

AVAL CONSULTING GROUP.

CIVIL, ENVIRONMENT & STRUCTURAL ENGINEERS



Drainage Strategy

Land on Brendon Avenue, Moston, M40 9DN
M Kenny Properties Ltd

February 2024

Project Information

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1. Executive Summary

- 1.1 Aval Consulting Group Limited has been commissioned by HAD & Co Property Consultants Ltd on behalf of M Kenny Properties Ltd ('the client') to provide a Drainage Strategy in relation to a planning application for the demolition of the existing development and the construction of 6no. new semi-detached C3 residential dwellings.
- 1.2 The total area of the site is 0.1089ha with the 6no. units measuring 0.07ha and is in Flood Zone 1. As the site is less than 1 hectare in size and in a very low risk flood zone a full Flood Risk Assessment is not required.
- 1.3 The site is at low risk of fluvial and pluvial flooding from the neighbouring watercourses. The site is located in an area with less than 0.1% risk of fluvial flooding (Flood Zone 1) and based on NPPF 2021 the development proposal is wholly suitable in terms of flood risk as it is a more vulnerable development.
- 1.4 The existing site is brownfield, including a dilapidated hall with trees and shrubs surrounding it which will be cleared and ground will be reprofiled. Attenuation and SuDS are to be provided within the site infrastructure to ensure that the impact of the site on the existing surface water network is minimised.
- 1.5 A topographical survey and GPR survey was provided by Survey Hub Ltd to help inform the report. No ground-based investigation report was available to aid the Drainage Strategy. An infiltration test was undertaken by Rogers Geotechnical Services Ltd.
- 1.6 The proposed surface water drainage discharge for the site is to be restricted to a maximum rate of 1.0 l/s which is subject to approval by Manchester City Council LLFA. This is proposed to discharge into the existing combined water sewer network.
- 1.7 The proposed drainage is sustainable and will reduce the flow rate from the site. This will reduce the risk of off-site flooding for other properties and the attenuation tank will contribute to the overall network performance in the area. The proposed surface water will be discharged into the existing United Utilities combined water sewer network located South of the site on Brendon Avenue.
- 1.8 The proposed foul water will be discharged into the proposed private combined water system which connects into the existing United Utilities combined water sewer network located South of the site on Brendon Avenue.

2. Introduction

Overview

- 2.1 AVAL Consulting Group Limited (ACL) has been commissioned by the client to produce a Drainage Strategy for the proposed development at the Land on Brendon Avenue, Moston, M40 9DN.
- 2.2 The application is for the demolition of the existing development and the construction of 6no. new semi-detached C3 residential dwellings.
- 2.3 The proposal includes a surface water drainage plan including a dedicated surface water drainage system to drain the surface water from the site.
- 2.4 The existing site plan is presented in Appendix A. The proposed site plan is presented in Appendix B.
- 2.5 A flood exceedance plan has been included as part of the proposal.

Objective

- 2.6 The purpose of this report is to demonstrate to Manchester City Council and the Lead Local Flood Authority that the proposed development is subject to an acceptable level of flood risk and should not increase the likelihood of flooding elsewhere. It should also demonstrate that the site can be drained both safely and sustainably for the lifetime of the development.
- 2.7 The report has been prepared in accordance with the guidance set out in the National Planning Policy Framework (NPPF) Technical Guidance (Department of Communities and Local Government – July 2021). The report also considers the Manchester City Council's Strategic Flood Risk Assessment.
- 2.8 In addition, the report includes an appraisal of the relevance of the various sustainable drainage systems (SuDS) with respect to their potential inclusion within the surface-water drainage for this development and puts forward a drainage statement. The drainage statement will cover issues such as the control of surface water flows generated by the site and the use of SuDS features.

Site Location and Details

- 2.9 Figure 2.1 shows the proposed site location. The surroundings of the proposed development site are largely residential. The site is bounded by a church to the North, Brendon Avenue to the south and residential units to the east and west.

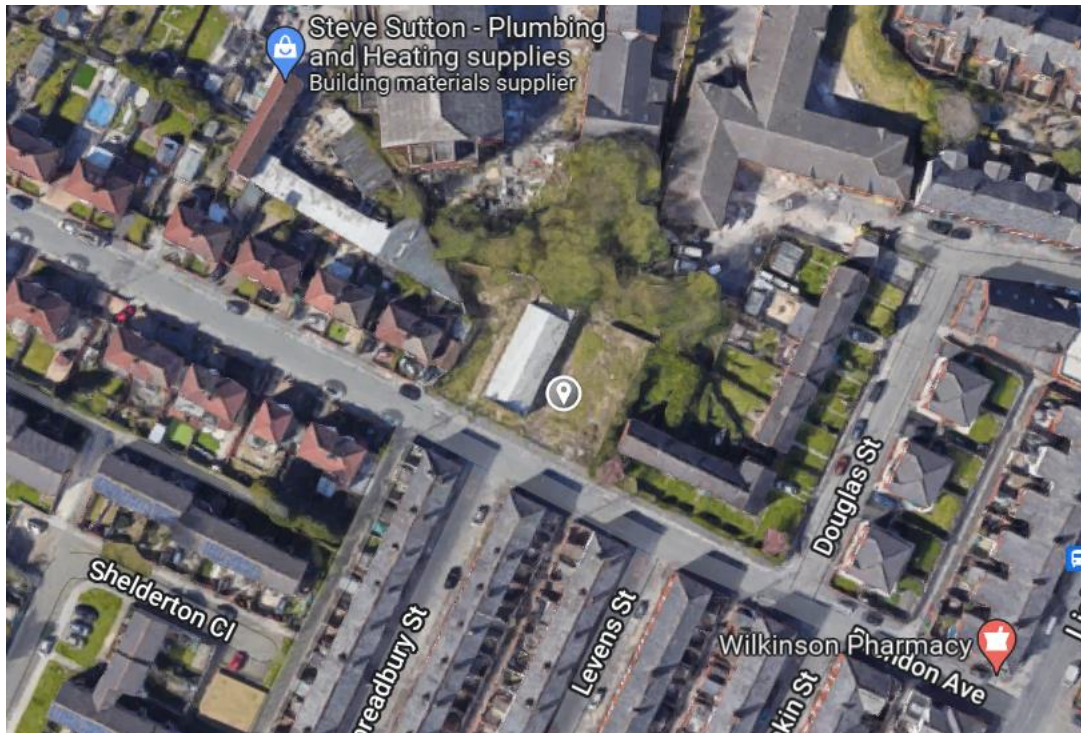


Figure 2.1: Proposed Site Location (Source: Google Maps)

3. Relevant Standards and Policies

- 3.1 This section summarises all legislation, policy, statutory and non-statutory guidelines relevant to the proposed development. That also includes all the latest regional and local planning policy guidance specifically applicable to the proposed development.

The National Planning Policy Framework (NPPF)

- 3.2 The latest National Planning Policy framework (NPPF) was published on 20th December 2023. The NPPF is supported by technical guidance set out within the Planning Practice Guidance for Flood Risk and Drainage, including the classification of the site vulnerability and the requirement to do an Exception Test in relation to the Flood Zone and Vulnerability Classification.
- 3.3 One of the key aims of the NPPF is to ensure that flood risk is taken into account at all stages of the planning process to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.
- 3.4 It advises that where new development is necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible should reduce flood risk overall.
- 3.5 It advises that where new development is necessary in areas of higher risk, flood mitigation resilience and resistance measures should be incorporated which can include but not limited to a higher finished floor level, installing flood boards and moving electrical points above. The developments upstream of the proposed development should also be taken into the consideration of flood risk.
- 3.6 The NPPF's flood risk advice is all set out in Chapter 14 of the Framework document, meeting the challenge of climate change, flooding and coastal change.

Flood and Water Management Act 2010

- 3.7 The Flood and Water Management Act 2010 received Royal Assent on 8th April 2010. This Act provides duties on the Environment Agency, Local Authorities, Developers and other bodies to manage flood risks. The Act has significant planning and design implications for Developers.
- 3.8 It should be noted that these standards and procedures are being reviewed by the respective regulatory bodies and third parties against the requirements imposed by the Flood and Water Management Act 2010. The advice and recommendations provided may change when associated regulations have been issued in order to implement the full scope of the Act.

Regional and Local Policy Guidance

3.1 Manchester City Council Core Strategy Development Plan

The Manchester City Council's Core Strategy Development Plan document (adopted on 11th July 2012) includes the main policy regarding Flood Risk.

Policy EN 14: Flood Risk states the following:

"In line with the risk-based sequential approach contained within PPS25, development should be directed away from sites at the greatest risk of flooding, and towards sites with little or no risk of flooding; this should take account of all sources of flooding identified in the Manchester-Salford-Trafford Strategic Flood Risk Assessment (SFRA).

In addition to the requirements for site-specific Flood Risk Assessments (FRAs) set out in PPS25, an appropriate FRA will also be required for all development proposals including changes of use, on sites greater than 0.5ha within Critical Drainage Areas (CDAs) and Canal Hazard Zones identified in the SFRA.

All new development should minimise surface water run-off, including through Sustainable Drainage Systems (SUDS) and the appropriate use of Green Infrastructure Developers should have regard to the surface water run-off rates in the SFRA User Guide. In CDAs, evidence to justify the surface water run-off approach / rates will be required.

The City of Manchester contains many sections of rivers which are culverted or 'hidden' where these are indicated in the SFRA beneath the proposed development site, further investigation will be required and the development proposal should take this into account; where feasible and appropriate development should seek to open up culverted/hidden rivers to reduce the associated flood risk and danger of collapse, taking advantage of opportunities to enhance biodiversity and Green Infrastructure."

3.2 Manchester City Council Strategic Flood Risk Assessment

The Manchester City Council's Strategic Flood Risk Assessment provides maps of flood zones, flood extents and other relevant maps and highlights the requirement and procedures for the Sequential and where necessary the Exception Tests. This will be used in order to progress through this report.

4. Physical Setting

Site Details

Site Name and Address		Land on Brendon Avenue, Moston, M40 9DN
National Grid Reference		SD 87257 01396
Site Shape and Development Details		The site is rectangular in shape and occupies an area of 0.11ha.
General Topography		The site slopes from the north east of the site towards the low point located south west of the site.
Existing Surfacing		The existing site is a brownfield site which consists of commercial units and associated pathways.
Above Ground Structures		Commercial units and hall.
Sub-Surface Structures and Services		There are existing surface and foul water lines servicing the site but are to be made redundant.
Watercourses		Data shows that there are no water networks within 250m of the site.
Site History		In 1891, the site consisted of open field with a village a short distance to the north-east. The site then remains open field as mostly residential buildings take up a large majority of land east of the site in the 1900's. A hall is erected on-site in the early 1930's, with a second one being built between 1950-1955. Residential buildings continue to be built around the site in all directions up until the turn of the century. In 2003, one of the halls on-site was demolished and in 2022, it currently sits empty and surrounded by residential estates.
Boundaries	North	Lightbowne Evangelical Church,
	East	Residential units,
	South	Brendon Avenue,
	West	Residential units,
Access	Vehicular	There is vehicular access south of the site off Brendon Avenue.
	Pedestrian	Brendon Avenue
Summary of Walkover Features		A walkover was not undertaken.

5. Existing Site Characteristics

Existing Public Sewers

- 5.1 There is evidence of an existing 300mm diameter United Utilities combined water sewer located south of the proposed site boundary, on Brendon Avenue. The sewer flows east along Brendon Avenue.
- 5.2 The United Utilities Asset Search is attached in Appendix E.

Existing Private Drainage

- 5.3 The existing site has a combined water system which connects to the public sewers located along Brendon Avenue.

Local Topography and Geology

- 5.4 The site is located at an average height of 87.0m AOD.
- 5.5 The topographical drawing can be found in Appendix A.
- 5.6 The Soilscape maps indicate the underlying deposits are slowly permeable seasonally wet acid loamy and clayey soils, with an impeded drainage to the ground.
- 5.7 There are no boreholes within the site.

Watercourses, Land Drainage and other Waterbodies

- 5.8 The nearest watercourse to the site is mentioned below:
- The River Irk is located approximately 1750m west from the site boundary.

Existing Flood Defences and Other Structures

- 5.9 There are no flood defences recorded on any maps within close proximity to the proposed development site. The existing site has no flood walls or other defences.

Historical Land Use

- 5.10 The site consisted of open field with a village a short distance to the north-east. The site then remains open field as mostly residential buildings take up a large majority of land east of the site in the 1900's. A hall is erected on-site in the early 1930's, with a second one being built between 1950-1955. Residential buildings continue to be built around the site in all directions up until the turn of the century.

6. Management of Flood Risk

- 6.1 This section will explain how the proposed development will reduce the flood risk within the site and within the surrounding areas of the site.

Residual Risk

- 6.2 The primary residual risk that would remain at the site would be the drainage of surface water. Flood Mitigation and Management details will be given in Section 7. However, other residual risks remain such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system; failure of a reservoir; or a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.
- 6.3 In order to further reduce the risk of surface water flooding within the proposed development, Sustainable Urban Drainage Systems would need to be installed to either safely discharge the surface water or to temporarily store the surface water for future use or discharge. This can be in the form but are not limited to, permeable paving, green roofs or rainwater harvesting.

Exception Test

- 6.4 The National Planning Policy Framework sets out the different conditions in terms of the vulnerability of the development and the flood zone and accordingly sets out the requirements to do an Exception Test. The table below describes the conditions required for an Exception Test.

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	✗	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	✗	✗	✗

Key: ✓ Development is appropriate.
✗ Development should not be permitted.

The proposed development would fall onto the 'More Vulnerable' classification. With the proposed development site being located within a Flood Zone 1, an Exception Test is not required, and the proposed development is appropriate.

7. Flood Mitigation/Management Measures and Evacuation Plan

- 7.1** As stated in Section 6.3, SuDS can help in reducing the effect of flooding within the site and also upstream of the development site. Storage of surface water for future use or a controlled discharge of surface water are implemented in the reduction of flooding upstream of the proposed development.
- 7.2** Although outside of the Flood Alert area, it is highly recommended for the users of the proposed development to sign up to the Environment Agency's Flood Alert service in order to receive alerts and information regarding any future flood alerts.
- 7.3** All residents would need to be aware of the Flood Alert System and sign up for the alerts upon using the proposed development. If the most severe warning appears, residents would have to call 999 if in immediate danger.
- 7.4** Users of the commercial unit would need to move upstairs to a higher level in the event that any flooding does occur at the site. The residents of the houses can stay within the flats until rescue services arrive.

8. Surface Water Management

8.1 National Planning Policy Framework

8.2 The National Planning Policy Framework 2021 (NPPF) and accompanying Planning Practice Guidance indicate surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management.

8.3 Consideration should therefore firstly be given to using sustainable urban drainage (SuDS) techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water run-off from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved document Part H of the Building Regulations (2010) sets out a hierarchy for the disposal of surface water which encourages a SuDS approach, as detailed above.

Climate Change

8.4 There are indications that the climate in the UK is changing significantly and it is widely believed that the nature of climate change will vary greatly by region. Current expert opinion indicates the likelihood that future climate change would produce more frequent short duration and high-intensity rainfall events with the addition of more frequent periods of long duration rainfall.

8.5 The Environment Agency has highlighted the climate change allowance for all proposed developments which will need to be used for all future surface water runoff calculations.

Small and Urban Catchment Climate Change Growth

8.6 The table below highlights the potential climate change expected in the future.

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

As this development is for residential use, **a climate change growth factor of 40% is proposed** to be used for the surface water runoff calculations to consider worst-case scenarios for surface water flooding.

Methods of Surface Water Management

8.7 As set out in Part H of the Building Regulations and the NPPF, there are four methods that have been reviewed for the management and discharge of surface water for the site which are detailed below; these may be applied individually or collectively to form a complete strategy. They should be applied in the order of priority as listed:

- Discharge via infiltration;
- Discharge via watercourse;
- Discharge via public surface water sewer; and
- Discharge via a combined sewer.

Discharge via Infiltration

8.8 Any impermeable areas that can drain to a soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems.

8.9 SOIL mapping for the site suggests that the soils beneath the site may not be able to infiltrate.

8.10 In line with United Utilities standard practice, the drainage will be required to discharge via soakaways.

8.11 Infiltration tests were undertaken by Rogers Geotechnical Services Ltd, which concluded that the site is not conducive to infiltration.

8.12 Therefore it is not possible to discharge via soakaways.

Discharge via Watercourse

8.13 The next consideration for the disposal of surface water is via a watercourse. There are no nearby watercourses and therefore it is not possible to discharge via a watercourse.

Discharge via Public Surface Water sewer

8.14 The next discharge method of surface water is via a public surface water. There are no public surface water sewers within close vicinity and therefore, a discharge to a public surface water sewer is not possible.

Discharge via Public Combined Water sewer

8.15 The next discharge method of surface water is via a public combined water sewer. There is a United Utilities combined water sewer to the south of the site along Brendon Avenue. This can be used to help discharge surface water from the site.

Therefore, a discharge via a public combined water sewer is the best method possible.

Proposed Surface Water Discharge Strategy

8.16 As stated in Section 8.12, the preferred method of discharging surface water is via a direct connection to the existing combined water United Utilities combined water sewer located along Brendon Avenue.

8.17 The primary principle of the surface water drainage strategy for this site is to collect the runoff from the roof run-off and associated footpaths, and convey this to the permeable paving sub-

base and an attenuation tank. From there the water, through a flow control hydrobrake, will be discharged into the existing combined water sewer network.

- 8.18 The proposed restricted discharge rate and calculated post-development runoff rates generate a storage requirement during periods of intense rainfall. This storage volume will need to store water which will not be able to discharge through to the existing sewer.
- 8.19 The Causeway Flow 'Quick Storage Estimate' module has been used to estimate the storage volume required for both a 1 in 30 year and 1 in 100 year storm event plus a 40% allowance for climate change.
- 8.20 As the site is brownfield, the aim was to improve the existing surface water discharge by providing betterment under all conditions including the 1 in 100 year flood event with 40% Climate Change. The existing site brownfield flow rate was calculated to be 49.2l/s at a 1 in 100 flood event.
- 8.21 In order to achieve the discharge rate of 3.0 l/s, a combination of an attenuation tank and permeable paving sub-base storage has been modelled and calculated within the design. A flow control (Hydrobrake) is also included at the last surface water manhole prior to joining the combined water sewer.
- 8.22 The attenuation volume is split according to the internal site (privately owned) and a future adopted attenuation system (publicly owned). Of these areas, the split is as follows:
- 8.23 Upon modelling the drainage network, the required attenuation tank size If storage crates are used, and assuming a 95% void ratio, is **13.68m³**.
- 8.24 If permeable paving sub-base is used, and assuming a 30% void ratio, the required volume of crates is a minimum of **22.50m³**. The permeable sub-base will cover the entire proposed area of 300m² with a 0.25m sub-base depth.
- 8.25 The proposed site discharge has been estimated at discharge rate of 3 litres per second which we will propose to Manchester City Council LLFA.
- 8.26 An 'in-principle' agreement has been provided by United Utilities on the discharge rate allowance of no more than 3 l/s.
- 8.27 Appendix E includes the drawings and calculations of the surface water discharge and flood exceedance plan.

9. Foul Water Drainage Proposal

- 9.1 Based on the 4000 l/dwelling/day (0.05 l/s/dwelling), the foul water will be discharged at a peak flow rate of 0.3 l/s.
- 9.2 The foul water will be discharged into the existing private combined system located within the site and connects downstream to the United Utilities Combined Water sewer along Brendon Avenue.

10. SuDS Appraisal and Proposed SuDS for Development

SuDS- General

- 10.1 Appropriately designed, constructed and maintained, SuDS are more sustainable than conventional drainage systems. Their benefits in general terms are summarised below.

SuDS can:

- Reduce run-off surface water flow-rates and/or volumes and hence reduce the risk of flooding;
- Encourage natural groundwater re-charge;
- Reduce pollutant concentrations in storm water;
- Provide habitats for wildlife.

SuDS Appraisal

- 10.2 There are many site-specific factors which will influence the choice of any single or combination of SuDS device used within a development. The primary factors are:

- Whether the development is domestic, commercial or industrial;
- Whether the underlying ground is contaminated. If so, infiltration systems (soakaways) will most probably not be permitted;
- Whether the underlying ground is permeable enough for infiltration systems (soakaways) to be considered;
- Whether the groundwater levels are deep enough for infiltration systems (soakaways) to be considered;
- Whether the site is steeply sloping and its general topography;
- The availability of space inside the development for each potential SuDS facility;

Health and Safety aspects should the development be likely to be inhabited or used by children.

Types of SuDS with Respect to Proposed Development

10.3 As part of the design for this development, SuDS have been incorporated wherever practicably feasible. Based on local and regional policy, where there is a net increase in impermeable area, at least one 'at source' SuDS measure is to be provided to assist with reducing the volume of run-off.

10.4 In theory, SuDS Such as tree pits, rainwater harvesting systems, rain gardens, etc could be proposed. However, due to the site location and space available to install the SuDS, it is not practical or feasible to propose tree pits, rain gardens, etc.

The primary SuDS element proposed for this development is outlined below:

Flow Control Devices

10.5 Hydrobrakes can be used to restrict the discharge rate of surface water as it allows for a controlled discharge of surface water whilst not causing any potential flooding within the site and elsewhere (alongside storage).

10.6 The site includes an Hydrobrake to discharge the surface water at a maximum rate of 3.0 l/s.

Permeable Paving

10.7 It is proposed to use permeable paving around the common areas of the site, such as parking area, walking paths, etc.

10.8 The sub-base of the permeable paving can assist with the temporary storage and discharge of surface water, eliminating the need for any extensive attenuation tank installation and groundworks.

10.9 Permeable paving also have a low maintenance requirement and therefore, is popular amongst the possible options for SuDS.

10.10 Permeable paving are also beneficial in absorbing carbon emissions from vehicles, thus making it sustainable in terms of air quality and biodiversity.

10.11 It is proposed to have a 0.25m deep sub-base, which is sufficient to store surface water and to discharge at a maximum rate of 3.0 l/s.

Water Butts

10.12 It is proposed to install water butts at the back of the residential units. Water butts can assist with the temporary storage of surface water during any rainfall.

10.13 The stored water can then be used by the users of the residential units for gardening, recreational or personal purposes.

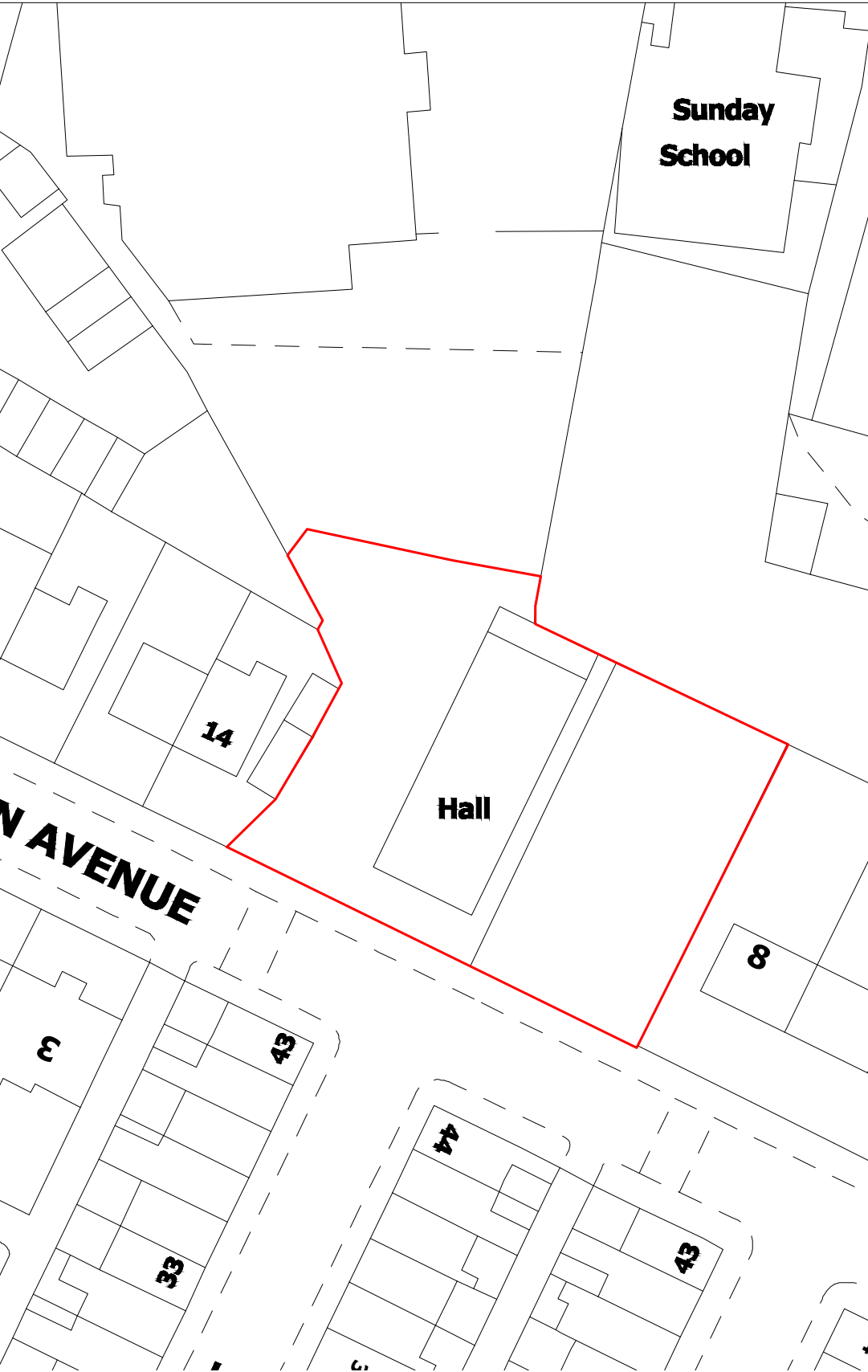
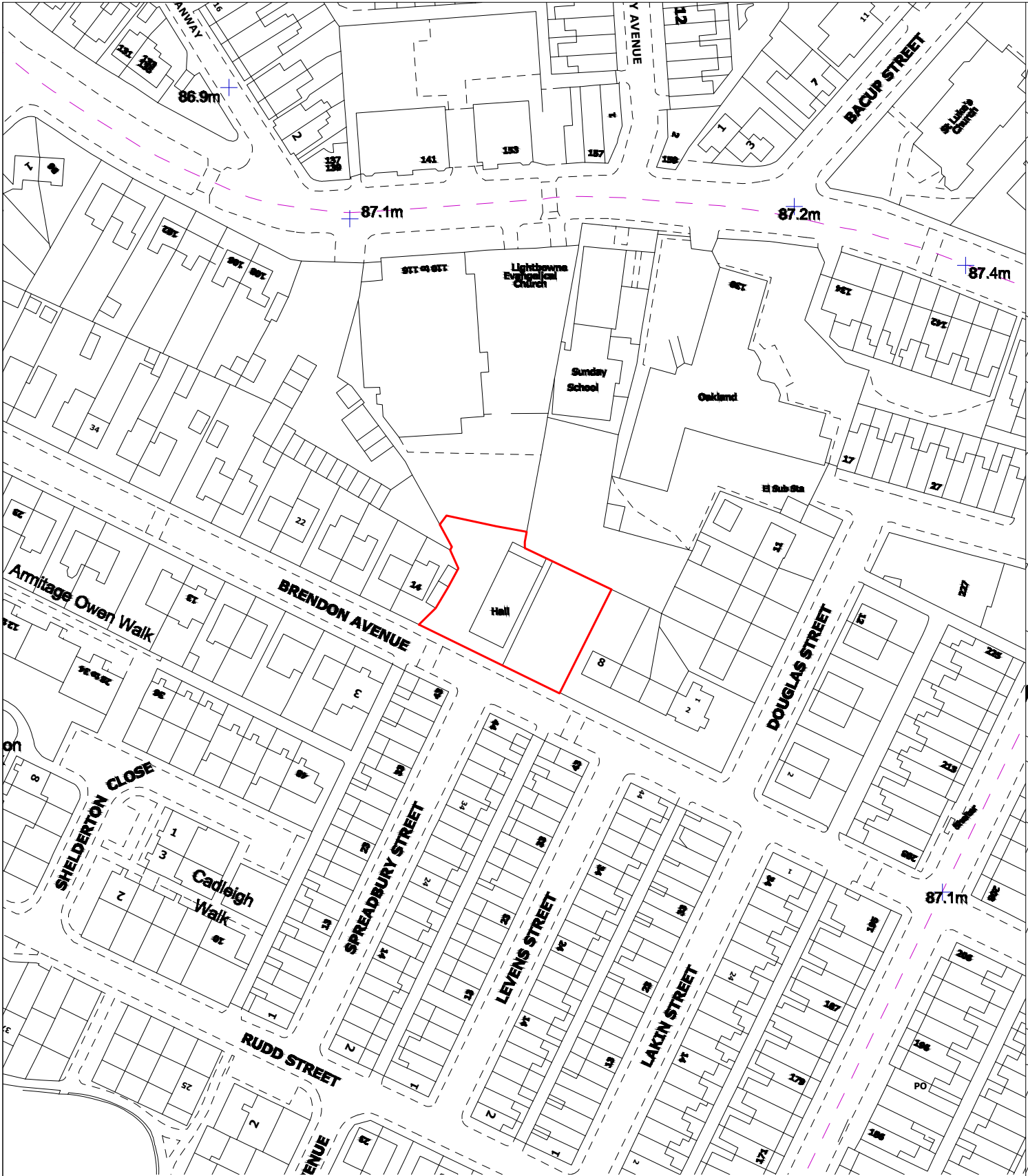
11. Maintenance and Management and Blockage Plan

- 11.1** A dedicated maintenance and management plan as well as a Blockage Plan in relation to the site and the proposed drainage strategy is provided within Appendix F.

12. Summary

- 12.1 The proposed development site is located within Flood Zone 1, with a very low risk of river/sea flooding and a low risk of surface water flooding.
- 12.2 As per the SFRA, the proposed development site is suitable for development and an Exception test was not required as per the NPPF due to the development being within Flood Zone 1.
- 12.3 The proposed development will discharge the surface water into the United Utilities surface water sewer along Brendon Avenue. The maximum proposed discharge rate was calculated to be 3.0 l/s under all flood events upto and including the 1 in 100 year flood event with 40% Climate Change.
- 12.4 The primary option for surface water disposal is via an indirect connection to the existing combined water system located within the site and connects downstream to the United Utilities combined water sewer along Brendon Avenue.
- 12.5 The surface water is proposed to be stored and discharged via the permeable paving sub-base, with a Hydrobrake restricting the discharge rate to more than 3.0 l/s.
- 12.6 The peak foul flow was calculated to be 0.3 l/s which will be discharged into the existing private combined system located within the site and connects downstream to the United Utilities Combined Water sewer along Brendon Avenue.
- 12.7 The proposed development proposes SuDS such as water butts and permeable paving to store and discharge surface water at a restricted rate.
- 12.8 It can therefore be concluded that the proposed development meets the local and national policy.

Appendix A: Existing Site Plan and Topographical Survey



Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.
All work and materials should comply with Health and Safety legislation.
All dimensions are in millimetres unless where explicitly shown otherwise.
The contractor should check and certify all dimensions as work proceeds and notify the agent of any discrepancies.
Do not scale off the drawings, if in doubt ask.
HAD & Co. are not liable for any work undertaken prior to Full Planning Consent and/ or Building Regulations Approval.
CDM REGULATIONS 2015
The client must abide by the Construction Design and Management Regulations 2015. The client must appoint a contractor, if more than one contractor is to be involved, the client will need to appoint (in writing) a principal designer (to plan, manage and coordinate the planning and design work) and a principal contractor (to plan, manage and coordinate the construction and ensure there are arrangements in place for managing and organising the project).
Domestic clients
The domestic client is to appoint a principal designer and a principal contractor when there is more than one contractor. If not your duties will automatically transferred to the contractor or principal contractor.
The designer can take on the duties, provided there is a written agreement between you and the designer to do so.
The Health and Safety Executive is to be notified as soon as possible before construction work starts if the works:
(a) Last longer than 30 working days and has more than 20 workers working simultaneously at any point in the project.
Or:
(b) Exceeds 500 person days.
THERMAL BRIDGING
Care shall be taken to limit the occurrence of thermal bridging in the insulation layers caused by gaps within the thermal element, (i.e. around windows and door openings). Reasonable provision shall also be made to ensure the extension is constructed to minimise unwanted air leakage through the new building fabric.
MATERIALS AND WORKMANSHIP
All works are to be carried out in a workmanlike manner. All materials and workmanship must comply with Regulation 7 of the Building Regulations, all relevant British Standards, European Standards, Agreement Certificates, Product Certification of Schemes (Kite Marks) etc. Products conforming to a European technical standard or harmonised European product should have a CE marking.

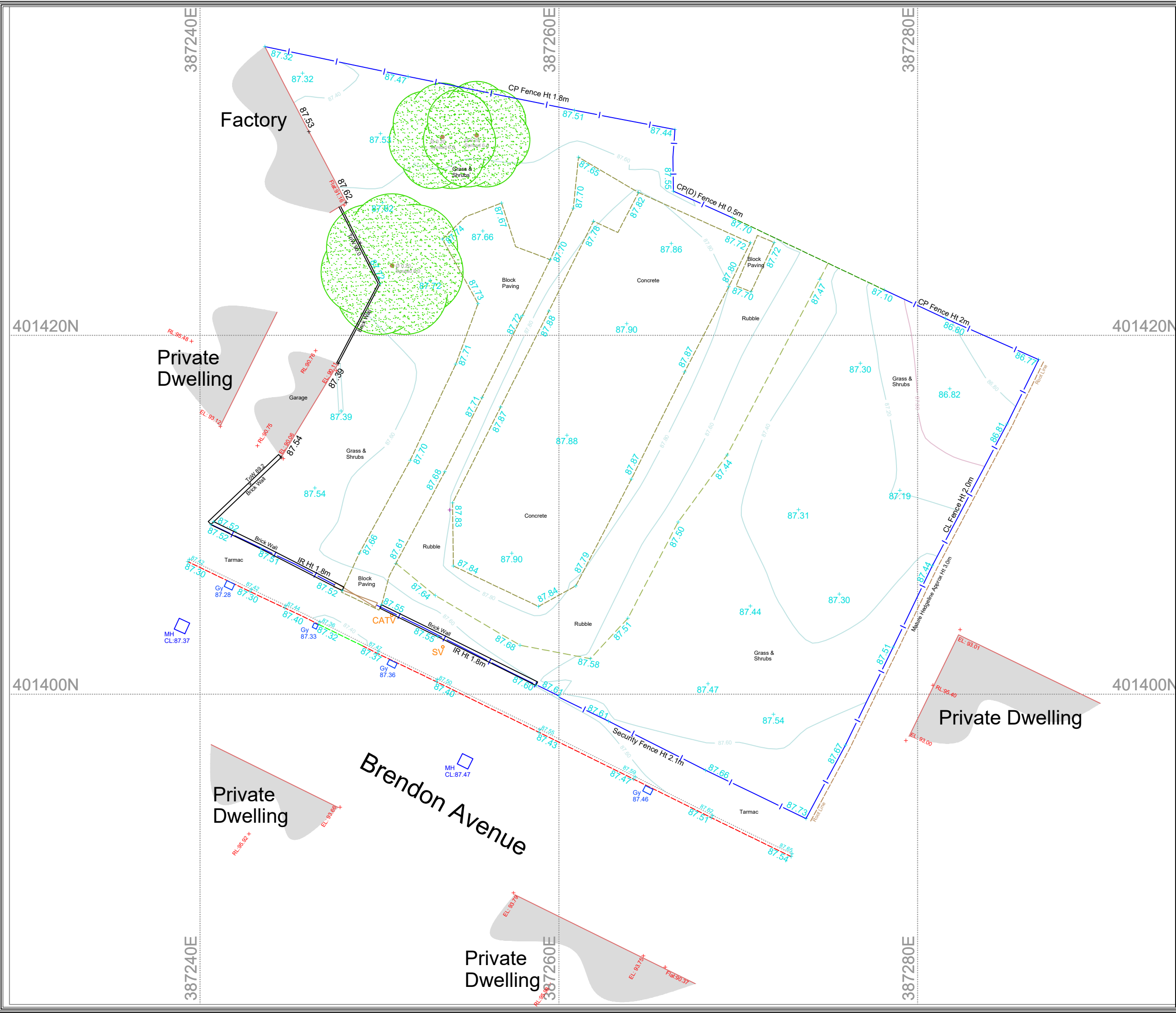
Revisions List:



HAD & Co.
www.hussainarchitecture.co.uk
01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Location and Site Plan	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 13-04-2022	Paper: A3
Drawing No: HAD3412-01	Scale: 1:200
Revision:	





KEY:

BL	Best Level	ANT	Antenna	LP	Long Point
CL	Cover Level	AV	Air Valve	LR	Life Preserver
DP	Down Pipe	BB	Bellows Beacon	MR	Service Marker
DPC	Down Pipe Gully	BM	Benchmark	PS	Post Box
Gy	Gully	BO	Boat	PM	Parking Meter
L	Level	BW	Gate Box	PO	Post
KO	Kerb Outlet	BS	Bus Stop	PK	Crossing Control
MH	Manhole	BT	British Telecom	RP	Reflective Post
NE	Needing Eye	CATV	Cable Television	RS	Road Sign
NL	Water Level	CD	Cigarette Bin	SC	Speed Camera
BH	Bore Hole	COMS	Communication	SP	Sign Post
EL	Eaves Level	DWB	Dog Waste Bin	SV	Stop Valve
FL	Flat Roof Level	EL	Electric Cover	SY	Slay
FLD	Parapet Level	EP	Electric Pole	TCL	Telephone Cover
HL	Hedge Level	ER	Earth Road	TL	Traffic Light
Spr. Lst	North Springing Level	FH	Fire Hydrant	TP	Telephone Pole
UAB	Underside of Beam	FB	Fid into Building	TS	Trucks Signal Cover
UAF	Underside of Feature	FG	Fid into Ground	VP	Vent Pipe
W	Water Level	FLT	Front Light	WM	Water Meter
GP	Gate Post	FLP	Flag Pole	WO	Wash Out
MU/MO	Multi Side Trunk	GL	Ground Light	WV	Water Valve
TCL	Tree Canopy Level	GP	Gas Pipe	FL	Finished Floor Level
TT	Traffic Planning	GV	Gas Valve	Th	Threshold Level
ACU	Air Conditioning Unit	IC	Inspection Cover	W	Wall

Boundary Line: --- Fence: ---
Building Roof Line: --- OS Detail: ---
Building: --- Steps: ---
Building Canopy: --- Trackway: ---
Edge of Scrub: --- Tree Canopy: ---
Edge of Vegetation: --- Verge: ---
Embankment Bottom: --- Verge Concrete: ---
Embankment Top: --- Verge Grass: ---
Kerb: --- Verge Tarmac: ---
Kerb - Drop: --- Wall: ---
Kerb - Top: --- Water Edge: ---

Surface: (D) - Disrupted (L) - Illuminated (R) - Retractable (RF) - Reflective

Station	Easting (m)	Northing (m)	Level (m)
SH01	387299.307	401378.039	87.716
SH02	387262.304	401396.313	87.579
SH03	387229.529	401412.408	87.453

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows:

- Arbitrary
- Arbitrary but approx. related to North
- Best fit to an Ordnance Survey Digital Sheet
- Related to the Ordnance Survey National GPS Network

Levels
Please note that the levels shown on this drawing are as follows:

- Arbitrary
- Related to an Ordnance Survey Bench Mark
- Related to the Ordnance Survey National GPS Network

Survey Hub Nottingham | Manchester | London
Head Office: 0115 7141123
mail@surveyhub.co.uk
www.surveyhub.co.uk

Client: **Mkenney Properties Ltd**

Project: **Brendon Avenue, Moston
Manchester, M40 9DN**

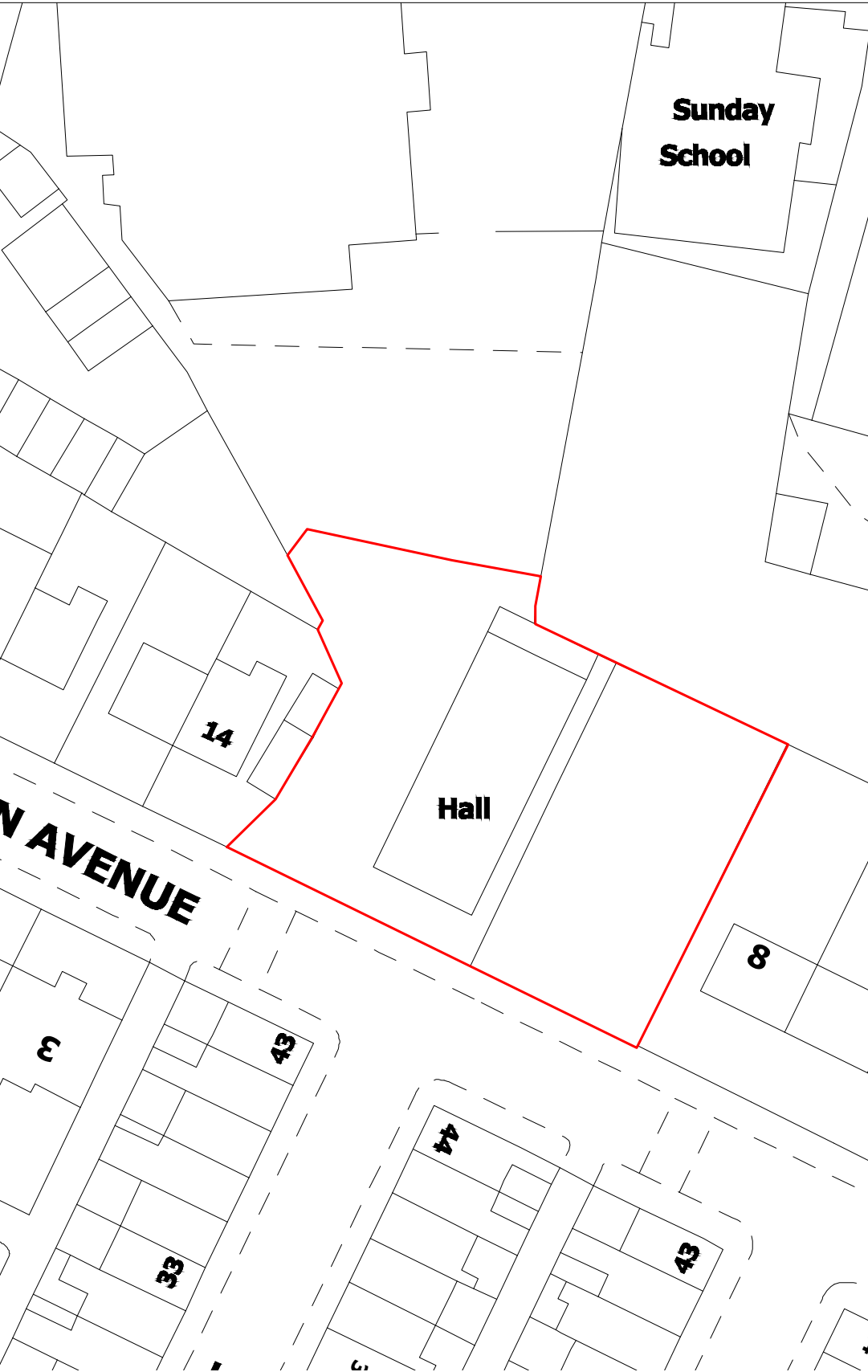
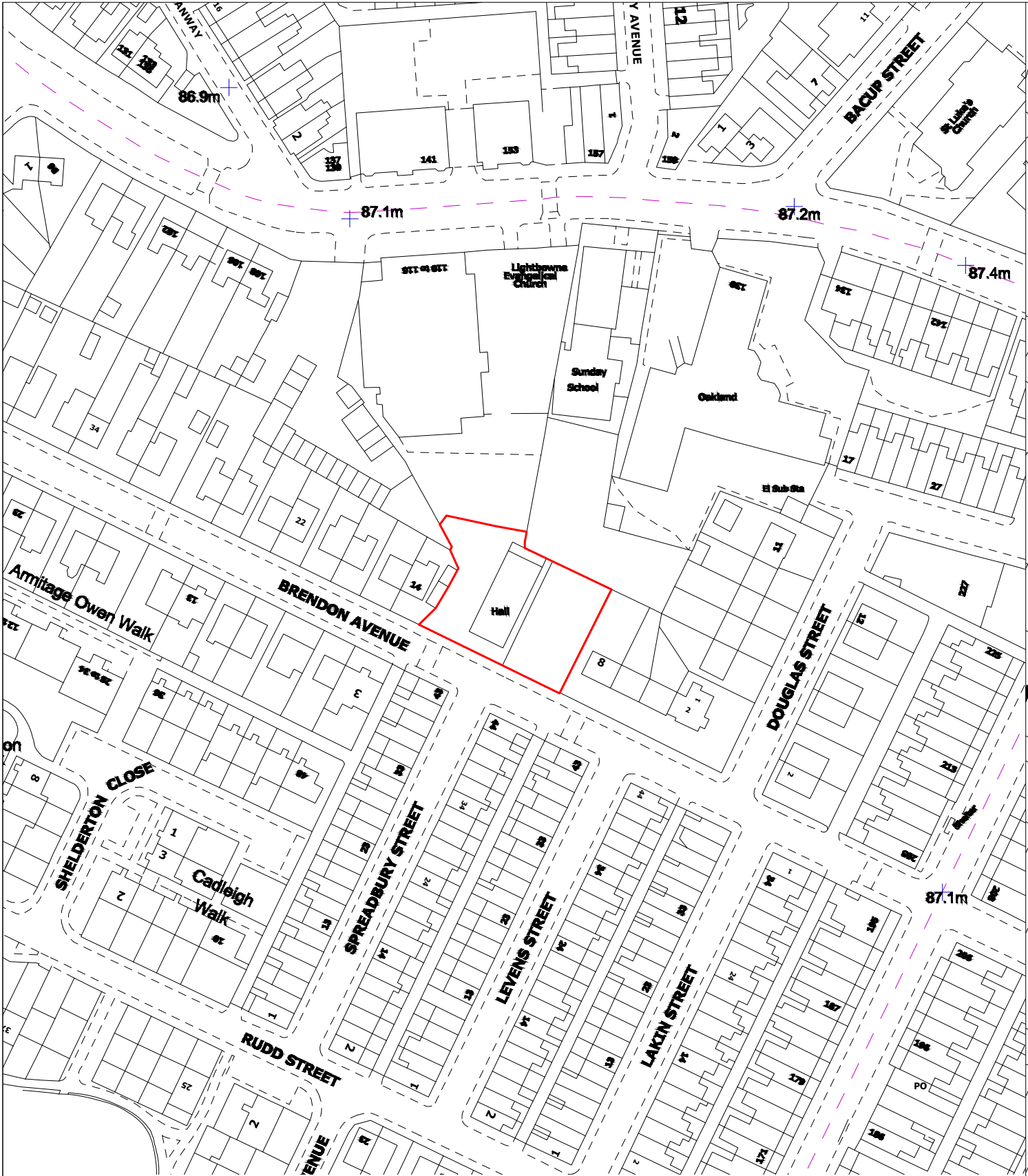
Title: **Topographical Survey 2D**

Surveyed ST Checked NS Date 24/11/2022
Sheet No 1 of 1 Scale 1:200@A3

Job No. 5731 Rev. 0

NOTES:
All critical measurements should be checked on site prior to design.
No liability will be taken for this plan if passed on to 3rd parties.
Some services/data may be omitted in areas of parked vehicles and vegetation.
THIS SURVEY HAS BEEN ORIGINATED BY THE ORDNANCE SURVEY (OS) NETWORK DATA
FORGIVEN VIA A GLOBAL POSITION SYSTEM (GPS) AND THE OS ACTIVE NETWORK (OS NET).
THE OS DATA COORDINATE HAS BEEN ESTABLISHED NEAR TO THE SITE CENTRE VIA A
TRANSFORMATION USING THE OS DATA & OS DATA TRANSFORMATION MODELS.
THE SURVEY HAS BEEN CORRELATED TO THE OS DATA & OS DATA TRANSFORMATION MODELS.
OS DATA POINTS ARE USED TO CREATE A SURFACE & A SURFACE FOR ANGLE CORRELATION.
NO SCALE FACTOR HAS BEEN APPLIED TO THE SURVEY THEREFORE THE COORDINATES
SHOWN ARE LOCAL PLANE ONLY.
PLEASE REFER TO SURVEY STATION TABLE TO ENABLE ESTABLISHMENT OF THE ON-SITE
GRID.

Appendix B: Proposed Site Plan



Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.
All work and materials should comply with Health and Safety legislation.
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HAD & Co. are not liable for any work undertaken prior to Full Planning Consent and/ or Building Regulations Approval.
CDM REGULATIONS 2015
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The designer can take on the duties, provided there is a written agreement between you and the designer to do so.
The Health and Safety Executive is to be notified as soon as possible before construction work starts if the works:
(a) Last longer than 30 working days and has more than 20 workers working simultaneously at any point in the project.
Or:
(b) Exceeds 500 person days.
THERMAL BRIDGING
Care shall be taken to limit the occurrence of thermal bridging in the insulation layers caused by gaps within the thermal element, (i.e. around windows and door openings). Reasonable provision shall also be made to ensure the extension is constructed to minimise unwanted air leakage through the new building fabric.
MATERIALS AND WORKMANSHIP
All works are to be carried out in a workmanlike manner. All materials and workmanship must comply with Regulation 7 of the Building Regulations, all relevant British Standards, European Standards, Agreement Certificates, Product Certification of Schemes (Kite Marks) etc. Products conforming to a European technical standard or harmonised European product should have a CE marking.

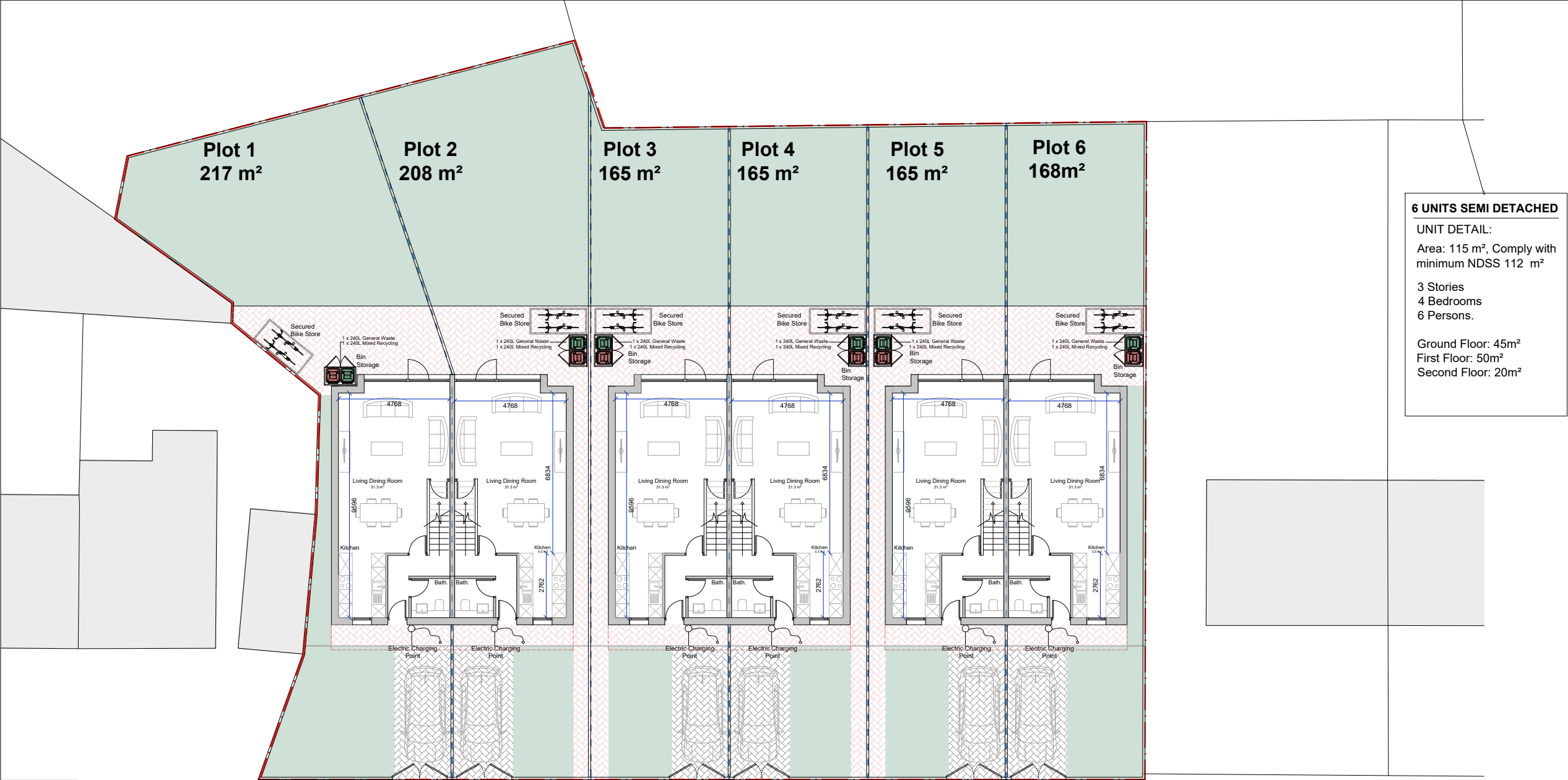
Revisions List:



HAD & Co.
www.hussainarchitecture.co.uk
01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Location and Site Plan	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 13-04-2022	Paper: A3
Drawing No: HAD3412-01	Scale: 1:200
Revision:	



Proposed Ground Floor



Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.

All work and materials should comply with Health and Safety legislation.

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Or:
(b) Exceeds 500 person days.

THERMAL BRIDGING
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MATERIALS AND WORKMANSHIP
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Drawings not yet checked internally or by building control, external consultants input required including a structural engineer, all drawings are subject to change and must not be relied upon at this stage.

Revisions List:

a- Dimensions and areas have been added, the dwellings are comply with NDSS.

b- Updated plans with the rear bin storage and bike store.



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01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Proposed Ground Floor Plan	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 4-10-2022	Paper: A3
Drawing No: HAD3412-02	Scale: 1:200
Revision:	a b



6 UNITS SEMI DETACHED

UNIT DETAIL:

Area: 115 m², Comply with minimum NDSS 112 m²

3 Stories
4 Bedrooms
6 Persons.

Ground Floor: 45m²
First Floor: 50m²
Second Floor: 20m²

Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.

All work and materials should comply with Health and Safety legislation.

All dimensions are in millimetres unless where explicitly shown otherwise.

The contractor should check and certify all dimensions as work proceeds and notify the agent of any discrepancies.

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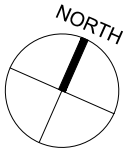
MATERIALS AND WORKMANSHIP
All works are to be carried out in a workmanlike manner. All materials and workmanship must comply with Regulation 7 of the Building Regulations, all relevant British Standards, European Standards, Agreement Certificates, Product Certification of Schemes (Kite Marks) etc. Products conforming to a European technical standard or harmonised European product should have a CE marking.

Drawings not yet checked internally or by building control, external consultants input required including a structural engineer, all drawings are subject to change and must not be relied upon at this stage.

Revisions List:

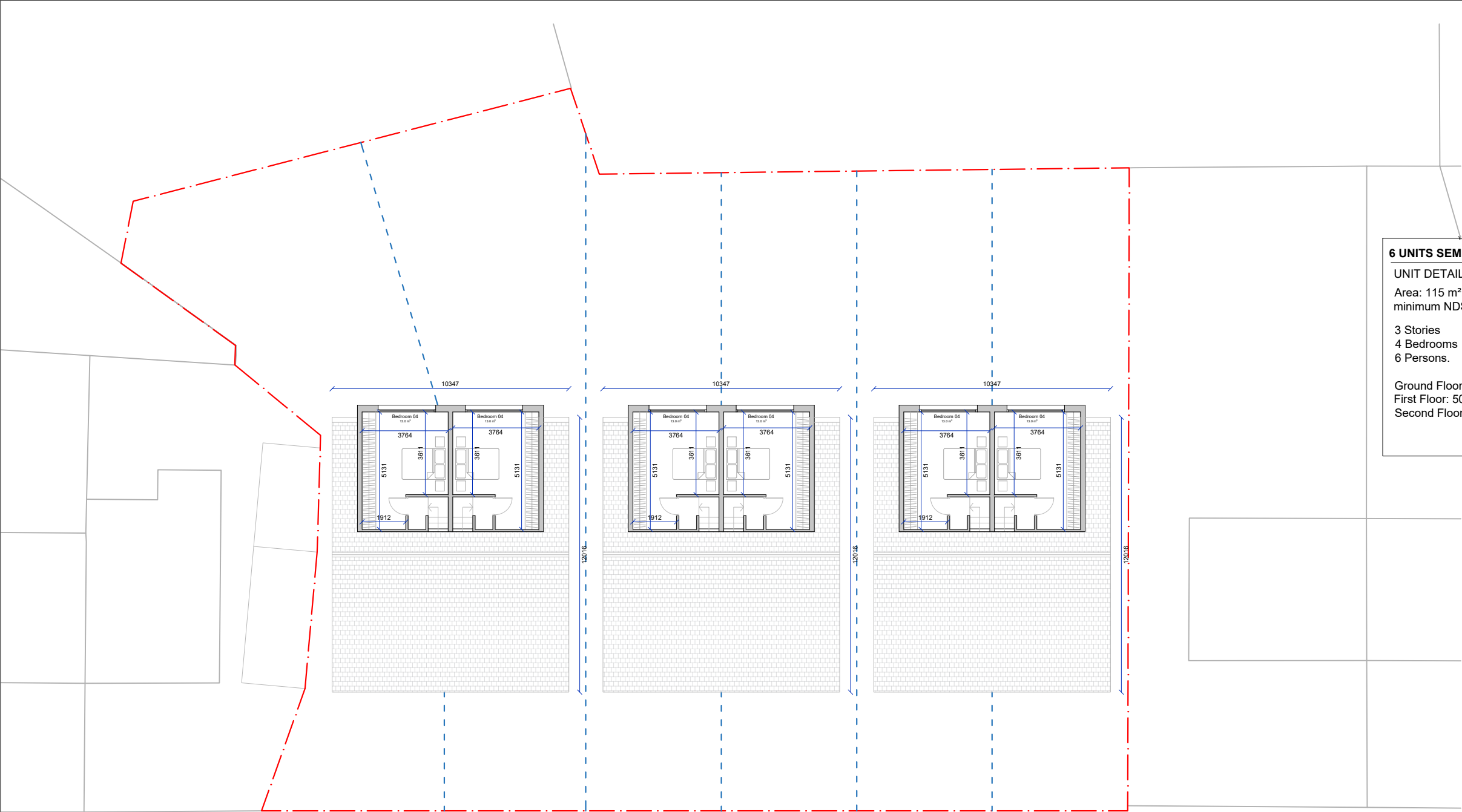
a- Dimensions and areas have been added, the dwellings are comply with NDSS.

Proposed First Floor

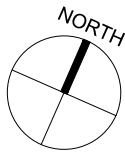


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01282 451428

Address: Brendon Avenue Moston M40 9DN	
Title: Proposed First Floor Plan	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 12-09-2022	Paper: A3
Drawing No: HAD3412-03	Scale: 1:200
Revision:	a



Proposed Second Floor



6 UNITS SEMI DETACHED

UNIT DETAIL:

Area: 115 m², Comply with minimum NDSS 112 m²

3 Stories
4 Bedrooms
6 Persons.

Ground Floor: 45m²
First Floor: 50m²
Second Floor: 20m²

Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.

All work and materials should comply with Health and Safety legislation.

All dimensions are in millimetres unless where explicitly shown otherwise.

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Do not scale off the drawings, if in doubt ask.

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Or:
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THERMAL BRIDGING
Care shall be taken to limit the occurrence of thermal bridging in the insulation layers caused by gaps within the thermal element, (i.e. around windows and door openings). Reasonable provision shall also be made to ensure the extension is constructed to minimise unwanted air leakage through the new building fabric.

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Drawings not yet checked internally or by building control, external consultants input required including a structural engineer, all drawings are subject to change and must not be relied upon at this stage.

Revisions List:

a- Dimensions and areas have been added, the dwellings are comply with NDSS.



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Address: Brendon Avenue
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M40 9DN

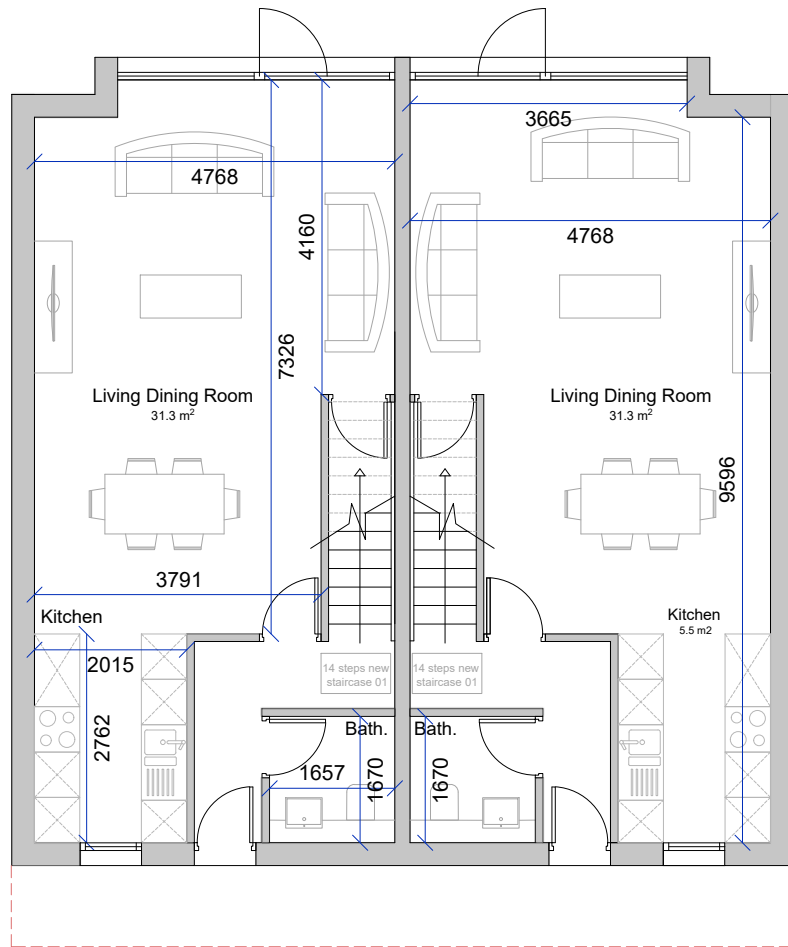
Title: Proposed Second Floor Plans	Drawn: HA
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Client: Oseni Musa	Checked: SH
---------------------------	--------------------

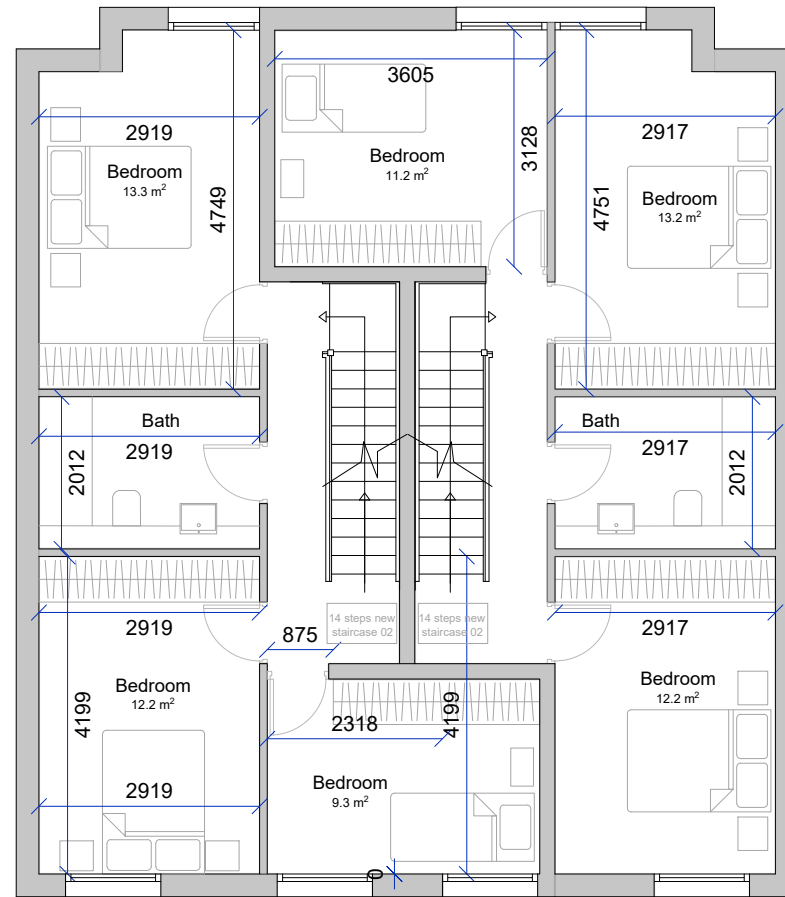
Date: 12-09-2022	Paper: A3
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Drawing No: HAD3412-04	Scale: 1:200
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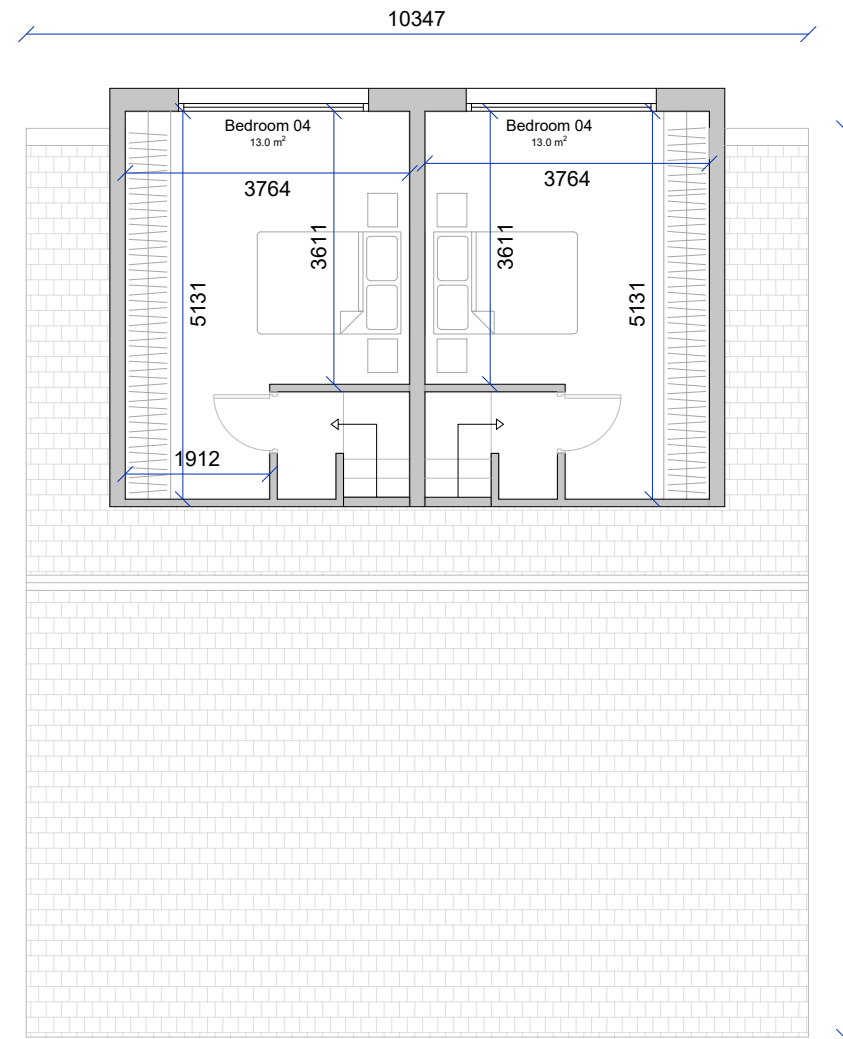
Revision:	a								
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Proposed Ground Floor



Proposed First Floor



Proposed Second Floor

6 UNITS SEMI DETACHED

UNIT DETAIL:

Area: 115 m², Comply with minimum NDSS 112 m²

3 Stories
4 Bedrooms
6 Persons.

Ground Floor: 45m²
First Floor: 50m²
Second Floor: 20m²

Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.
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Or:
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THERMAL BRIDGING
Care shall be taken to limit the occurrence of thermal bridging in the insulation layers caused by gaps within the thermal element, (i.e. around windows and door openings). Reasonable provision shall also be made to ensure the extension is constructed to minimise unwanted air leakage through the new building fabric.
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Revisions List:

a- Dimensions and areas have been added, the dwellings are comply with NDSS.



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01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Proposed Semi Detached House Plans

Drawn: HA

Client: Oseni Musa

Checked: SH

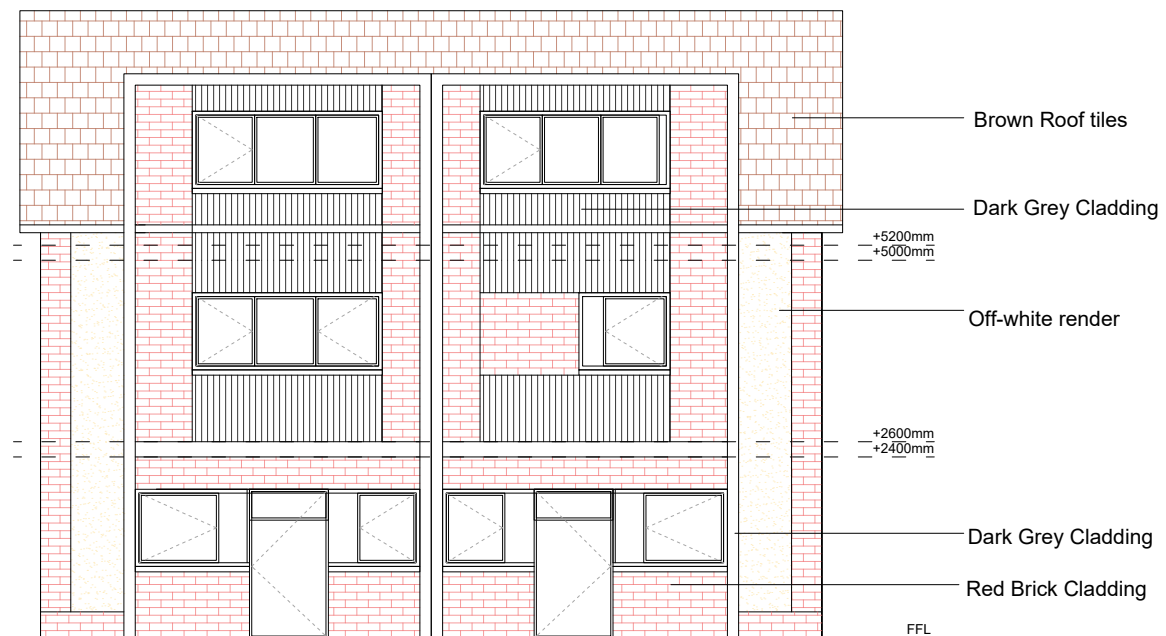
Date: 12-09-2022

Paper: A3

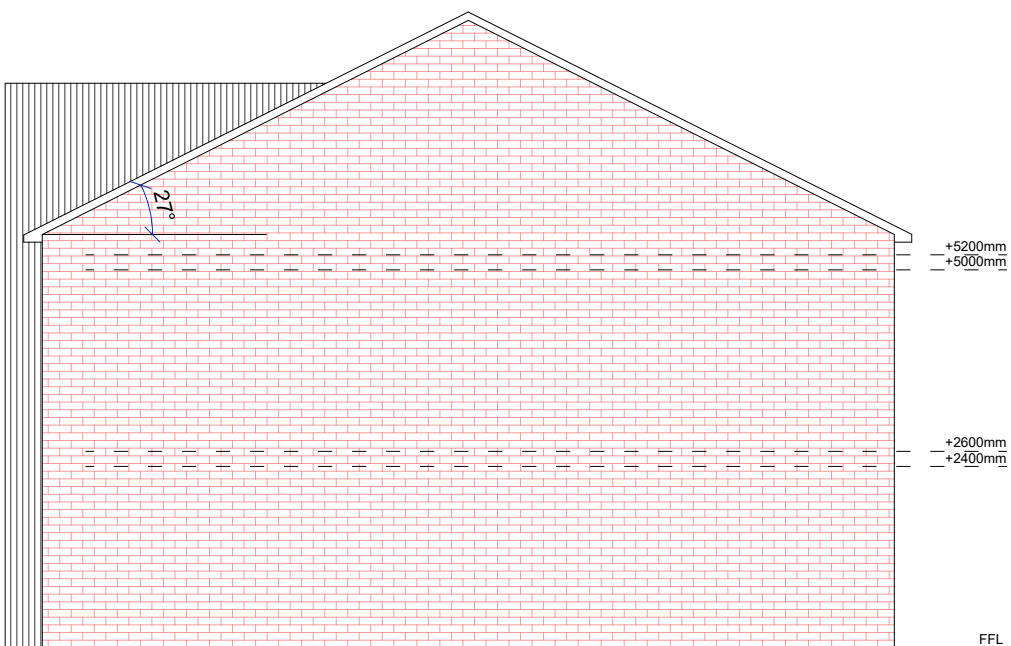
Drawing No: HAD3412-05

Scale: 1:100

Revision:	a						
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Proposed Rear Elevation 1:100 @ A3
Option 01



Proposed Side Elevation 1:100 @ A3

All works: to be carried out to the latest current British Standards Codes of Practice and recognised working practices.

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HAB & Co. are not liable for any work undertaken prior to Full Planning Consent and/or Building Regulations Approval.

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THERMAL BRIDGING

Care shall be taken to limit the occurrence of thermal bridging in the insulation layers caused by gaps within the thermal element. (i.e. around windows and door openings). Reasonable provision shall also be made to ensure the external insulation is constructed to minimise unwanted air leakage through the new building fabric.

MATERIALS AND WORKMANSHIP

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Revisions List:



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01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Proposed Elevations					Drawn: HA				
Client: Oseni Musa					Checked: SH				
Date: 13-04-2022					Paper: A3				
Drawing No: HAD3412-06					Scale: 1:100				
Revision:									



Proposed Street Scene Elevations

Notes:
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Drawings not yet checked internally or by building control, external consultants input required including a structural engineer, all drawings are subject to change and must not be relied upon at this stage.

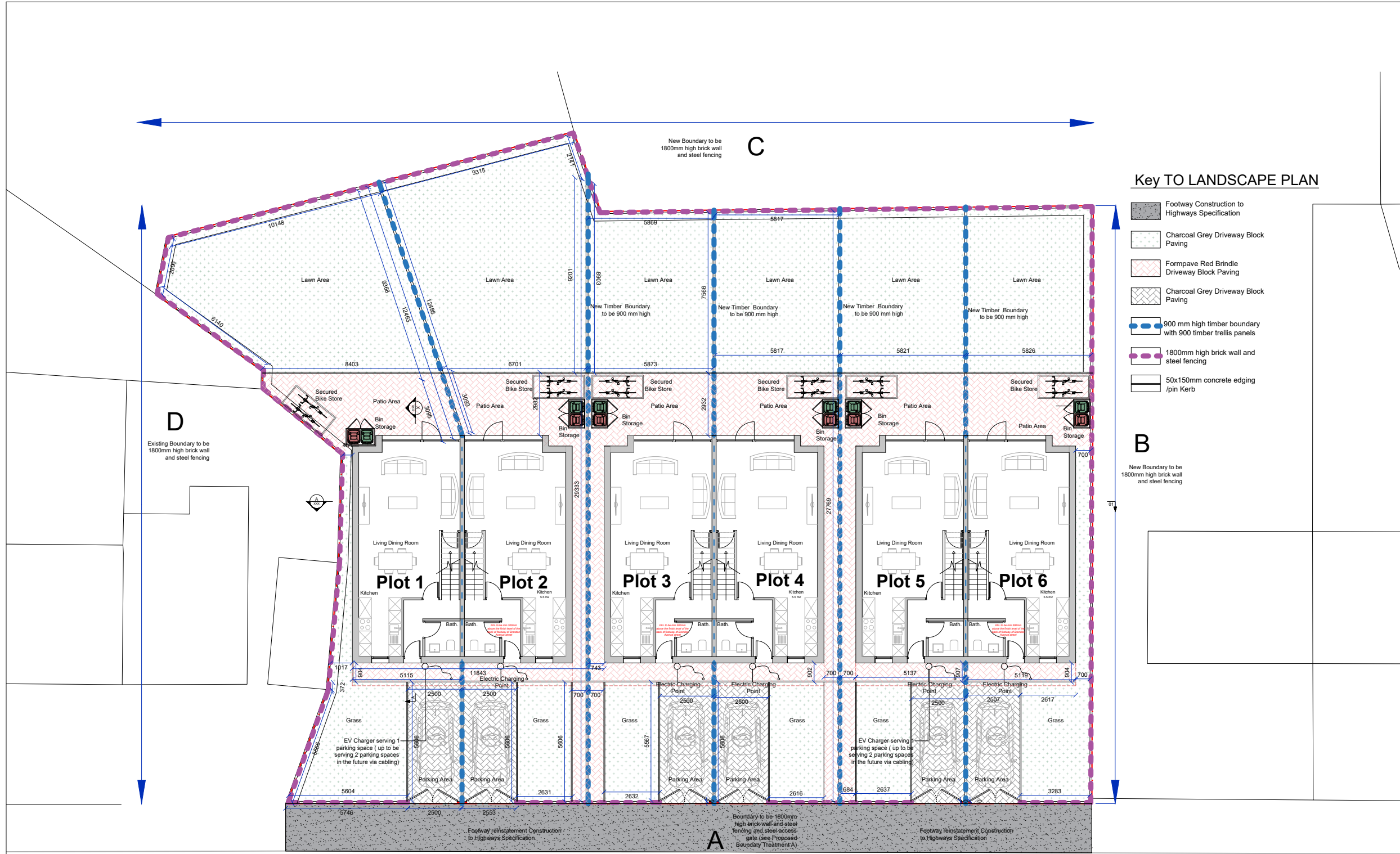
Revisions List:



HAD & Co.
www.hussainarchitecture.co.uk
01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Street Scene Elevations	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 13-04-2022	Paper: A3
Drawing No: HAD3412-07	Scale: 1:200
Revision:	



Proposed Landscaping and
Setting out Plan 1:200 @A3

Notes:
All work is to be carried out to the latest current British Standards Codes of Practice and recognised working practices.
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Basic surface water plans, will need to be confirmed by a drainage consultant at a later date.

Revisions List:

No.	Description	Date

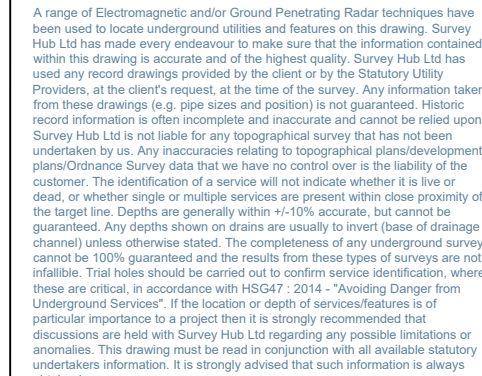


HAD & Co.
www.hussainarchitecture.co.uk
01282 451428

Address: Brendon Avenue
Moston
M40 9DN

Title: Landscaping Plans	Drawn: HA
Client: Oseni Musa	Checked: SH
Date: 22-07-2022	Paper: A3
Drawing No: HAD3412-12	Scale: 1:200
Revision:	

Appendix C: Existing Site Drainage Review

[illegible]

KEY	
DL	DL PIPE(S)
FUEL	FUEL PIPE(S)
SC	SCHEMATIC
BT	BT TRAFFIC SIGNAL
BT	OVERHEAD BT CABLE(S)
COMM	COMMUNICATIONS CABLE(S)
COMM	OVERHEAD COMMUNICATIONS CABLE(S)
CTV	CABLE TV CABLE(S)
EL	ELECTRIC CABLE(S)
ED	OVERHEAD ELECTRIC CABLE(S)
FO	FIBROPTIC CABLE(S)
GS	GAS MAIN
GS	GAS SERVICE
GRF	GROUND PENETRATING RADAR (GPR) TRACE
GRF	PIPE
LC	LIGHTING CIRCUIT
LC	SECURITY CIRCUIT
UN	UNIDENTIFIED TRACE
WT	WATER MAIN
WT	WATER MAIN
WT	FIRE ALARM CABLE(S)
WT	EMPTY DUCTING
WT	COMBINED SEWER
WT	FLOOD SEWER
WT	RISING MAIN
WT	SURFACE WATER SEWER
WT	CHAMBER (APPROX. POSITION)
WT	INVESTIGATION EXTENTS
WT	STANDARD ROUTE
WT	SERVICE TAKEN FROM RECORDS
WT	DEPTH TO SERVICE
WT	END OF TRACE

Survey Coordinates and Grid
Please note that the grid shown on this drawing is as follows;

- ☐ Arbitrary
- ☐ Arbitrary but approx. related to North
- ☐ Best fit to an Ordnance Survey Digital Sheet
- ☒ Related to the Ordnance Survey National GPS Network

Levels
Please note that the levels shown on this drawing are as follows:

- ☐ Arbitrary
- ☐ Related to an Ordnance Survey Bench Mark
- ☒ Related to the Ordnance Survey National GPS Network

Survey Hub

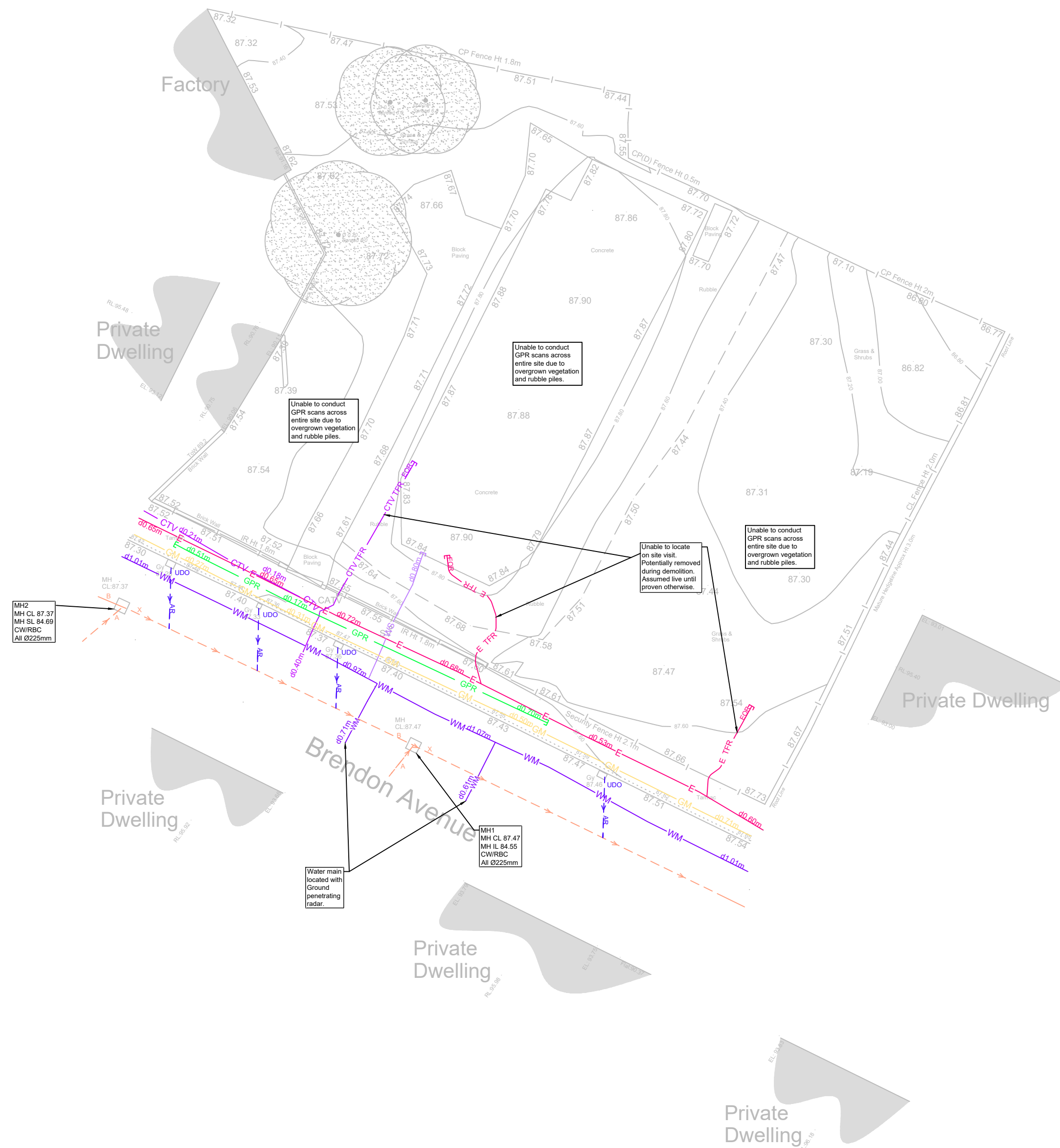
Nottingham | Manchester | London
Head Office: 0115 7141123
mail@surveyhub.co.uk
www.surveyhub.co.uk

Client	Mkenny Properties Ltd
Project	Brendon Avenue, Moston Manchester, M40 9DN
Title	Underground Utility Survey

Surveyed	LM	Checked	CR	Survey Date	24/11/2022
Sheet No	1 of 1			Drawing Scale	1:200@A2
Job No.	5731			Issue Date	29/11/2022

NOTES:
All critical measurements should be checked on site prior to design.
No liability will be taken for this plan if passed on to 3rd parties.
Some services/data may be omitted in areas of parked vehicles and vegetation.

THIS SURVEY HAS BEEN ORIENTED TO THE ORDNANCE SURVEY (O.S.) NATIONAL GRID (OSNGR) VIA A GLOBAL POSITION SYSTEM (GPS) AND THE O.S. ACTIVE NETWORK (OSNET). A TRUE OSNGR COORDINATE HAS BEEN ESTABLISHED NEAR TO THE SITE CENTRE VIA A TRANSFORMATION USING THE CENTRE OF GRAVITY TRANSFORMATION EQUATION. THE SURVEY HAS BEEN CORRELATED TO THIS POINT AND A FURTHER ONE OR MORE OSNGR POINTS ESTABLISHED TO CREATE A TRUE O.S. BEARING FOR ANGLE ORIENTATION. NO SCALE FACTOR HAS BEEN APPLIED TO THE SURVEY THEREFORE THE COORDINATES SHOWN ARE ARBITRARY & NOT TRUE O.S. COORDINATES WHICH HAVE A SCALE FACTOR APPLIED. PLEASE REFER TO SURVEY STATION TABLE TO ENABLE ESTABLISHMENT OF THE ON-SITE GRID.



Station	Easting (m)	Northing (m)	Level (m)

Environmental
Geotechnical
Specialists



SOAKAWAY LETTER REPORT

job number	C2623/23/E/5398	date	18/05/2023
site address	Brendon Avenue Moston Manchester M40 9DN		
written by	J.Finch	checked by	I.Sakoor
issued by	J.Finch		



Please consider the environment before printing this report.



Environmental
Geotechnical
Specialists

Rogers Geotechnical Services Ltd
Offices 1 & 2 Barncliffe Business Park, Near Bank, Shelley, Huddersfield, HD8 8LU
☎ 01484 604354 Company No. 5130864

<ENVIRONMENTAL> <GEOTECHNICAL>

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2. Limitations	2
3. Fieldworks	2
4. Geology	3
5. Strata Conditions	3
6. Insitu Testing	3
6.1 Soakaway Test	3
7. Discussion	3
8. References	5

Appendices

1. Site Plan
2. Trial Pit Records
3. Trial Pit Photographs
4. Soakaway Results



Report on Soakaway Testing

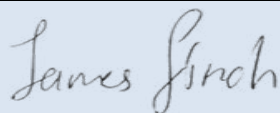
Location: **Land on Brendon Avenue**
Moston, Manchester, M40 9DN

For: MKenny Properties Limited

Report No. C2623/23/E/5398

Report Date: May 2023

For and on behalf of **Rogers Geotechnical Services Ltd**



James Finch BSc FGS
Graduate Engineer



Imran Sakoor BEng FGS
Geo-environmental Engineer

Report Summary¹

Item	Comments	Section
Geology	Till over Pennine Middle Coal Measures Formation.	4.
Strata Conditions	Significant thickness of granular made ground overlying sandy clay (Till).	5.
Groundwater	Water strikes recorded within the sandy clay in TP03 at 1.6m.	5.
Suitability of Soakaways	Not recommended.	7.

¹ This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

We thank you for your request to undertake percolation testing at the above mentioned site and take pleasure in enclosing the results of this work. The investigation was undertaken on the 11th May 2023 in accordance with your instruction to proceed. This report describes the work undertaken, presents the data obtained and discusses the results of the tests

2. Limitations

The recommendations made and opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between trial pit positions, these are for guidance only and no liability can be accepted for their accuracy.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of issue.

3. Fieldworks

Three trial pits were excavated in order to undertake soakaway testing, the positions of which are shown in Appendix 1. The soakaway tests were undertaken at the base of each pit at depths rational to the construction of soakaways. The soils exposed in the trial pits were logged on site in general accordance with BS5930: 2015 +A1: 2020, and full descriptions are given on the trial pit records which are presented in Appendix 2. Photographs of the trial pits are included within Appendix 3.

Once excavations were completed, the trial pits were carefully re-instated with the arisings. Whilst every care was taken during the infilling process, including compacting of the infill at regular intervals with the back acting arm of the excavator, it should be appreciated that some mounding of the surface may have resulted. Moreover, the infilled soils may be subjected to settlement over time, such that a depression in the surface may also occur. Therefore, the locations of any pits undertaken in this investigation should be conveyed to the current site user, as the mounds or depressions associated with the pits may present a risk to current site operations. Furthermore, it must be realised that the infilled pits represent an area of disturbance within the site soils, thus the soils at the pit locations may vary characteristically compared to the undisturbed ground. As such, foundations placed in this disturbed material may not perform as anticipated.

4. Geology

The available published geological data for the site has been examined and the following table presents the anticipated geology.

Table 1: Geological Data for the Site			
Strata Type	Strata Name ²	Previous Name ³	Description ³
Superficial Geology	Till	-	Heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.
Solid Geology	Pennine Middle Coal Measures Formation	Middle Coal Measures Formation Grey Measures of Yorkshire And Nottingham	Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit.

5. Strata Conditions

In accordance with the geology of the area, the succession has been shown to include the following:

Table 2: Generalised Strata Profile			
Depth m below ground level to underside of layer	Strata Type	Positions Layer Revealed	Groundwater Strikes m below ground level
0.1	Dark brown gravelly clayey SILT	TP03	None
0.6 – 1.2	Made Ground (Clayey gravelly SAND).	All	None
1.3 – +2.2	Brown and grey slightly sandy CLAY.	All	TP03 (1.6m)
2.2+ – +2.4	Dark grey sandy CLAY.	TP01, TP02	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated.

² Sources: British Geological Survey (NERC) Map Sheets 78; Wakefield; Solid and Drift Edition, and Geology of Britain Viewer [online resource from www.bgs.ac.uk]

³ Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

6. Insitu Testing

6.1 Soakaway Test

On reaching the elected soakaway test depth, the pit was trimmed and squared as much as practicable. Water was then introduced into the pit at a controlled rate to prevent collapse of the sides and the level monitored at time intervals relative to a reference bar at ground level. The results obtained from the soakaway tests are presented at Appendix 4 and are summarised below:

Table 3: Soakaway Test Results					
Location	Soakage Area Dimensions (average) (m)	Depths of soaked strata (m)	Soil Description (of soaked strata)	Infiltration Rate (m/sec)	*Drainage Characteristics
TP01	0.5 x 2.7	1.54 to 1.55	Side – Slightly sandy CLAY Base – Sandy CLAY	N/A	Practically impermeable
TP02	0.5 x 2.8	1.48 to 1.49	Side – Slightly sandy CLAY Base – Sandy CLAY	N/A	Practically impermeable
TP03	0.5 x 2.7	1.7 to 1.7	Side – Slightly sandy CLAY Base – Slightly sandy CLAY	N/A	Practically impermeable

*Based on the most onerous results for each test.

During the soakaway tests the water level did not drop more than 10mm in any position and therefore failed to achieve a fall from 75% to 25% of the effective depth of the storage volume. It is considered that the initial movement in TP01 and TP02 was observed as water filled any gaps and fissures within the clay in the sides of the pits. On this basis, the tests could not be completed within the scope of the method provided in BRE Digest 365 due to the poor soakage rate of the exposed soils. Due to the negligible water movement it was not possible to extrapolate the results obtained in order to obtain a soil infiltration rate.

7. Discussion

The natural soils encountered beneath the made ground were found to be typical of cohesive till deposits indicated to underly the area. The strata conditions and subsequent drainage characteristics appear to be comparable across the site. In this instance, the infiltration testing has revealed that the soils have practically impermeable drainage characteristics. Whilst the made ground included gravel and sand, these soils cannot be recommended as a soakage stratum due to the potential presence of contamination and the potential for collapse compression should concentrated flows of water be introduced. Therefore, soakaways cannot be recommended at this site and an alternative form of drainage should be adopted.

8. References

- Building Research Establishment (BRE) Digest 365, *Soakaway Design*, September 1991.
- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations*, B.S.I., London.
- Barnes, G. (2000). *Soil Mechanics Principle and Practice*. 2nd ed. London: Macmillan Press Ltd, p.47.

Appendix 1

Site Plan

Notes:

Investigation positions approximated from site operative's notes.



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe
Business Park,
Near Bank,
Shelley,
Huddersfield,
HD8 8LU

Telephone: 0843 50 66 87
www.rogersgeotech.co.uk

Client:

Mkenny Properties Limited

Job Number:

C2623/23/E/5398

Project Details:

Brendon Avenue, Moston

Scale: Not to scale - reference only



Appendix 2

Trial Pit Records



Trial Pit Log

Trialpit No

TP01

Sheet 1 of 1

Project Name: Brendon Avenue, Moston

Project No.
C2623/23/E/5398Co-ords: -
Level:Date
11/05/2023

Location: Brendon Avenue, Moston, Manchester, M40 9DN

Dimensions
(m):

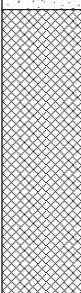
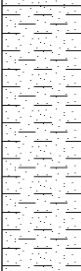
2.7

Depth
2.20

0.5

Scale
1:25Logged
JF

Client: MKenny Properties Limited

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				0.05			PAVING SLAB MADE GROUND (Brown to black clayey gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse brick, macadam and sandstone.)	
				1.00			Stiff grey mottled orangish brown slightly sandy CLAY. Sand is fine to medium.	1
				1.30			Firm to stiff brown and grey sandy CLAY. Sand is fine to medium.	
				2.20			End of pit at 2.20 m	2
								3
								4
								5

Remarks: Arrive Site: 08:15 / Leave Site: 12:00 /

Stability: Minor instability in made ground.





Trial Pit Log

Trialpit No

TP02

Sheet 1 of 1

Project Name: Brendon Avenue, Moston

Project No.
C2623/23/E/5398Co-ords: -
Level:Date
11/05/2023

Location: Brendon Avenue, Moston, Manchester, M40 9DN

Dimensions
(m):

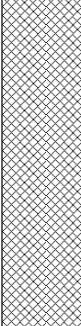
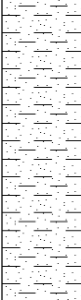
2.8

Depth
2.40

0.5

Scale
1:25Logged
JF

Client: MKenny Properties Limited

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
				1.10			MADE GROUND (Brown to black clayey gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse brick, macadam and sandstone.)	1
				2.10			Soft to firm grey mottled orangish brown slightly sandy CLAY. Sand is fine to medium.	2
				2.40			Firm dark grey and dark brown sandy CLAY. Sand is fine to medium.	
							End of pit at 2.40 m	3
								4
								5

Remarks: Arrive Site: 08:15 / Leave Site: 12:00 /

Stability: Minor instability in made ground.





Trial Pit Log

Trialpit No

TP03

Sheet 1 of 1

Project Name: Brendon Avenue, Moston

Project No.
C2623/23/E/5398Co-ords: -
Level:Date
11/05/2023

Location: Brendon Avenue, Moston, Manchester, M40 9DN

Dimensions
(m):

2.7

Depth
2.20

0.5

Scale
1:25Logged
JF

Client: MKenny Properties Limited

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
▼				0.30			TOPSOIL (Dark brown gravelly clayey SILT. Gravel is of angular and subangular fine to coarse brick, macadam, glass, ceramic and sandstone. Frequent small and medium roots.)	
				0.60			MADE GROUND (Brown to black clayey gravelly fine to coarse SAND. Gravel is angular and subangular fine to coarse brick, macadam and sandstone.)	
				2.20			Firm dark grey slightly sandy CLAY. Sand is fine to medium.	
							End of pit at 2.20 m	

Remarks: Arrive Site: 08:15 / Leave Site: 12:00 / Notes: Water strike 1.6 /

Stability: Minor instability in made ground.



Appendix 3

Trial Pit Photographs



TP01: East side of the trial pit.



TP01: West side of the trial pit.



TP01: North side of the trial pit.



TP01: South side of the trial pit.



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield,

Job No:

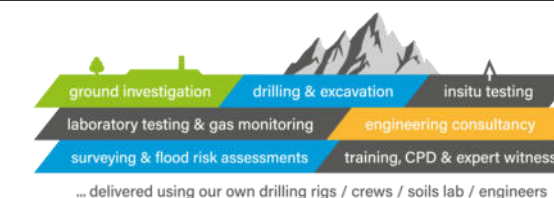
C2623/23/E/5398

Site:

Land on Brendon Avenue
Moston
Manchester
M40 9DN

Client:

MKenny Properties Limited

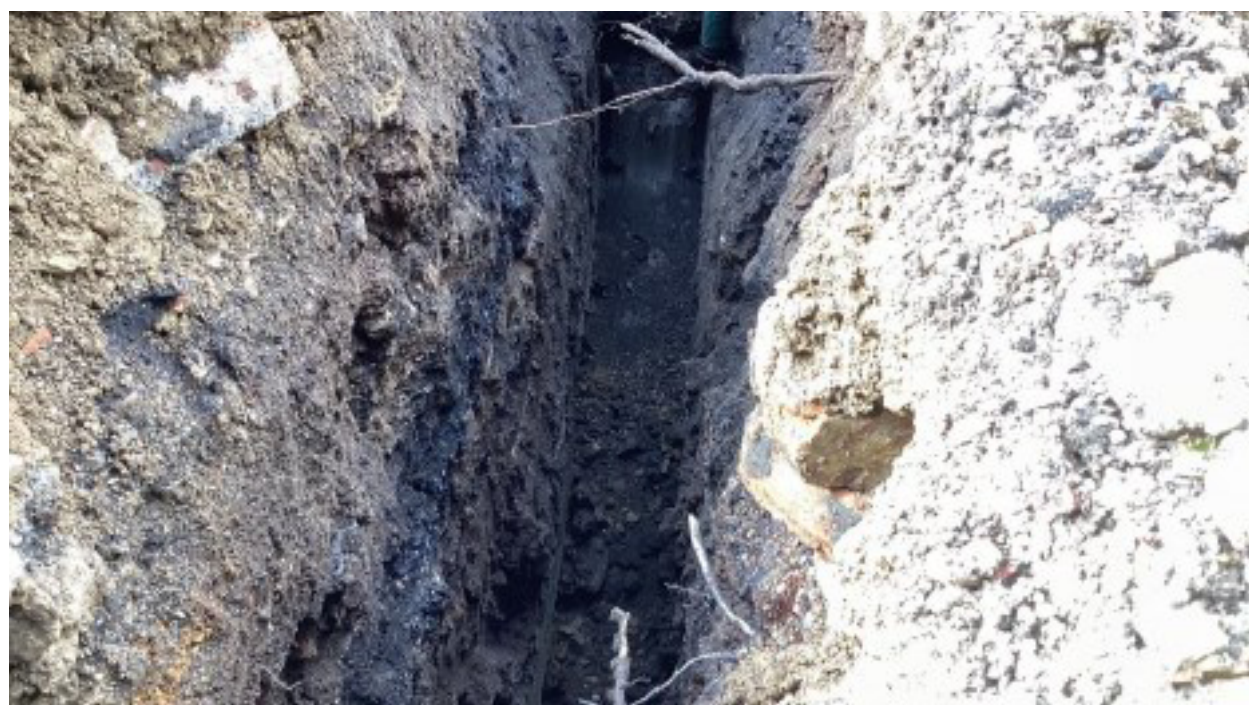




TP02: South side of the trial pit.



TP01: West side of the trial pit.



TP02: North side of the trial pit.



TP02: East side of the trial pit.



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield,

Job No:

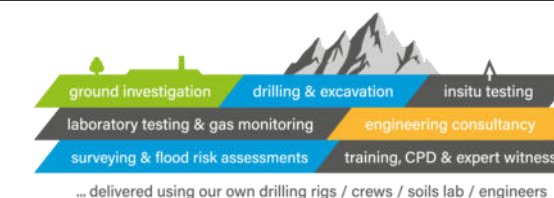
C2623/23/E/5398

Site:

Land on Brendon Avenue
Moston
Manchester
M40 9DN

Client:

MKenny Properties Limited





TP03: South side of the trial pit.



TP03: East side of the trial pit.



TP01: West side of the trial pit.



TP03: North side of the trial pit.



Rogers Geotechnical Services Ltd

Offices 1 & 2, Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield,

Job No:

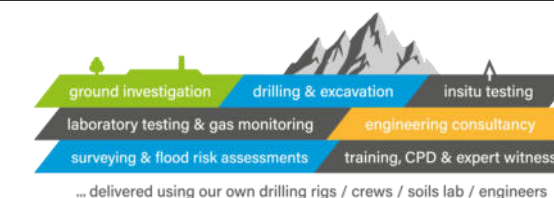
C2623/23/E/5398

Site:

Land on Brendon Avenue
Moston
Manchester
M40 9DN

Client:

MKenny Properties Limited



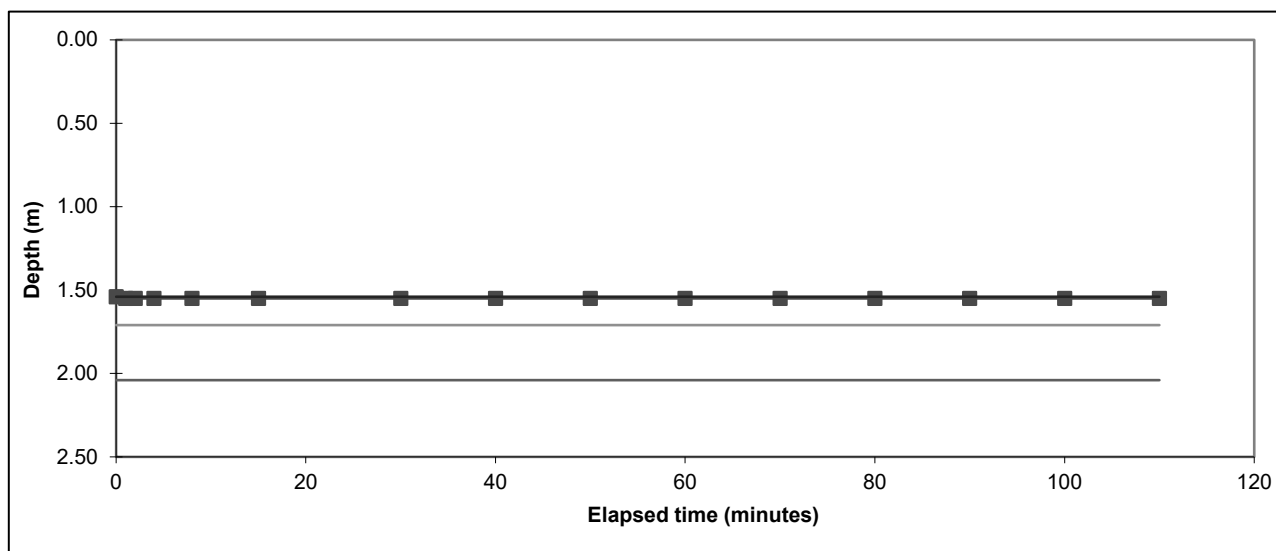
Appendix 4

Soakaway Results

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP01	Test No:	1	Date:	11/05/2023
Length (m):	2.700	Datum Height:			0.00 m agl
Width (m):	0.50	Granular infill:	None		
Depth (m):	2.20	Porosity of infill:	1	(assumed)	
	Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)	
	0	1.540	110	1.550	
	1	1.550			
	2	1.550			
	4	1.550			
	8	1.550			
	15	1.550			
	30	1.550			
	40	1.550			
	50	1.550			
	60	1.550			
	70	1.550			
	80	1.550			
	90	1.550			
	100	1.550			



Start water depth for analysis (mbgl):	1.54		
75% effective depth (mbgl):	1.71	Elapsed time (mins):	N/A
50% effective depth (mbgl):	1.87		
25% effective depth (mbgl):	2.04	Elapsed time (mins):	N/A
Base of soakage zone (mbgl):	2.20		

Volume outflow between 75% and 25% effective depth (m³):

Mean surface area of outflow (m²): 3.46

(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks Results processed following BRE 365 (2007).

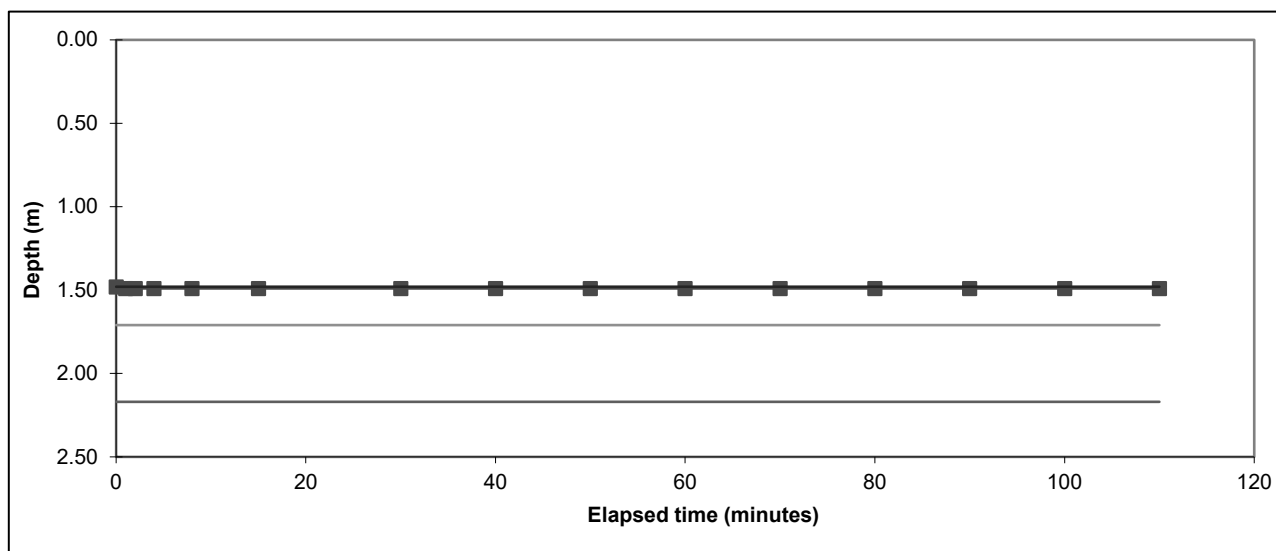
Client:	Mkenny Properties Limited	Job No:	C2623/23/E/5398
Site:	Brendon Avenue, Moston		

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP02	Test No:	1	Date:	11/05/2023
Length (m):	2.800	Datum Height:			0.00 m agl
Width (m):	0.50	Granular infill:	None		
Depth (m):	2.40	Porosity of infill:	1	(assumed)	

Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)
0	1.480	110	1.490
1	1.490		
2	1.490		
4	1.490		
8	1.490		
15	1.490		
30	1.490		
40	1.490		
50	1.490		
60	1.490		
70	1.490		
80	1.490		
90	1.490		
100	1.490		



Start water depth for analysis (mbgl):	1.48		
75% effective depth (mbgl):	1.71	Elapsed time (mins):	N/A
50% effective depth (mbgl):	1.94		
25% effective depth (mbgl):	2.17	Elapsed time (mins):	N/A
Base of soakage zone (mbgl):	2.40		

Volume outflow between 75% and 25% effective depth (m³):

Mean surface area of outflow (m²): 4.44

(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

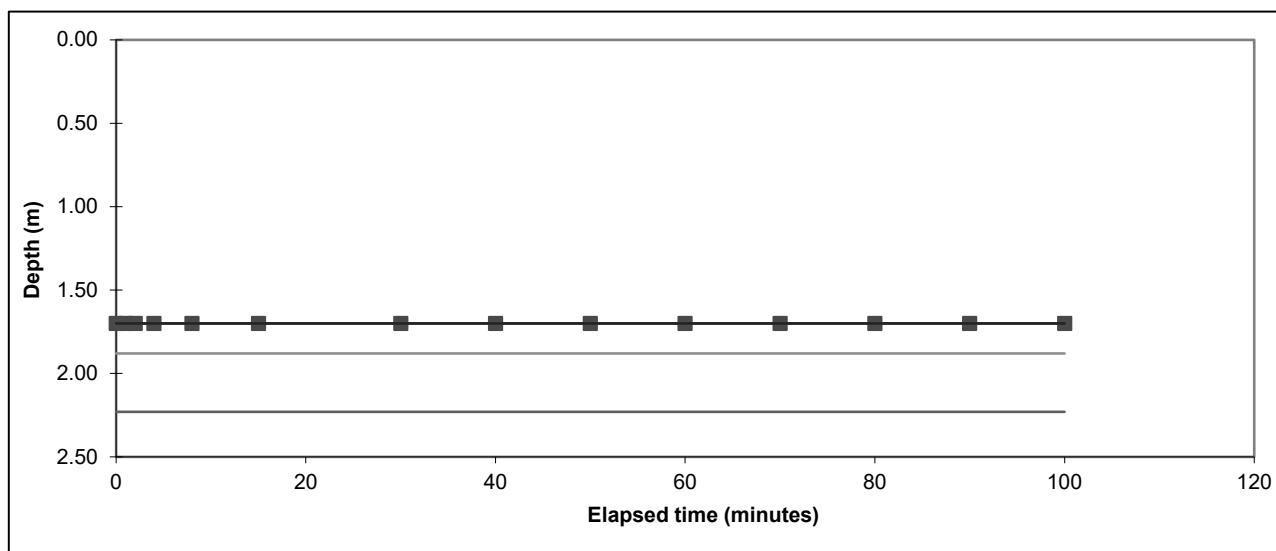
Remarks Results processed following BRE 365 (2007).

Client:	Mkenny Properties Limited	Job No:	C2623/23/E/5398
Site:	Brendon Avenue, Moston		

Rogers Geotechnical Services L

Soakaway Test

Trial Pit No:	TP03	Test No:	1	Date:	11/05/2023
Length (m):	2.700	Datum Height:			0.00 m agl
Width (m):	0.50	Granular infill:	None		
Depth (m):	2.20	Porosity of infill:	1	(assumed)	
	Elapsed time (minutes)	Water Depth (m below datum)	Elapsed time (minutes)	Water Depth (m below datum)	
	0	1.700			
	1	1.700			
	2	1.700			
	4	1.700			
	8	1.700			
	15	1.700			
	30	1.700			
	40	1.700			
	50	1.700			
	60	1.700			
	70	1.700			
	80	1.700			
	90	1.700			
	100	1.700			



Start water depth for analysis (mbgl):	1.70		
75% effective depth (mbgl):	1.88	Elapsed time (mins):	N/A
50% effective depth (mbgl):	2.05		
25% effective depth (mbgl):	2.23	Elapsed time (mins):	N/A
Base of soakage zone (mbgl):	2.40		

Volume outflow between 75% and 25% effective depth (m³):

Mean surface area of outflow (m²): 3.59

(side area at 50% effective depth + base area)

Time for outflow between 75% and 25% effective depth (mins):

Soil infiltration rate (m/s):	Test incomplete as 25% effective depth not achieved. Unable to reliably determine soil infiltration rate.
--------------------------------------	--

Remarks Results processed following BRE 365 (2007).

Client:	Mkenny Properties Limited	Job No:	C2623/23/E/5398
Site:	Brendon Avenue, Moston		

Appendix D: Existing and Proposed Catchment Areas Review



NOTES

1) ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE

KEY

SITE BOUNDARY

TOTAL SITE AREA: 1089m²

PROPOSED IMPERMEABLE AREA 653m²

PROPOSED PERMEABLE AREA 436m²

REVISIONS

REV	DESCRIPTION	DATE	BY
-	FIRST ISSUE	20/12/22	WR

Aval Consulting Group

Transportation Planning : Environmental Consultants

www.aval-group.co.uk, Email: contact@aval-group.co.uk
Company Number: 11922939

Client Name:

EQT EXETER

Project Title:

LAND ON BRENDON AVENUE,
MOSTON, M40 9DN

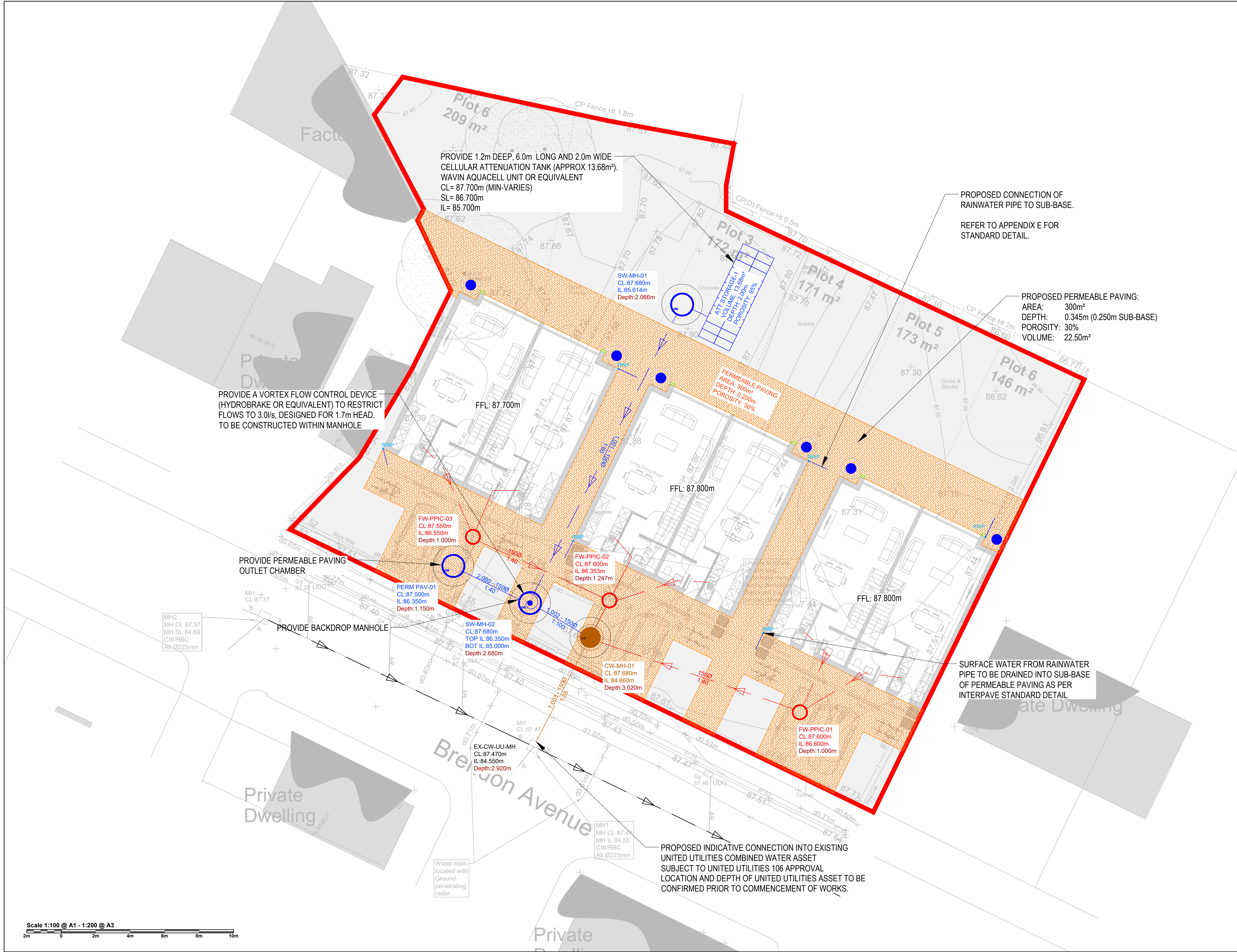
Drawing Title:

PROPOSED CATCHMENT AREAS PLAN

Date:	20.12.2022	Drawn By:	WR
Scale:	1:100 @ A1 1:200 @ A3	Checked:	WR
Status:	DRAFT	Approved:	AC

Drawing No:	AVAL/92071B/500/02	Rev:	-
-------------	--------------------	------	---

Appendix E: Proposed Drainage Strategy, United Utilities Asset Search and In-Principle Agreement with United Utilities



NOTES

1) ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE

2) THE DEVELOPER HAS SELF VETTED THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATION FOR THE PROPOSED ADOPTABLE SEWERS IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION AND THE REQUIREMENTS OF DCWW AS THE STATUTORY UNDERTAKER.

3) ALL PRIVATE DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH PART H OF THE CURRENT BUILDING REGULATIONS AND OR NHBC GUIDANCE.

4) THE POSITION AND DEPTH OF EXISTING STATUTORY UNDERTAKERS EQUIPMENT AFFECTED BY THE PROPOSED WORKS ARE TO BE CHECKED FOR ACCURACY ON SITE PRIOR TO COMMENCEMENT OF ANY OTHER WORKS.

5) ALL WORKS TO BE CONSTRUCTED MUST COMPLY WITH THE CURRENT HEALTH & SAFETY AT WORK ACT.

6) THE INVERT LEVELS OF EXISTING MANHOLES AND SEWER SPUR PIPES INTENDED FOR FUTURE CONNECTION BY THE PROPOSED DEVELOPMENT ARE TO BE CHECKED FOR ACCURACY ON SITE BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF ANY OTHER WORKS.

7) POSITION OF SOIL PIPE & BACK INLET GULLY CONNECTION POINTS TO BE CHECKED AGAINST ARCHITECTS HOUSE TYPE PLANS PRIOR TO COMMENCEMENT OF WORKS.

8) THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERING, ARCHITECTS AND LANDSCAPING DRAWINGS. ANY DISCREPANCIES IS TO BE REPORTED TO THE ENGINEER IMMEDIATELY TO SEEK CLARIFICATION.

9) ALL LATERAL CONNECTIONS INTO ADOPTABLE MANHOLES TO BE 150mm DIA. UNLESS OTHERWISE SHOWN.

10) AVAL ACCEPTS NO RESPONSIBILITY FOR THE DESIGN AND SPECIFICATION OF THE RAINWATER HARVESTING SYSTEM. THE CLIENT SHOULD VERIFY THE ACCURACY AND COMPLETENESS OF THE DESIGN, INCLUDING COMPATIBILITY WITH THE M&E DESIGN.

11) ALL PIPES TO BE EITHER STRENGTH V.C. TO BS 65 OR PVC TO BS 4680 OR BS 5481 'UPONOR ULTRARIB' OR CONCRETE CLASS 120 TO BS 5911.

12) CONCRETE BED AND SURROUND IS REQUIRED TO ALL GULLY LEADS AND TO ALL PIPES IN HIGHWAYS/HARDSTANDINGS WHERE COVER TO PIPE <1200MM.

13) RAINWATER PIPES TO CONNECT TO SUB-BASE OF PERMEABLE PAVING

14) THE SUGGESTED LOCATIONS FOR RAINWATER PIPES ARE BASED ON ASSUMPTIONS AND ARE PROVIDED FOR ILLUSTRATIVE PURPOSES ONLY.

KEY

SITE BOUNDARY

PROPOSED SURFACE WATER SEWER

PROPOSED FOUL WATER SEWER

PROPOSED COMBINED WATER SEWER

EXISTING UNITED UTILITIES COMBINED WATER

PROPOSED SURFACE WATER PPIC

PROPOSED FOUL WATER PPIC

PROPOSED COMBINED WATER MANHOLE

PROPOSED HYDROBRAKE

PROPOSED WATER BUTS

PROPOSED PERMEABLE PAVING

RAINWATER PIPE

REVISIONS

REV	DESCRIPTION	DATE	BY
-	FIRST ISSUE	21/12/22	WR
A	SECOND ISSUE	22/09/23	WR
B	THIRD ISSUE	01/12/23	WR
C	THIRD ISSUE	05/02/24	WR

AVAL CONSULTING GROUP

CIVIL, ENVIRONMENT & STRUCTURAL ENGINEERS

Transportation Planning : Environmental Consultants

www.aval-group.co.uk, Email: contact@aval-group.co.uk
Company Number: 11922039

Client Name:

M KENNY PROPERTIES LTD

Project Title:

LAND ON BRENDON AVENUE,
MOSTON, M40 9DN

Drawing Title:

PROPOSED DRAINAGE STRATEGY

Date:

05.02.2024

Drawn By:

WR

Scale:

1:100 @ A1

1:200 @ A3

Checked:

WR

Status:

DRAFT

Approved:

AC

Drawing No:

AVAL/92071B/500/01

Rev:

C



NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIALIST DETAILS AND SPECIFICATIONS.

2. ALL DIMENSIONS ARE IN METERS UNLESS STATED OTHERWISE.

KEY

SITE BOUNDARY

PROPOSED EXCEEDANCE FLOW ROUTE

REVISIONS

REV	DESCRIPTION	DATE	BY
-	FIRST ISSUE PLANNING	04/01/22	WR
A	REVISED DRAINAGE LAYOUT	30/11/23	WR

AVAL CONSULTING GROUP

CIVIL, ENVIRONMENT & STRUCTURAL ENGINEERS

Transportation Planning : Environmental Consultants

www.aval-group.co.uk, Email: contact@aval-group.co.uk, Company Number: 11602059

Client Name:

EQT EXETER

Project Title:

LAND ON BRENDON AVENUE, MOSTON, M40 9DN

Drawing Title:

PROPOSED EXCEEDANCE FLOW ROUTE

Date:	13.07.2022	Drawn By:	PR
Scale:	1:100 @ A1 1:200 @ A3	Checked:	WR
Status:	PLANNING	Approved:	AC

Drawing No:	AVAL/92071B/500/03	Rev:	A
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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	1.200
CV	0.840	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
ATT-01		5.00	87.700	1200	387.072	391.786	2.000
Perm Pav-01		5.00	87.700	1200	370.879	376.770	1.350
SW-MH-01			87.680	1200	383.087	392.496	2.066
SW-MH-02	0.070	5.00	87.680	1200	375.353	374.603	2.680
CW-MH-01			87.680	1200	378.912	372.571	2.799
EX-CW-UU-MH			87.470	1200	375.569	366.217	2.699

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	0.0
M5-60 (mm)	17.000	Check Discharge Rate(s)	✓
Ratio-R	0.400	1 year (l/s)	6.5
Summer CV	0.750	30 year (l/s)	15.1
Winter CV	0.840	100 year (l/s)	19.1
Analysis Speed	Normal	Check Discharge Volume	✓
Skip Steady State	x	100 year +40% 360 minute (m³)	26

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	0	0	0
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Time of Concentration (mins)	4.00
Brownfield Method	MRM	Betterment (%)	50
Contributing Area (ha)	0.071	Q 1 year (l/s)	6.5
PIMP (%)	100	Q 30 year (l/s)	15.1
CV	0.840	Q 100 year (l/s)	19.1

Pre-development Discharge Volume

Site Makeup	Brownfield	CV	0.840	Betterment (%)	50
Brownfield Method	MRM	Return Period (years)	100	PR	0.840
Contributing Area (ha)	0.071	Climate Change (%)	40	Runoff Volume (m ³)	26
PIMP (%)	100	Storm Duration (mins)	360		

Node SW-MH-02 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	85.000	Product Number	CTL-SHE-0067-3000-2500-3000
Design Depth (m)	2.500	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	3.0	Min Node Diameter (mm)	1200

Node Perm Pav-01 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	87.260	Slope (1:X)	500.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	0	Depth (m)	0.250
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	30.000		

Node ATT-01 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	85.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	81

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	12.0	0.0	1.200	12.0	0.0	1.201	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 99.02%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	ATT-01	26	85.767	0.067	4.6	0.8418	0.0000	OK
15 minute summer	Perm Pav-01	1	86.350	0.000	0.0	0.0000	0.0000	OK
15 minute winter	SW-MH-01	12	85.796	0.182	5.3	0.2061	0.0000	SURCHARGED
15 minute winter	SW-MH-02	12	85.819	0.819	8.3	0.9268	0.0000	SURCHARGED
120 minute winter	CW-MH-01	60	84.911	0.030	1.9	0.0338	0.0000	OK
120 minute winter	EX-CW-UU-MH	60	84.800	0.029	1.9	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	ATT-01	1.000	SW-MH-01	-4.6	-0.457	-0.199	0.0491	
15 minute summer	Perm Pav-01	2.000	SW-MH-02	0.0	0.000	0.000	0.0000	
15 minute winter	SW-MH-01	1.001	SW-MH-02	-5.3	-0.389	-0.232	0.3432	
15 minute winter	SW-MH-02	1.002	CW-MH-01	1.9	0.692	0.109	0.0334	
120 minute winter	CW-MH-01	1.003	EX-CW-UU-MH	1.9	0.797	0.080	0.0145	7.7

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.02%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	ATT-01	50	86.209	0.509	7.2	6.3758	0.0000	SURCHARGED
15 minute summer	Perm Pav-01	1	86.350	0.000	0.0	0.0000	0.0000	OK
60 minute winter	SW-MH-01	50	86.209	0.595	7.8	0.6727	0.0000	SURCHARGED
60 minute winter	SW-MH-02	51	86.209	1.209	10.4	1.3669	0.0000	SURCHARGED
60 minute winter	CW-MH-01	52	84.912	0.031	2.1	0.0355	0.0000	OK
60 minute winter	EX-CW-UU-MH	52	84.801	0.030	2.1	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	ATT-01	1.000	SW-MH-01	-7.2	-0.541	-0.313	0.0713	
15 minute summer	Perm Pav-01	2.000	SW-MH-02	0.0	0.000	0.000	0.0000	
60 minute winter	SW-MH-01	1.001	SW-MH-02	-7.8	-0.445	-0.341	0.3432	
60 minute winter	SW-MH-02	1.002	CW-MH-01	2.1	0.711	0.120	0.0358	
60 minute winter	CW-MH-01	1.003	EX-CW-UU-MH	2.1	0.818	0.088	0.0155	15.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 99.02%

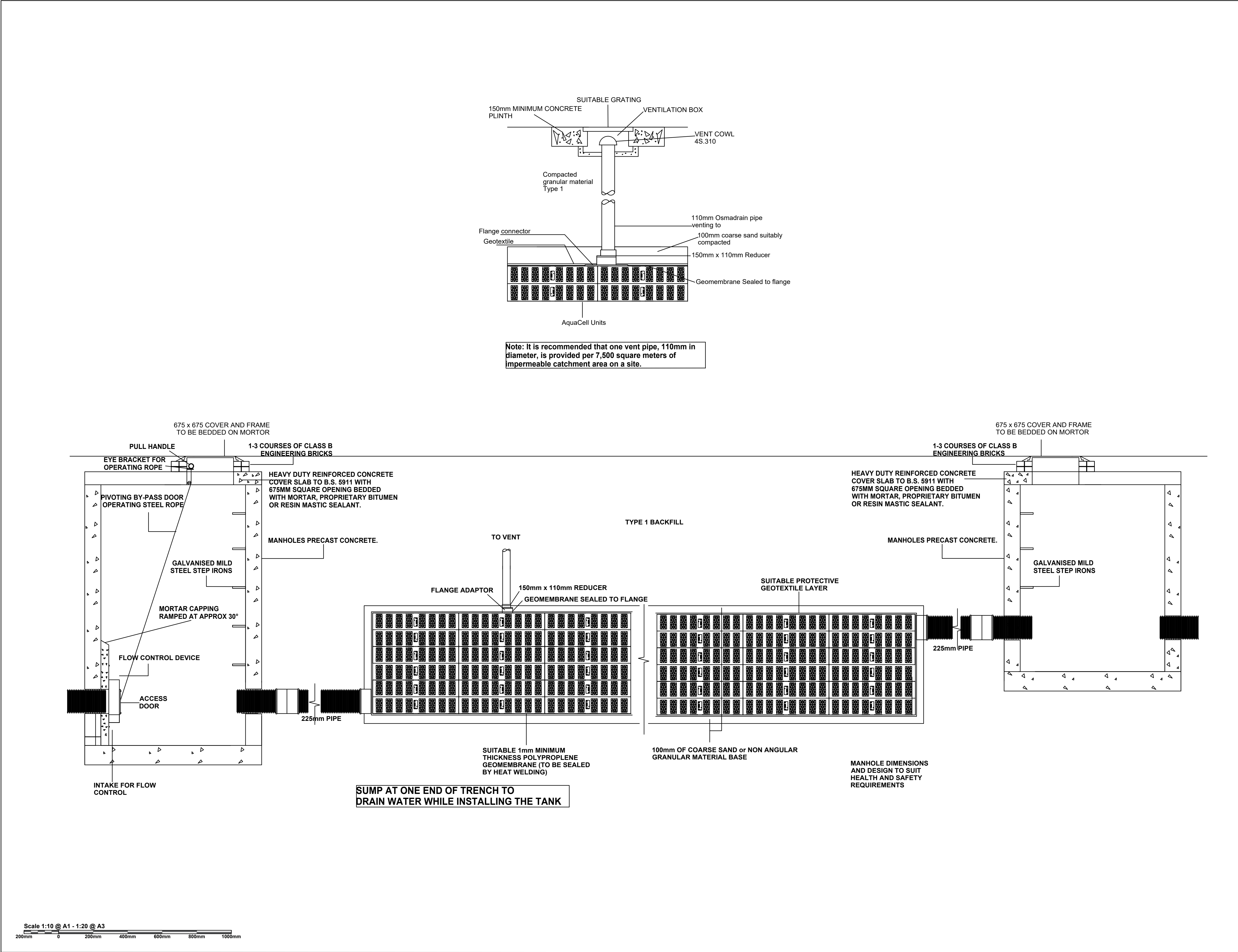
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	ATT-01	58	86.471	0.771	9.8	9.6600	0.0000	SURCHARGED
60 minute winter	Perm Pav-01	57	86.471	0.121	0.4	0.1369	0.0000	OK
60 minute winter	SW-MH-01	58	86.471	0.857	10.7	0.9690	0.0000	SURCHARGED
60 minute winter	SW-MH-02	57	86.471	1.471	13.7	1.6637	0.0000	SURCHARGED
60 minute winter	CW-MH-01	57	84.914	0.033	2.3	0.0373	0.0000	OK
60 minute winter	EX-CW-UU-MH	57	84.802	0.031	2.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	ATT-01	1.000	SW-MH-01	-9.8	-0.559	-0.428	0.0713	
60 minute winter	Perm Pav-01	2.000	SW-MH-02	-0.4	-0.049	-0.016	0.0816	
60 minute winter	SW-MH-01	1.001	SW-MH-02	-10.7	-0.609	-0.467	0.3432	
60 minute winter	SW-MH-02	1.002	CW-MH-01	2.3	0.729	0.131	0.0383	
60 minute winter	CW-MH-01	1.003	EX-CW-UU-MH	2.3	0.839	0.096	0.0166	20.0

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.02%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	ATT-01	59	87.002	1.302	13.1	15.1582	0.0000	SURCHARGED
60 minute winter	Perm Pav-01	59	87.001	0.651	1.7	0.7361	0.0000	SURCHARGED
60 minute winter	SW-MH-01	59	87.002	1.388	14.2	1.5697	0.0000	SURCHARGED
60 minute winter	SW-MH-02	59	87.001	2.001	19.2	2.2630	0.0000	SURCHARGED
60 minute winter	CW-MH-01	59	84.917	0.036	2.7	0.0402	0.0000	OK
60 minute winter	EX-CW-UU-MH	60	84.805	0.034	2.7	0.0000	0.0000	OK

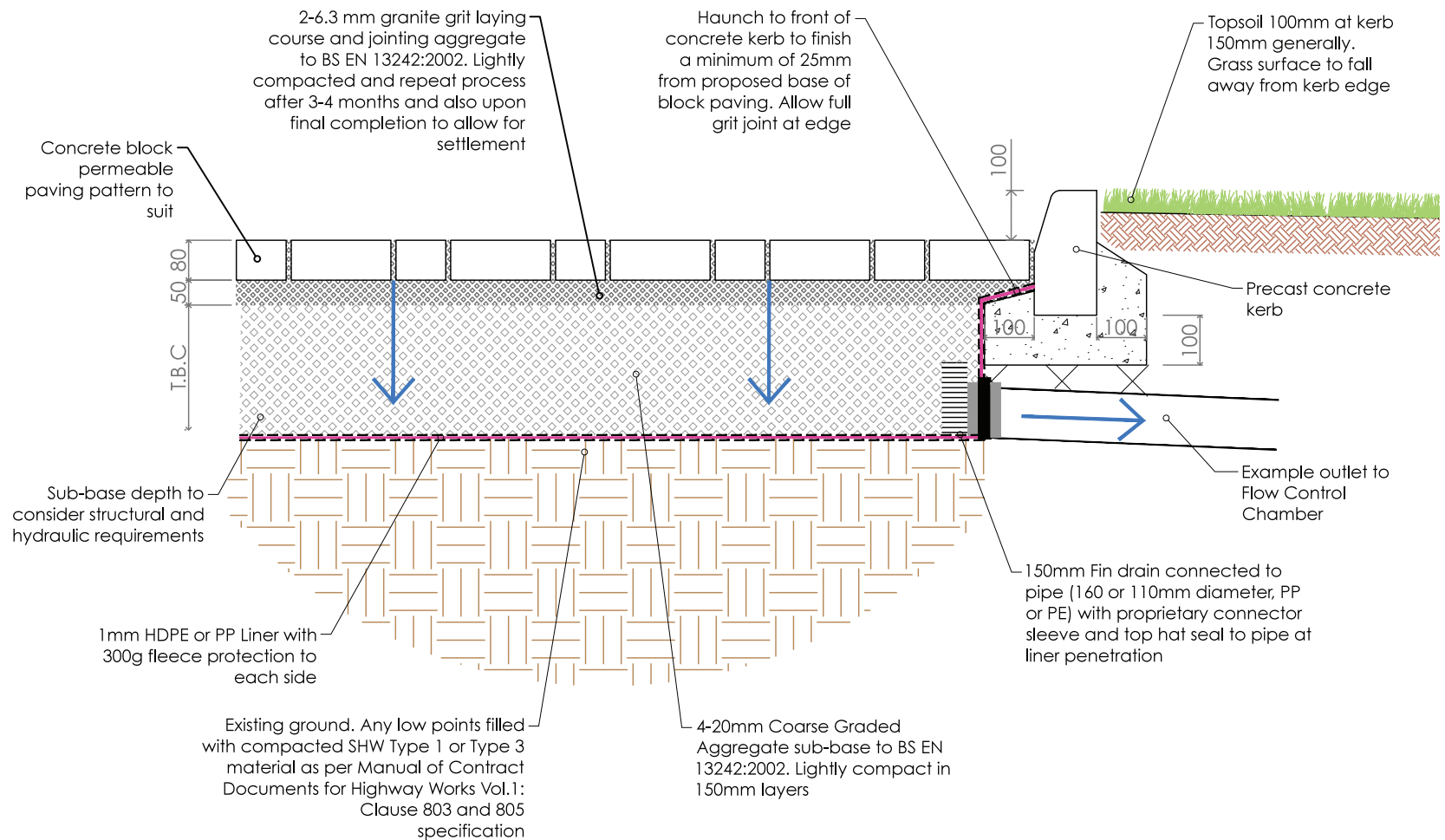
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	ATT-01	1.000	SW-MH-01	-13.1	-0.742	-0.569	0.0713	
60 minute winter	Perm Pav-01	2.000	SW-MH-02	-1.7	-0.134	-0.059	0.0875	
60 minute winter	SW-MH-01	1.001	SW-MH-02	-14.2	-0.808	-0.619	0.3432	
60 minute winter	SW-MH-02	1.002	CW-MH-01	2.7	0.757	0.152	0.0426	
60 minute winter	CW-MH-01	1.003	EX-CW-UU-MH	2.7	0.873	0.111	0.0184	28.1



NOTES				
1) THE DEVELOPER SHOULD TAKE ALL NECESSARY PRECAUTIONS TO AVOID CAUSING ANY DAMAGE TO, OR INTERFERENCE WITH FLOW IN EXISTING SEWERS AND SHALL ENSURE THAT DEBRIS, SILT, MUD ETC. DO NOT ENTER WHERE WORKS ARE TO BE CARRIED OUT ON SEWERS.				
2) THE CONTRACTOR MUST CARRY OUT THEIR WORKS IN ACCORDANCE WITH 'THE CLASSIFICATION AND MANAGEMENT OF CONFINED SPACES' PUBLISHED BY WATER UK. THEY MUST ALSO COMPLY WITH ALL OTHER RELEVANT HEALTH AND SAFETY LEGISLATION/ DOCUMENTATION.				
3) ALL MATERIALS ARE TO BE STORED IN SUCH A MANNER AS TO PRESERVE THEIR QUALITY AS TO THE STANDARD SPECIFIED IN THE SPECIFICATION.				
4) ALL CONCRETE TO BE PRODUCED ON SITE MUST BE MIXED WITH ONLY POTABLE WATER. TO ENSURE THAT IT IS CLEAN FROM DIRT AND AGGREGATES FOR CONCRETES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 12620 AND PD 6682-1.				
5) SANDS FOR MORTAR AND GROUTS SHALL BE WASHED SAND, COMPLYING WITH BS EN 13139 AND PD 6682-3. ALL OTHER SANDS ARE TO COMPLY WITH BS EN 12620 AND PD 6682-1 OR BS EN 13139 AND PD 6682-3.				
6) PULVERISED-FUEL ASH (PFA) FOR USE AS A COMPONENT MATERIAL IN CEMENTITIOUS GROUT OUR NON STRUCTURAL CONCRETE SHALL COMPLY VIRTIFIED CLAY PIPES AND FITTINGS FOR SEWERS SHALL HAVE FLEXIBLE MECHANICAL JOINTS.				
7) PIPES FOR FOUL SEWERS AND SURFACE WATER SEWERS SHALL COMPLY WITH THE RELEVANT REQUIREMENTS OF BS EN295 AND BS85 (SURFACE WATER PIPES ONLY) PRE-CAST CONCRETE MANHOLE UNITS OF CIRCULAR CROSS SECTION FOR MANHOLES, CHAMBERS AND WET WELLS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1917 AND BS 5911-3.				
8) LADDERS FOR MANHOLES IN A VERTICAL PLANE ARE TO BE MILD STEEL AND COMPLY WITH BS4211, CLASS A AND PD 970. GRP LADDERS SHALL BE MANUFACTURED IN ACCORDANCE WITH BS EN 131, AND FROM GLASS-REINFORCED POLYESTER USING AN APPROPRIATE RESIN FOR THE LADDER LOCATION. UNIDIRECTION REINFORCEMENT SHALL BE PROVIDED IN THE GRP MATRIX TO MAXIMISE STRENGTH.				
9) MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124, BS 7903 AND HIGHWAYS AGENCY GUIDANCE DOCUMENT HA 10402. THEY SHALL BE OF A NON-ROCKING DESIGN WHICH DO NOT RELY ON THE USE OF CUSHION INSERTS.				
10) CLAY BRICKS TO BE USED WITHIN MANHOLES ARE TO BE SOLID, CLASS B ENGINEERING BRICKS COMPLYING TO BS 3921. ALL BRICKS SHALL BE FROST RESISTANT CATEGORY F. STANDARD CONCRETE MIXES SHOULD BE IN ACCORDANCE WITH BS EN 206-1 AND BS 8500 AND SHALL BE USED WITH A 20mm NOMINAL MAXIMUM SIZE OF AGGREGATE AND A SLUMP CLASS OF S2 FOR A TARGET OF 70mm.				
11) GEN1 CONCRETE TO BE USED FOR, FILLINGS, BINDINGS, SOFT SPOTS AND DRAINAGE SLUMPS. GEN3 CONCRETE TO BE USED FOR, ALL OTHER APPLICATIONS. U.N.O. ADMIXTURES (INCLUDING CALCIUM CHLORIDE AND PIGMENTS) SHALL NOT BE USED IN THE PRODUCTION OF CONCRETE.				
12) HIGH STRENGTH CONCRETE TOPPING SHALL BE PRODUCED, LAID AND FINISHED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF BS 8204: PART 2 AND THE FOLLOWING APPROXIMATE MIX PROPORTIONS SHALL BE USED: 1PART CEMENT, 1 PART NATURAL SAND AND 2 PARTS SINGLE-SIZED COARSE AGGREGATE.				
13) ALL MORTAR MIXES SHALL BE IN ACCORDANCE WITH BS 5628-1:2005. ALL PIPES TO BE EITHER EXTRA STRENGTH VC TO BS 65 OR PVC TO BS 4660 OR BS 5481 "UPONOR ULTRARIB"				
REVISIONS				
REV	DESCRIPTION	DATE	BY	
-	FIRST ISSUE	30/11/23	WR	
AVAL CONSULTING GROUP CIVIL, ENVIRONMENT & STRUCTURAL ENGINEERS Transportation Planning : Environmental Consultants www.avalgroup.co.uk, Email: contact@avalgroup.co.uk Company Number: 11922039				
Client Name:				
M KENNY PROPERTIES LTD				
Project Title:				
LAND ON BRENDON AVENUE, MOSTON, M40 9DN				
Drawing Title:				
TYPICAL ATTENUATION TANK CONSTRUCTION DETAILS				
Date:	26.03.2023	Drawn By:	WR	
Scale:	AS SHOWN	Checked:	WR	
Status:	PLANNING	Approved:	AC	
Drawing No.	AVAL/92071B/700/01			Rev.
				A

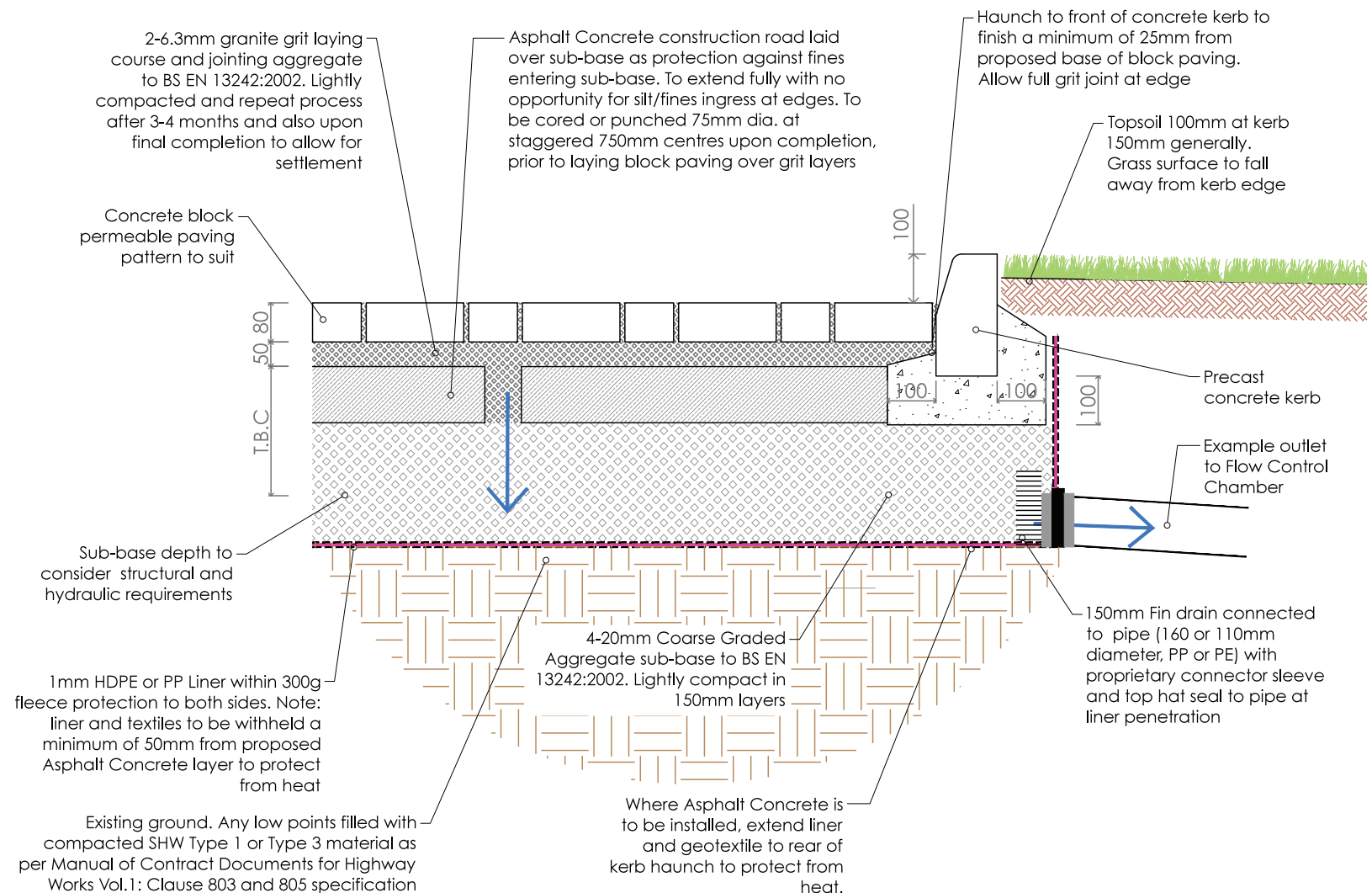
CBPP Details

Detail 3 - Lined Permeable Paving (System C) No Infiltration - with Sealed Outlet to Flow Control



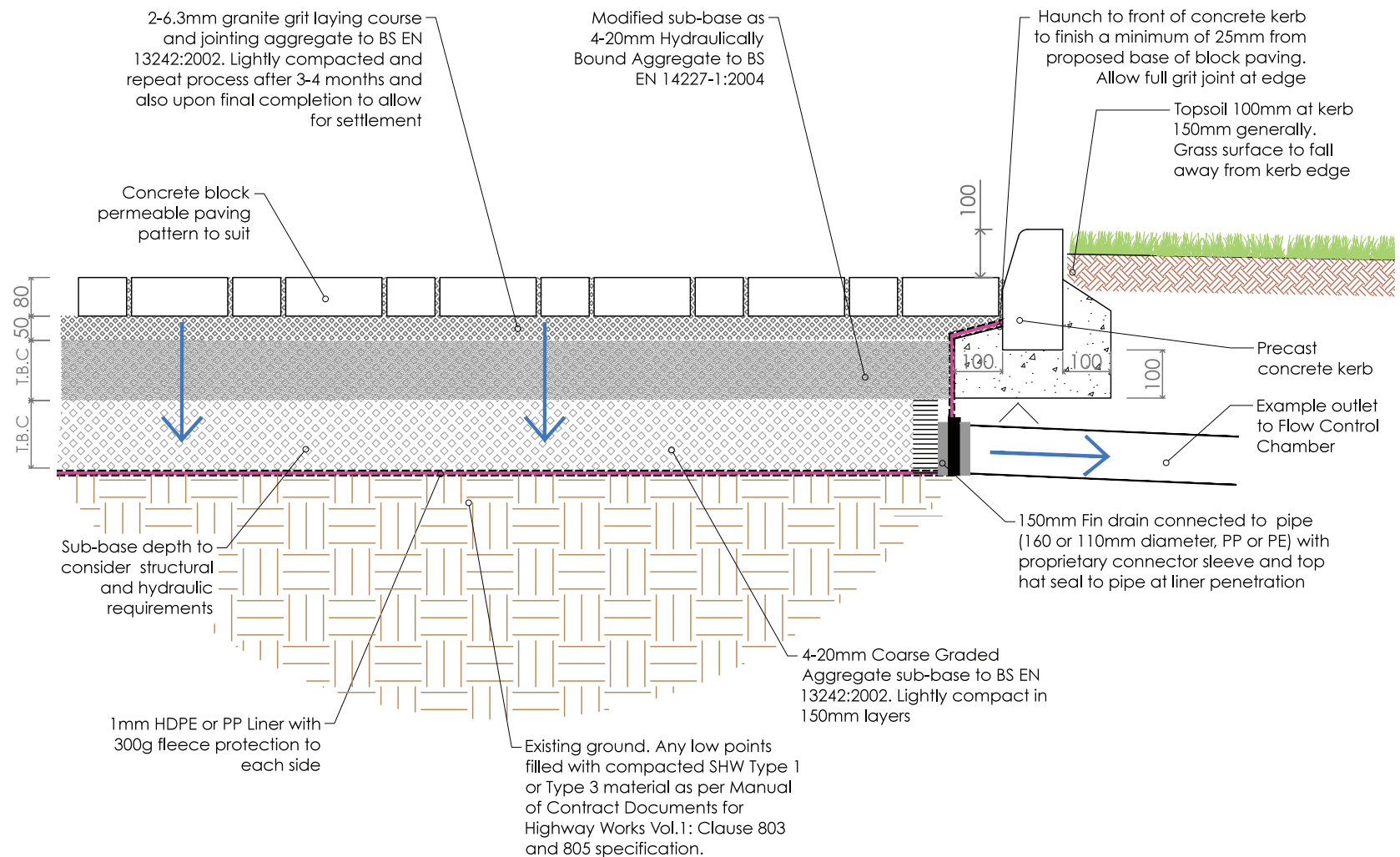
CBPP Details

Detail 4 - Lined Permeable Paving (System C) Incorporating Asphalt Concrete (Construction Road)



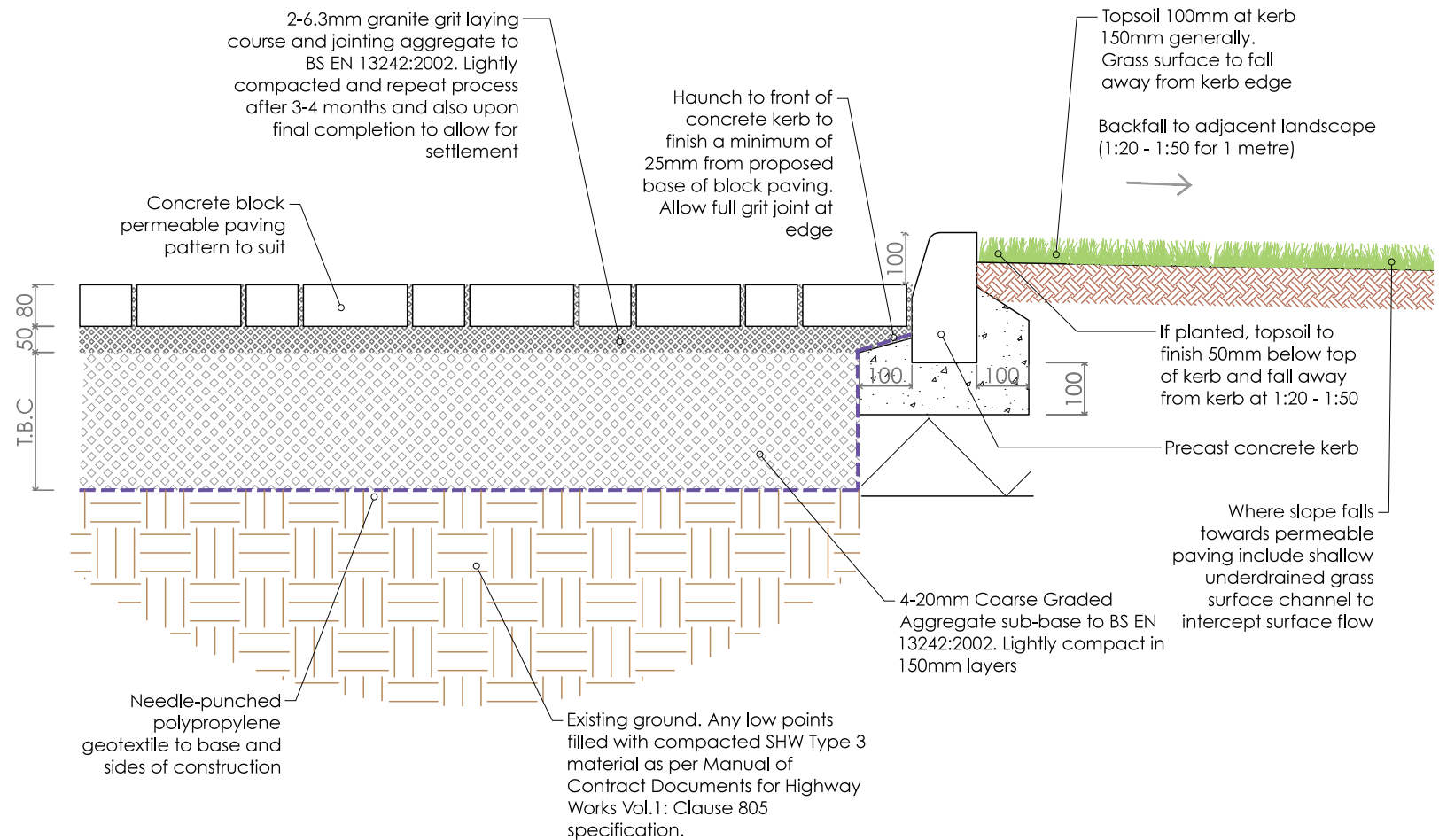
CBPP Details

Detail 5 - Lined Permeable Paving (System C) Incorporating Hydraulically Bound Aggregate



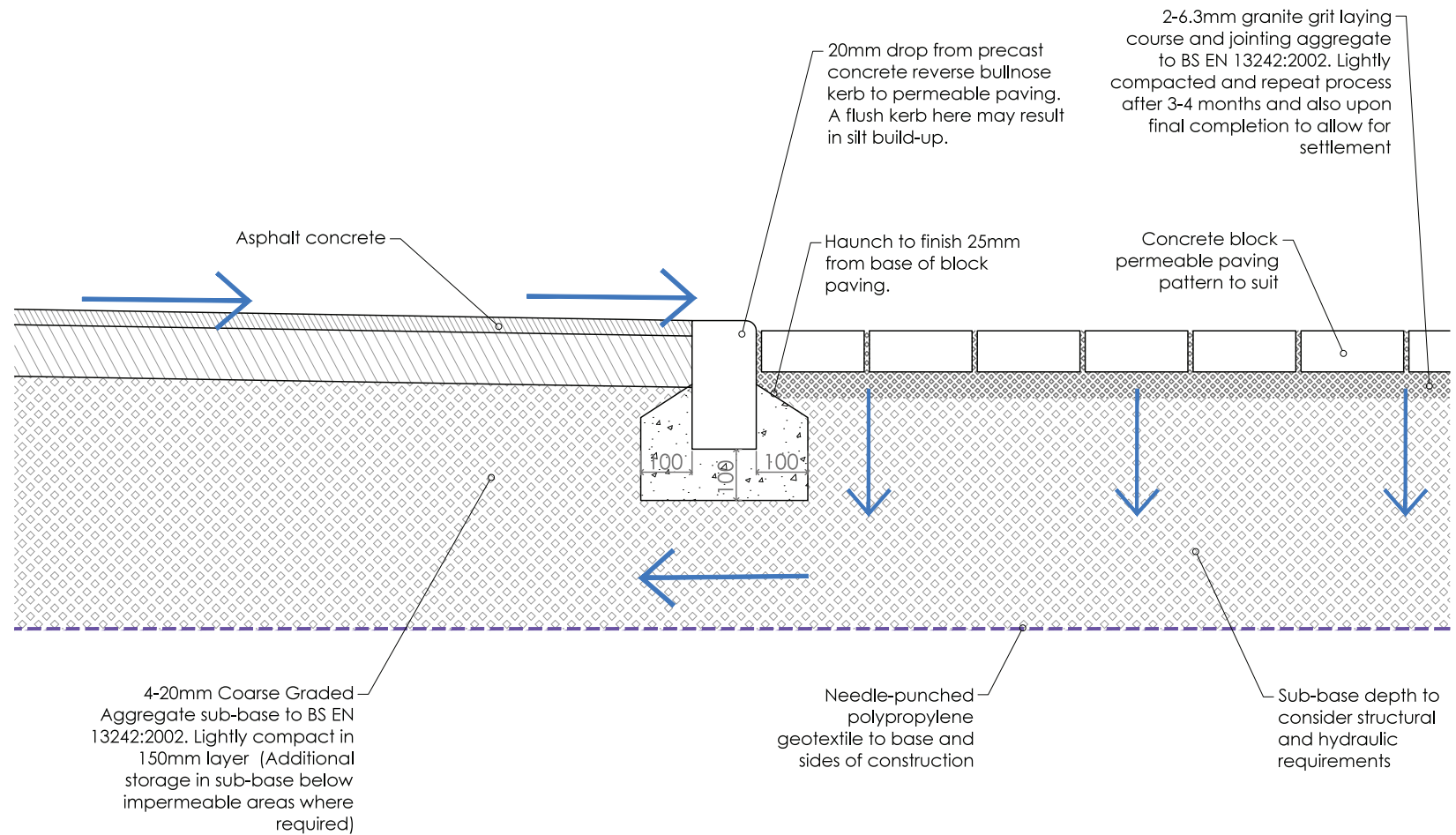
CBPP Details

Detail 6 - Landscape Adjacent to Paved Surface - Shown with System A



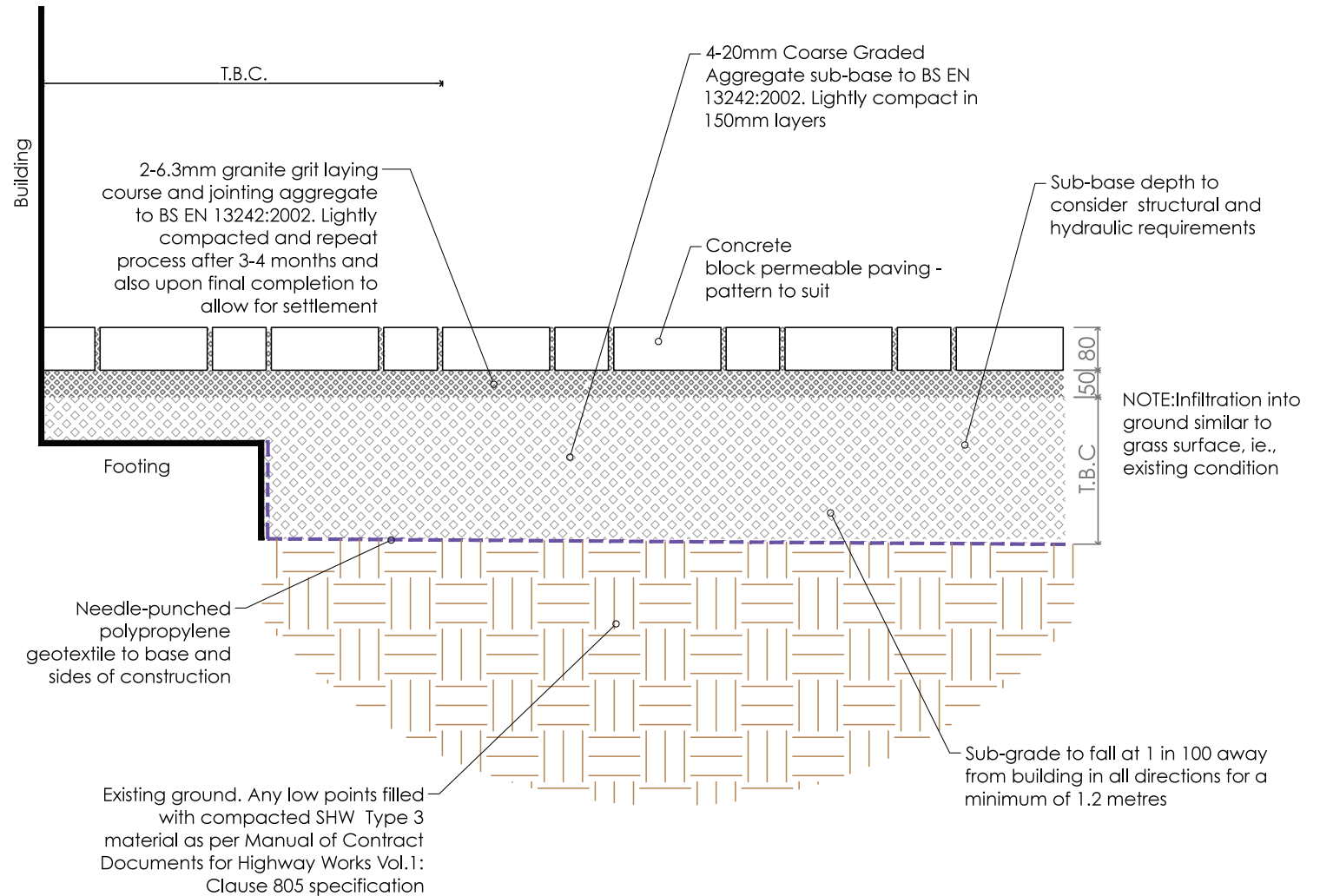
CBPP Details

Detail 9 - Edge Detail Between Impermeable and Permeable Paving



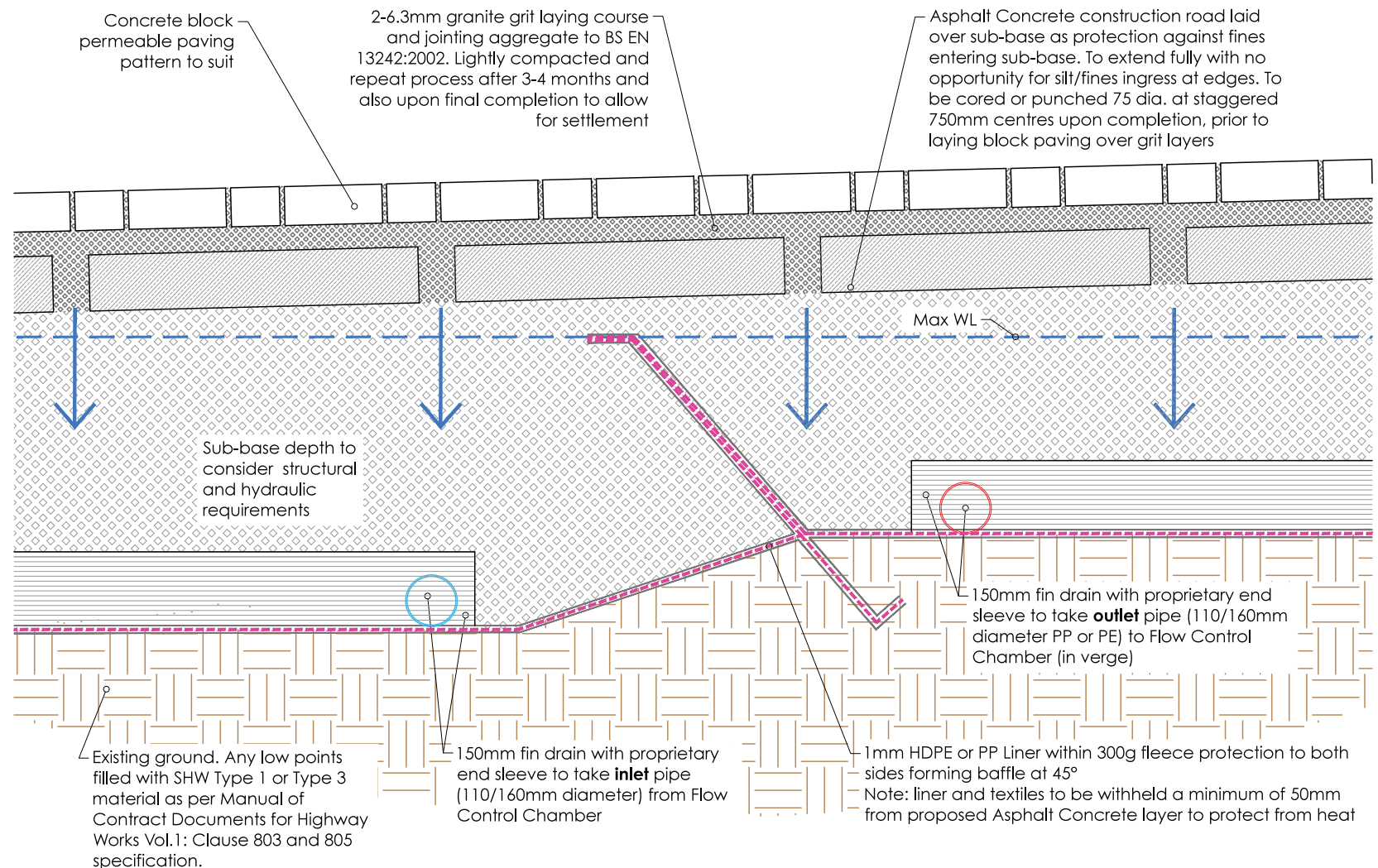
CBPP Details

Detail 10 - Permeable Paving (with no Contributing Surface) Adjacent to Building



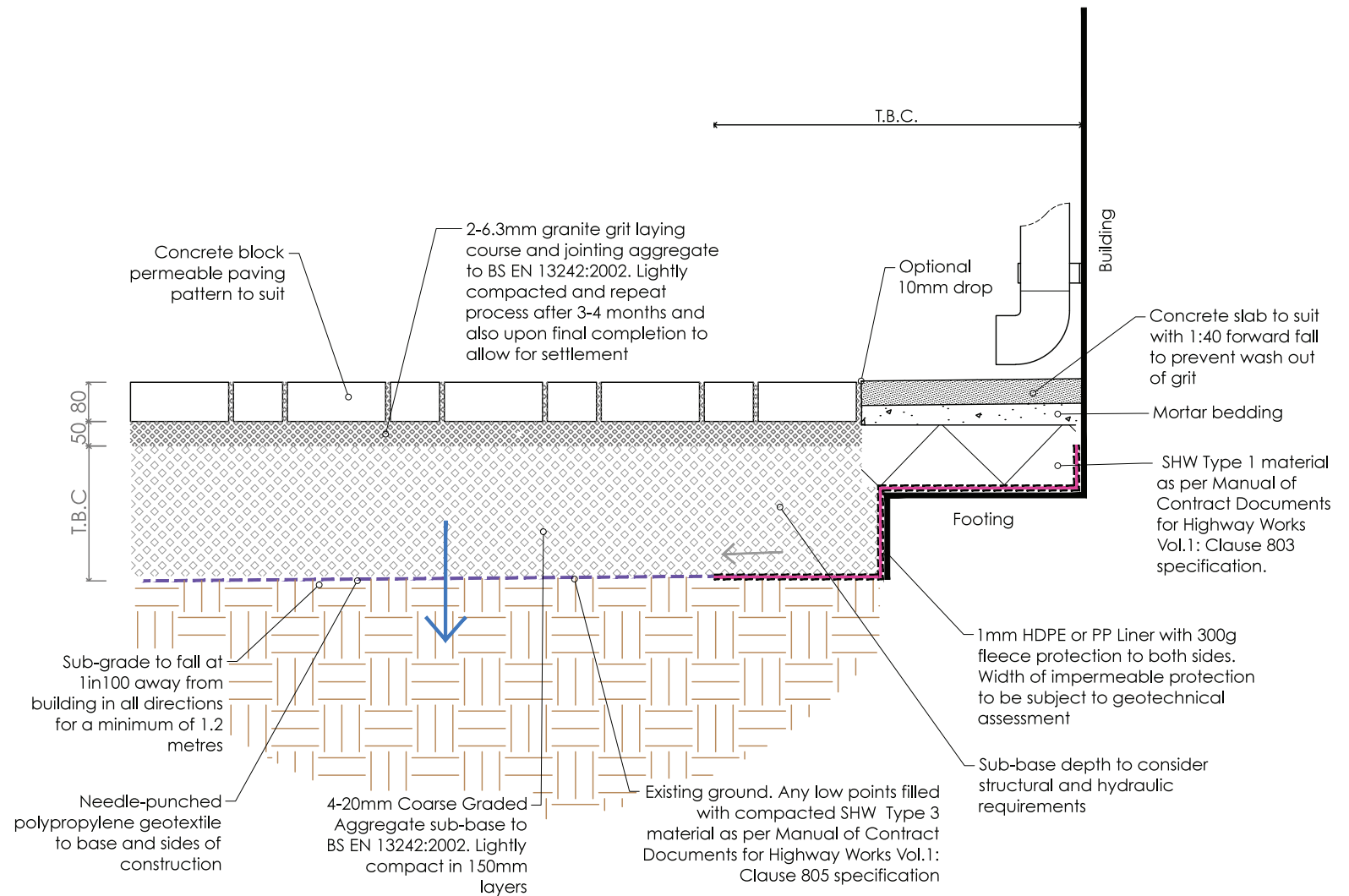
CBPP Details

Detail 11 - Internal Baffles with Controls - Cross-section System C - Non Infiltrating



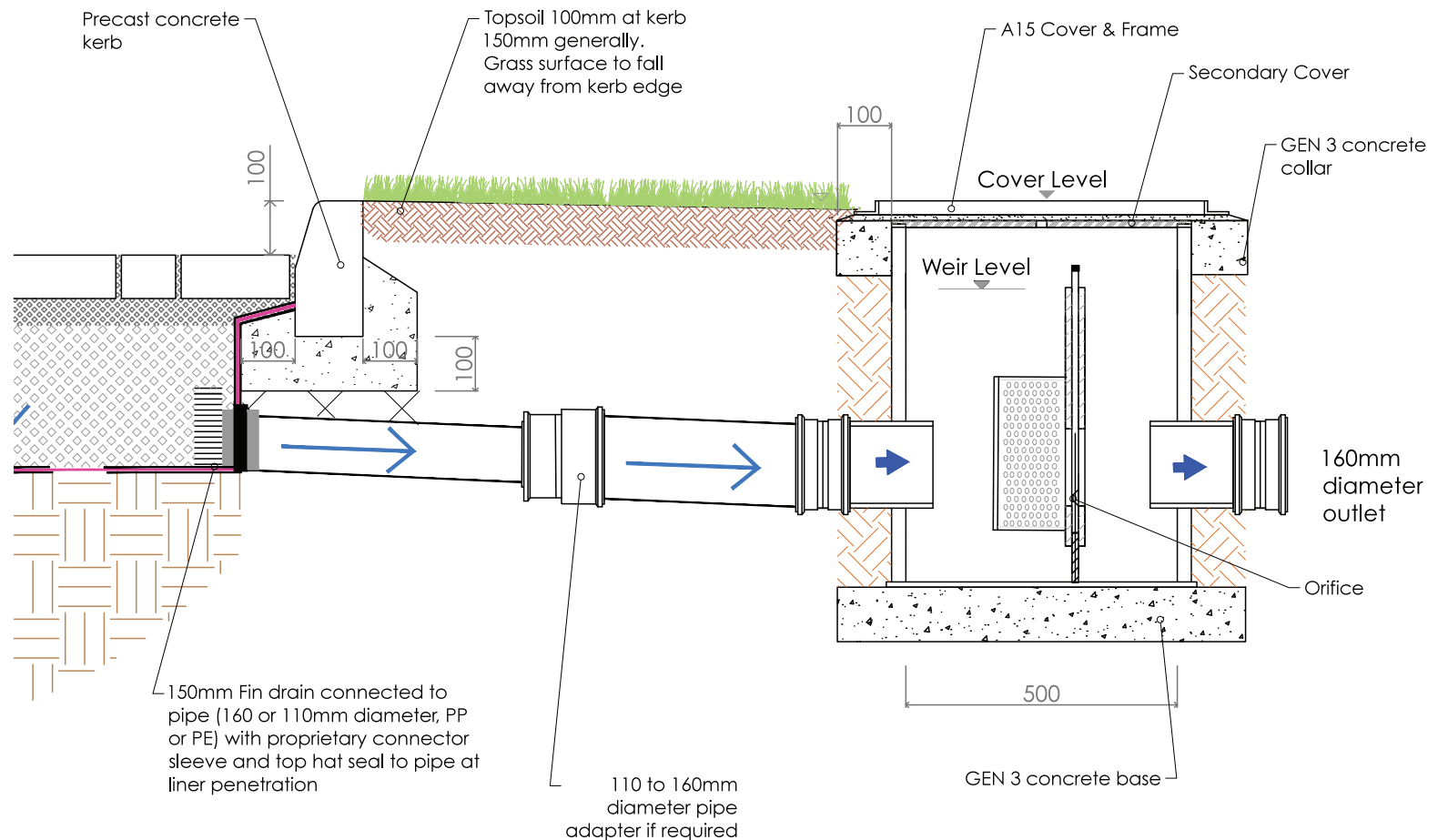
CBPP Details

Detail 13 - Downpipe with Shoe onto Permeable Paving - Type A - Fully Infiltrating



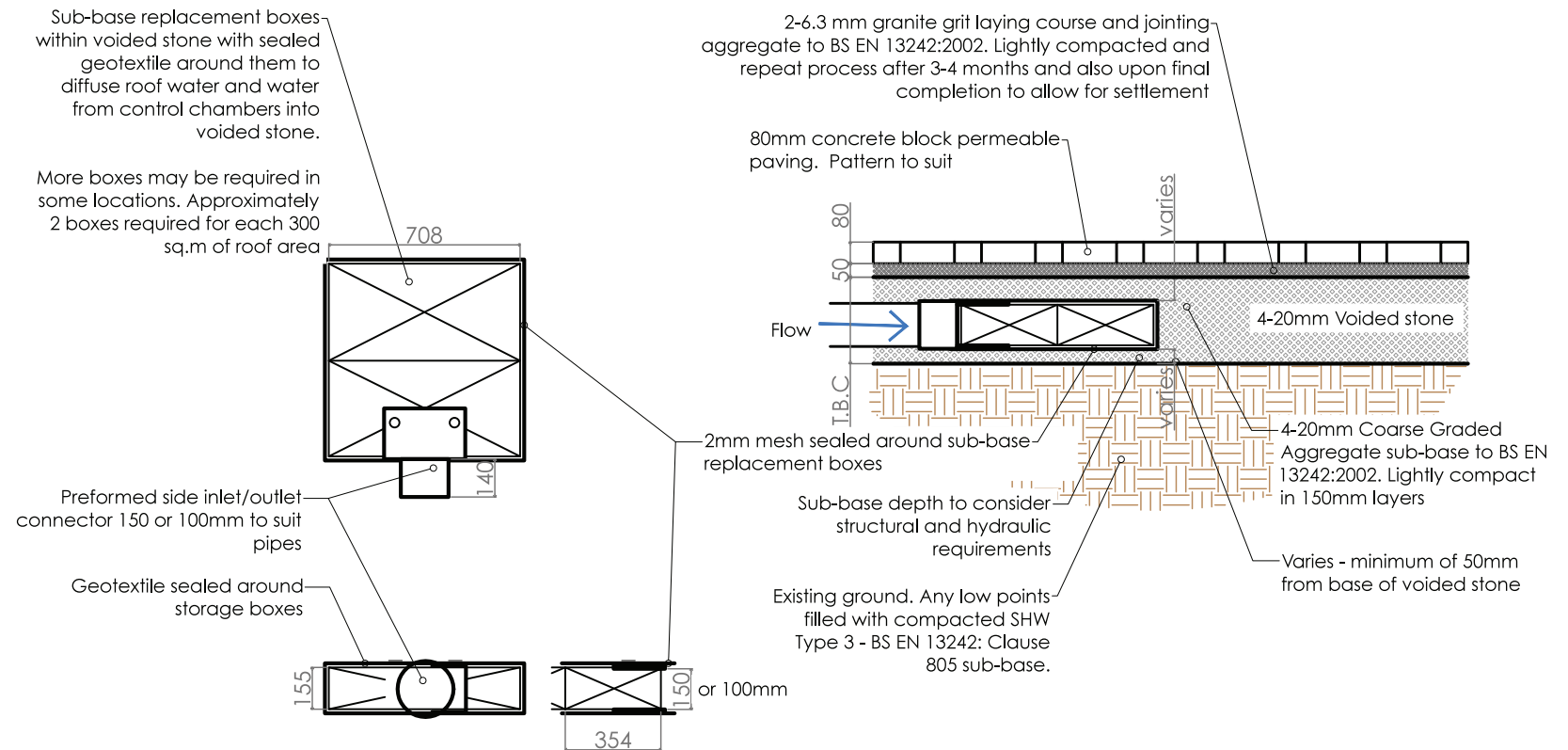
Features for CBPP or SuDS

Detail 15 - Flow control chamber with a protected orifice within a removable plate, suitable for any SuDS technique outlet. For CBPP, flow controls do not need protection from blockages, as the water passing from the CBPP will be free of debris.



CBPP Details

Detail 14 - Diffuser Box with Upstream Silt Trap



NOTE: The boxes are structural and designed to be in the road construction. Inlet silt trap with needle punched polypropylene geotextile protection around inlet to prevent silt getting into the box

Technical Specification

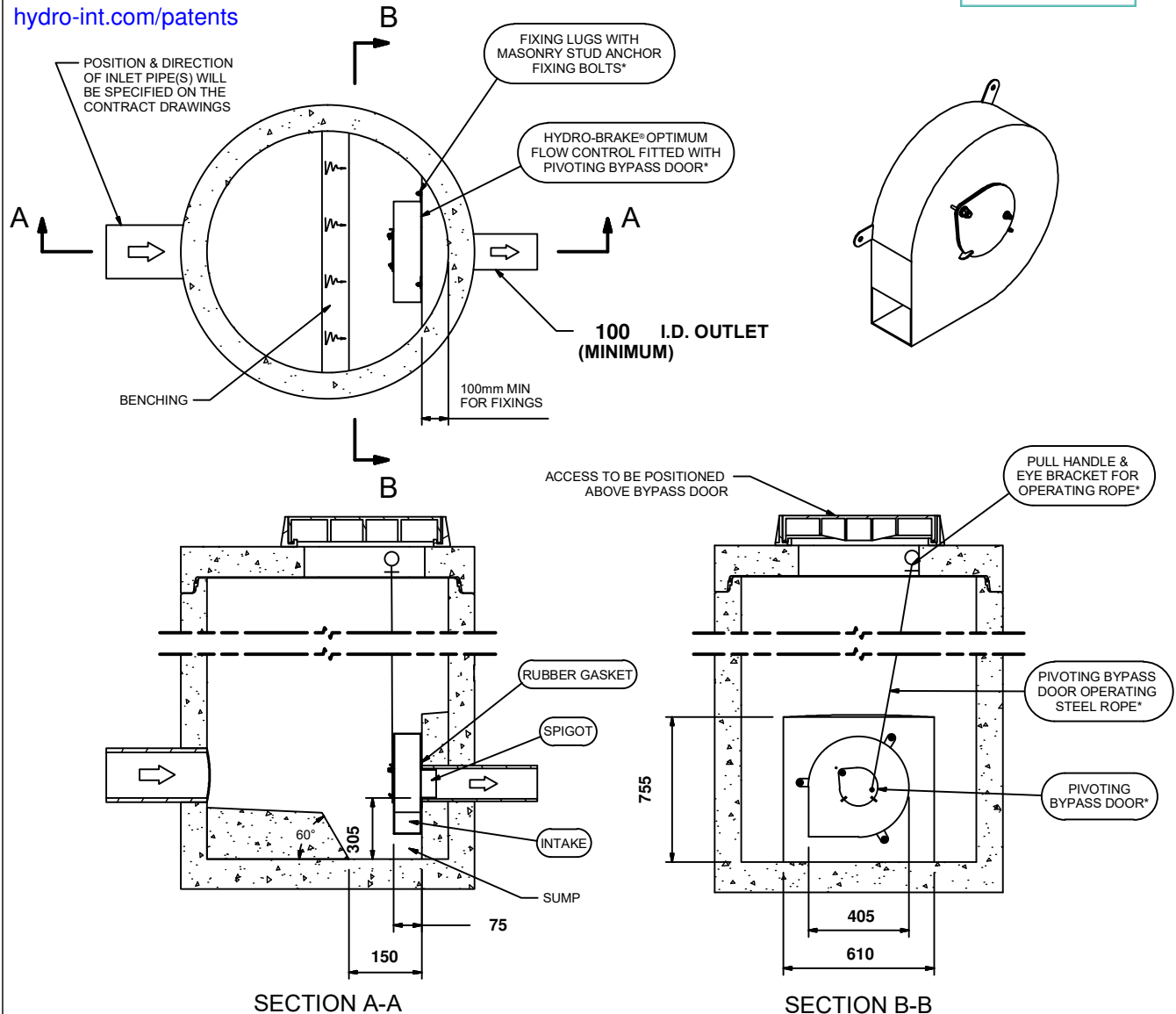
Control Point	Head (m)	Flow (l/s)
Primary Design	2.500	3.000
Flush-Flo™	0.291	1.916
Kick-Flo®	0.593	1.554
Mean Flow		2.195

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Indicative Weight: 10 kg



hydro-int.com/patents



IMPORTANT:

○ LIMIT OF HYDRO INTERNATIONAL SUPPLY

THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS

* WHERE SUPPLIED

HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SHE-0067-3000-2500-3000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**
A CRH COMPANY

DATE	25/09/2023 09:46	SHE-0067-3000-2500-3000 Hydro-Brake® Optimum
SITE	Land on Brendon Avenu	
DESIGNER	Pratheek Ramesh	
REF	92071B / 23_21_0065	

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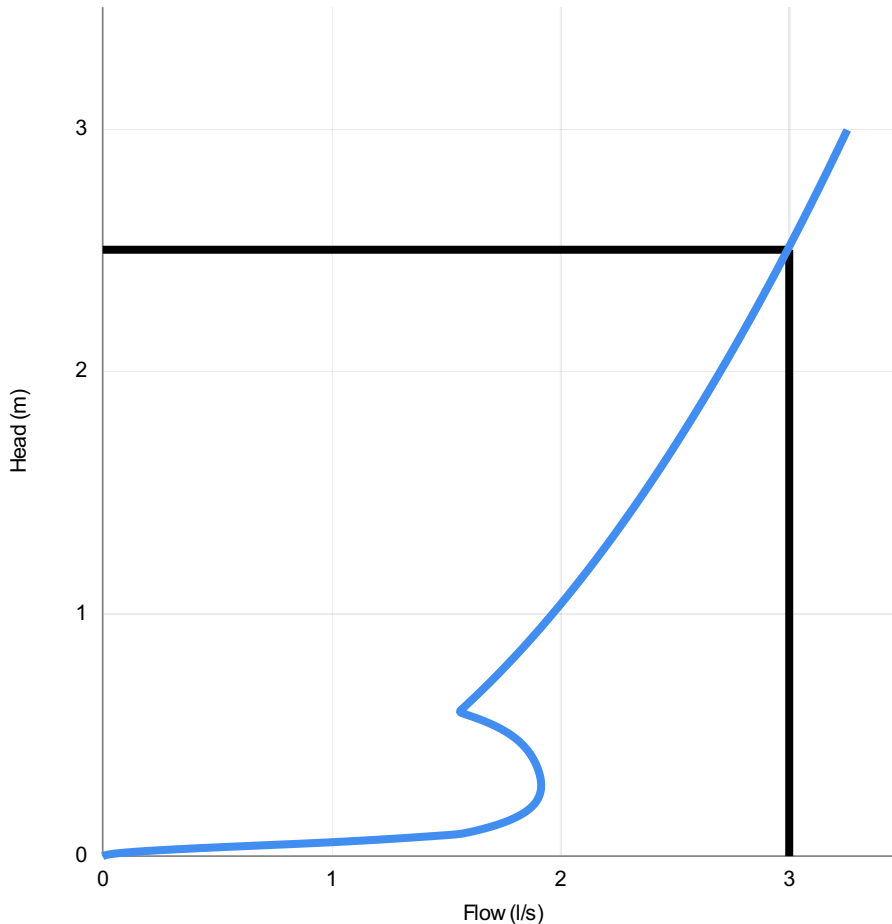
pratheek.ramesh@aval-group.co.uk

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	2.500	3.000
Flush-Flo	0.291	1.916
Kick-Flo®	0.593	1.554
Mean Flow		2.195



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Head (m)	Flow (l/s)
0.000	0.000
0.086	1.496
0.172	1.831
0.259	1.911
0.345	1.907
0.431	1.861
0.517	1.754
0.603	1.567
0.690	1.663
0.776	1.754
0.862	1.839
0.948	1.920
1.034	1.998
1.121	2.071
1.207	2.142
1.293	2.211
1.379	2.277
1.466	2.341
1.552	2.403
1.638	2.463
1.724	2.522
1.810	2.579
1.897	2.635
1.983	2.689
2.069	2.742
2.155	2.795
2.241	2.846
2.328	2.896
2.414	2.945
2.500	2.993

DESIGN ADVICE



The head/flow characteristics of this SHE-0067-3000-2500-3000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro
International
A CRH COMPANY

DATE	25/09/2023 09:46
Site	Land on Brendon Avenu
DESIGNER	Pratheek Ramesh
Ref	92071B / 23_21_0065

SHE-0067-3000-2500-3000
Hydro-Brake Optimum®

[REDACTED]

Sent: 11 September 2023 08:48 AM
To: seweradoptions@uuplc.co.uk
Cc: [REDACTED]
Subject: Re: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

Hi Anthony,

Many thanks for your email. As you had mentioned, we will look into the possibility of blockage and will provide the necessary information to the LLFA.

We will proceed with updating the drawings for a 3 l/s discharge and we will get back to you with the updated drawings for a final 'in-principle' agreement.

Kind Regards,

[REDACTED]

AVAL CONSULTING GROUP.

CIVIL, ENVIRONMENT & STRUCTURAL ENGINEERS

London | Newcastle | Brighton | York | Oxford | Durham | Birmingham

T: [+ 44 \(0\) 333 006 2524](tel:+44203330062524) | E: pratheek.ramesh@aval-group.co.uk | W: aval-group.co.uk



Services: Civil and Structural | Air Quality | Transport | Noise | Odour | Lighting | Flood Risk | Drainage | Contaminated Land | Ecology

Aval Consulting Group Ltd. Registered in England and Wales no. 11922039
Registered office: Newhaven Enterprise Centre, Denton Island, Newhaven, England, BN9 9BA

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From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk>

Date: Friday, 8 September 2023 at 3:08 pm

[REDACTED]

Subject: RE: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

[REDACTED]

Thank you for your email.

I would be willing to push this to 3l/s to assist you, please note any drainage design including blockage avoidance is the responsibility of the designer and not United Utilities as the assets will remain private.

I trust this brings our discussions regarding this matter to a close.

Regards

Anthony



Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

[REDACTED]

To: wastewaterdeveloperservices@uuplc.co.uk

[REDACTED]

Subject: RE: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

Hi Anthony,

Please see attached the comments received from the LLFA for your reference. Part of the comments require a blockage assessment to be made for flows under 5l/s for us to liaise with United Utilities to check on the maximum permitted discharge rate to avoid any blockage issues with Drainage.

Hence the request in my previous email to check if there was scope of increasing the flow rate to above 5 l/s. If that is not possible, then not an issue as we will follow the emails below and create a blockage plan.

Hope the above helps. I look forward to hearing from you.

Kind Regards,

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From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>

Sent: Tuesday, September 5, 2023 10:38 AM

Subject: RE: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

Thank you for your email.

The planning condition has been recommended for discharge based on 1 l/s pass forward flow, why are you now requesting 5 l/s? I need to understand some form of rational.

Regards

Anthony



Anthony Laithwaite

Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

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

Sent: 04/09/2023 10:54

To: wastewaterdeveloperservices@uuplc.co.uk

Subject: RE: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

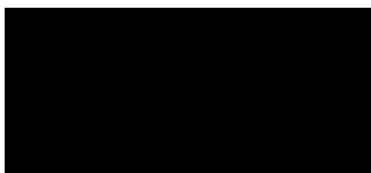
Good Morning Anthony,

Many thanks for the email below. Would United Utilities be happy and approve if we are to increase the flow rate to at least 5 l/s or more?

If you can please provide the maximum flow rate possible, that would be greatly appreciated.

I look forward to hearing from you.

Kind Regards,



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London | Newcastle | Brighton | York | Oxford | Durham | Birmingham

T: + 44 (0) 333 006 2524 | E: pratheek.ramesh@aval-group.co.uk | W: aval-group.co.uk



Services: Civil and Structural | Air Quality | Transport | Noise | Odour | Lighting | Flood Risk | Drainage | Contaminated Land | Ecology

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From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>

Sent: Monday, September 4, 2023 11:46 AM

Subject: Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

Good Morning [REDACTED]

Thank you for your email, please see our response below

Section 106 connection application – UU REF - 03422774 Land on Brendon Avenue Manchester M40 9DN

Please note United Utilities has recommended the discharge of condition with the council regarding the drainage design, this is based on your drawing number AVAL/92071B/500/01 showing a combined connection with a maximum pass forward flow of 1 l/s.

Should you wish to discuss the connection of flow rate do please contact me.

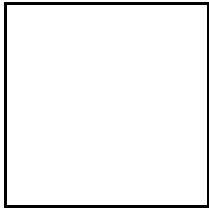
Regards

Anthony



Anthony Laithwaite
Ww Lead - ICS / Portal Project
Ww Engineer
Developer Services & Metering
Customer Services

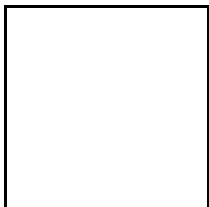
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Appendix F: Maintenance and Management and Blockage Plan

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Drainage Strategy – Maintenance and Management and Blockage Plan

Land on Brendon Avenue, Moston, M40 9DN
M Kenny Properties Ltd

November 2023

Project Information

Title	Drainage Strategy – Maintenance and Management and Blockage Plan
Job Code	92071
Sector	Drainage
Report Type	DS
Client	M Kenny Properties Ltd
Revision	A
Status	Draft
Date of Issue	30 November 2023

Revision History

Revision	Date	Author	Reviewer	Approver	Status
A	25 September 2023	PR	WR	AC	Draft

Disclaimer

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party. This report may include data obtained from trusted third-party consultants/laboratories that have been supplied to us in good faith. Whilst we do everything, we can to ensure the quality of all the data we use, we cannot be held responsible for the accuracy or integrity of third party data.

1. Introduction

Aval Consulting Limited has been commissioned by HAD & CO Property Consultants Ltd on behalf of M Kenny Properties Ltd ('the client') to provide a Maintenance and Management and Blockage Plan for the following proposed development:

The proposal comprises of the demolition of the existing development and the construction of 6no. new Semi-Detached C3 Residential Dwellings.

The purpose of the report is to set out the maintenance and management plan of the drainage network and features used within the site. Maintenance programmes will be provided to ensure optimal performance of the SuDS proposed within the site to prevent any unforeseen risks of flooding within the site or elsewhere.

The maintenance and inspection programme are standard to the proposed SuDS. However, suppliers of the SuDS may request additional maintenance and inspections if necessary. It is therefore recommended to adjust the maintenance and inspection programme in order to maximise the performance efficiency of the SuDS.

The company, MKenny Properties Limited will be responsible to follow the proposed maintenance and inspection plans.

As the attenuation tank is located within plot three's garden. This asset will need an adequate easement and maintenance access throughout the development's lifetime, which will be included within the property deeds.

This report will cover a Blockage Plan in the event the proposed drainage system is at full capacity due to any unforeseen rainfall events not simulated as part of the Drainage Strategy. This is a requirement for Manchester LLFA due to the proposed discharge rate being between 2-5 l/s.

2. Proposed SuDS as Part of Proposed Development

The proposed development includes the following SuDS within the design:

- Permeable Paving
- Flow Controls (Hydrobrake)
- Piped Network and Manholes
- Water Butts
- Attenuation Storage

The permeable paving is proposed to be placed within the common areas of the site including carparks, walking paths, etc. The permeable paving will be the primary source of storing and discharge of surface water.

The strategy entails a combination of an attenuation tank and permeable paving to effectively manage critical storm events, including those up to a 1 in 100-year flood event with a 40% Climate Change factor.

Finally, water butts are proposed to be placed outside each residential unit to help with the storage and re-use of surface water.

3. SuDS Maintenance Plan

There are three types of maintenance that may be required to be undertaken:

- Regular Maintenance
- Occasional Maintenance
- Remedial Maintenance

Regular maintenance is a frequent and planned maintenance/inspection schedule. This can include but is not limited to basic tasks such as debris removal, vegetation clearance/management, etc.

Occasional maintenance is a much less frequent and predictable schedule. It is mostly done periodically. This can include but is not limited to sediment removal.

Remedial maintenance is where maintenance is done to fix or repair faults within the system. This can be in the form of restricting the attenuation tanks, repairing flow controls, etc.

In all cases, all maintenance and inspections carried out should be recorded by the contractor/company in charge of the maintenance of the system. This should include information about the status of the system and the actions taken during any maintenance tasks.

The Permeable paving appears to be in significantly close proximity to the proposed dwellings footprint. Once the permeable paving needs fully replacing, close attention should be paid to the dwelling's foundations.

Table 1 is the Maintenance Plan for the Permeable Paving and Water Butts.

Table 1: Maintenance Plan for Permeable Paving and Water Butts

Type of Maintenance	Action Required	Frequency
Monitoring/Inspection	Inspection of outlet manhole chamber/pipe	Bi-annually
	Review of water levels within the system	Quarterly
Regular Maintenance	Visual inspection of permeable paving	Quarterly
	Removing any silt/dirt	Bi-annually
Occasional Maintenance	Flushing of system to remove any dirt/silt	As required

Remedial Actions	To replace/repair damaged components	As required
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Table 2 is the Maintenance Plan for the attenuation storage.

Table 1: Maintenance Plan for Attenuation Storage

Type of Maintenance	Action Required	Frequency
Monitoring/Inspection	Inspection of inlet and outlet pipes	Quarterly
	Review of water levels within the system	Quarterly
Regular Maintenance	CCTV survey of the tank to inspect the condition	Annually
	Removing any silt/dirt	Bi-annually
Occasional Maintenance	Flushing of system to remove any dirt/silt	As required
Remedial Actions	To replace/repair damaged components	As required

Table 3 contains the maintenance plans of the Hydrobrake.

Table 2: Maintenance Plan for Hydrobrake

Type of Maintenance	Action Required	Frequency
Regular Maintenance	Inspection of flow control via the pump	Monthly
	Removing any silt/dirt	Monthly
Occasional Maintenance	Checking connection features of pump to ensure parts such as bolts are not loose	Annually unless required

Remedial Actions	To replace and repair damaged components	As required
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4. Blockage Risk Assessment

As per Manchester LLFA requirements, a Blockage Risk Assessment is required to be undertaken for discharge rates between 2.0 and 5.0 l/s.

As per the Environment Agency and the SFRA, there have been no previously recorded flood events at the site or within the nearby area as can be seen in Figure 1.

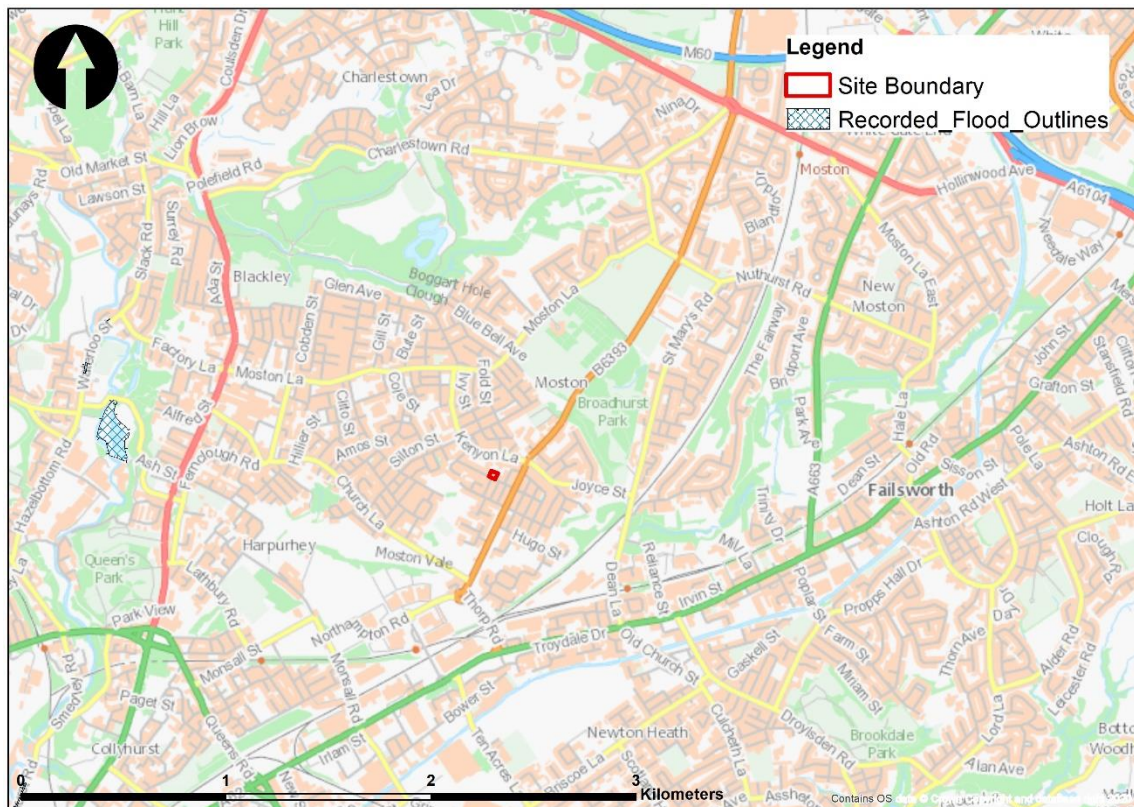


Figure 1: Recorded Flood Outlines (Source: GIS Data from the Environment Agency)

The current drainage system is proposed to be replaced by a new Drainage Strategy which has been provided within the Drainage Strategy report. No known issues with the existing drainage system were recorded during its use.

The site is also not within a risk of groundwater flooding as highlighted within the SFRA as can be seen in Figure 2.

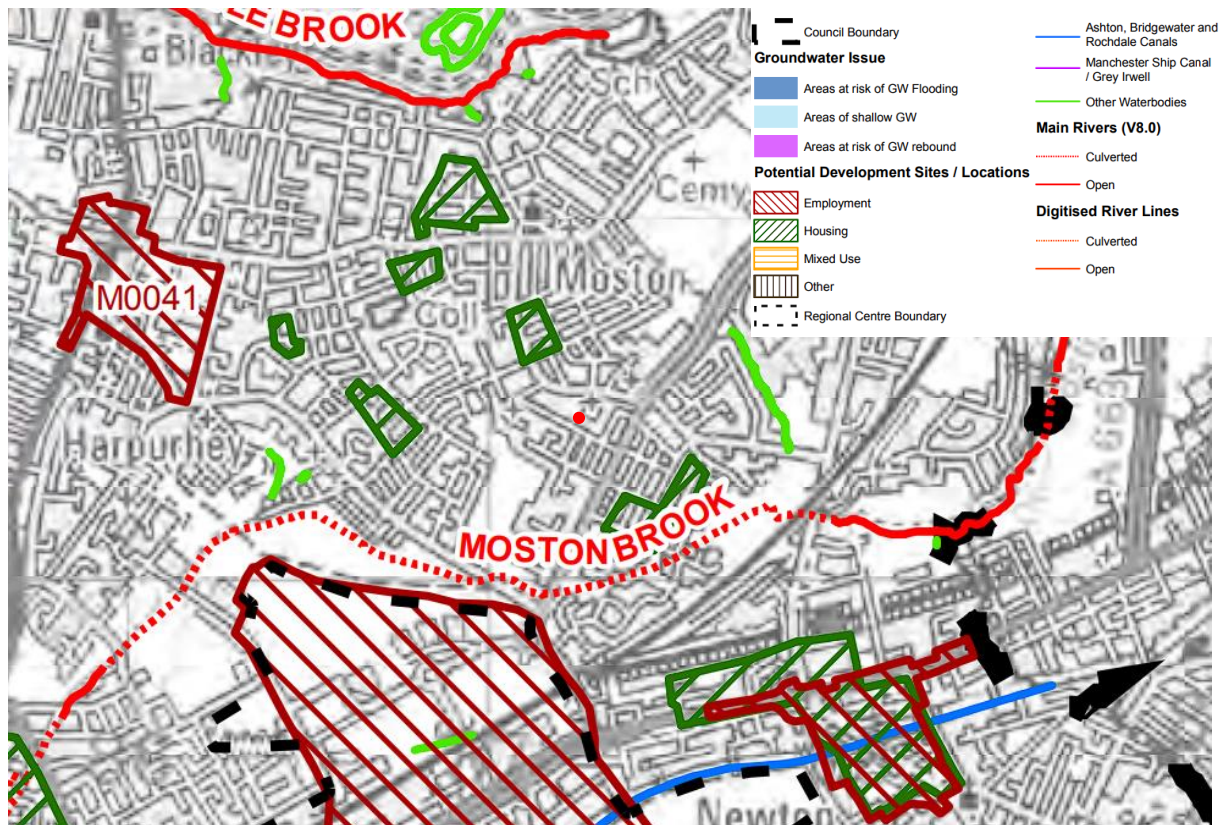


Figure 2: Groundwater Flooding Risk (Source: Manchester City Council SFRA)

As part of the proposed Drainage Strategy, several possible blockages of the drainage system have been considered such as:

- Blockage of pipe junctions
- Debris within manholes and inspection chambers
- Debris within gutters/rainwater pipes
- Dumping of soil or debris by homeowners
- Natural flow of dirt and silt into the system
- Unforeseen rainfall events which are not simulated or predicted

The proposed Drainage Strategy only includes two pipe junctions: one from the permeable paving sub-base chamber to the private combined manhole, and the existing connection from the site to the public sewers. This therefore helps to reduce the risk of blockages from pipe junctions.

Given the limited number of manholes and inspection chambers, the risk of debris causing blockages is relatively low. However, homeowners should remain vigilant and familiarise themselves with the maintenance plan outlined earlier in this report.

Gutters and rainwater pipes are the most common places for blockages to occur. Therefore, it is recommended for the homeowners to visually observe and clean the gutters/rainwater pipes as required.

As part of the proposed Drainage Strategy, an attenuation tank is to be placed within the rear garden to provide emergence storage under an unforeseen rainfall event.

Finally, should the site experience unforeseen flood events, a Flood Exceedance Route plan is provided as part of the Drainage Strategy, which directs surface water away from the proposed residential units.

In conclusion, the risk of blockage within the proposed drainage strategy is relatively low when considering the low risk of groundwater flooding, no previous flooding on site and the proposed method of discharging surface water from the site via the proposed Drainage Strategy. In the event that the system does get blocked, the flood exceedance route shows surface water will flow away from the residential units.

It is recommended that the developers/landowners provide an awareness plan to the new homeowners which explains the need for the homeowners to restrict impact to the Drainage system.