



Flood Risk Assessment and Drainage Strategy at

**Pennington Street,
Levenshulme,
M12 4QJ**

Client: Onward Homes

Reference: 34391-SUT-ZZZ-XX-RP-C-0001

Date: 20th November 2025

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Flood Risk Assessment & Drainage Strategy

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Flood Risk Assessment

1 Introduction

- 1.1 As part of the planning requirements for the development along Pennington Street, Levenshulme, it is necessary to prepare a site-specific flood risk assessment to ensure the flood risk is appropriately considered and managed to protect people and property from flooding.
- 1.2 The site boundary, Figure 1, totals to 0.40 hectares and is entirely within flood zone 1 as defined by the Environment Agency.
- 1.3 The National Planning Policy Framework (NPPF) Paragraph 170 seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. This assessment will demonstrate that all sources of flooding have been considered, and that development of the site is appropriate.
- 1.4 The existing site is classed as a greenfield site however it does have live adopted drainage running through the site. The site is to be developed with 14 dwellings along with an associated adopted road and private parking. The proposed site boundary is shown in figure 1.
- 1.5 The proposed site plans are provided in Appendix A for reference.
- 1.6 The development site is located just off Pennington Street to the south of Manchester City Centre. The location data for the site is:

Post Code:	M12 4QJ		
Grid Reference:	SJ 87211 94694		
Coordinates:	X: 387211	Y: 394694	
Latitude:	53°26'56"N	Longitude:	002°11'39"W
What3Words:	Ranges.issued.camera		

Table 1 – Location details

- 1.7 Flood risk information for planning has been obtained from the Environment Agency (EA) website and is provided in Appendix C. The EA data confirms the sites falls entirely within Flood Zone 1.



— Development
Site 1 Boundary

Figure 1: Site Boundary

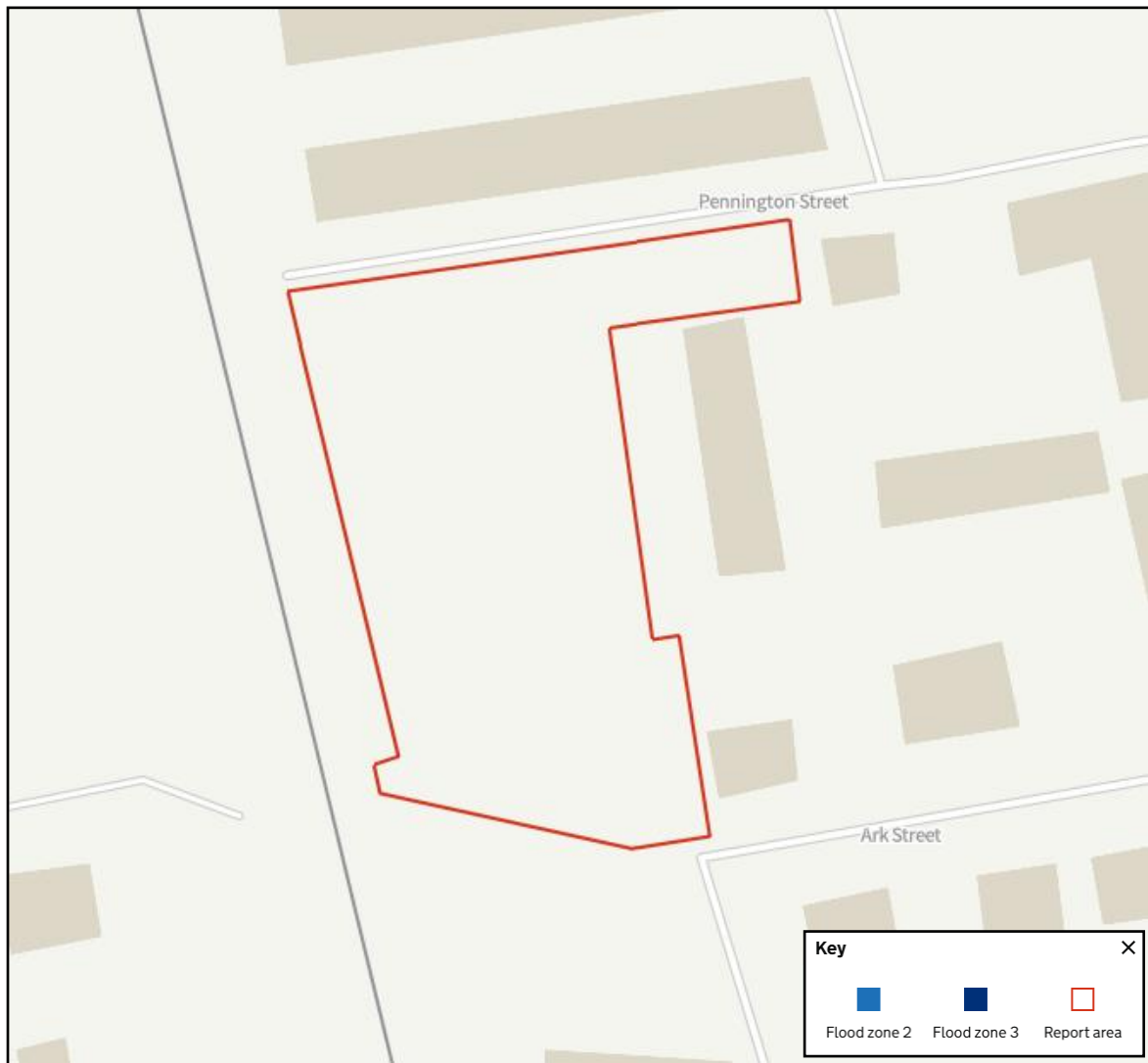


Figure 2: Environment Agency Flood Map for Planning (Flood Zones)

2 Planning Context

- 2.1. The National Planning Policy Framework expects Local Planning Authorities (LPA) to protect people and property from flooding. In fulfilling their duty LPAs are to ensure the following steps are assessed prior to granting planning permission:
 - 2.1.1 Assess flood risk
 - 2.1.1.1 The LPA must undertake a Strategic Flood Risk Assessment to inform the local plan and identify development sites that are in areas of low flood risk.
 - 2.1.1.2 Sites greater than 1 hectare or in areas of flood risk must have a Site-Specific Flood Risk Assessment prepared.
 - 2.1.2 Avoid flood risk
 - 2.1.2.1 The LPA should apply the sequential test to, as far as practicable, locate development sites in areas at the least risk of flooding from area survey, and if required carry out the exception test.
 - 2.1.3 Manage and mitigate flood risk

- 2.1.3.1 Where alternative sites are not available the LPA should ensure that development is flood resilient and resistant, safe for the users over the development's lifetime and will not increase overall flood risk.
- 2.1.3.2 LPAs and developers should manage flood risk through the inclusion of sustainable drainage techniques.
- 2.2. There is no general statutory duty on the Government to protect land or property against flooding. However, the Government recognises the need for action to be taken to safeguard the wider social and economic wellbeing of the country.
- 2.3. Landowners have the primary responsibility for safeguarding their land and others property against natural hazards such as flooding. Individual property owners and users are also responsible for managing the drainage of their land in such a way as to prevent, as far as is reasonably practicable, adverse impacts on neighbouring land.
- 2.4. Those proposing development are responsible for:
 - 2.1.4 Demonstrating that it is consistent with the NPPF.
 - 2.1.5 Providing an assessment of:
 - 2.1.5.1 Whether any proposed development is likely to be affected by flooding from any source.
 - 2.1.5.2 Whether it will increase flood risk elsewhere.
 - 2.1.5.3 The measures to deal with these effects and risks.
 - 2.1.5.4 Satisfying the local planning authority that any flood risk to the development or additional risk arising from the proposal will be successfully managed with the minimum environmental effect.
 - 2.1.5.5 Designs which reduce flood risk to the development and elsewhere, by incorporating sustainable drainage systems and where necessary flood resilience measures.
 - 2.1.5.6 Identifying opportunities to reduce flood risk, enhance biodiversity and amenity and seek collective solutions to managing flood risk.

3 Catchment/Site Description

- 3.1 The topography of the development boundary generally slopes from north to south. The maximum elevation is 55.31mAOD, the minimum elevation is 52.95mAOD. The topographic survey is included within the appendix A for reference.
- 3.2 A review of grid reference finder confirms the Nico Ditch is a culverted watercourse running through the site, an extract of the Map is in Figure 3 below.

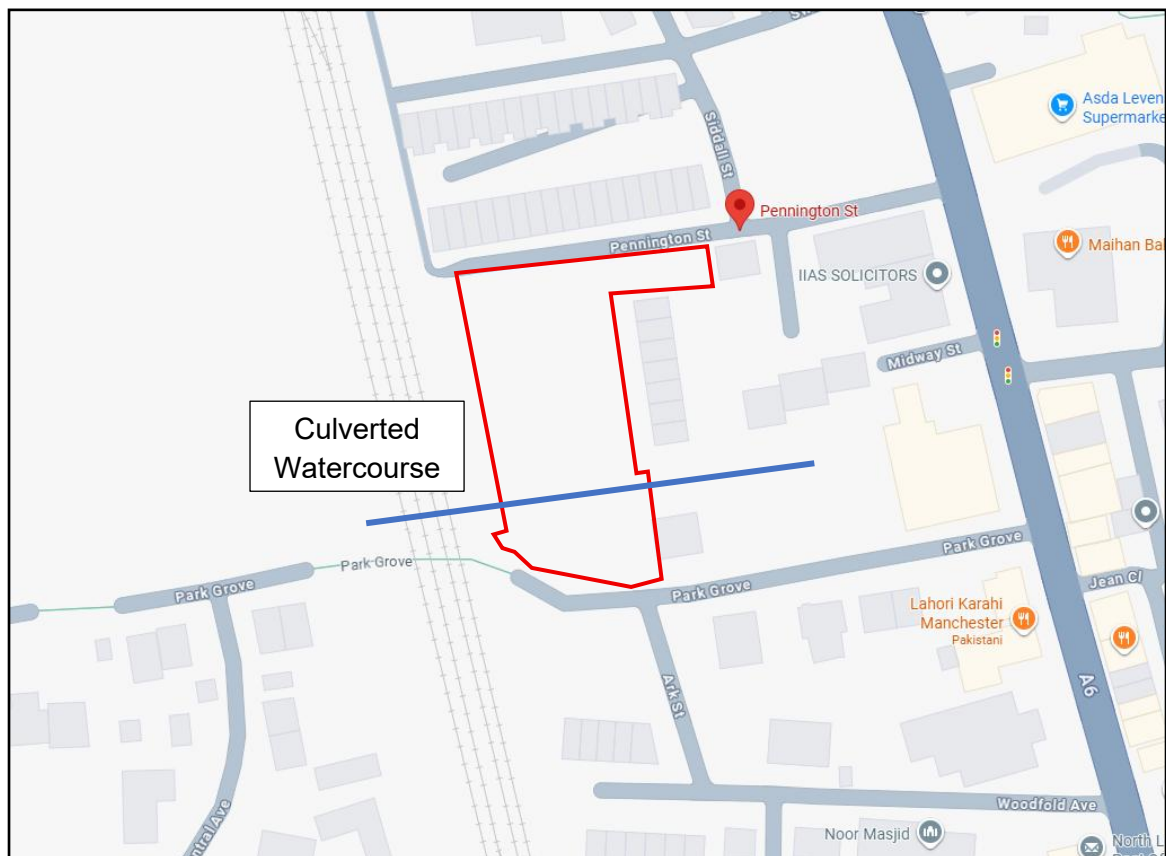


Figure 3: Existing Watercourses. (Source: Google Maps)

- 3.3 The National Soils Resources Institute, through the Soilscape web viewer, identifies the soil type within the proposed sites as Soilscape 17, Slowly permeable seasonally wet acid loamy and clayey soils.
- 3.4 The British Geological Survey (BGS) Geology of Britain viewer defines the bedrock geology within the proposed site as Chester Formation - Sandstone. Superficial deposits are shown as Till, Devensian - Diamicton.
- 3.5 Flood Risk Assessment
- 3.5.1 The National Planning Policy Framework (NPPF) seeks to promote development in areas at low risk of flooding and to reduce the flood risk resulting from development. The purpose of this site-specific flood risk assessment is to demonstrate that the site can be considered to fall within an area of low annual probability and assess the risk to the site from all sources of flooding.
- 3.5.2 The planning flood maps from the Environment Agency show that the site boundary falls within Flood Zone 1 in terms of risk posed by sea or river as seen in Figure 2 above.
- 3.6 The Sequential Test
- 3.6.1 In accordance with the NPPF it is required to apply the sequential test at all stages of the planning process.
- 3.6.2 The aim of this process is to steer new developments to areas at the lowest probability of flooding (Flood Zone 1).
- 3.6.3 The Environment Agency's flood zones are the starting point for applying the sequential test. The zones refer to flooding from sea and river flooding only.

- 3.6.4 The proposed buildings are already located within a Flood Zone 1 so therefore passes the sequential test for flooding related to rivers or the sea.
- 3.6.5 Paragraph 23 of the NPPF (Flood Risk and Coastal Change) requires developments avoid, so far as possible, development in areas of current and future medium and high-risk flooding, including surface water flooding.
- 3.6.6 The Environmental Agency Flood Map for Planning (surface water) indicates that the site may be at risk of flooding from the 1 in 30 year event.
- 3.6.7 The Environment Agency cautions that due to the limitations within the model (single drainage rate, national level modelling, LiDAR data etc.) the surface water flood maps do not provide a definitive risk of surface water flooding at the plot level. This flood map reflects the current scenario and provides an indication of the potential surface water flood risk in the absence of drainage network designed to facilitate the proposed development through the management of surface water.
- 3.6.8 Surface water flooding is shown on site during the 30-year storm and above.

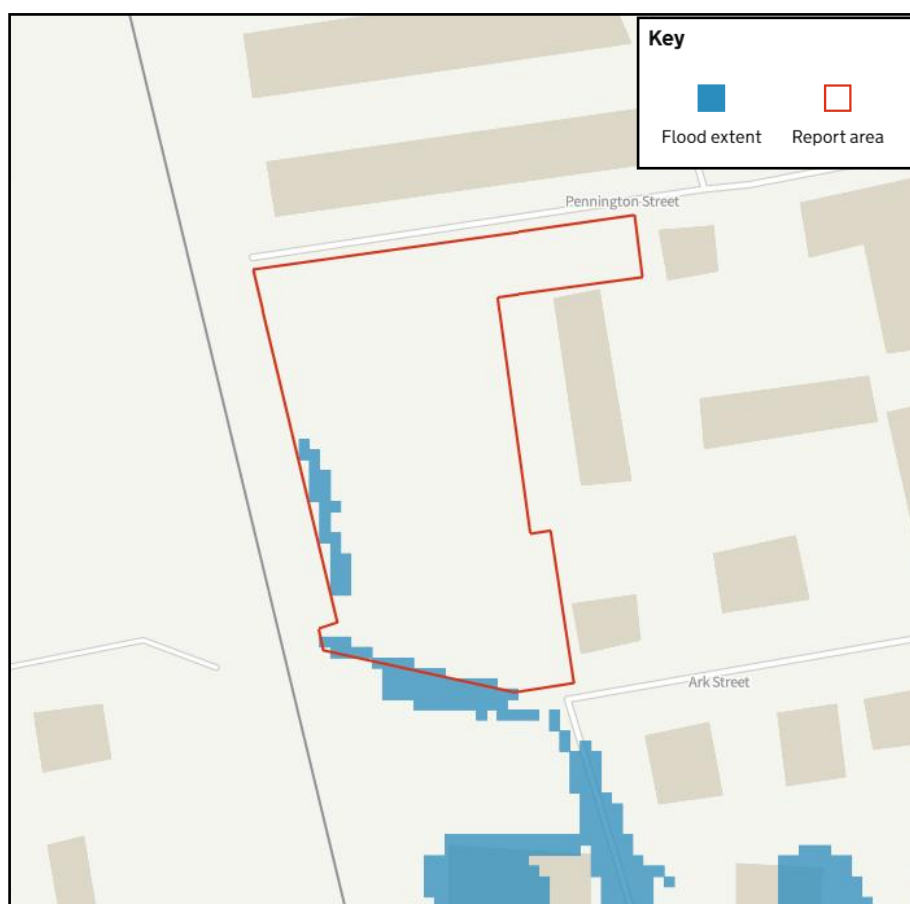


Figure 4: Environment Agency Surface Water Long Term Flood Risk (30 year)

- 3.6.9 A new drainage network is to be designed and installed to current standards, reducing peak run off to as close to greenfield rates as practically possible, therefore reducing flood risk. Following this the site passes the sequential test.

- 3.7 According to the NPPF Annex 3: Flood risk vulnerability classification the site is classed as 'more vulnerable'.

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.						

Figure 5: Table 3 from the NPPF Technical Guide illustrating site classification

- 3.7.1 A review of Table 3 of the NPPF Technical guide indicates that an exception test is not required for areas classed as more vulnerable that falls within Flood Zone 1.
- 3.8 Sources of Flooding
- 3.8.1 Flooding is a natural hazard and can happen at any time in a wide variety of locations. There are several forms of flooding, which present a range of different risks. The speed of inundation and the duration of different forms of flooding vary greatly. With climate change, the frequency, patterns, and severity of flooding are forecast to change and become more damaging.
- 3.8.2 The limits of flood risk areas cannot be defined precisely because floods with similar probability can arise from different combinations of weather, sources, rainfall patterns, local topography, and patterns of development.
- 3.8.3 Every flood will have different consequences on people, property and the environment and depends on the land use.
- 3.9 Flooding from the River and the Sea
- 3.9.1 Flooding from rivers or the sea is classed as a low/no risk (flood zone 1) across the site boundary as seen in Figure 6.

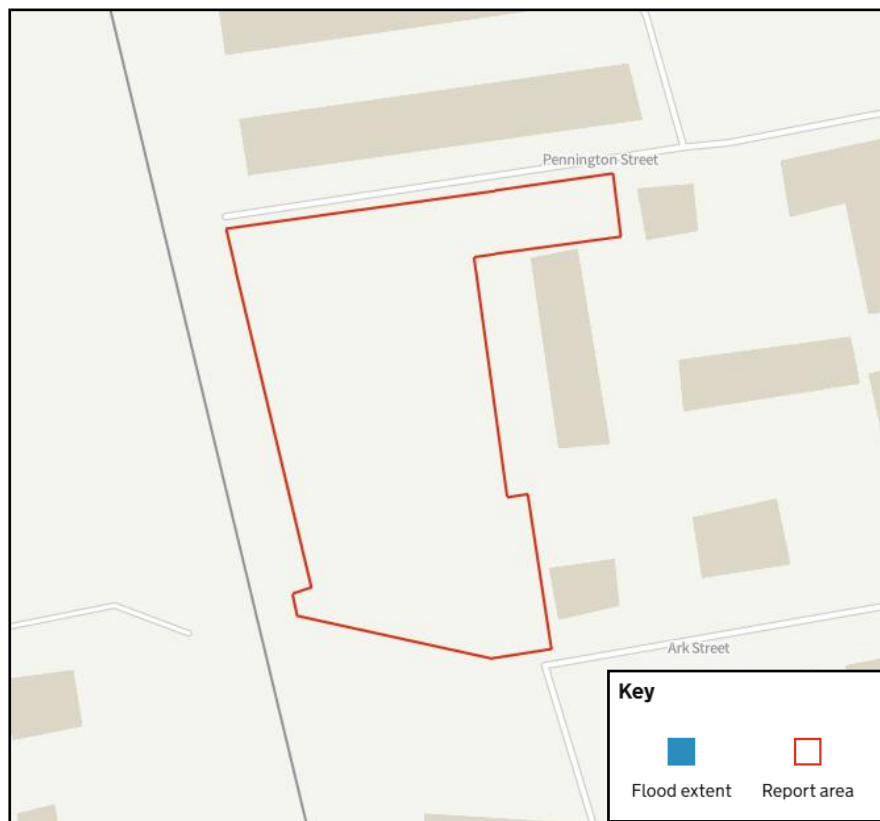


Figure 6: Environment Agency Flood Map - Extents of Flooding from Rivers or the Sea

3.10 Flooding from Surface Water

- 3.10.1 Flooding from surface water may occur in times of intense rainfall at a local site level as any drainage system may not be able to disperse the rainfall quickly enough. Surface flooding occurs when both the natural interception capacity of the ground is exceeded and the capacity of inlets to the drainage system are exceeded.
- 3.10.2 The Environment Agency provides surface water flood maps for the high (greater than 3.3% Annual exceedance probability (AEP), medium (1% AEP) and low (0.1% AEP) risk scenarios. The surface water flood maps from the Environment Agency website are provided in Appendix C for reference, although the low-risk scenario is generally considered above the design return period.
- 3.10.3 The extent of surface water flooding, Figure 4 above, indicates that there is a risk of surface water flooding occurring within the site boundary during the 30-year, 100-year and 1000-year storms.
- 3.10.4 As stated within the sequential test a surface water network is proposed to mitigate against any on site surface water flooding, Entrances to buildings will also be set to direct water away from the building entrances, therefore the risk of surface water flooding to the site can be considered low.
- 3.10.5 Flooding from Sewers
- 3.10.6 Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development will not increase the risk off site posed by sewer flooding as the surface water runoff, a primary cause of sewer surcharging, from the site is to be managed in accordance with the requirements of the NPPF and LLFA.
- 3.10.7 The development site is an existing greenfield site however does have existing sewers within it; a new surface water network will be designed and manage surface water discharge to greenfield rates.

- 3.10.8 Drainage for the proposed development will be designed to current best practice for both foul and surface water drains using Approved Document H. The new surface water drainage network for the site shall be designed to cater for the 100-year plus climate change event in accordance with current guidance and will incorporate long-term storage and SuDS as appropriate.
- 3.10.9 The existing culvert within the site will be used as the point of discharge for the proposed surface water network. The foul water network will discharge to the combined sewer within the site boundary. Proposed drainage within the site will be designed to the current requirements of the LLFA, the site can therefore be considered at low risk of sewer flooding.
- 3.11 Flooding from Infrastructure
- 3.11.1 Flooding from infrastructure occurs when canals, dams or other manmade structures capacity is exceeded, or fail. The Environment Agency Flood Map for Planning confirms the site is not within a flood risk area for a reservoir and the site is not located near canals.
- 3.11.2 There is no risk of flooding associated with infrastructure failure.
- 3.12 Flooding from Groundwater
- 3.12.1 The 'Manchester City Strategic Flood Risk Assessment maps' shows no risk of groundwater flooding within the site area or surrounding areas as seen in Figure 7 below.



Figure 7: Map – Groundwater flooding - Manchester City Strategic Flood Risk Assessment

- 3.12.2 This indicates that the site falls within a low likelihood area for groundwater flooding.
- 3.12.3 There are no other sources of flooding that affect the site. Overall flood risk to the proposed development can be considered low.

4 Climate Change

- 4.1 Paragraph 162 of the National Planning Policy Framework (NPPF) requires that plans should take a proactive approach to mitigating and adapting to climate change.
- 4.2 Paragraph 181 of the NPPF requires all plans to adopt a sequential risk-based approach considering all sources of flood risk and future impacts of climate change.
- 4.3 To appropriately mitigate the increased flood risk caused by climate change the Government has published guidance (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>) related to the appropriate climate change allowances.

3.3% Annual Exceedance Rainfall Event		
Upper Mersey	Central Allowance	Upper End Allowance
2050s	20%	35%
2070s	30%	40%
1% Annual Exceedance Rainfall Event		
Upper Mersey	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

Table 1: Climate Change Allowances. (Upper Mersey Management Catchment)

- 4.4 For developments with a lifetime between 2061 and 2125 the 2070s Upper Mersey data should be used.
- 4.5 To mitigate the impact of climate change on the development the upper end allowances should be considered for both the 1% and 3.3% annual exceedance probability events and the development should be design for the 1% annual exceedance probability event so that there is:
- 4.5.1 No increased flooding elsewhere.
- 4.5.2 And the development is safe from surface water flooding.
- 4.6 Where new surface water drainage is proposed an allowance for climate change shall be included to mitigate the risk.

5 Emergency Access/Escape

- 5.1 With flood risk to the site considered low and the area being within a flood zone 1 for sea and rivers, there is no requirement for an emergency access or escape routes.

6 Flood Risk Summary and Conclusion

- 6.1 From the above assessment of flood risk, it has been established that the development site is entirely within Flood Zone 1 for river and sea flooding.
- 6.2 Surface water flood risk can be mitigated through careful consideration of finished floor levels and implementation of a SuDS drainage scheme that helps to manage runoff from the development.
- 6.3 The surface water drainage network will be designed taking climate change into consideration and to help ensure the development is safe for its lifetime.
- 6.4 The development will not increase the risk of flooding off site.

Surface Water Drainage Strategy

7 Policy Context

- 7.1 The LLFA expect the surface water management strategy to comply with:
- 7.2 Paragraph 80 of the Planning Practice Guidance (PPG);
- 7.3 Paragraph 175 of the National Planning Policy Framework; and
- 7.4 Paragraph 56 of the Planning Practice Guide requires that surface water from development be discharged in line discharge hierarchy.
- 7.5 The discharge hierarchy from of the part New National Standards for SuDS. Standard S1 requires it to be managed in line with the below hierarchy.
 - 7.5.1 Collected for non-potable use
 - 7.5.2 Infiltrate into the ground close to source.
 - 7.5.3 Discharge runoff to a surface water body.
 - 7.5.4 Discharge runoff to a surface water sewer, highway drain or other surface water drainage system.
 - 7.5.5 Discharge to a combined sewer.
- 7.6 The implementation of the hierarchy will be discussed in greater detail in Section 11.
- 7.7 Paragraph 175 of the National Planning Policy requires major developments to incorporate sustainable drainage systems unless there is clear evidence that their inclusion would be inappropriate. Sustainable drainage systems should:
 - 7.7.1 Take account of advice from the LLFA.
 - 7.7.2 Have appropriate proposed minimum operational standards.
 - 7.7.3 Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - 7.7.4 Where possible, provide multifunctional benefits.
- 7.8 The National Standards for SuDS are:
 - 7.8.1 S1 requires, that runoff should be discharged following the hierarchy stated above. Appropriate evidence is to be provided to demonstrate all higher priority final destinations have been utilised to the maximum extent practicable. Higher cost alone shall not be a reason to utilise lower priority destinations. Where more than one destination is utilised, each final destination's ability to accept runoff shall be maximised in order of priority.
 - 7.8.2 S2 requires, that at least the first 5mm of rainfall for the majority of rainfall events does not result in runoff from the site to surface waters or piped drainage systems. Evidence shall be provided that the approach to managing runoff from 'everyday' rainfall has been developed alongside and in support of the management of runoff quality and the delivery of amenity and biodiversity benefits.

- 7.8.3 S3 requires, development runoff is managed during extreme rainfall, including allowances for climate change and urban creep. Across all discharge methods the flood risk should be mitigated to ensure there is no increased risk elsewhere. Any flooding for events up to the 1% AEP shall be managed within the development. Any flooding from off-site sources shall be managed on site or safely routed through the site, ensuring no increased downstream risks compared to the predevelopment scenario.
- 7.8.4 S4 requires, a SuDS approach that protects surface waters, groundwater and coastal waters by managing the quality of the surface water runoff to adequately address water quality risks from the development. The proposals shall utilise SuDS based on a robust water quality risk assessment, appropriate to the pollution hazard and sensitivity of receiving waters. It should reflect industry recognised guidance or other quantitative assessments as agreed with the approving body and permitting requirements.
- 7.8.5 S5 requires, that SuDS should maximise benefits for amenity through the creation of multi-functional places and landscapes.
- 7.8.6 S6 requires SuDS be used to ensure surface water drainage system maximises biodiversity benefits throughout the development lifecycle. This can be done by creating diverse, self-sustaining and resilient local ecosystems. Also, supporting natural local habitat and species and contributing to the delivery of local biodiversity strategies and contributing to habitat connectivity.
- 7.8.7 S7 requires that drainage systems can be easily and safely constructed and maintained. A maintenance plan is to be provided that support the design objectives within standards 1 to 6. Surface water drainage design should examine any potential failure scenarios that can occur during the operational design life and manage these risks. It shall be designed to ensure structural integrity under anticipated loading conditions to ensure the structural integrity of the proposed or existing components is not affected.
- 7.9 The requirements of the local and national policy will be addressed by the proposed site layout and proposed drainage system, discussed in detail in Sections 9 and 11.

8 Existing Drainage

- 8.1 Compliance with policy begins with a review of the existing site and its drainage characteristics.
- 8.2 As discussed within the flood risk assessment, the development site is considered to have a greenfield land classification as it falls with no existing infrastructure.
- 8.3 The nearest watercourse to the development is the Nico Ditch, a culverted watercourse running through the site.
- 8.4 The site topography directs runoff to the south
- 8.5 The surface water runoff from the development site is to be discharged as close as reasonably practicable to greenfield rates due to a new surface drainage network being proposed.

9 Proposed Site Layout

- 9.1 The proposed site layout is influenced by existing levels and infrastructure surrounding the site and the existing road connection points to the north and south of the site.
- 9.2 Proposed site levels are influenced by the existing topography with the site falling gently towards the south.
- 9.3 Appropriate FFLs are to be set for the proposed developments to mitigate against surface water flooding implied on the EA surface water flood maps.

10 Urban Creep

- 10.1 A 10% urban creep factor has been applied to the footprint of each house within the development.

11 Proposed Surface Water Drainage

- 11.1 Planning policy requires that the SuDS drainage hierarchy is explored when discharging surface water runoff as noted in Section 7.
- 11.2 The first level of the hierarchy requires for surface water to be collected for non-potable use within the proposed site.
- 11.3 Due to the development not being within a water stressed area and there being insufficient catchment area across the site for what would be required, the next stage of the hierarchy will be explored.
- 11.4 The second level of the hierarchy requires that infiltration solutions be considered for the management of surface water runoff.
- 11.4.1 Infiltration systems can take the form of soakaways, detention ponds, permeable pavements, bio-retention areas etc.
- 11.4.2 The Soilscape viewer identified the general area as Soilscape 18, Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
- 11.4.3 Infiltration testing has not been carried out on the proposed development site, but after reviewing the soilscape ground conditions it is believed the use of soakaways is not a viable solution for the management of surface water from the development. Infiltration testing will be carried out to BRE365 standards to confirm.
- 11.5 The third tier of the hierarchy requires surface water to be discharged to a surface water body.
- 11.5.1 A review of the area surrounding the site has confirmed that there is the Nico Ditch culverted watercourse running through the development site.
- 11.5.2 This will be used as the preferred point of discharge and will be restricted to as close to greenfield rates as possible. As the proposed road is to be adopted a minimum discharge rate of 5l/s has been used.
- 11.6 The fourth tier of the hierarchy requires surface water to runoff to a surface water sewer.
- 11.7 The fifth tier requires surface water to be discharged to a combined sewer.
- 11.7.1 With the proposed surface water sewer discharging to the culverted watercourse the development is considered to be managed at level three of the discharge hierarchy.
- 11.8 Details of the proposed drainage strategy are presented on the proposed drainage plans in Appendix A.
- 11.9 With the proposed surface water network in the proposed road being offered for adoption the minimum orifice size that can be used is 100mm, therefore the network has been restricted to the agreed discharge rate of 5l/s to comply with this.
- 11.10 The greenfield rate calculation is shown in Appendix B.

- 11.11 The proposed drainage network requires a flow control and attenuation, to achieve the required discharge rates and manage surface water to mitigate the flood risk stemming from the development, prior to discharging to the surface water network.
- 11.12 Attenuation is provided in the form of large drainage pipes prior to a controlled discharge into the culverted watercourse via a vortex control.
- 11.13 The calculations for the proposed drainage strategy network are provided in the Appendix D, for reference, these confirm the volume and discharge rates. The calculations confirm the resultant discharges can be managed to satisfy the limiting discharge rate.
- 11.14 The simulation results confirm that the proposed surface water network satisfies the required design standards for all events up to and including the 100 year plus 45% climate change event.
- 11.15 The proposed surface water drainage network can be considered to fulfil the policy requirements as far as practicable.

12 Water Quality

- 12.1 Water quality guidance is set out in Chapter 26 of the SuDS Manual (CIRIA C753). For the anticipated hazards the simple index approach is suitable.
- 12.2 Pollution hazard indices for the simple index approach are provided in Table 26.2 of the SuDS Manual. The development site primarily consists of roofs, roads and parking areas. The pollution hazard from these land use classifications can be considered low.
- 12.3 Suspended solids from the surface runoff will be managed through the use of permeable paving and trapped gullies with a sump, prior to the outfall, which will allow suspended solids to settle out.

13 Proposed Foul Water Network

- 13.1 The proposed foul water network will be designed in accordance with the requirement of Approved Document H.
- 13.2 The anticipated peak foul flow connection point and discharge rate will be agreed with United Utilities.

14 Maintenance and Management

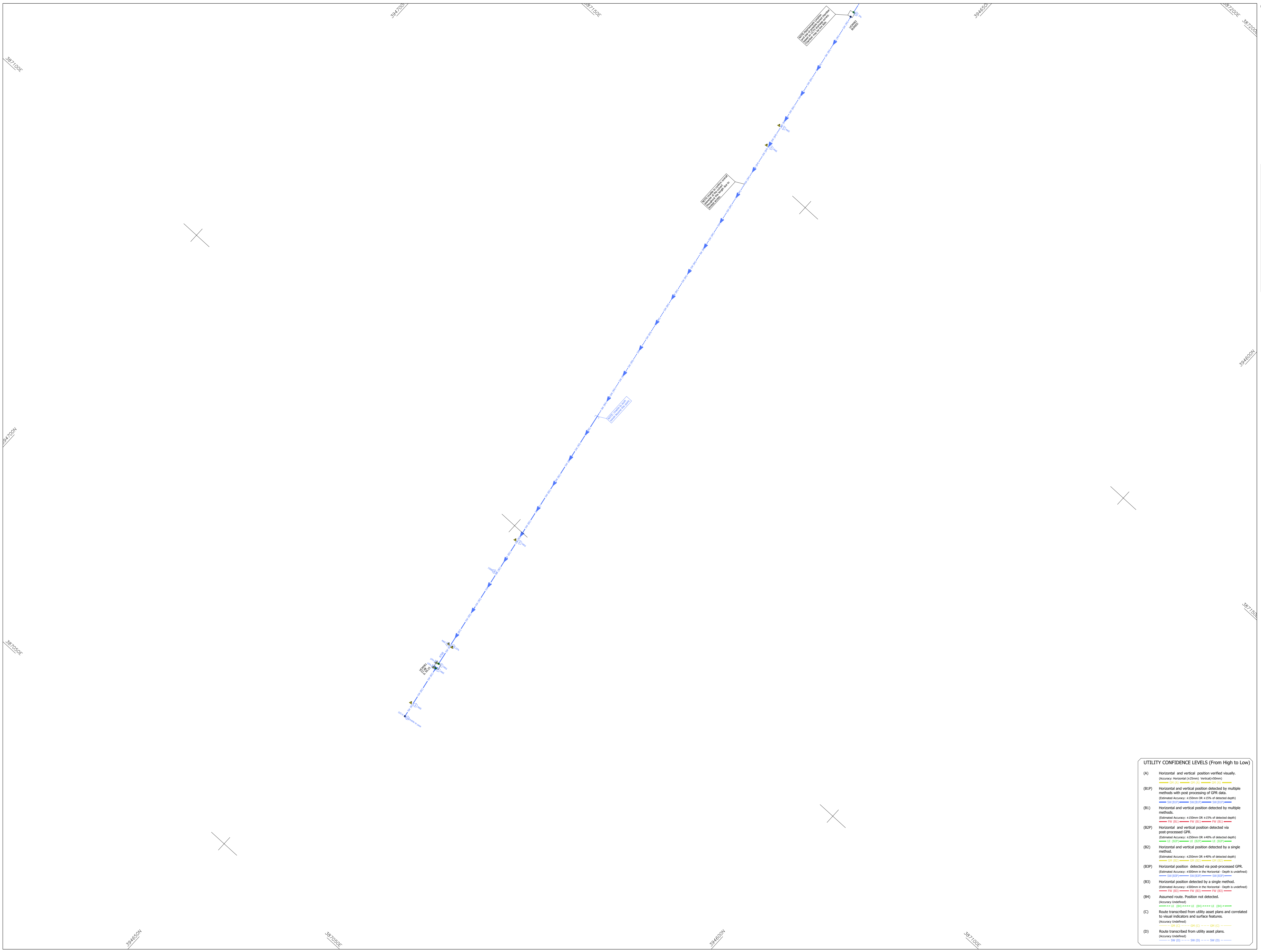
- 14.1 The proposed drainage network will be managed by a building management company.
The piped network and flow control will be maintained in accordance with the building management company processes.

15 Surface Water Management summary and Conclusion

- 15.1 The proposed drainage network manages surface water runoff up to the 100-year plus 45% climate event.
- 15.2 Long-term storage is provided within large diameter pipes, and the runoff rate is controlled to comply with standards S3 of the National Standards for SuDS, as far as practicable, through the inclusion of a flow control in accordance with CIRIA C753.

- 15.3 The surface water discharge rate is controlled in line with the requirements of the Statutory Undertaker and the LLFA.
- 15.4 The proposed drainage network includes SuDS as far as practicable given the layout of the site and constraints set by the existing external constraints.
- 15.5 Through the implementation of the proposed drainage strategy the site does not increase flooding within or downstream of the catchment including an allowance for climate change.
- 15.6 The proposed drainage network is considered to satisfy the requirement of local and national planning policy.

16 Appendix A – Proposed plans / Topographic survey



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NOTES:
Survey plotted on a plane Local Grid, Orientated to National Grid.
All levels relate to OS (Newlyn) Datum, Established using Network RTK.

CCTV LEGEND:
B BROKEN
C CRACK
CN CLOSURE POINT
CX DEFECTIVE CONNECTION
DEA ATTACHED DEPOSITS
DES SETTLED DEPOSITS
INT END MODE TYPE
DI DISTRIBUTION
FW FRACTURE
FW FLOW FROM DISCONNECTING PIPE
H HOLE
HZA HAZARDOUS ATMOSPHERE
INF INFILTRATION
ING INGRESS OF SOIL
J JOINT CORROSION
JN JUNCTION
N DEFECTIVE ANCHOR
L LINE DEVIATION
LC CHANGE OF LINING
LX LINING DEFECTIVE
MC CHANGE OF MATERIAL
CB OTHER DETAILS
CP OTHER POINT
PC CHANGE OF PIPE LENGTH
PM PIPE MATERIAL
R ROOTS
RP POINT REPAIR
RX DEFECTIVE REPAIR
S SURFACE DAMAGE
SA SURVEY ABANDONED
SC CHANGE OF SLOPE
SMT STREET MODE TYPE
SR SEALING RING
SV SOIL VISIBLE
V VORTEX
VV VOID VISIBLE
WL WATER LEVEL
WX WELD FAILURE
XP COLLAPSED
CCTV REMARK
CCTV START NODE
CCTV END NODE
END OF TRACE
UNABLE TO TRACE
UNABLE TO SURVEY
FOUL WATER
SURFACE WATER
COMBINED SEWER
ATTENTION
WARNING
NO FURTHER HITS
UNABLE TO LIFT
OUTSIDE SURVEY AREA
FW (A)
FW (B)
FW (C)
FW (D)
FW (E)
FW (F)
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FW (J)
FW (K)
FW (L)
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FW (U)
FW (V)
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FW (Y)
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Only manholes and services visible at time of survey shown. Drainage information must be checked and verified with local authority records prior to work commencing.
Lines of drainage systems recorded using measured survey techniques (e.g. Total Station, GPS) will be subject to the below Utilities Disclaimer and will be in accordance with PAS128 guidelines.
Where survey information is overlaid onto supplied topographical data, positions are to be taken as measured based on the supplied data.
Layer Surveys Ltd cannot be held responsible for the accuracy of any data supplied by third parties.
It will not always be possible to fully survey the extent of each drainage run due to factors outside the control of Layer Surveys Ltd, including but not limited to collapsed, blocked, or damaged drains. Reasonable assumptions will be made to identify the continuation of these runs but these assumed lines should be treated with caution.

UTILITIES DISCLAIMER:
Layer Surveys utilizes skilled staff and advanced electromagnetic and radar techniques for locating subsurface utilities. Utility survey drawings are produced in compliance with BS1 PAS 128:2022 Specification. However, the performance of non-invasive survey equipment can be affected by uncontrollable factors. As such, Layer Surveys cannot guarantee the detection of all utilities on site. Clients should consult regional records and conduct trial excavations where necessary.
In areas with cluttered services, individual lines may not be distinguishable due to signal interference and will be represented as a single annotated line, with depths shown for the shallowest utility detected. Tracing non-conductive materials and narrow/distributed drainage may be limited.
Depth readings of underground service features are generally accurate to +/- 10% but cannot be guaranteed. Depths typically indicate the top of the service unless otherwise stated, with gravity sewerlines showing invert depths.
Some above-ground features may be obscured at the time of the survey, and GPS operation can be hindered in areas with dense vegetation, debris, or uneven terrain.
Existing records provided should be considered indicative only. Excavation near located services must be carried out with due diligence (Ref. HSG47).

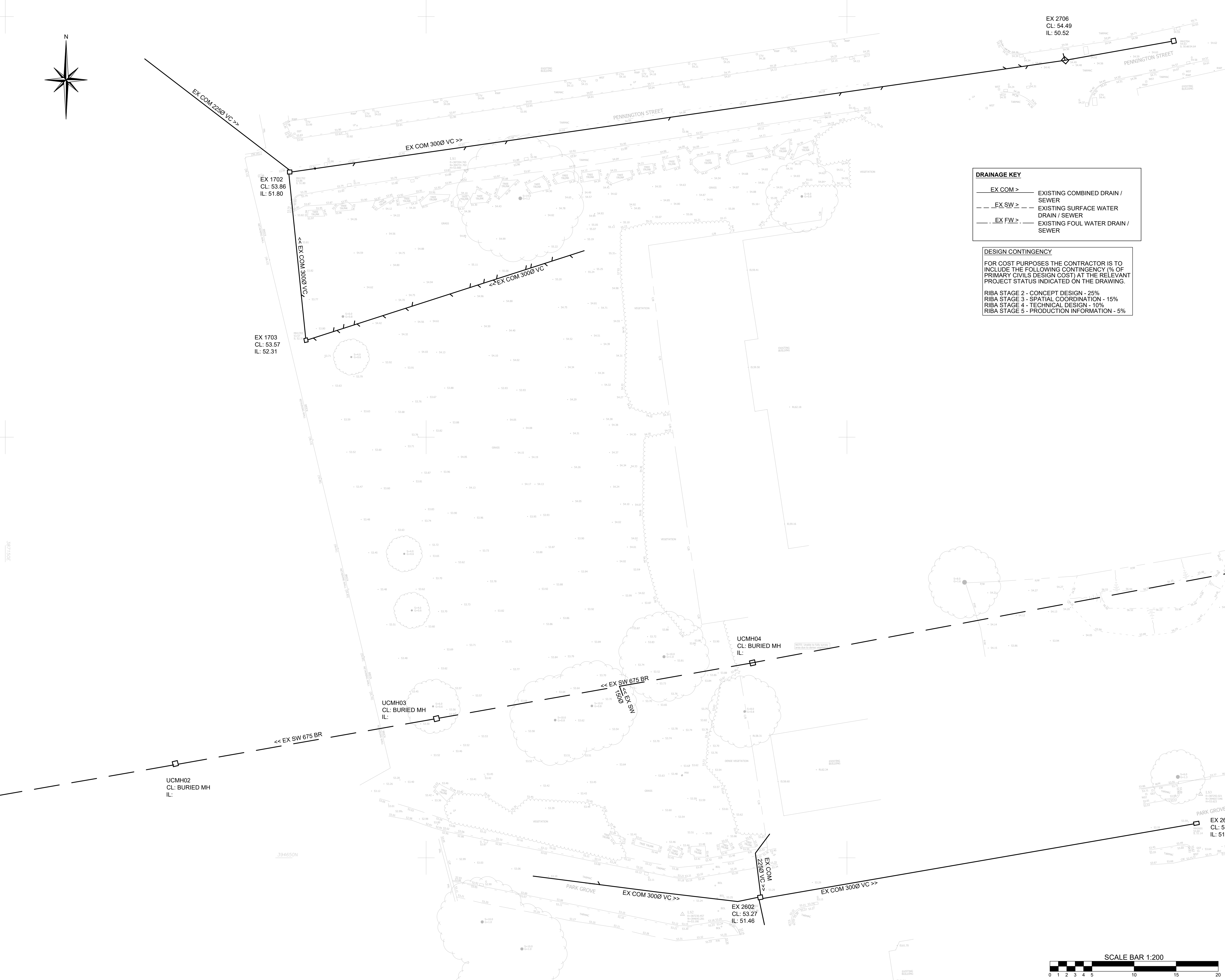
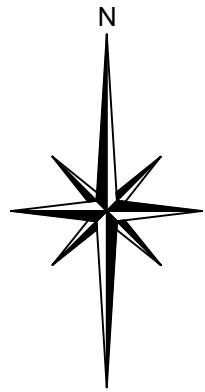
UTILITY CONFIDENCE LEVELS (From High to Low)
(A) Horizontal and vertical position verified visually.
(B1P) Horizontal and vertical position detected by multiple methods with post-processing of GPS data.
(B1) Horizontal and vertical position detected by multiple methods.
(B2P) Horizontal and vertical position detected via post-processed GPS.
(B2) Horizontal and vertical position detected by a single method.
(B3P) Horizontal position detected via post-processed GPS.
(B3) Horizontal position detected by a single method.
(B4) Assumed route. Position not detected.
(C) Route transcribed from utility asset plans and correlated to visual indicators and surface features.
(D) Route transcribed from utility asset plans.

CLIENT
Onward Homes

PROJECT TITLE
Utility Survey at:
Pennington Street
Levenshulme
Manchester
M12 4QJ

Drawing Ref.	Drawn	Checked	Rev
L55976	J.Macgregor	B.Brady	#
Surveyed	Date	Scale	Sheet
T.W/S.H	May 25	A1	02
Scale			No.
1:200			02





DRAINAGE KEY

— EX COM > — EXISTING COMBINED DRAIN / SEWER

- - - EX SW > - - - EXISTING SURFACE WATER DRAIN / SEWER

— EX FW > — EXISTING FOUL WATER DRAIN / SEWER

DESIGN CONTINGENCY

FOR COST PURPOSES THE CONTRACTOR IS TO INCLUDE THE FOLLOWING CONTINGENCY (% OF PRIMARY CIVILS DESIGN COST) AT THE RELEVANT PROJECT STATUS INDICATED ON THE DRAWING.

RIBA STAGE 2 - CONCEPT DESIGN - 25%

RIBA STAGE 3 - SPATIAL COORDINATION - 15%

RIBA STAGE 4 - TECHNICAL DESIGN - 10%

RIBA STAGE 5 - PRODUCTION INFORMATION - 5%

- GENERAL NOTES**
- A1.1 THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
- A1.2 ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.
- A1.3 ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
- A1.4 ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS AND WHERE APPLICABLE LOCAL AUTHORITIES REQUIREMENTS.
- A1.5 ALL MATERIALS TO BE MARKED WITH BSI KITE MARK WHERE APPLICABLE.

P01	PRELIMINARY ISSUE	03.10.25	MG	MB
Rev	Description	Date	By	Chkd
Drawing Status				
S2 - CONCEPT DESIGN				
				

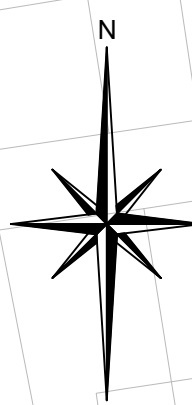
Client **ONWARD HOMES**

Project **PENNINGTON STREET MANCHESTER**

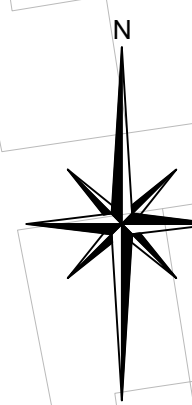
Drawing Title **EXISTING DRAINAGE**

Date OCT '25	Drawn By MG	Checked By MB
Scale at A1 1:200	Project Number 34391	Status S2
Sheet Number 34391-SUT-ZZ-XX-DR-C-6000	Revision P01	

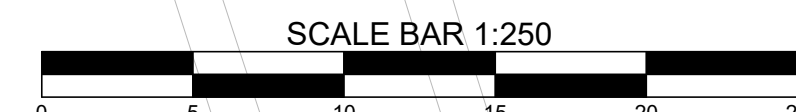




EXISTING PLAN



PROPOSED PLAN



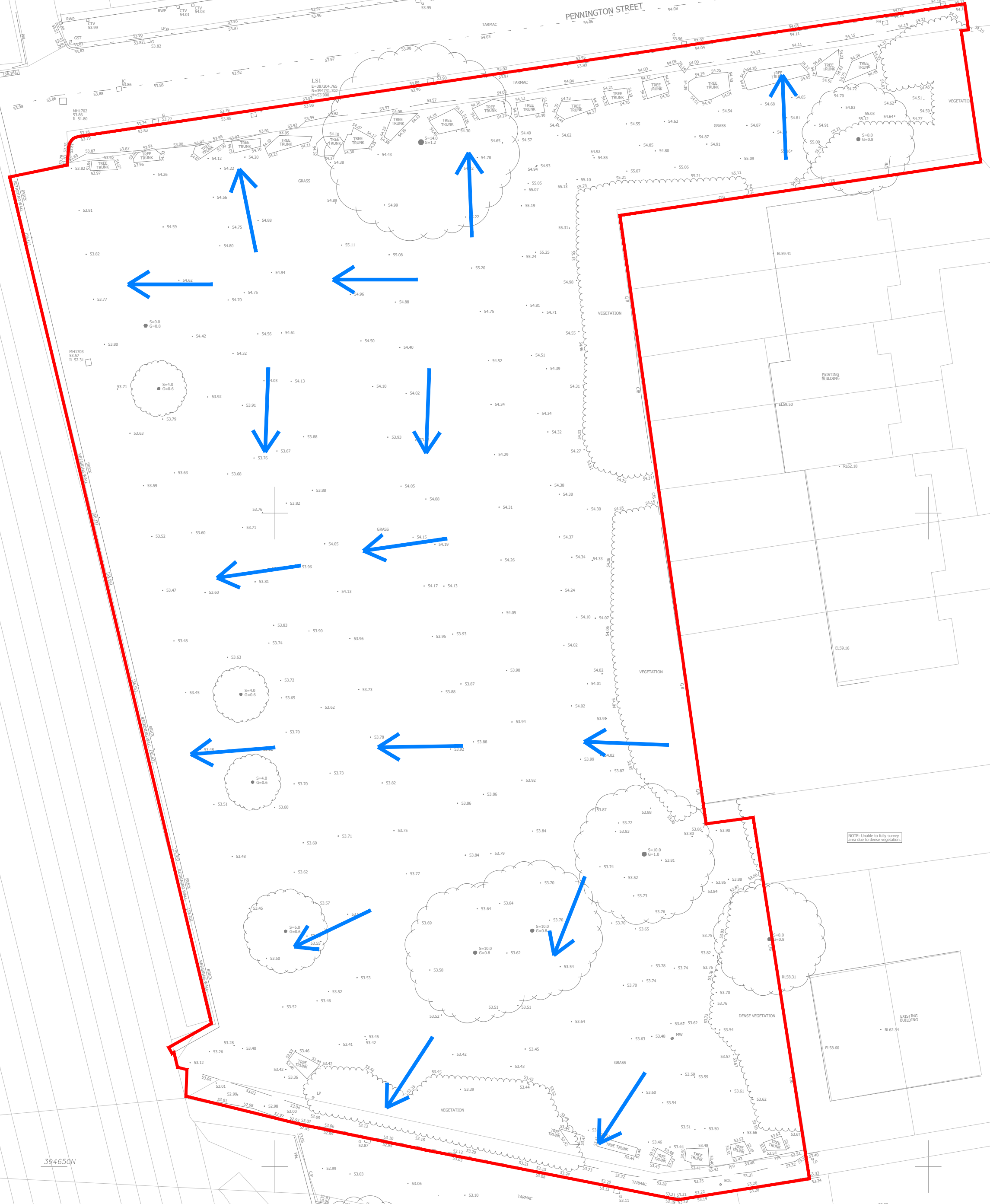
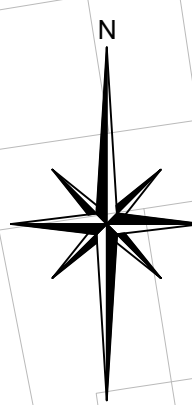
- GENERAL NOTES**
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DESIGN CONTINGENCY

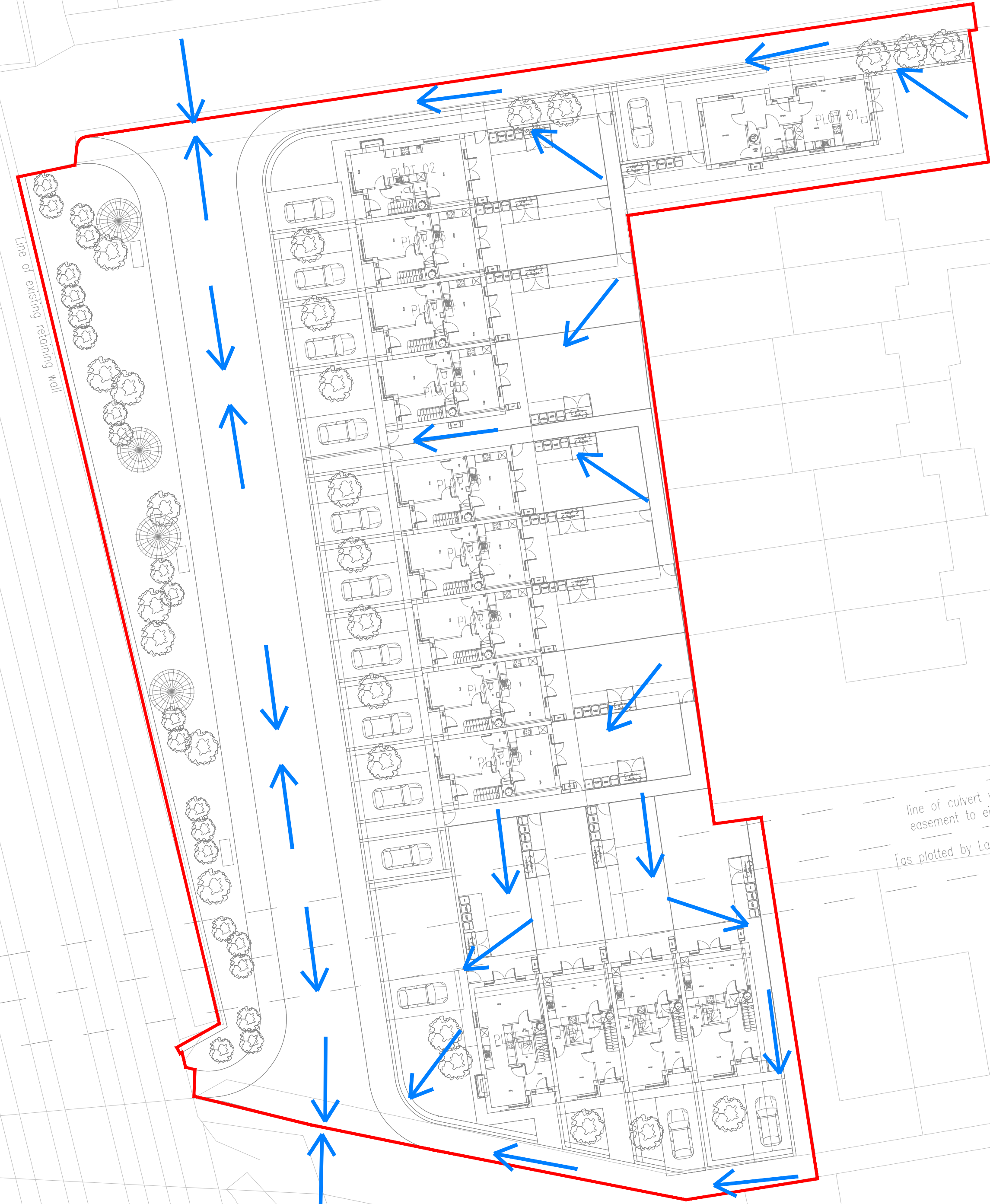
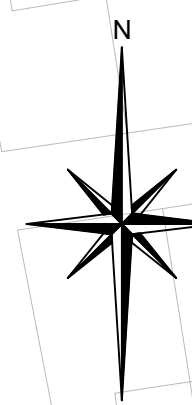
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RIBA STAGE 5 - PRODUCTION INFORMATION - 5%

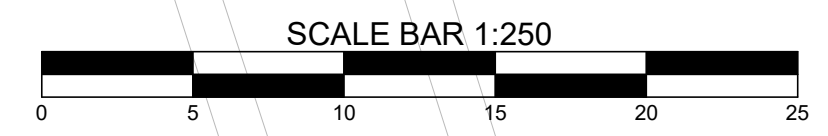
P01	PRELIMINARY ISSUE	03.10.25	MG	MB
Rev	Description	Date	By	Chkd
Drawing Status				
S2 - CONCEPT DESIGN				
		<i>Structural & Civil Engineering</i> Sutcliffe <i>Geotechnical & Environmental Investigation Building Surveying Pav Planning Services</i>		
London Head Office 0171 227 2155	Manchester Office 0161 817 3180	North Wales Office 01792 664 071	Luton Office 028 9714 4320	
www.sutcliffe.co.uk		    	      	
Client				
ONWARD HOMES				
Project				
PENNINGTON STREET MANCHESTER				
Drawing Title				
IMPERMEABLE AREAS				
Date		Drawn By		Checked By
OCT '25		MG		MB
Scale at A1		Project Number		Status
1:250		34391		Revision
				P01
Sheet Number				
34391-SUT-ZZ-XX-DR-C-6100				



EXISTING PLAN



PROPOSED PLAN



GENERAL NOTES

A1.1 THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

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A1.4 ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS AND WHERE APPLICABLE LOCAL AUTHORITIES REQUIREMENTS.

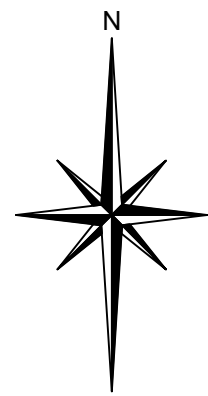
A1.5 ALL MATERIALS TO BE MARKED WITH BSI KITE MARK WHERE APPLICABLE.

DESIGN CONTINGENCY

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RIBA STAGE 3 - SPATIAL COORDINATION - 15%
RIBA STAGE 4 - TECHNICAL DESIGN - 10%
RIBA STAGE 5 - PRODUCTION INFORMATION - 5%

P01	PRELIMINARY ISSUE	08.10.25	MG	MB
Rev	Description	Date	By	Chkd
Drawing Status				
S2 - CONCEPT DESIGN				
				
Client ONWARD HOMES				
Project PENNINGTON STREET MANCHESTER				
Drawing Title FLOOD EXCEEDANCE LAYOUT				
Date OCT '25	Drawn By MG	Checked By MB		
Scale at A1 1:250	Project Number 34391	Status S2	Revision P01	
Sheet Number 34391-SUT-ZZ-XX-DR-C-6900				



GENERAL NOTES

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- A1.5 ALL MATERIALS TO BE MARKED WITH BSI KITE MARK WHERE APPLICABLE.

EXISTING SITE CONDITIONS

- E1.1 THE DEVELOPER SHALL NOT COMMENCE ANY WORK WHICH AFFECTS THE PUBLIC HIGHWAY UNTIL ALL THE APPROVED TRAFFIC SAFETY AND MANAGEMENT MEASURES NECESSITATED BY THE WORKS ARE IN PLACE.
- E1.2 THE DEVELOPER SHALL MAINTAIN ACCESS TO AND ALONG ALL EXISTING FOOTWAYS, PRIVATE ACCESSES, PUBLIC RIGHTS OF WAY AND PROPOSED CROSSINGS OF THE WORKS THROUGHOUT THE CONSTRUCTION PHASE.
- E1.3 THE CONTRACTOR IS TO CONFIRM EXISTING ROAD LEVELS AT ALL PROPOSED JUNCTIONS BETWEEN NEW AND EXISTING ROAD CONSTRUCTION PRIOR TO COMMENCEMENT OF WORKS.

KEY

- ×33.935 PROPOSED SPOT LEVEL
- 33.95 PROPOSED LEVEL AT CORNER OF BUILDING
- 1 in 20 PROPOSED SURFACE GRADIENT

×33.53 EXISTING SPOT LEVELS

FFL 54.250 FINISHED FLOOR LEVELS

RTH1025 PROPOSED RETAINING WALL
RTH = DIFFERENCE FROM PROPOSED LOWER GROUND LEVEL TO HIGHER GROUND LEVEL (mm).

—54.000— PROPOSED CONTOURS

DESIGN CONTINGENCY

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RIBA STAGE 4 - TECHNICAL DESIGN - 10%
RIBA STAGE 5 - PRODUCTION INFORMATION - 5%

P01	PRELIMINARY ISSUE	07.08.25	AJB	TC
Rev	Description	Date	By	Chkd

Drawing Status
S2 - CONCEPT DESIGN

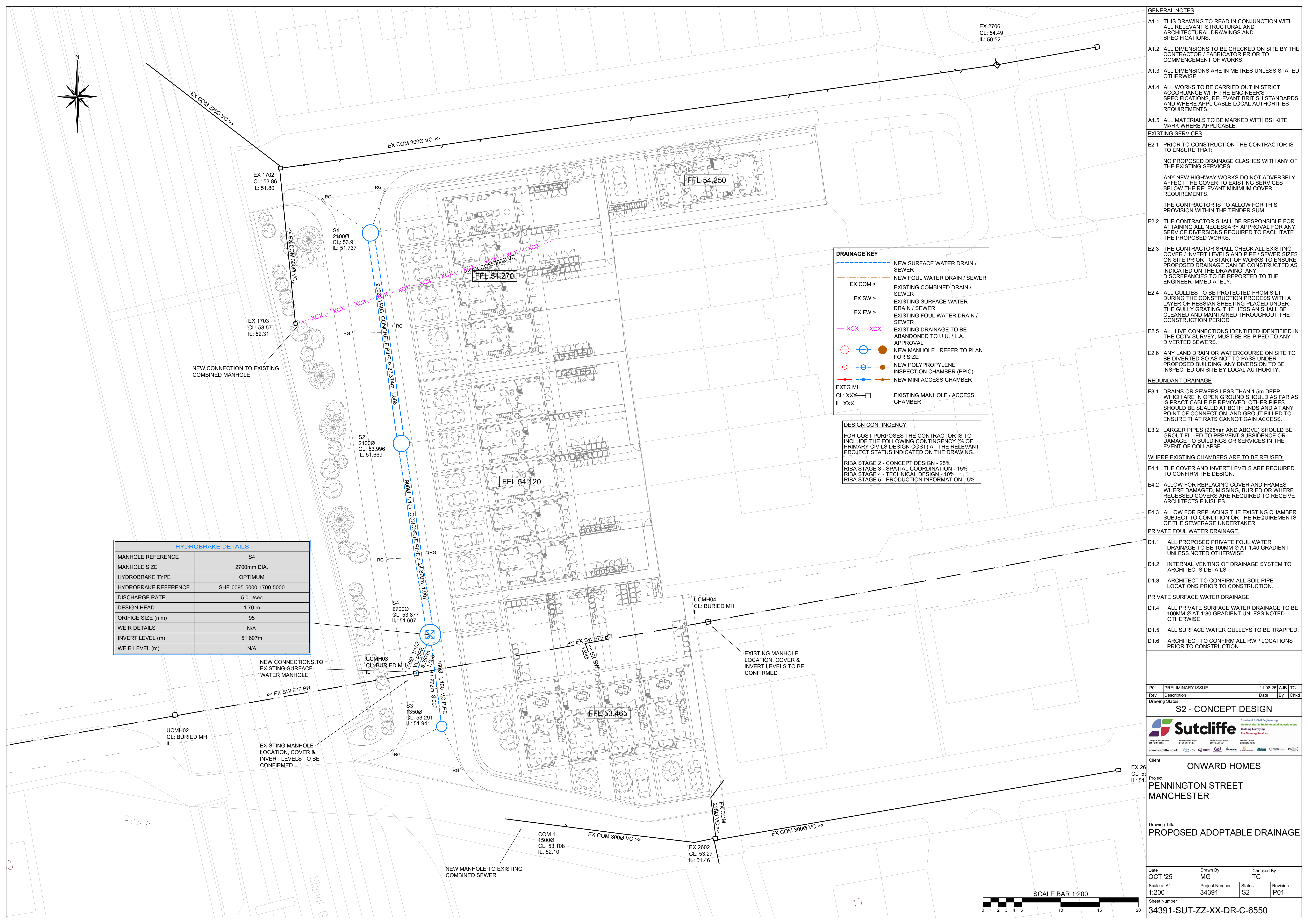


Client
ONWARD HOMES

Project
**PENNINGTON STREET
MANCHESTER**

Drawing Title
PROPOSED LEVELS

Date AUG. 2025	Drawn By AJB	Checked By TC
Scale at A1 1:200	Project Number 34391	Status S2
Sheet Number 34391-SUT-ZZ-XX-DR-C-6150	Revision P01	



HYDROBRAKE DETAILS	
MANHOLE REFERENCE	S4
MANHOLE SIZE	2700mm DIA.
HYDROBRAKE TYPE	OPTIMUM
HYDROBRAKE REFERENCE	SHE-0095-5000-1700-5000
DISCHARGE RATE	5.0 l/sec
DESIGN HEAD	1.70 m
ORIFICE SIZE (mm)	95
WEIR DETAILS	N/A
INVERT LEVEL (m)	51.607m
WEIR LEVEL (m)	N/A

P01	PRELIMINARY ISSUE	11.08.25	AJB	TC
Rev	Description	Date	By	Chkd

S2 - CONCEPT DESIGN



Client ONWARD HOMES

Project
**PENNINGTON STREET
MANCHESTER**

Drawing Title
PROPOSED ADOPTABLE DRAINAGE

Date OCT '25	Drawn By MG	Checked By TC	
Scale at A1 1:200	Project Number 34391	Status S2	Revision P01

Sheet Number
34391-SUT-ZZ-XX-DR-C-6550





A1.1	THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
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A1.5	ALL MATERIALS TO BE MARKED WITH BSI KITE MARK WHERE APPLICABLE.

E2.1 PRIOR TO CONSTRUCTION THE CONTRACTOR IS TO ENSURE THAT:

NO PROPOSED DRAINAGE CLASHES WITH ANY OF THE EXISTING SERVICES.

ANY NEW HIGHWAY WORKS DO NOT ADVERSELY AFFECT THE COVER TO EXISTING SERVICES BELOW THE RELEVANT MINIMUM COVER REQUIREMENTS.

THE CONTRACTOR IS TO ALLOW FOR THIS PROVISION WITHIN THE TENDER SUM.

E2.3 THE CONTRACTOR SHALL CHECK ALL EXISTING COVER / INVERT LEVELS AND PIPE / SEWER SIZES ON SITE PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE CAN BE CONSTRUCTED AS INDICATED ON THE DRAWING. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

E2.4 ALL GULLIES TO BE PROTECTED FROM SILT DURING THE CONSTRUCTION PROCESS WITH A LAYER OF HESSIAN SHEETING PLACED UNDER THE GULLY GRATING. THE HESSIAN SHALL BE CLEANED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD

E2.5 ALL LIVE CONNECTIONS IDENTIFIED IN THE CCTV SURVEY, MUST BE RE-PIPED TO ANY DIVERTED SEWERS.

E2.6 ANY LAND DRAIN OR WATERCOURSE ON SITE TO BE DIVERTED SO AS NOT TO PASS UNDER PROPOSED BUILDING. ANY DIVERSION TO BE INSPECTED ON SITE BY LOCAL AUTHORITY.

E3.1 DRAINS OR SEWERS LESS THAN 1.5m DEEP WHICH ARE IN OPEN GROUND SHOULD AS FAR AS IS PRACTICABLE BE REMOVED. OTHER PIPES SHOULD BE SEALED AT BOTH ENDS AND AT ANY POINT OF CONNECTION, AND GROUT FILLED TO ENSURE THAT RATS CANNOT GAIN ACCESS.

E3.2 LARGER PIPES (225mm AND ABOVE) SHOULD BE GROUT FILLED TO PREVENT SUBSIDENCE OR DAMAGE TO BUILDINGS OR SERVICES IN THE EVENT OF COLLAPSE.

E4.1 THE COVER AND INVERT LEVELS ARE REQUIRED TO CONFIRM THE DESIGN.

E4.2 ALLOW FOR REPLACING COVER AND FRAMES WHERE DAMAGED, MISSING, BURIED OR WHERE RECESSED COVERS ARE REQUIRED TO RECEIVE ARCHITECTS FINISHES.

E4.3 ALLOW FOR REPLACING THE EXISTING CHAMBER SUBJECT TO CONDITION OR THE REQUIREMENTS OF THE SEWERAGE UNDERTAKER

D1.1 ALL PROPOSED PRIVATE FOUL WATER DRAINAGE TO BE 100MM Ø AT 1:40 GRADIENT UNLESS NOTED OTHERWISE

D1.2 INTERNAL VENTING OF DRAINAGE SYSTEM TO ARCHITECTS DETAILS

D1.3 ARCHITECT TO CONFIRM ALL SOIL PIPE LOCATIONS PRIOR TO CONSTRUCTION.

D1.4 ALL PRIVATE SURFACE WATER DRAINAGE TO BE 100MM Ø AT 1:80 GRADIENT UNLESS NOTED OTHERWISE.

D1.5 ALL SURFACE WATER GULLEYS TO BE TRAPPED.

D1.6 ARCHITECT TO CONFIRM ALL RWP LOCATIONS PRIOR TO CONSTRUCTION.

Drawing Status

 Sutcliffe

Structural & Civil Engineering
Geotechnical & Environmental Investigations
Building Surveying
Pier Planning Services

Liverpool Head Office: 0151 827 3155
Manchester Office: 0161 817 5180
North Wales Office: 01797 664 071
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Client **ONWARD HOMES**

Project
PENNINGTON STREET
MANCHESTER

Drawing Title
PROPOSED PRIVATE DRAINAGE

Scale at A1	Project Number	Status	Revision
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1:200	34391	S2	P01
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Sheet Number
34391-SUT-ZZ-XX-DR-C-6200



17 Appendix B – Greenfield calculations

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Title: UK and Ireland Rural Runoff Calculator	Sutcliffe: 18-20 Harrington Street		


Sutcliffe

ICP SUDS / IH 124

Details

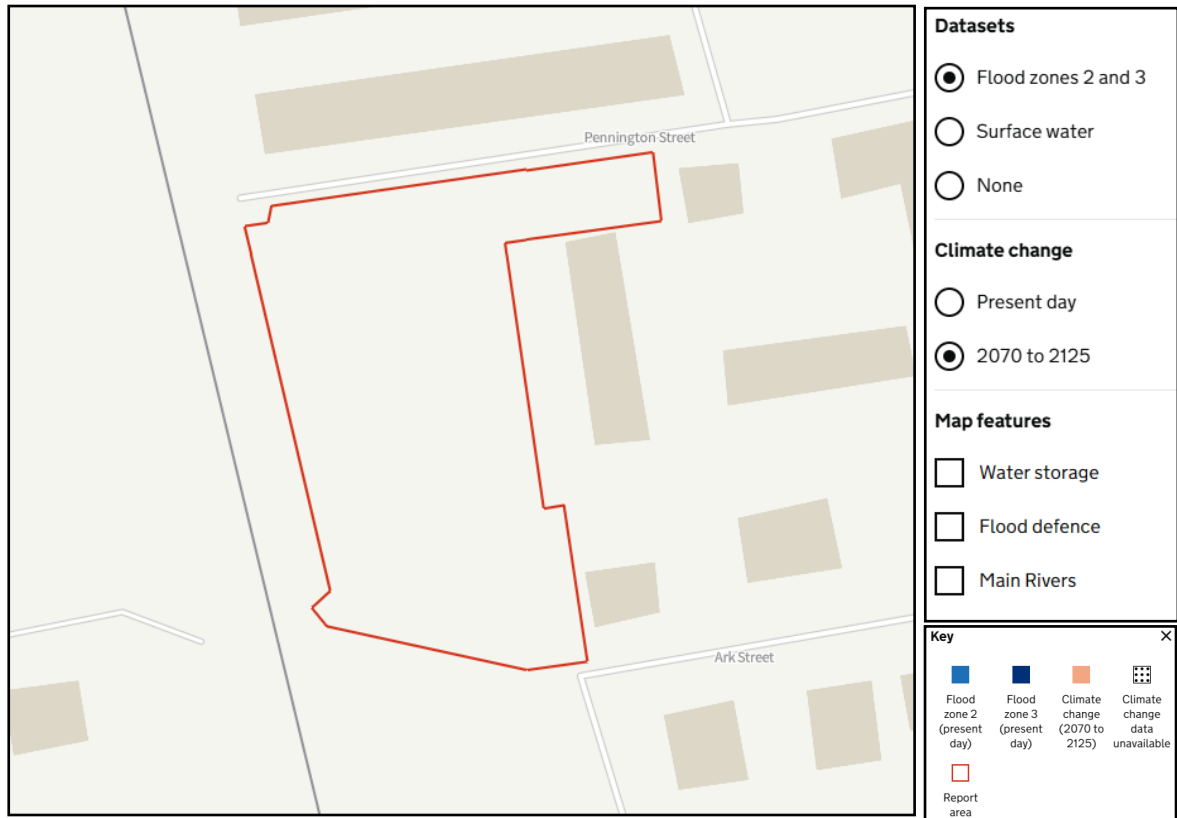
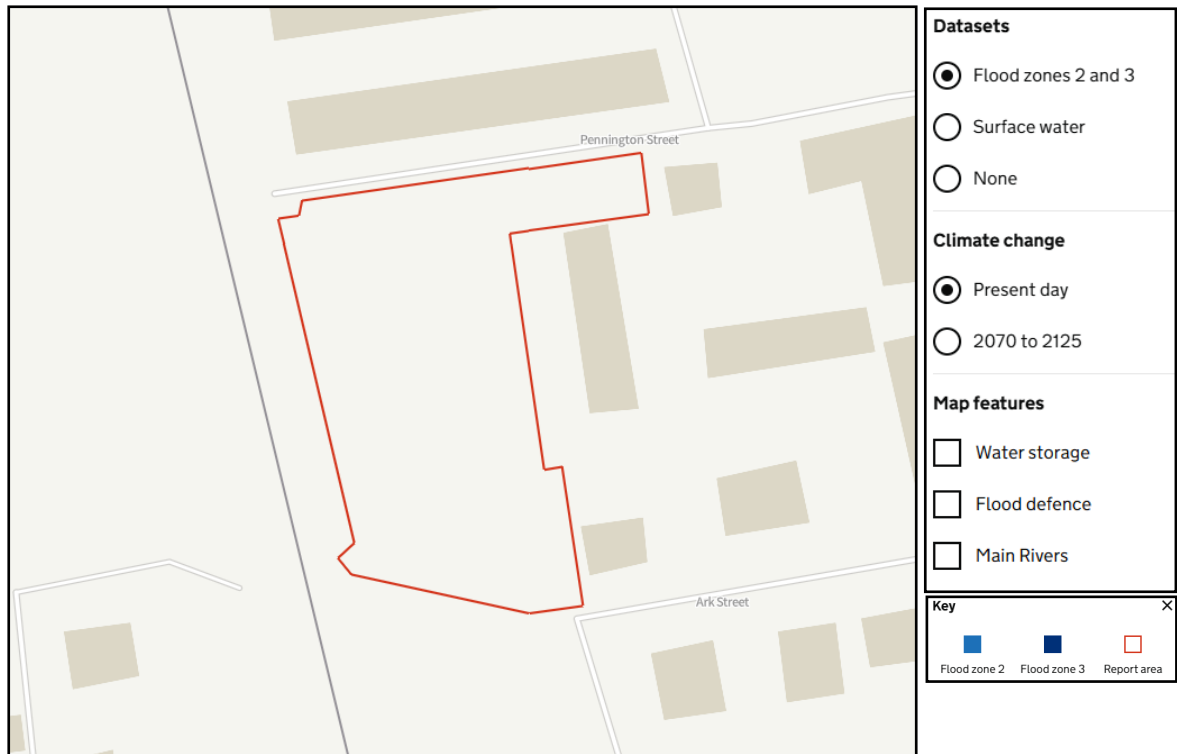
Method	ICP SUDS
Area (ha)	0.40
SAAR (mm)	823.0
Soil	0.3
Region	Region 10
Urban	0
Return Period (years)	0

Results

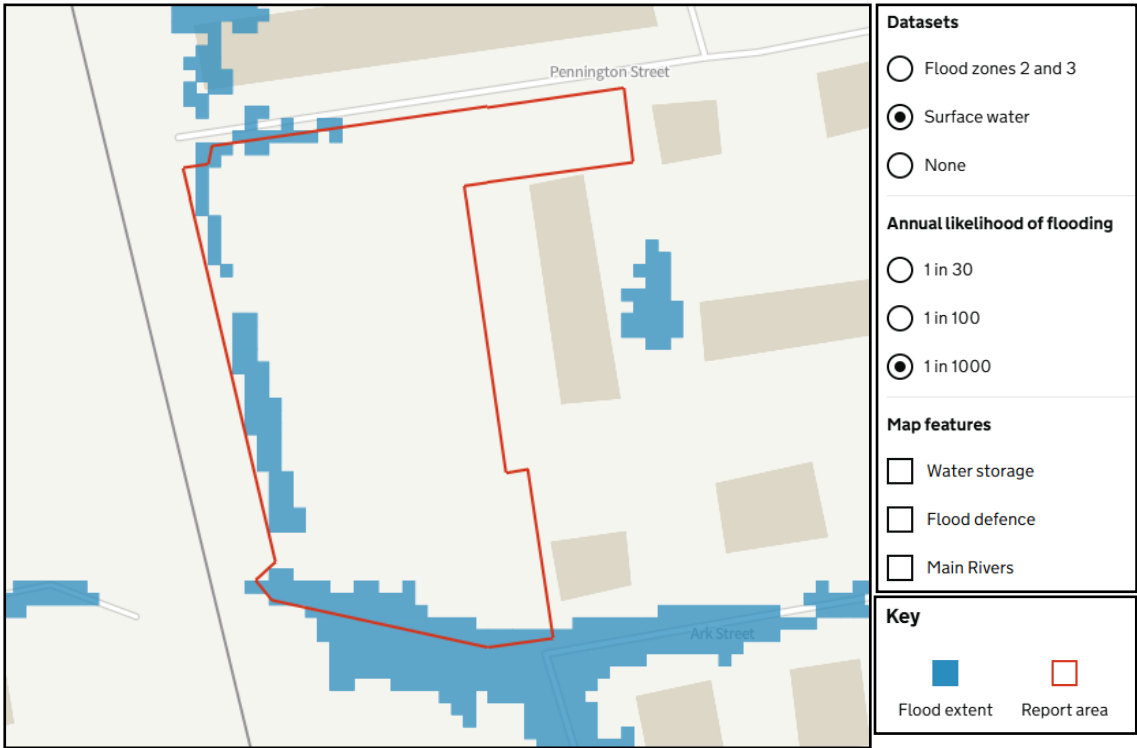
Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 10	0.9	0.9	0.8	1.5	1.8

18 Appendix C – Environment Agency Data

EA Flood maps







19 Appendix D – Infodrainage Calculations

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Junctions Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
S1	Manhole	387195.354	394723.176	53.911	2.174	51.737	Circular	2.100
S3	Manhole	387203.050	394671.502	53.877	2.270	51.607	Circular	2.700
OUTFALL	Manhole	387201.258	394666.529	53.754	2.199	51.555	Circular	1.200
S2	Manhole	387199.331	394696.093	53.996	2.327	51.669	Circular	2.100
PS4	Manhole	387202.528	394728.825	54.061	1.131	52.930	Circular	0.450
PS2	Manhole	387245.292	394735.107	54.245	0.765	53.480	Circular	0.450
PS3	Manhole	387230.780	394733.002	54.175	0.885	53.290	Circular	0.450
RE	Manhole	387231.815	394726.051	54.439	0.864	53.575	Circular	0.150
PS8	Manhole	387203.191	394724.371	54.202	1.377	52.826	Circular	0.450
PS1	Manhole	387246.313	394728.203	54.240	0.665	53.575	Circular	0.150
PS5	Manhole	387215.830	394722.375	54.290	0.790	53.500	Circular	0.150
PS6	Manhole	387218.102	394707.042	54.180	0.880	53.300	Circular	0.450
PS7	Manhole	387206.032	394705.253	54.131	0.991	53.140	Circular	0.450
Simple Junction	Simple Junction	387225.322	394732.195					
Simple Junction (2)	Simple Junction	387205.037	394711.961					
Simple Junction (3)	Simple Junction	387204.265	394717.166					
PS14	Manhole	387209.913	394678.993	54.085	0.721	53.364	Circular	0.450
PS16	Manhole	387207.225	394697.053	54.110	1.404	52.707	Circular	0.450
PS12	Manhole	387218.176	394705.857	54.108	1.162	52.946	Circular	0.450
PS9	Manhole	387221.921	394680.546	54.108	0.842	53.266	Circular	0.450
PS13	Manhole	387206.243	394704.055	54.116	1.321	52.795	Circular	0.450
PS10	Manhole	387220.676	394688.961	54.114	0.955	53.159	Circular	0.450
PS11	Manhole	387219.717	394695.440	54.120	1.043	53.077	Circular	0.450
PS15	Manhole	387208.738	394686.884	54.085	1.008	53.077	Circular	0.450
Simple Junction (4)	Simple Junction	387207.013	394698.565					
Simple Junction (5)	Simple Junction	387207.776	394693.350					
Simple Junction (6)	Simple Junction	387208.569	394688.023					
Simple Junction (7)	Simple Junction	387209.342	394682.825					
PS17	Manhole	387233.795	394656.193	53.455	0.668	52.787	Circular	0.450
PS18	Manhole	387214.561	394653.452	53.303	0.759	52.544	Circular	0.450
PS20	Manhole	387212.685	394664.761	53.520	1.119	52.401	Circular	0.450
PS21	Manhole	387211.433	394672.907	53.968	1.649	52.319	Circular	0.450
PS19	Manhole	387234.501	394668.229	53.588	0.888	52.700	Circular	0.150

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Junctions Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Name	Lock
S1	None
S3	None
OUTFALL	None
S2	None
PS4	None
PS2	None
PS3	None
RE	None
PS8	None
PS1	None
PS5	None
PS6	None
PS7	None
Simple Junction	
Simple Junction (2)	
Simple Junction (3)	
PS14	None
PS16	None
PS12	None
PS9	None
PS13	None
PS10	None
PS11	None
PS15	None
Simple Junction (4)	
Simple Junction (5)	
Simple Junction (6)	
Simple Junction (7)	
PS17	None
PS18	None
PS20	None
PS21	None
PS19	None

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Junctions Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
S1	Outlet	1.006	Free Discharge
S3	Outlet	1.008	Hydro-Brake®
	Invert Level (m)	51.607	
	Design Depth (m)	1.600	
	Design Flow (L/s)	5.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☒	
	Unit Reference	SHE-0097-5000-1600-5000	
S2	Outlet	1.007	Free Discharge
PS4	Outlet	1.004	Free Discharge
PS2	Outlet	1.001	Free Discharge
PS3	Outlet	1.003	Free Discharge
RE	Outlet	2.000	Free Discharge
PS8	Outlet	1.005	Free Discharge
PS1	Outlet	1.000	Free Discharge
PS5	Outlet	3.000	Free Discharge
PS6	Outlet	3.001	Free Discharge
PS7	Outlet	3.002	Free Discharge
Simple Junction	Outlet	1.003A	Free Discharge
Simple Junction (2)	Outlet	3.003	Free Discharge
Simple Junction (3)	Outlet	3.004	Free Discharge
PS14	Outlet	5.000	Free Discharge
PS16	Outlet	4.006	Free Discharge
PS12	Outlet	4.003	Free Discharge
PS9	Outlet	4.000	Free Discharge
PS13	Outlet	4.004	Free Discharge
PS10	Outlet	4.001	Free Discharge
PS11	Outlet	4.002	Free Discharge
PS15	Outlet	5.001A	Free Discharge
Simple Junction (4)	Outlet	4.005	Free Discharge
Simple Junction (5)	Outlet	5.003	Free Discharge
Simple Junction (6)	Outlet	5.002	Free Discharge
Simple Junction (7)	Outlet	5.001	Free Discharge
PS17	Outlet	6.000	Free Discharge
PS18	Outlet	6.001	Free Discharge
PS20	Outlet	6.002	Free Discharge
PS21	Outlet	6.003	Free Discharge
PS19	Outlet	7.000	Free Discharge

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Porous Paving

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.129
Depth (m)	0.390
Base Level (m)	53.739
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	40.00
Width (m)	3.600
Total Volume (m³)	1.944

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.041
Depth (m)	0.390
Base Level (m)	53.651
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	40.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.030
Depth (m)	0.390
Base Level (m)	53.640
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	40.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Porous Paving (3)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.000
Depth (m)	0.390
Base Level (m)	53.610
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	50.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (4)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.025
Depth (m)	0.390
Base Level (m)	53.635
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.008
Long. Slope (1:X)	100.00
Width (m)	3.000
Total Volume (m³)	1.622

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (5)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.112
Depth (m)	0.390
Base Level (m)	53.722
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	80.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Porous Paving (6)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.110
Depth (m)	0.390
Base Level (m)	53.720
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	180.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (7)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.040
Depth (m)	0.390
Base Level (m)	53.650
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	400.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (8)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.006
Depth (m)	0.390
Base Level (m)	53.616
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	120.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Porous Paving (9)

Type : Porous Paving

Dimensions

Exceedance Level (m)	54.019
Depth (m)	0.390
Base Level (m)	53.629
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	80.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (10)

Type : Porous Paving

Dimensions

Exceedance Level (m)	53.953
Depth (m)	0.390
Base Level (m)	53.563
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	400.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (12)

Type : Porous Paving

Dimensions

Exceedance Level (m)	53.351
Depth (m)	0.440
Base Level (m)	52.911
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.779
Long. Slope (1:X)	80.00
Width (m)	2.637
Total Volume (m³)	1.877

Advanced

Conductivity (m/hr)	3.6
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Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Porous Paving (13)

Type : Porous Paving

Dimensions

Exceedance Level (m)	53.376
Depth (m)	0.390
Base Level (m)	52.986
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	6.000
Long. Slope (1:X)	60.00
Width (m)	3.000
Total Volume (m³)	1.620

Advanced

Conductivity (m/hr)	3.6
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Porous Paving (11)

Type : Porous Paving

Dimensions

Exceedance Level (m)	53.471
Depth (m)	0.390
Base Level (m)	53.081
Paving Layer Depth (mm)	90
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	5.714
Long. Slope (1:X)	80.00
Width (m)	3.000
Total Volume (m³)	1.543

Advanced

Conductivity (m/hr)	3.6
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Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Connections Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
1.006	27.374	Pipe	402.555		0.6	900	53.911	51.737
1.008	5.287	Pipe	101.669		0.6	150	53.877	51.607
1.007	24.870	Pipe	401.126		0.6	900	53.996	51.669
1.003	5.518	Pipe	79.000		0.6	150	54.175	53.290
2.000	7.029	Pipe	24.662		0.6	150	54.439	53.575
Pipe (31)	1.168	Pipe	1.719		0.6	100	53.492	53.081
1.000	6.979	Pipe	73.465		0.6	150	54.240	53.575
1.001	14.664	Pipe	77.178		0.6	150	54.245	53.480
3.000	15.501	Pipe	77.504		0.6	150	54.290	53.500
3.001	12.202	Pipe	76.262		0.6	150	54.180	53.300
3.002	6.781	Pipe	51.000		0.6	150	54.131	53.140
1.005	7.927	Pipe	23.419		0.6	150	54.202	52.826
1.003A	23.041	Pipe	79.452		0.6	150	54.158	53.220
1.002	1.097	Pipe	2.260		0.6	100	54.135	53.739
1.004	4.503	Pipe	43.095		0.6	100	54.061	52.930
Pipe (12)	4.398	Pipe	5.329		0.6	100	54.049	53.651
Pipe (13)	4.397	Pipe	8.882		0.6	100	54.071	53.635
3.003	5.262	Pipe	51.317		0.6	150	54.182	53.007
Pipe (14)	4.432	Pipe	7.478		0.6	100	54.006	53.610
3.004	7.285	Pipe	92.273		0.6	150	54.193	52.904
Pipe (15)	4.477	Pipe	6.087		0.6	100	54.036	53.640
4.000	8.506	Pipe	80.000		0.6	150	54.108	53.266
4.003	12.068	Pipe	80.000		0.6	150	54.108	52.946
4.004	5.543	Pipe	80.000		0.6	150	54.116	52.795
5.000	3.875	Pipe	28.238		0.6	150	54.085	53.364
4.006	7.952	Pipe	27.648		0.6	150	54.110	52.707
4.001	6.550	Pipe	80.000		0.6	150	54.114	53.159
4.002	10.530	Pipe	80.000		0.6	150	54.120	53.077
5.001A	1.151	Pipe	28.227		0.6	150	54.085	53.077
4.005	1.527	Pipe	78.763		0.6	150	54.111	52.726
Pipe (21)	1.349	Pipe	1.385		0.6	100	54.107	53.722
5.003	3.744	Pipe	27.552		0.6	150	54.108	52.843
Pipe (22)	1.351	Pipe	1.539		0.6	100	54.104	53.720
5.002	5.386	Pipe	27.742		0.6	150	54.089	53.037
Pipe (23)	4.493	Pipe	7.328		0.6	100	54.043	53.650
5.001	4.104	Pipe	27.423		0.6	150	54.076	53.227
Pipe (24)	4.441	Pipe	11.423		0.6	100	54.008	53.616
Pipe (25)	4.793	Pipe	18.137		0.6	100	54.051	53.629
6.000	19.429	Pipe	79.840		0.6	150	53.455	52.787
6.001	11.464	Pipe	80.166		0.6	150	53.303	52.544
7.000	22.090	Pipe	73.880		0.6	150	53.588	52.700
6.002	8.242	Pipe	100.512		0.6	150	53.520	52.401
6.003	8.500	Pipe	229.722		0.6	225	53.968	52.319
Pipe (32)	6.392	Pipe	32.143		0.6	100	53.381	52.986
Pipe (33)	6.501	Pipe	52.363		0.6	100	53.369	52.911
Pipe (34)	5.563	Pipe	4.473		0.6	100	54.055	53.563

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
	Sutcliffe: 18-20 Harrington Street		
Report Details: Type: Connections Storm Phase: Phase			

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance	Wall Thickness (mm)
1.006	53.996	51.669		None		(None)	(None)	0
1.008	53.754	51.555		None	5.4	(None)	(None)	0
1.007	53.877	51.607		None		(None)	(None)	0
1.003	54.158	53.220		None		(None)	(None)	0
2.000	54.175	53.290		None		(None)	(None)	0
Pipe (31)	53.520	52.401		None	10.4	(None)	(None)	0
1.000	54.245	53.480		None		(None)	(None)	0
1.001	54.175	53.290		None		(None)	(None)	0
3.000	54.180	53.300		None		(None)	(None)	0
3.001	54.131	53.140		None		(None)	(None)	0
3.002	54.182	53.007		None		(None)	(None)	0
1.005	53.911	52.487	All			(None)	(None)	0
1.003A	54.061	52.930	None			(None)	(None)	0
1.002	54.158	53.253	None			(None)	(None)	0
1.004	54.202	52.826	None			(None)	(None)	0
Pipe (12)	54.202	52.826	None			(None)	(None)	0
Pipe (13)	54.131	53.140	None			(None)	(None)	0
3.003	54.193	52.904	None			(None)	(None)	0
Pipe (14)	54.182	53.017	None			(None)	(None)	0
3.004	54.202	52.826	None			(None)	(None)	0
Pipe (15)	54.193	52.904	None			(None)	(None)	0
4.000	54.114	53.159	None			(None)	(None)	0
4.003	54.116	52.795	None			(None)	(None)	0
4.004	54.111	52.726	None			(None)	(None)	0
5.000	54.076	53.227	None			(None)	(None)	0
4.006	53.996	52.419	All			(None)	(None)	0
4.001	54.120	53.077	None			(None)	(None)	0
4.002	54.108	52.946	None			(None)	(None)	0
5.001A	54.089	53.037	None			(None)	(None)	0
4.005	54.110	52.707	None			(None)	(None)	0
Pipe (21)	54.111	52.747	None			(None)	(None)	0
5.003	54.110	52.707	None			(None)	(None)	0
Pipe (22)	54.108	52.843	None			(None)	(None)	0
5.002	54.108	52.843	None			(None)	(None)	0
Pipe (23)	54.089	53.037	None			(None)	(None)	0
5.001	54.085	53.077	None			(None)	(None)	0
Pipe (24)	54.076	53.227	None			(None)	(None)	0
Pipe (25)	54.085	53.364	None			(None)	(None)	0
6.000	53.303	52.544	None			(None)	(None)	0
6.001	53.520	52.401	None			(None)	(None)	0
7.000	53.520	52.401	None			(None)	(None)	0
6.002	53.968	52.319	None			(None)	(None)	0
6.003	53.877	52.282	All			(None)	(None)	0
Pipe (32)	53.455	52.787	None		10.4	(None)	(None)	0
Pipe (33)	53.455	52.787	None		11.4	(None)	(None)	0
Pipe (34)	53.968	52.319	None			(None)	(None)	0

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Connections Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



Name	Material	Trench Width (mm)	Bedding Material	Surrounding Material
1.006		0		
1.008		0		
1.007		0		
1.003		0		
2.000		0		
Pipe (31)		0		
1.000		0		
1.001		0		
3.000		0		
3.001		0		
3.002		0		
1.005		0		
1.003A		0		
1.002		0		
1.004		0		
Pipe (12)		0		
Pipe (13)		0		
3.003		0		
Pipe (14)		0		
3.004		0		
Pipe (15)		0		
4.000		0		
4.003		0		
4.004		0		
5.000		0		
4.006		0		
4.001		0		
4.002		0		
5.001A		0		
4.005		0		
Pipe (21)		0		
5.003		0		
Pipe (22)		0		
5.002		0		
Pipe (23)		0		
5.001		0		
Pipe (24)		0		
Pipe (25)		0		
6.000		0		
6.001		0		
7.000		0		
6.002		0		
6.003		0		
Pipe (32)		0		
Pipe (33)		0		
Pipe (34)		0		

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
	Sutcliffe: 18-20 Harrington Street		
Report Details: Type: Inflow Summary Storm Phase: Phase			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	PS3		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (1)	RE		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (2)	PS2		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (3)	PS1		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (4)	Porous Paving (5)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (5)	Porous Paving		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (6)	S1		Time of Concentration	0.007	100	0	100	0.007
Catchment Area (7)	S2		Time of Concentration	0.020	100	0	100	0.020
Catchment Area (8)	S3		Time of Concentration	0.021	100	0	100	0.021
Catchment Area (9)	PS5		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (10)	Porous Paving (1)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (11)	Porous Paving (6)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (12)	Porous Paving (8)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (13)	Porous Paving (1)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (14)	Porous Paving (2)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (15)	PS5		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (16)	Porous Paving (9)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (17)	Porous Paving (2)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (18)	Porous Paving (3)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (18) (1)	Porous Paving (4)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (19)	PS6		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (19) (1)	PS6		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (20)	Porous Paving (10)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (21)	Porous Paving (3)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (22)	Porous Paving (11)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (23)	Porous Paving (4)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (24)	Porous Paving (12)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (25)	Porous Paving (13)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (26)	Porous Paving (5)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (27)	PS12		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (28)	Porous Paving (6)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (29)	PS11		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (30)	Porous Paving (7)		Time of Concentration	0.002	100	0	100	0.002

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
	Sutcliffe: 18-20 Harrington Street		
Report Details: Type: Inflow Summary Storm Phase: Phase			

Catchment Area (31)	PS10		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (32)	Porous Paving (8)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (33)	PS10		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (34)	Porous Paving (9)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (35)	PS9		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (36)	Porous Paving (7)		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (37)	PS18		Time of Concentration	0.001	100	0	100	0.001
Catchment Area (38)	PS17		Time of Concentration	0.001	100	0	100	0.001
Catchment Area (39)	PS18		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (40)	PS20		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (41)	PS18		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (42)	PS20		Time of Concentration	0.002	100	0	100	0.002
Catchment Area (43)	Porous Paving (12)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (44)	PS19		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (45)	Porous Paving (13)		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (46)	PS19		Time of Concentration	0.003	100	0	100	0.003
Catchment Area (47)	S3		Time of Concentration	0.014	100	0	100	0.014
TOTAL		0.0		0.161				0.161

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Title: Rainfall Analysis Criteria	Sutcliffe: 18-20 Harrington Street		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Pennington Street:	Date: 22/09/2025		
	Designed by: MB	Checked by: TC	Approved By: TC
Report Details: Type: Junctions Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S1	FEH: 100 years: +45 %: 120 mins: Winter	53.91 1	51.73 7	53.240	1.503	9.5	5.206	0.000	2.7	15.769	Surcharged
S3	FEH: 100 years: +45 %: 120 mins: Winter	53.87 7	51.60 7	53.240	1.633	14.3	9.350	0.000	5.0	60.571	Surcharged
OUTFALL	FEH: 100 years: +45 %: 120 mins: Winter	53.75 4	51.55 5	51.609	0.054	5.0	0.000	0.000	5.0	59.078	OK
S2	FEH: 100 years: +45 %: 120 mins: Winter	53.99 6	51.66 9	53.240	1.571	14.0	5.442	0.000	4.9	31.094	Surcharged
PS4	FEH: 100 years: +45 %: 120 mins: Winter	54.06 1	52.93 0	53.241	0.311	1.9	0.049	0.000	1.9	5.542	Surcharged
PS2	FEH: 100 years: +45 %: 15 mins: Summer	54.24 5	53.48 0	53.516	0.036	2.6	0.006	0.000	2.5	1.141	OK
PS3	FEH: 100 years: +45 %: 15 mins: Summer	54.17 5	53.29 0	53.347	0.057	5.4	0.009	0.000	5.2	2.416	OK
RE	FEH: 100 years: +45 %: 15 mins: Summer	54.43 9	53.57 5	53.595	0.020	1.4	0.000	0.000	1.4	0.601	OK
PS8	FEH: 100 years: +45 %: 120 mins: Winter	54.20 2	52.82 6	53.240	0.415	7.9	0.066	0.000	7.9	20.265	Surcharged
PS1	FEH: 100 years: +45 %: 15 mins: Summer	54.24 0	53.57 5	53.599	0.024	1.2	0.000	0.000	1.2	0.520	OK
PS5	FEH: 100 years: +45 %: 15 mins: Summer	54.29 0	53.50 0	53.544	0.044	3.9	0.001	0.000	3.8	1.692	OK
PS6	FEH: 100 years: +45 %: 15 mins: Summer	54.18 0	53.30 0	53.366	0.066	7.6	0.011	0.000	7.4	3.344	OK
PS7	FEH: 100 years: +45 %: 120 mins: Winter	54.13 1	53.14 0	53.241	0.101	3.2	0.016	0.000	3.2	8.589	OK
Simple Junction	FEH: 100 years: +45 %: 15 mins: Summer		53.22 0	53.277	0.057	6.0			5.9	2.779	OK
Simple Junction (2)	FEH: 100 years: +45 %: 120 mins: Winter		53.00 7	53.241	0.234	4.1			4.1	10.574	Surcharged
Simple Junction (3)	FEH: 100 years: +45 %: 120 mins: Winter		52.90 4	53.241	0.337	5.0			5.0	12.573	Surcharged
PS14	FEH: 100 years: +45 %: 60 mins: Summer	54.08 5	53.36 4	53.388	0.023	1.7	0.004	0.000	1.7	1.575	OK
PS16	FEH: 100 years: +45 %: 120 mins: Winter	54.11 0	52.70 7	53.240	0.533	7.5	0.085	0.000	7.5	18.158	Surcharged
PS12	FEH: 100 years: +45 %: 120 mins: Winter	54.10 8	52.94 6	53.240	0.295	2.8	0.047	0.000	2.8	8.165	Surcharged
PS9	FEH: 100 years: +45 %: 15 mins: Summer	54.10 8	53.26 6	53.296	0.031	1.9	0.005	0.000	1.9	0.822	OK

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Report Details: Type: Junctions Summary Storm Phase: Phase		Sutcliffe: 18-20 Harrington Street			

PS13	FEH: 100 years: +45 %: 120 mins: Winter	54.11 6	52.79 5	53.241	0.446	2.8	0.071	0.000	2.8	8.160	Surcharged
PS10	FEH: 100 years: +45 %: 120 mins: Winter	54.11 4	53.15 9	53.241	0.082	1.7	0.013	0.000	1.7	4.858	OK
PS11	FEH: 100 years: +45 %: 120 mins: Winter	54.12 0	53.07 7	53.241	0.164	2.2	0.026	0.000	2.2	6.464	Surcharged
PS15	FEH: 100 years: +45 %: 120 mins: Winter	54.08 5	53.07 7	53.241	0.164	1.9	0.026	0.000	1.9	3.966	Surcharged
Simple Junction (4)	FEH: 100 years: +45 %: 120 mins: Winter		52.72 6	53.240	0.514	3.8			3.8	10.271	Surcharged
Simple Junction (5)	FEH: 100 years: +45 %: 120 mins: Winter		52.84 3	53.240	0.398	3.7			3.7	7.900	Surcharged
Simple Junction (6)	FEH: 100 years: +45 %: 120 mins: Winter		53.03 7	53.240	0.204	2.8			2.8	5.930	Surcharged
Simple Junction (7)	FEH: 100 years: +45 %: 60 mins: Summer		53.22 7	53.260	0.033	3.4			3.3	3.123	OK
PS17	FEH: 100 years: +45 %: 120 mins: Winter	53.45 5	52.78 7	53.241	0.453	2.1	0.072	0.000	2.1	6.569	Flood Risk
PS18	FEH: 100 years: +45 %: 120 mins: Winter	53.30 3	52.54 4	53.240	0.696	3.6	0.111	0.000	3.6	10.784	Flood Risk
PS20	FEH: 100 years: +45 %: 120 mins: Winter	53.52 0	52.40 1	53.240	0.839	6.2	0.133	0.000	6.1	18.078	Flood Risk
PS21	FEH: 100 years: +45 %: 120 mins: Winter	53.96 8	52.31 9	53.240	0.921	6.3	0.146	0.000	6.3	18.403	Surcharged
PS19	FEH: 100 years: +45 %: 120 mins: Winter	53.58 8	52.70 0	53.240	0.540	1.6	0.010	0.000	1.2	3.450	Surcharged

Pennington Street:	Date: 22/09/2025		
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Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street		



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FEH: 100 years: +45 %: 1440 mins: Summer	54.279	53.742	0.391	0.003	0.1	0.987	0.006	0.000	0.1	2.440	49.242	Flood
Porous Paving (1)	FEH: 100 years: +45 %: 60 mins: Summer	54.207	53.669	0.406	0.018	2.0	1.002	0.142	0.000	2.0	1.722	38.133	Flood
Porous Paving (2)	FEH: 100 years: +45 %: 60 mins: Summer	54.195	53.658	0.405	0.018	1.9	0.991	0.133	0.000	1.8	1.566	38.821	Flood
Porous Paving (3)	FEH: 100 years: +45 %: 60 mins: Summer	54.135	53.629	0.406	0.019	1.9	1.002	0.140	0.000	1.8	1.558	38.165	Flood
Porous Paving (4)	FEH: 100 years: +45 %: 60 mins: Summer	54.103	53.655	0.408	0.020	1.9	1.026	0.162	0.000	1.7	1.556	36.727	Flood
Porous Paving (5)	FEH: 100 years: +45 %: 60 mins: Summer	54.205	53.734	0.408	0.012	2.0	1.006	0.164	0.000	1.9	1.668	37.872	Flood
Porous Paving (6)	FEH: 100 years: +45 %: 60 mins: Summer	54.163	53.732	0.410	0.012	1.9	1.018	0.176	0.000	1.7	1.550	37.144	Flood
Porous Paving (7)	FEH: 100 years: +45 %: 60 mins: Summer	54.076	53.668	0.411	0.018	1.9	1.051	0.192	0.000	1.6	1.544	35.140	Flood
Porous Paving (8)	FEH: 100 years: +45 %: 60 mins: Summer	54.074	53.636	0.408	0.021	1.9	1.032	0.166	0.000	1.7	1.550	36.302	Flood
Porous Paving (9)	FEH: 100 years: +45 %: 60 mins: Summer	54.111	53.653	0.407	0.025	1.9	1.033	0.157	0.000	1.7	1.577	36.212	Flood
Porous Paving (10)	FEH: 100 years: +45 %: 1440 mins: Summer	53.970	53.566	0.392	0.003	0.1	0.836	0.017	0.000	0.1	1.922	48.425	Flood
Porous Paving (12)	FEH: 100 years: +45 %: 60 mins: Summer	53.455	53.133	0.459	0.222	2.0	1.551	0.170	0.000	1.4	1.604	17.407	Flood
Porous Paving (13)	FEH: 100 years: +45 %: 60 mins: Summer	53.494	53.165	0.408	0.179	2.0	1.321	0.160	0.000	1.8	1.755	18.448	Flood
Porous Paving (11)	FEH: 100 years: +45 %: 1440 mins: Summer	53.543	53.086	0.391	0.006	0.1	0.790	0.008	0.000	0.1	1.891	48.765	Flood