 1 | 1.001 | SWMH 2 | 0.5 | 0.343 | 0.037 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 6.5 | 1.112 | 0.822 | 0.0946 | 2.8 |
| 120 minute winter | SWMH 2 | 1.002 | SWMH 3 | 0.8 | 0.286 | 0.056 | 0.1472 | |
| 120 minute winter | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.6 | | | | 8.8 |
| 120 minute winter | Patio Permeable Paving | 1.000 | SWMH 1 | -2.3 | -0.130 | -0.158 | 0.0183 | |

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.22%

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m ³) | Flood (m ³) | Status |
|-------------------|--------------------------|-------------|-----------|-----------|--------------|----------------------------|-------------------------|------------|
| 240 minute summer | SWMH 1 | 176 | 36.936 | 0.423 | 3.1 | 0.2377 | 0.0000 | FLOOD RISK |
| 15 minute summer | Existing Rates | 11 | 8.850 | 0.150 | 9.2 | 0.1945 | 0.0000 | SURCHARGED |
| 15 minute summer | Existing outfall (dummy) | 11 | 8.515 | 0.091 | 8.5 | 0.0000 | 0.0000 | OK |
| 240 minute summer | SWMH 2 | 176 | 36.936 | 0.503 | 0.6 | 0.1550 | 0.0000 | FLOOD RISK |
| 240 minute summer | SWMH 3 | 176 | 36.936 | 0.559 | 0.7 | 0.3950 | 0.0000 | FLOOD RISK |
| 15 minute summer | OUFALL TO SW SEWER | 1 | 36.311 | 0.000 | 0.6 | 0.0000 | 0.0000 | OK |
| 240 minute summer | Patio Permeable Paving | 176 | 36.936 | 0.416 | 3.0 | 6.8339 | 0.0000 | FLOOD RISK |

| Link Event (Upstream Depth) | US Node | Link | DS Node | Outflow (l/s) | Velocity (m/s) | Flow/Cap | Link Vol (m ³) | Discharge Vol (m ³) |
|-----------------------------|------------------------|---------|--------------------------|---------------|----------------|----------|----------------------------|---------------------------------|
| 240 minute summer | SWMH 1 | 1.001 | SWMH 2 | 0.6 | 0.251 | 0.039 | 0.2101 | |
| 15 minute summer | Existing Rates | 2.000 | Existing outfall (dummy) | 8.5 | 1.101 | 1.076 | 0.1236 | 4.0 |
| 240 minute summer | SWMH 2 | 1.002 | SWMH 3 | 0.6 | 0.354 | 0.041 | 0.1472 | |
| 240 minute summer | SWMH 3 | Orifice | OUFALL TO SW SEWER | 0.6 | | | | 14.3 |
| 240 minute summer | Patio Permeable Paving | 1.000 | SWMH 1 | -3.0 | -0.171 | -0.208 | 0.0183 | |

APPENDIX III Surface Water Drainage Strategy Plan



- GENERAL
 - THIS DRAWING IS NOT TO BE SCALED, WORK TO FIGURED DIMENSIONS ONLY, CONFIRMED ON SITE.
 - THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS, DETAILED SPECIFICATIONS WHERE APPLICABLE AND ALL ASSOCIATED DRAWINGS IN THIS SERIES.
 - ANY DISCREPANCY ON THIS DRAWING IS TO BE REPORTED IMMEDIATELY TO THE PARTNERSHIP FOR CLARIFICATION.
 - THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND FOR THE STABILITY OF THE WORKS IN PROGRESS.
 - CDM REGULATIONS 2015. ALL CURRENT DRAWINGS AND SPECIFICATIONS MUST BE READ IN CONJUNCTION WITH THE DESIGNER'S HAZARD RISK AND ENVIRONMENT ASSESSMENT RECORD. DESIGN HAS BEEN PRODUCED BASED ON INFORMATION PROVIDED BY THE CLIENT/PRINCIPLE DESIGNER AVAILABLE AT TIME OF ISSUE. CONTRACTOR TO REVIEW DRAWING AND SPECIFICATION IN CONTEXT WITH THE WIDER SITE AND SPECIFIC SITE INVESTIGATION, CONTAMINATION ASSESSMENT, ASBESTOS SURVEY, ENVIRONMENTAL SURVEY, UXO SURVEY AND ANY OTHER RELEVANT INFORMATION AND MANAGE RISKS RELATING TO THE WORKS OUTLINED IN THE DRAWINGS AND SPECIFICATION. PRINCIPLE CONTRACTOR TO MAKE DESIGNER AND CLIENT AWARE OF SITE SPECIFIC RISKS THAT MAY AFFECT THE DRAWING AND SPECIFICATION.
 - CDM REGULATIONS 2015. FOR GENERIC MAINTENANCE AND MANAGEMENT RISKS REFER TO CHAPTER 36 OF CIRA 752 SUDS MANUAL. FOR PROPRIETARY SYSTEMS SEE MANUFACTURER'S MANAGEMENT AND MAINTENANCE DETAILS AND RISK ASSESSMENT WITH REGARDS TO MAINTENANCE OF PROPRIETARY SYSTEMS.

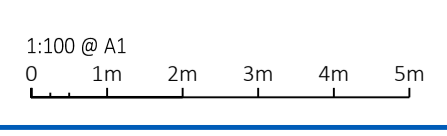
- CONSTRUCTION NOTE
 - THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.
 - THE MAIN CONTRACTOR IS RESPONSIBLE FOR ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.
 - ANY INFORMATION GIVEN REGARDING EXISTING UNDERGROUND SERVICES IS GIVEN IN GOOD FAITH AFTER CONSULTATION WITH THE RELEVANT AUTHORITY, HOWEVER ACCURACY IS NOT CERTAIN. THE MAIN CONTRACTOR IS RESPONSIBLE FOR CHECKING ALL INFORMATION ON SITE PRIOR TO WORK COMMENCING AND TAKING DUE CARE AND ATTENTION WHILST UNDERTAKING THE WORKS.
 - THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.
 - ALL PRODUCTS SPECIFIED SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS. IF THERE ARE DISCREPANCIES BETWEEN THAT INFORMATION AND THE DETAILS ON ANY MERIDIAN DRAWINGS, THE MANUFACTURERS INSTRUCTIONS MUST BE USED.
- BELOW GROUND DRAINAGE
 - UPVC IT PIPES TO BS 4660: 2000 AND PLASTIC INSPECTION CHAMBERS AND FITTINGS TO BS EN 13598-1:2020. CLAY PIPES TO BS EN 295-1:2013. CONCRETE MANHOLE AND INSPECTION CHAMBERS TO BS EN 1917:2002.
 - ALL ADAPTABLE DRAINAGE TO BE CONSTRUCTED IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE App C - DESIGN AND CONSTRUCTION GUIDANCE AND THE RELEVANT COUNCIL DESIGN GUIDE.
 - ALL PRIVATE FOUL WATER SEWERS TO BE LAID AT 1 IN 40 AT THE HEAD OF PIPE RUNS AND 1 IN 80 ELSEWHERE UNLESS OTHERWISE STATED.
 - ALL PRIVATE FOUL SEWER PIPES TO BE 100mm DIAMETER FROM SOIL STACKS UNLESS OTHERWISE STATED ON THE DRAWING AND 150mm WHERE SERVING MORE THAN 9 PROPERTIES.
 - ALL PRIVATE SURFACE WATER SEWERS TO BE LAID AT 1 IN 100 UNLESS OTHERWISE STATED ON THE DRAWING.
 - ALL PRIVATE SURFACE WATER SEWER PIPES TO BE 100mm DIAMETER FROM DOWNPIPES AND 150mm DIAMETER ELSEWHERE UNLESS OTHERWISE STATED ON THE DRAWING.
 - ALLOW FOR RODDING ACCESS ABOVE GROUND WHERE RAINWATER DOWNPIPES OR SOIL STACKS DO NOT HAVE A DIRECT CONNECTION TO AN INSPECTION CHAMBER.
 - EXISTING SEWER PIPE TO BE RE-USED TO BE SURVEYED AND LEVELLED PRIOR TO COMMENCEMENT OF THE DRAINAGE WORKS AND REURBISHED IF NECESSARY.
 - CONNECTIONS TO AN ADOPTED SEWER ONLY TO BE MADE FOLLOWING APPROVAL FROM THE RELEVANT ADOPTING AUTHORITY.
 - ALL DRAINS, SEWER PIPES AND MANHOLES TO BE CLEANED AND TESTED FOR WATER TIGHTNESS ON COMPLETION OF CONSTRUCTION.

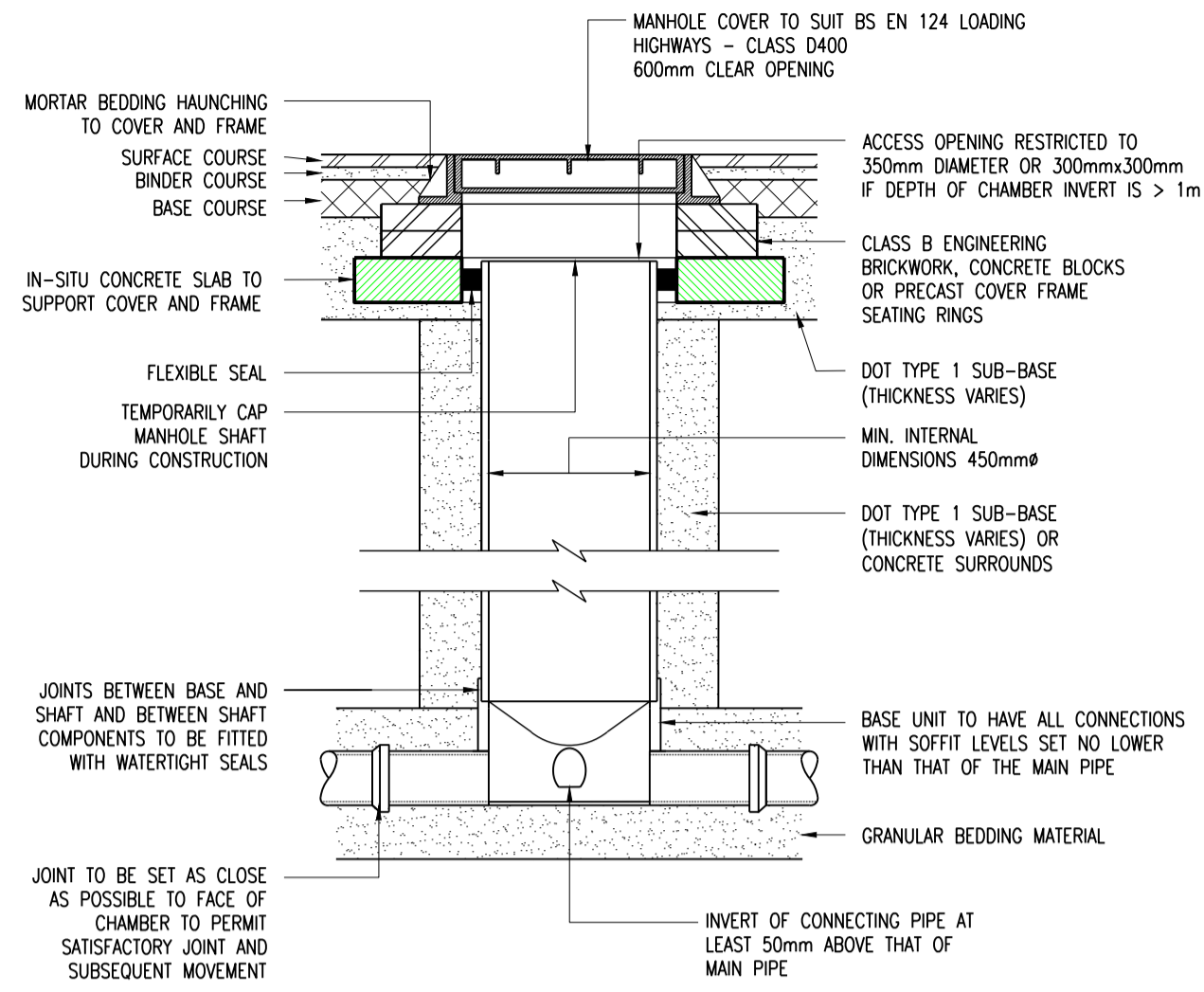
- MANHOLE COVERS AND FRAMES
 - MANHOLE COVERS TO BE CLASS D400 IN HIGHWAYS, CLASS B125 IN FOOTWAYS AND VERGES, CLASS A15 IN NON-TRAFFICED AREAS.
 - MANHOLE COVER AND FRAME TO BE BEDDED AND SURROUNDED IN 1:3 MORTAR.

LEGEND

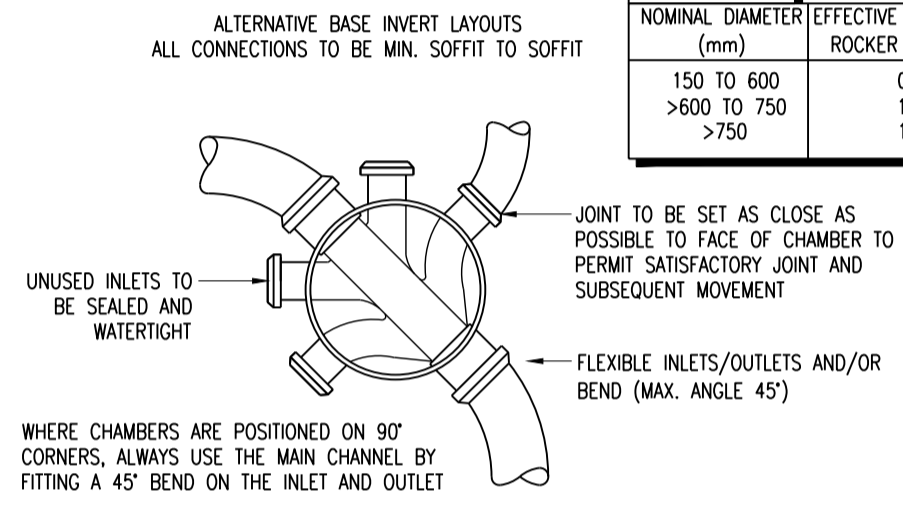
- PROPOSED SW PIPE RUN
- PROPOSED PERFORATED SW DRAIN
- EXISTING PRIVATE COMBINED WATER DRAIN - TO BE RETAINED
- EXISTING PRIVATE COMBINED WATER DRAINAGE INFRASTRUCTURE - TO BE REMOVED
- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- PROPOSED SW RODDING EYE
- PROPOSED SW RAINWATER PIPE
- PROPOSED TYPE 3 SW INSPECTION CHAMBER
- PROPOSED TYPE 4 SW INSPECTION CHAMBER
- PERMEABLE PAVING - TANKED (TYPE C)
- FILTER DRAIN
- RAIN GARDEN
- EXCEEDENCE FLOW

| | | | |
|--|--------------|-----------|----------|
| REV: | DESCRIPTION: | BY: | DATE: |
| STATUS: PRELIMINARY | | | |
| | | | |
| CLIENT: J&I BUILD LTD | | | |
| SITE: 45 MORLEY HILL, ENFIELD, EN2 0BL | | | |
| TITLE: SURFACE WATER DRAINAGE STRATEGY PROPOSED LAYOUT | | | |
| SCALE AT A1: | DATE: | DRAWN: | CHECKED: |
| 1:100 | JAN 24 | SD | MN |
| PROJECT NO: | DRAWING NO: | REVISION: | |
| MC0389 | DR01 | P01 | |

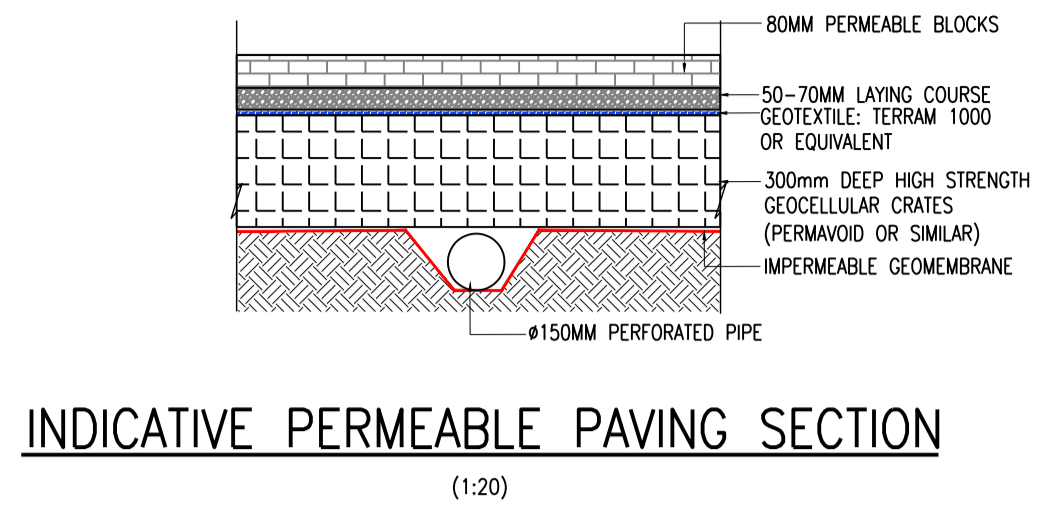




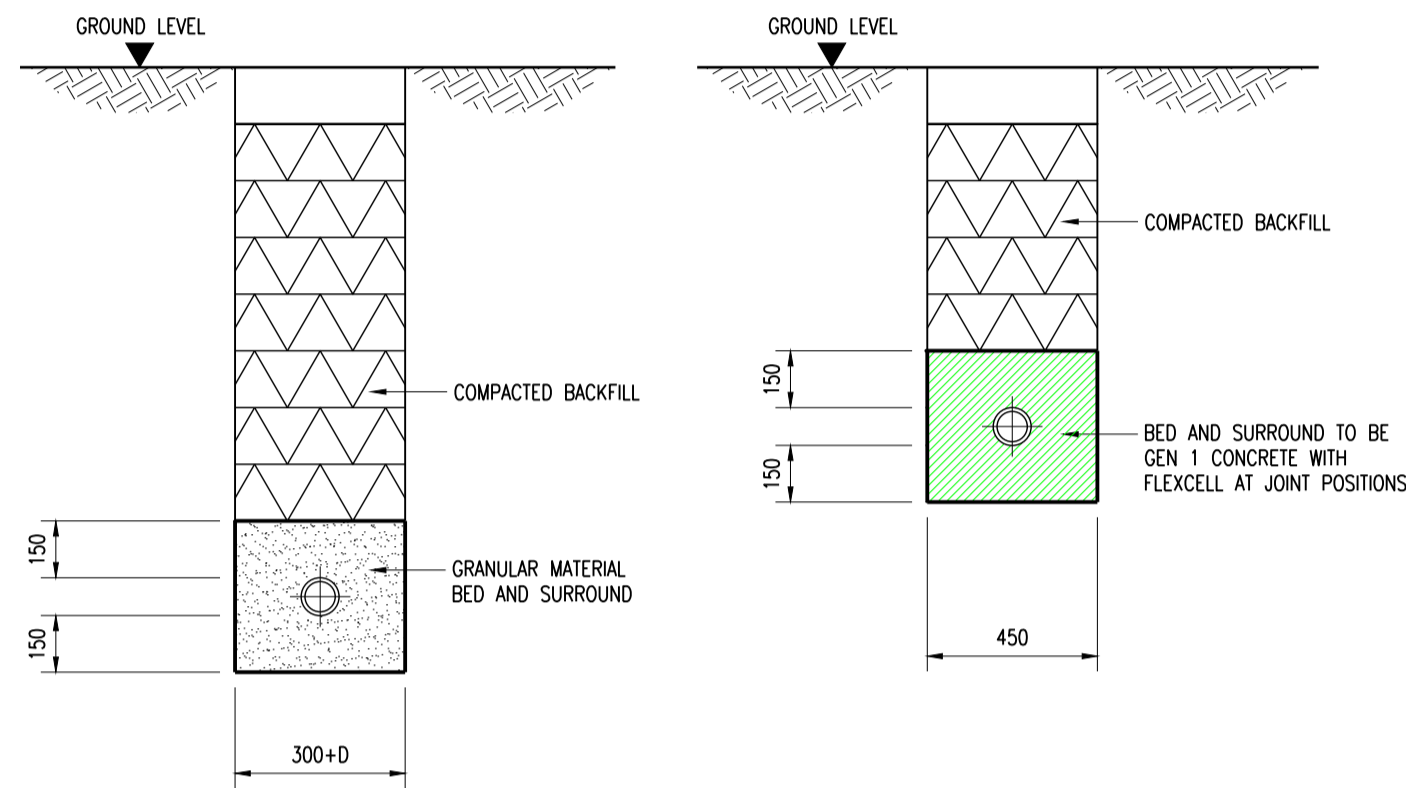
| NOMINAL DIAMETER (mm) | EFFECTIVE LENGTH OF ROCKER PIPE (m) |
|-----------------------|-------------------------------------|
| 150 TO 600 | 0.6 |
| >600 TO 750 | 1.0 |
| >750 | 1.2 |



TYPE 3 ACCESS CHAMBER – FLEXIBLE MATERIAL
(SUBJECT TO VEHICLE LOADING, MAX. DEPTH 3m, NON-ENTRY)
(1:20)



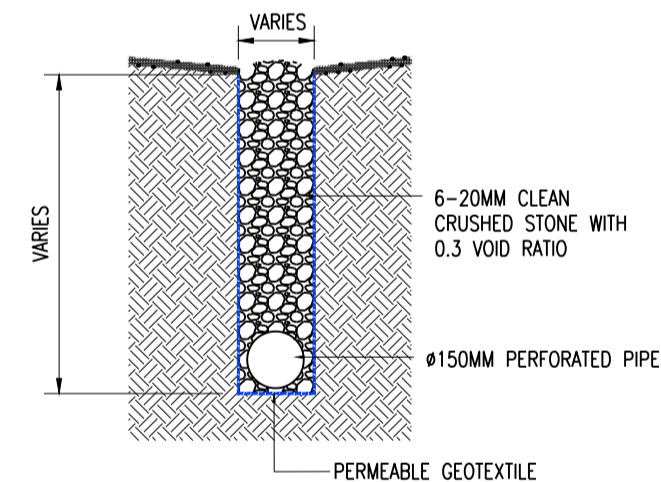
INDICATIVE PERMEABLE PAVING SECTION
(1:20)



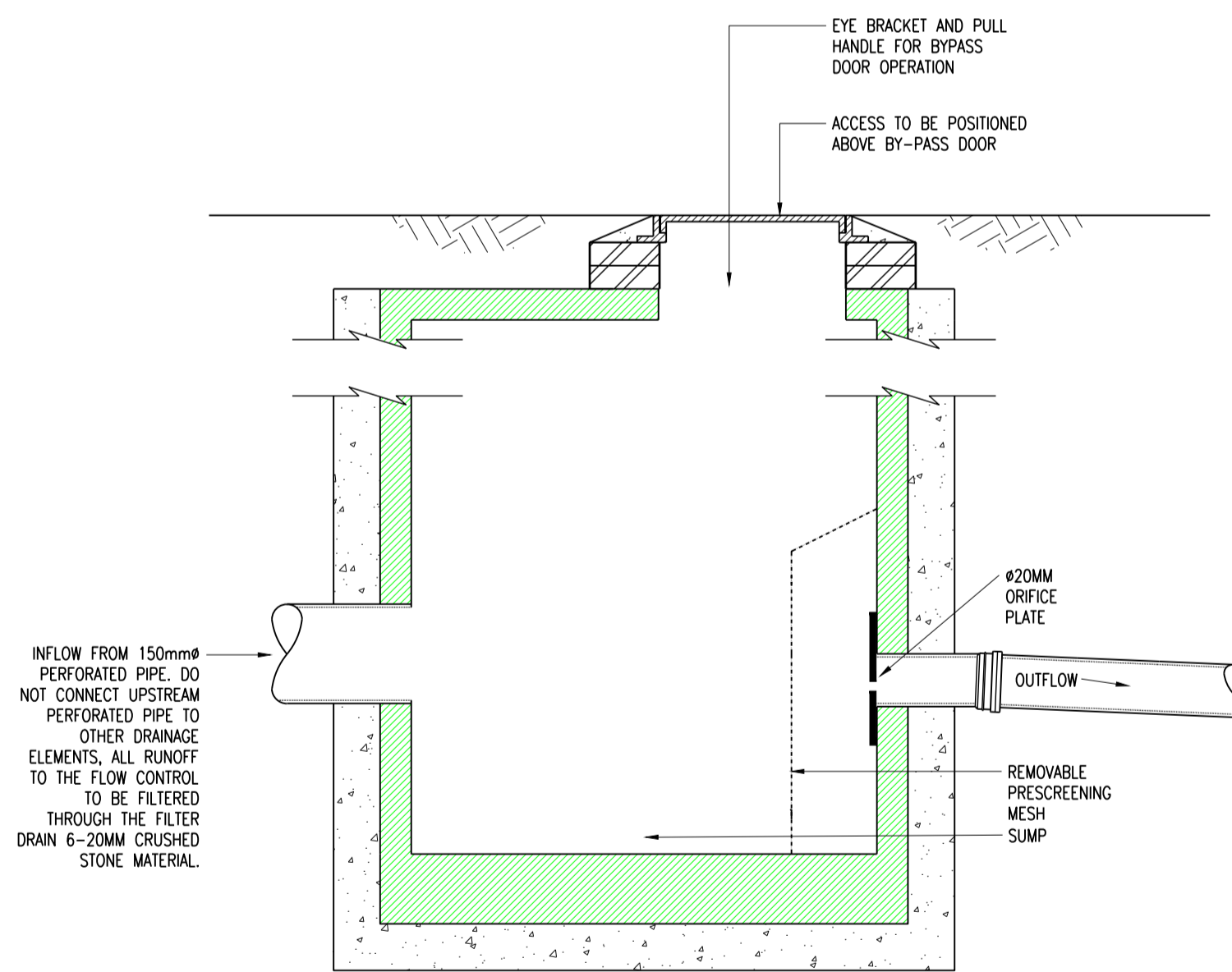
GRANULAR BEDDING DETAIL
(WHERE COVER >600mm)
(1:20)

CONCRETE BEDDING DETAIL
(WHERE COVER <600mm)
(1:20)

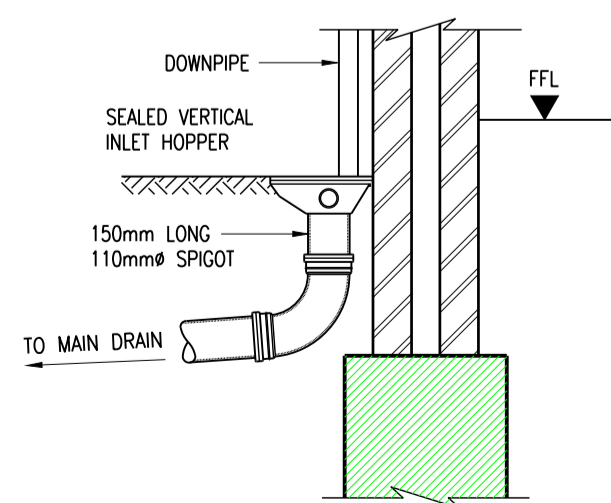
NOTE
ALL BACKFILLING AND REINSTATEMENT WITHIN ROADS AND STREETS TO BE IN ACCORDANCE WITH THE HIGHWAY AUTHORITY AND HAUC SPECIFICATION.



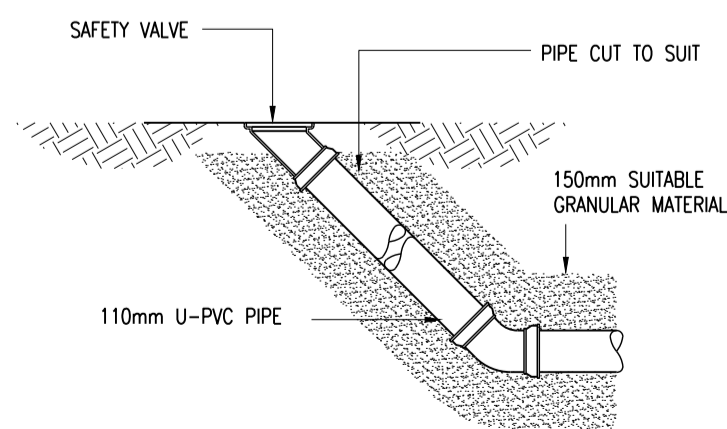
INDICATIVE FILTER DRAIN SECTION
(1:20)



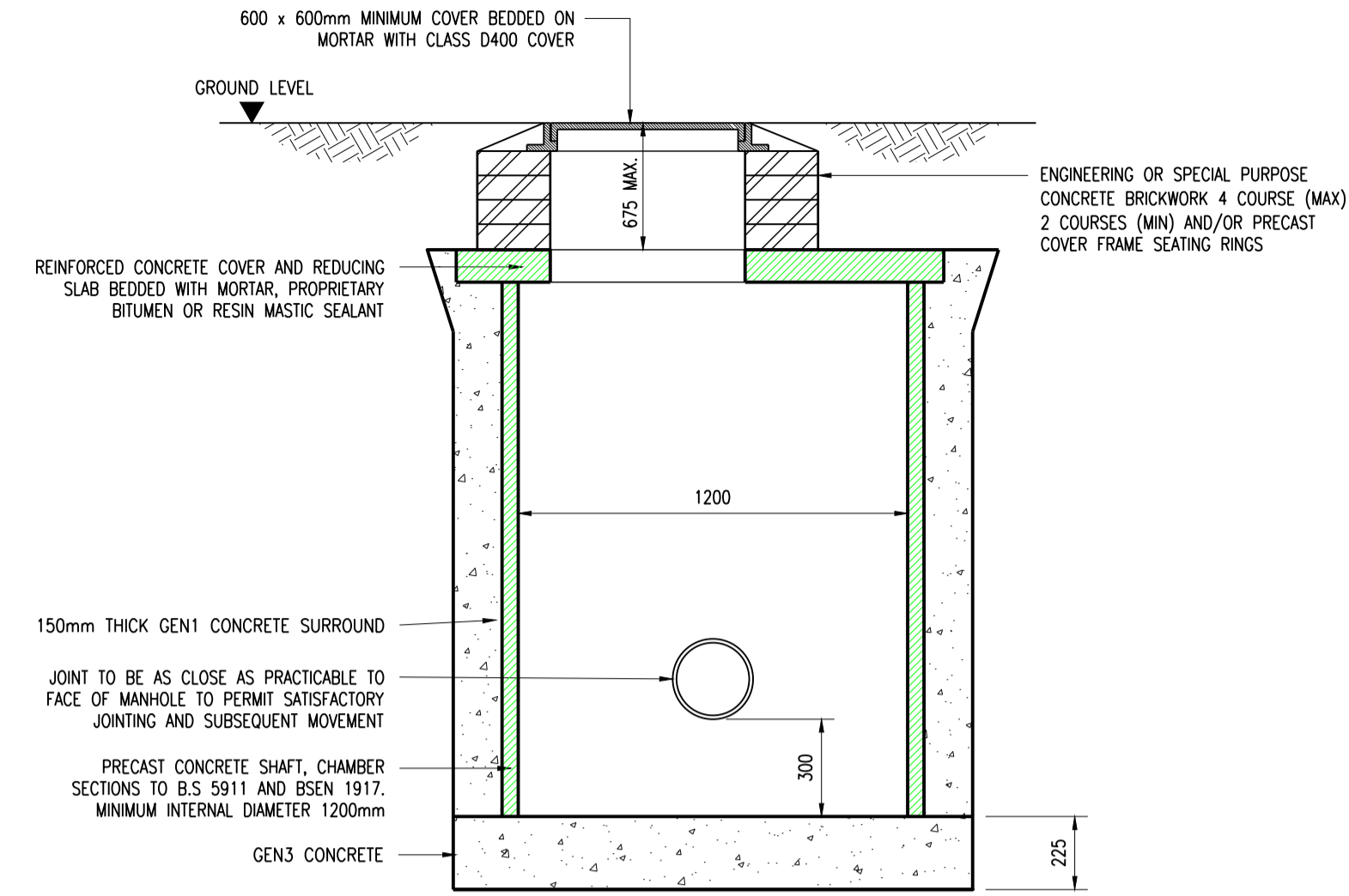
FLOW CONTROL MANHOLE
(1:20)



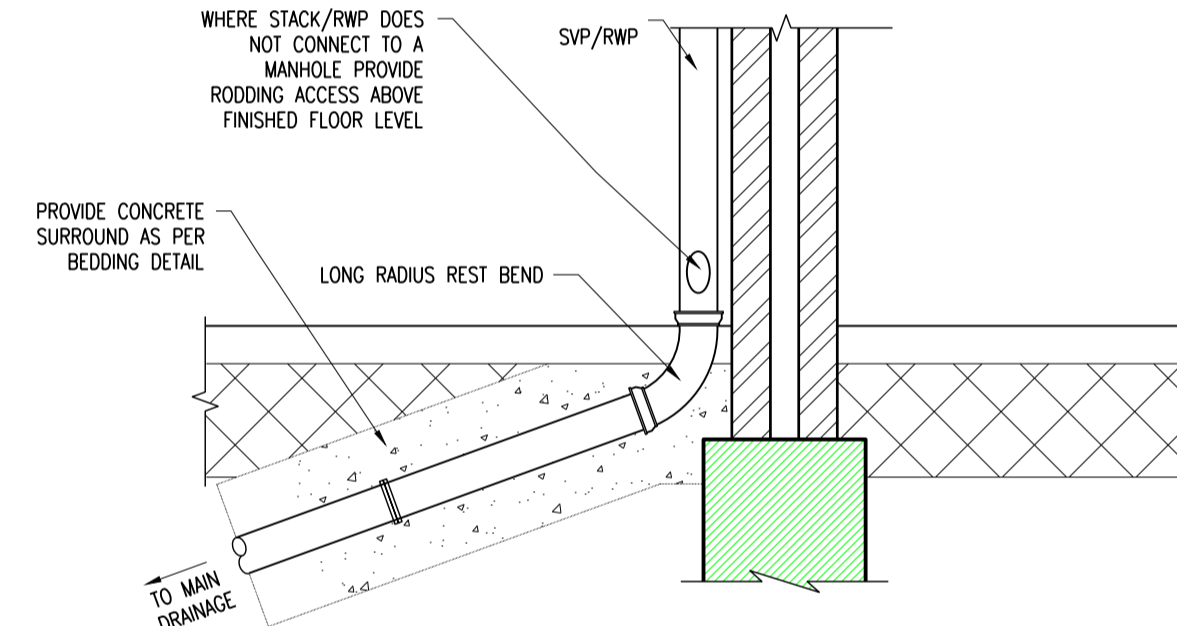
RWP CONNECTION
(1:20)



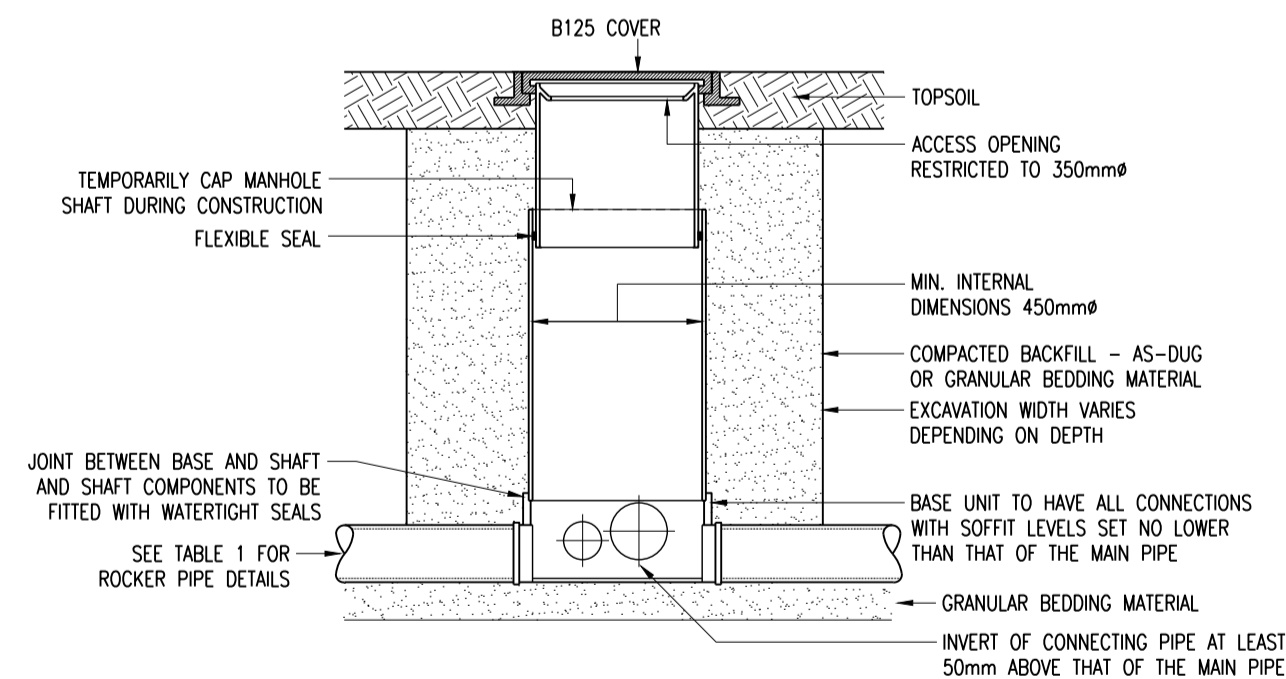
RODDING EYE DETAIL
(1:20)



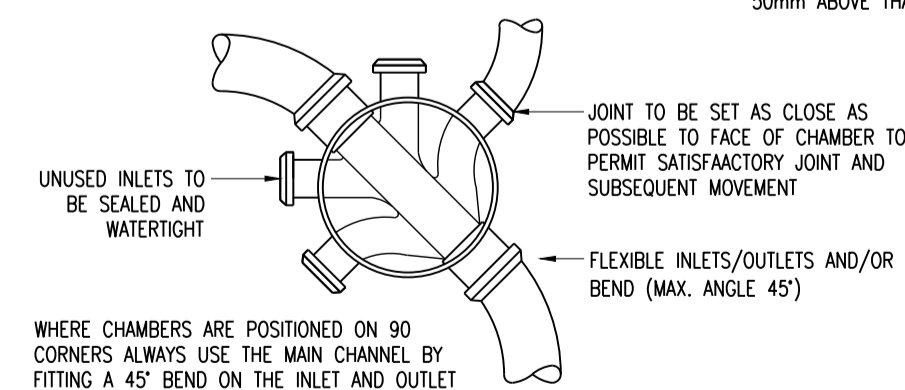
CATCHPIT TO INVERT 0.9m TO 2.7m
(1:20)



RWP CONNECTION
(1:20)



TYPE 4 ACCESS CHAMBER – FLEXIBLE MATERIAL
SOFT LANDSCAPING
(SUBJECT TO LIGHT TRAFFIC LOADS, MAX. DEPTH 3m, NON-ENTRY)
(1:20)



1:20 @ A1
0 200 400 600 800 1000mm

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 - ALL PRIVATE SURFACE WATER SEWERS TO BE LAID AT 1 IN 100 UNLESS OTHERWISE STATED ON THE DRAWING.
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 - MANHOLE COVERS TO BE CLASS D400 IN HIGHWAYS, CLASS B125 IN FOOTWAYS AND VERGES, CLASS A15 IN NON-TRAFFICED AREAS.
 - MANHOLE COVER AND FRAME TO BE BEDDED AND SURROUNDED IN 1:3 MORTAR.

| REV. | DESCRIPTION | BY: | DATE: |
|--|-------------|-----------|----------|
| - | - | - | - |
| STATUS: PRELIMINARY | | | |
| MERIDIAN CIVIL ENGINEERING CONSULTANCY | | | |
| CLIENT: J&L BUILD LTD | | | |
| SITE: 45 MORLEY HILL ENFIELD EN2 0BL | | | |
| TITLE: SURFACE WATER DRAINAGE DESIGN DRAINAGE DETAILS | | | |
| SCALE AT 1: | DATE: | DRAWN: | CHECKED: |
| 1:100 | DEC 2023 | SD | MN |
| PROJECT NO: | DRAWING NO: | REVISION: | |
| MC0389 | DR02 | P01 | |