



Land at Hornby St, Heywood, OL10 1BH

Flood Risk Assessment & Surface Water Design Strategy

23-510

Revision	Description	Issued by	Checked	Date
P01	First issue	AW	MN	13/12/2023
P02	Minor amendments	BB	MN	18/12/2023
P03	Update to include latest architectural drawings	LS	LS	20/12/2023

Prepared by:	Signed:	Date
AW		13/12/2023

Approved by:	Signed:	Date
MN		13/12/2023

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1 Introduction

QED Structures has prepared this site-specific Flood Risk Assessment and Surface Water Drainage Strategy for the development being carried out to Land at Hornby Street, Heywood, Greater Manchester, OL10 1BH.

It is understood that the proposed development is for the construction of a two-storey building comprised of 12 1-bedroom-1shower room with cycle storage and bin storage with ancillary space for worker accommodation. It can be seen that the site is currently an area of open green space in an urban setting.

Reference to the British Geological Survey (BGS) map shows that the underlying solid geology in the location of the subject site is Pennine Lower Coal Measures Formation consisting of mudstone, siltstone and sandstone. Overlying this are superficial deposits of Glaciofluvial Deposits, Devensian consisting of sand and gravel. According to this, infiltration could potentially be suitable as a method to manage surface water runoff but due to spatial constraints on site full infiltration is unlikely. However, external paving may be able to be permeable.

The Environment Agency (EA) mapping for Flood Risk, shows the site to be within Flood Zone 1 (low probability of flooding from rivers or seas). Land within Flood Zone 1 have a less than 0.1% annual probability of flooding from rivers or seas.

The EA mapping for surface water flooding (figure 4) below shows the site to be at very low risk of flooding from surface water. Very low risk means that each year this area has a chance of flooding of below 0.1% (i.e. Annual Exceedance Probability (AEP) of 0.1%). Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. Therefore, the development will likely be at a low risk of flooding from surface water.

The data published on the DEFRA database shows the site located within the Irwell Management Catchment and for this development (lifespan 100yrs) an upper end allowance of 45% should be applied to rainfall events as the climate change allowance within this region. As the site is located within Flood Zone 1, a climate change allowance for peak river flow does not need to be applied.

According to available data the site is at low to medium risk of groundwater flooding, relatively low risk of sewer flooding and low risk of reservoir flooding.

United Utilities have provided local sewer records and these show a 750mm combined drain running northwards on Stanley Street and a 225mm diameter combined drain running northwards in Hornby Street. Sewer record plans are included in Appendix D.

All new offsite sewer connections at the site should be agreed with the local sewer provider to ensure there is capacity in the network (to ensure no increased risk. To reduce risk of sewer backing up, it is recommended non return valves are installed on the drainage connections from the property to reduce the risk of backflow into the property.

In accordance with the NPPF, developments are required to use SuDS to reduce both the volume and runoff rates to the drainage system. Current local Sustainable drainage guidance is to achieve as close as feasible to greenfield runoff rates for storm runoff from new developments. Greenfield rates for the site are fairly low, so a minimum orifice diameter hydrobrake is proposed to control runoff. This will have an aperture diameter of 50mm, the smallest as recommended in the CIRIA SuDS manual. This will reduce runoff rates to a maximum of 1.1l/s for all events up to and including the 1 in 100 year + 45%CC event.

To allow for attenuation an oversized piped system is proposed to provide the required storage needed for rainfall events up to and including the 1 in 100yr+45%CC rainfall event. The diameter of the pipe is calculated to be 900mm and the length is 48m. Rainwater harvesting tanks could also be considered by the developer to help with attenuation.

It is proposed that hardstanding be constructed of permeable pavement in order to provide treatment and conveyance. The subbase would drain to the oversized pipe system and could also provide additional storage depending on the final site levels.

This report has been produced broadly in accordance with the National Planning Policy Framework (NPPF) as well as the EA Guidance on Flood Risk, Rochdale Borough Council Preliminary Flood Risk Assessment, The Greater Manchester SFRA and the CIRIA SuDS Manual.

2 Policy Compliance

The purpose of this assessment is to demonstrate that the proposals outlined above can be satisfactorily accommodated without increasing the risk of flooding for the area or without placing the development itself at risk of flooding, as per the:

- National Planning Policy Framework
- EA Guidance on Flood Risk
- Rochdale Borough Council Preliminary Flood Risk Assessment (PRFA) 2014-2024
- The Greater Manchester SFRA 2019
- CIRIA SuDS Manual

3 Site Location and Proposed Development

The proposed development is being carried out to Land at Hornby Street, Heywood, Greater Manchester, OL10 1BH.

It is understood that the proposed development is for the construction of a two-storey building comprised of 12 1-bedroom-1shower room with cycle storage and bin storage with ancillary space for worker accommodation. It can be seen that the site is currently an area of open green space in an urban setting.

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Proposed and existing Architects plans and topographical survey are included in Appendix A.

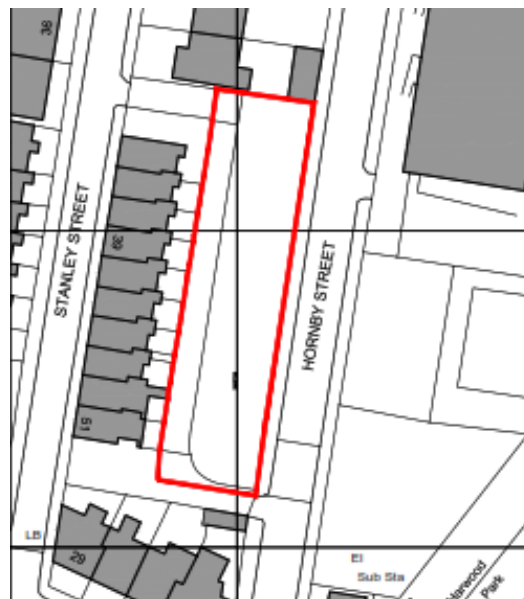


Figure 1: Site Location - redline shows the site

4 Geology and Infiltration Potential

A review of the British Geological Survey BGS geology viewer shows bedrock geology on site is of the Pennine Lower Coal Measures Formation consisting of mudstone, siltstone and sandstones. In addition, there are shown to be superficial deposits of sand and gravel.

According to BGS mapping information, infiltration could potentially be suitable as a method to manage surface water runoff but due to spatial constraints on site full infiltration is unlikely. However, external paving may be able to be permeable.

It is therefore recommended that infiltration testing take place as part of site investigation in order to confirm infiltration rates would be feasible. For the purposes of this report infiltration has not been included in the calculations as a worst-case assessment.

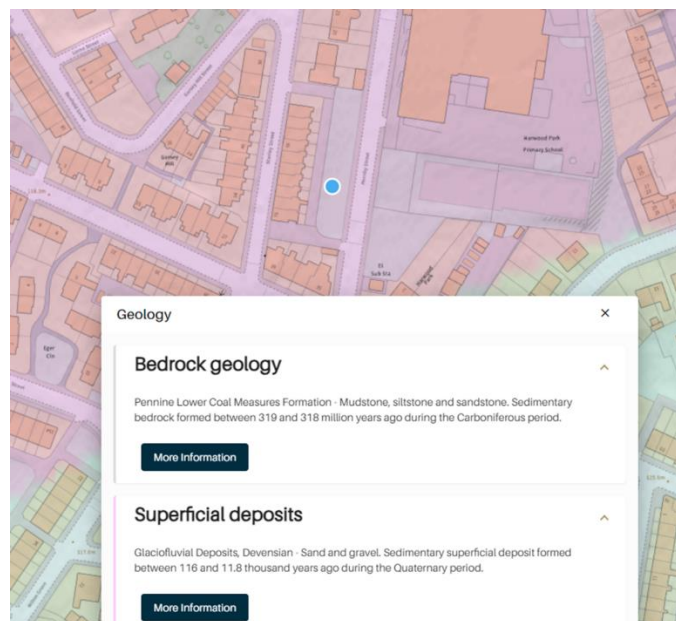


Figure 2: BGS Geology Viewer extract showing the site

5 Existing Drainage

Given the site is currently open green space it is considered unlikely there are existing drainage connections from the site.

United Utilities have provided local sewer records and these show a 750mm combined drain running northwards on Stanley Street and a 225mm diameter combined drain running northwards in Hornby Street. Sewer record plans are included in Appendix D.



Figure 3: UU Sewer record extract

6 Sequential Test/Exception Test

Under the NPPF, all new planning applications should undergo a Sequential Test. This test should be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain. A full sequential test is outside the scope of this report.

The Environment Agency (EA) mapping for Flood Risk, shows the site located within Flood Zone 1 (low risk of fluvial or tidal flooding). Areas within Flood Zone 1 have been shown to be at a less than 0.1% annual probability of flooding from rivers and/or from the sea.

Following the published Flood Risk and Coastal Change Planning Policy Guidance (PPG) Table 2 and NPPF guidelines, the proposed development is classed as 'More vulnerable'.

The NPPF Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table is reproduced below;

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b <i>Functional Floodplain</i>	Exception Test Required	✓	✗	✗	✗

Table 1 The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF. Please note: ✓ means development does not require an exception test; ✗ means the development should not be permitted.

Using the principles of the Sequential Test outlined above, the proposed development is classed as 'More Vulnerable' under the NPPF. The development areas are shown to be located within Flood Zone 1 (as defined by the EA flood map for planning in Figure 2) and therefore, in accordance with Table 1 above the proposed development would be acceptable without the need for an Exception Test.

7 Sources of Flooding

7.1 Tidal and Fluvial

The Environment Agency (EA) mapping for Flood Risk (Figure 3), shows the site located within Flood Zone 1 (low risk of fluvial or tidal flooding). Flood zone 1 is described as land having less than 1 in 1,000 annual probability of river or sea flooding.

As such, the risk from fluvial/tidal sources is deemed relatively low.

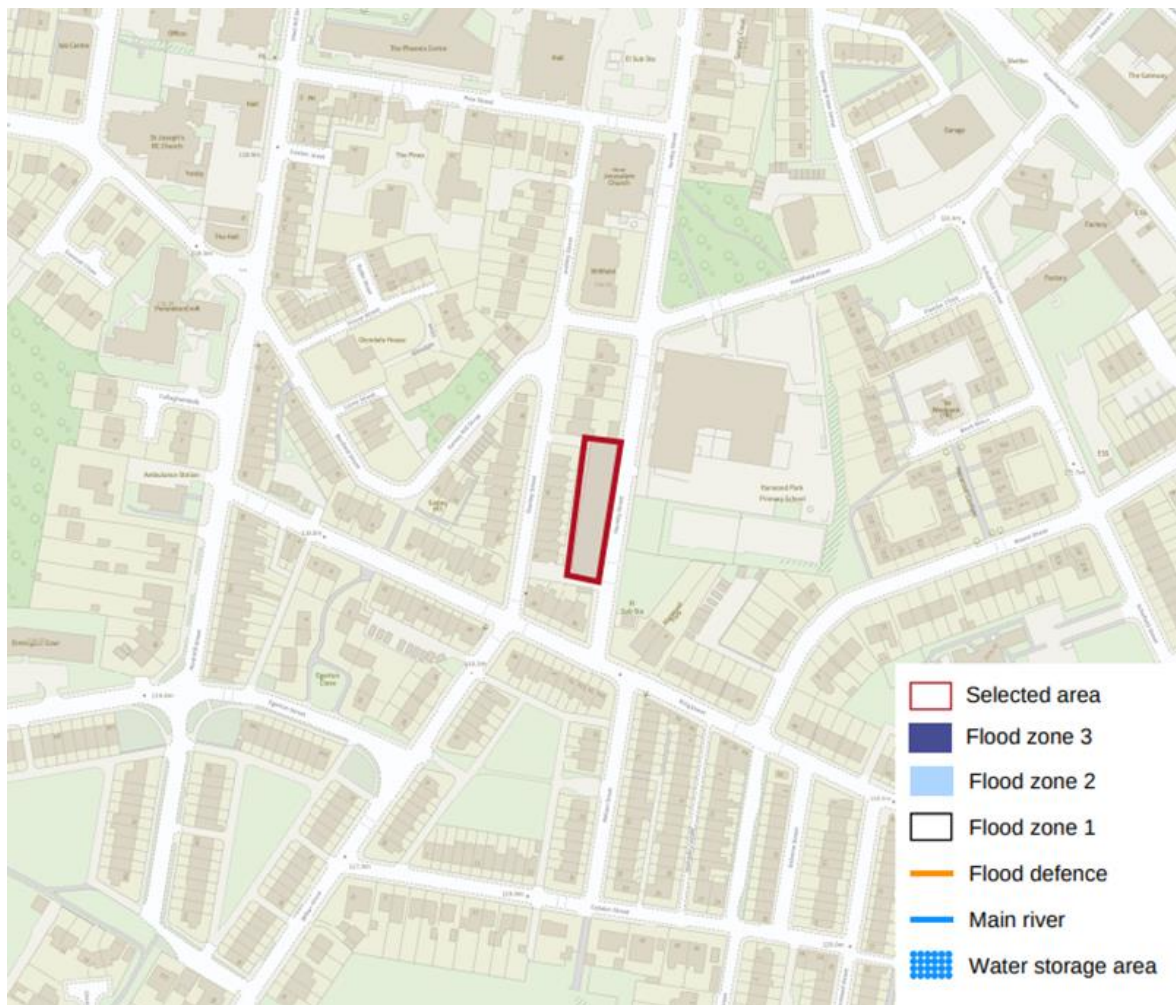


Figure 3 – EA Flood Map for planning extract

7.2 Surface Water

The EA mapping for surface water flooding (figure 4) below shows the site to be at very low risk of flooding from surface water. Very low risk means that each year this area has a chance of flooding of below 0.1% (i.e. Annual Exceedance Probability (AEP) of 0.1%). Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. Therefore, the development will likely be at a low risk of flooding from surface water.



Figure 4: Long Term Flood Risk map extract – Extent of flooding from surface water (Source: EA)

7.3 Groundwater

The Greater Manchester SFRA states that “Detailed groundwater information has not been made available for this SFRA. Groundwater information will be very localised and may differ significantly across GM.” However, looking at Rochdale Borough Council Strategy for Flood Risk Management mapping (figure 5) indicates that the site is located in an area susceptible to groundwater flooding. Looking at the BGS Geology of Britain mapping, there is no presence of clay. As such the site can be considered to be at low to medium risk of groundwater flooding.

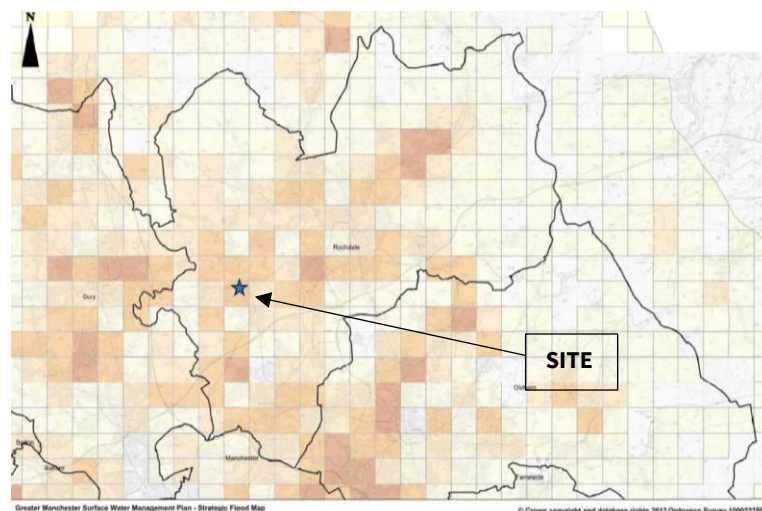


Figure 5: Rochdale Borough Council Strategy for Flood Risk Management 2014-2024

7.4 Reservoir

The EA Long Term flood risk mapping for reservoir flooding shows that the site is not located in an area at risk from reservoir flooding. As such the flood risk from reservoirs can be considered low.

7.5 Sewer

The Greater Manchester SFRA sewer flooding mapping shows the site to be in the vicinity of areas with 2-5 and 6-10 United Utilities recorded sewer incidents. According to this information the site is deemed to be at relatively low risk of sewer flooding.

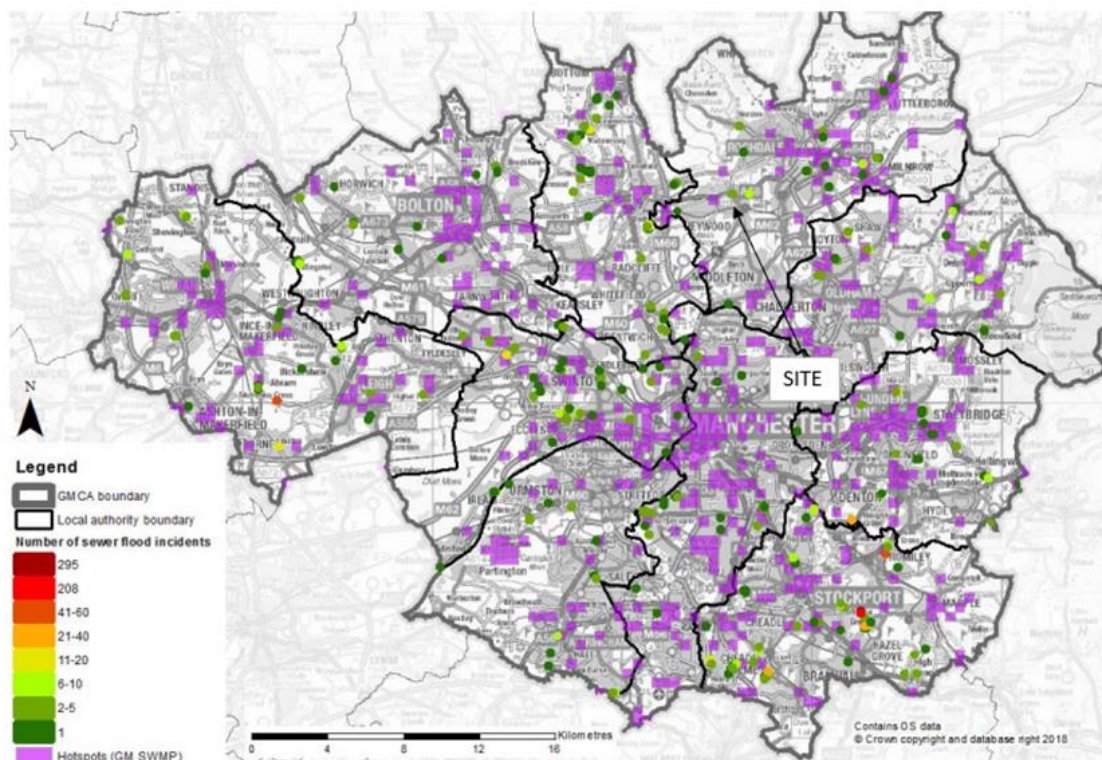


Figure 5: Greater Manchester SFRA sewer flooding mapping

All new offsite sewer connections at the site should be agreed with the local sewer provider to ensure there is capacity in the network (to ensure no increased risk). To reduce the risk of sewer backing up, it is recommended non return valves are installed on the drainage connections from the property to reduce the risk of backflow into the property.

8 Climate Change Allowances

Making an allowance for climate change in the design of surface water drainage systems will help to minimise vulnerability and provide resilience to flooding and coastal change in the future. Climate Change allowances vary across the UK subject to catchment conditions and are based on climate change projections and different scenarios of carbon dioxide (CO₂) emissions to the atmosphere.

Climate change allowances were recently updated by the EA and the climate change allowances are now defined by River Catchment peak rainfall allowances. The data published on the DEFRA database shows the site located within the Irwell Management Catchment and for residential development (lifespan 100yrs), in accordance with NPPF guidance, an upper end allowance of 45% should be applied to rainfall events as the climate change allowance within this region.

As the site is located within Flood Zone 1, a climate change allowance for peak river flow does not need to be applied.

9 Residual Risks

Residual risks will be limited to exceedance rainfall events causing overtopping of the designed drainage or blockage in underground drainage resulting in overland flow.

External levels should be designed so that any exceedance flow would be directed to the road or rear garden areas away from the proposed dwellings. Exceedance flow routes are included on the drainage strategy plan in appendix B

10 Offsite Impact

The proposal shows the proposed development to be at very low risk of surface water flooding and within Flood Zone 1. Consequently, the likelihood of development displacing floodwater is low and floodplain mitigation would not be required for this development.

The use of sustainable drainage should be considered by the developer in relation to limiting increased offsite flows generated by the increased development area. It is proposed that rainwater harvesting is considered. A full SUDS strategy is included in this report.

11 Flood Risk Management Measures

It is proposed that the finished floor levels of the dwelling be situated at least 150mm above existing surrounding ground levels, in line with common best practise. This would mitigate against residual risks to the site and exceedance events.

The use of sustainable drainage should be considered by the developer in relation to limiting increased offsite flows generated by the increased development area. A full SUDS strategy is included in this report.

All new offsite sewer connections at the site should be agreed with the local sewer provider to ensure there is capacity in the network (to ensure no increased risk). As the property could potentially be at risk from surface and fluvial flooding it is recommended non return valves are installed on the drainage connections from the property to reduce the risk of backflow into the property.

12 Sustainable Urban Drainage (SuDS) Assessment

In accordance with the SuDS management train approach, the use of various SuDS measures to reduce and control surface water flows have been considered in detail for the development.

A review of the British Geological Survey BGS geology viewer shows bedrock geology on site is of the Pennine Lower Coal Measures Formation consisting of mudstone, siltstone and sandstones. In addition, there are shown to be superficial deposits of sand and gravel.

According to BGS mapping information, infiltration could potentially be suitable as a method to manage surface water runoff but due to spatial constraints on site full infiltration is unlikely. However, external paving may be able to be permeable.

Given the local sewer records show combined drainage locally a strategy based on attenuation and controlled discharge is proposed. Rainwater harvesting is to be considered for the development.

The management of surface water has been considered in respect to the SuDS hierarchy below as detailed in the CIRIA 753 'The SUDS Manual', Section 3.2.3:

SUDS DRAINAGE HIERARCHY				
			Suitability	Comment
	1.	Store rainwater for later use	✓	Rainwater harvesting tanks to be considered
	2.	Use infiltration techniques, such as porous surfaces in non-clay areas	✓	Space constraints mean only local paving infiltration would be feasible
	3.	Attenuate rainwater in ponds or open water features for gradual release	x	Space unavailable
	4.	Attenuate rainwater by storing in tanks or sealed water features for gradual release	✓	Oversized piped system is proposed to provide necessary attenuation to reduce runoff rates from the site.
	5.	Discharge rainwater direct to a watercourse	x	No watercourse locally
	6.	Discharge rainwater to a surface water sewer/drain	x	No storm sewer locally
	7.	Discharge rainwater to Combined Sewer	✓	Available for connection.

Table 1: SuDS Drainage Hierarchy

The suitability of SuDS components has been assessed in order to provide a sustainable means of providing the required attenuation volumes. The following components have been assessed as follows in Table 2, below.

SUITABILITY OF SUDS COMPONENTS		
SuDS Component	Comment	Suitability
Infiltrating SuDs	Geology shows infiltration may be viable for external paving. But due to spatial constraints full infiltration is unlikely.	✓
Permeable Pavement	Permeable paving (type A or C depending on site investigation) is proposed for the hardstanding in order to provide treatment and conveyance.	✓
Green / Blue Roofs	Unsuitable due to pitched roofs.	x
Rainwater Harvesting	Rainwater harvesting is to be considered	✓
Swales	Insufficient space to implement such conveyancing SuDS techniques	x
Rills and Channels	These could be incorporated in to the proposed landscaping plan but overall provide only small additional storage capacity compared to the required site runoff to be managed.	✓
Bioretention Systems	Can be incorporated in to the proposed landscaping plan but not deemed necessary as runoff is not contaminated and space is limited	✓
Retention Ponds and Wetlands	Insufficient space for retention ponds or wetlands.	x
Detention Basins	Insufficient space on site to implement large scale SuDS techniques such as detention basins. These SuDS measures are better suited to large scale developments.	x
Oversized Pipe System	Oversized piped storage proposed to provide necessary additional attenuation storage	✓
Proprietary Treatment Systems	Permeable paving provides sufficient treatment	x
Filter Drains and Filter Strips	Insufficient space for filter drains/strips.	x

Table 2: Suitability of SuDS Components

13 Surface Water Drainage Strategy

In accordance with the NPPF and RBC LLFA SUDS guidance, developments are required to use SuDS to reduce both the volume and runoff rates to the drainage system.

Current local Sustainable drainage guidance is to achieve as close as feasible to greenfield runoff rates for storm runoff from new developments. Greenfield rates for the site are relatively low, so a minimum orifice diameter Hydrobrake is proposed to control runoff. This will have an aperture diameter of 50mm, the smallest as recommended in the CIRIA SuDS manual. This will reduce runoff rates to a maximum of 1.1l/s for all events up to and including the 1 in 100 year + 45%CC event.

To allow for attenuation an oversized piped system is proposed to provide the required storage needed for rainfall events up to and including the 1 in 100yr+45%CC rainfall event. The diameter of the pipe is calculated to be 900m and the length is 48m. Rainwater harvesting tanks could also be considered by the developer to help with attenuation.

It is proposed that hardstanding be constructed of permeable pavement in order to provide treatment and conveyance. The subbase would drain to the oversized pipe system and could also provide additional storage depending on the final site levels.

Runoff will be discharged to the nearby United Utilities combined sewer system that runs along the western edge of the site. A proposed storm drainage strategy plan layout is included in Appendix B.

Runoff rates have been calculated and are displayed in the table below.

SURFACE WATER DISCHARGE RATES SUMMARY					
	Area (ha)	Discharge Rates (l/s)			
		2 year/Q _{BAR}	30 year	100 year	100 year +45%CC
Pre Development Greenfield Rates	0.072	0.58	1.98	1.2	-
Proposed Runoff Rates	0.072	0.58	0.58	0.58	0.58

14 Water Quality

The primary risk to water quality is from the trafficked areas. As the development shows no proposed trafficked areas the risk is very low.

Residential roof runoff is considered to be largely uncontaminated and as such pollution mitigation is not deemed necessary.

The Pollution Hazard Indices are summarised in Table 4 – Summary of Pollution Hazard Indices for different Land Use below (based on Table 26.2 of The SuDS Manual):

POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS				
LAND USE	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Residential roofs	Very low	0.2	0.2	0.05
TOTAL POLLUTION HAZARD INDEX		0.5	0.4	0.4

When designing suitable treatment trains to deliver adequate treatment prior to discharging to sewers, watercourse or groundwater, consideration of the treatment properties of each SuDS component specified should be reviewed. With the total mitigation potential of a SuDS treatment train determined by:

$$SuDS_1 + 0.5 * SuDS_2 + 0.5 * SuDS_3 \dots = Total\ SuDS\ Mitigation\ Index$$

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

INDICATIVE SuDS MITIGATION INDICES FOR DISCHARGES TO SURFACE WATER			
SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Permeable Paving/Proprietary Treatment	0.7	0.6	0.7
TOTAL SUDS MITIGATION INDEX	0.7	0.6	0.7

15 Schedule of Maintenance

All onsite SuDS and drainage systems will be privately maintained. A long-term maintenance regime should be agreed with the site owners before adoption.

In addition to a long-term maintenance regime, it is recommended that all drainage elements implemented on site should be inspected following the first rainfall event post-construction and monthly for the first quarter following construction.

The property owner will be responsible for the management and maintenance of SuDS devices. Therefore, the proposed SuDS features will not be adoptable.

Typical key suds components operation and maintenance activities are provided below.

Item	Visual Inspection	Cleanse / De-sludge	CCTV Survey	Comments
Surface Water Drainage System (pipework, chambers etc.)	5 years	10 years	10 years	Cleansing to be carried as necessary
Oversized Pipe System	See Comments	See Comments	See Comments	Maintained in accordance with manufacturer's recommendation
Gullies/Channels	1 year	1 year	N/A	Cleansing to be carried as necessary
Hydrobrake	6 monthly	As required	N/A	Cleansing to be carried as necessary. Inspect after heavy rainfall event
Catchpits	1 year	1 year	N/A	Cleansing to be carried as necessary
Permeable Block Paving	1 year	'Swept' clean of debris every 2 years.	N/A	Lift blocks and remove sand bedding and replace and re-bed paving – refer to individual manufacturers recommendations.
Bioretention areas	6 monthly	Annually		Bioretention facilities shall be inspected and cleaned up annually, preferably during the Spring

16 CONCLUSION

QED Structures has prepared this site-specific Flood Risk Assessment and Surface Water Drainage Strategy for the development being carried out to Land at Hornby Street, Heywood, Greater Manchester, OL10 1BH.

It is understood that the proposed development is for the construction of a two-storey building comprised of 12 1-bedroom-1shower room with cycle storage and bin storage with ancillary space for worker accommodation. It can be seen that the site is currently an area of open green space in an urban setting.

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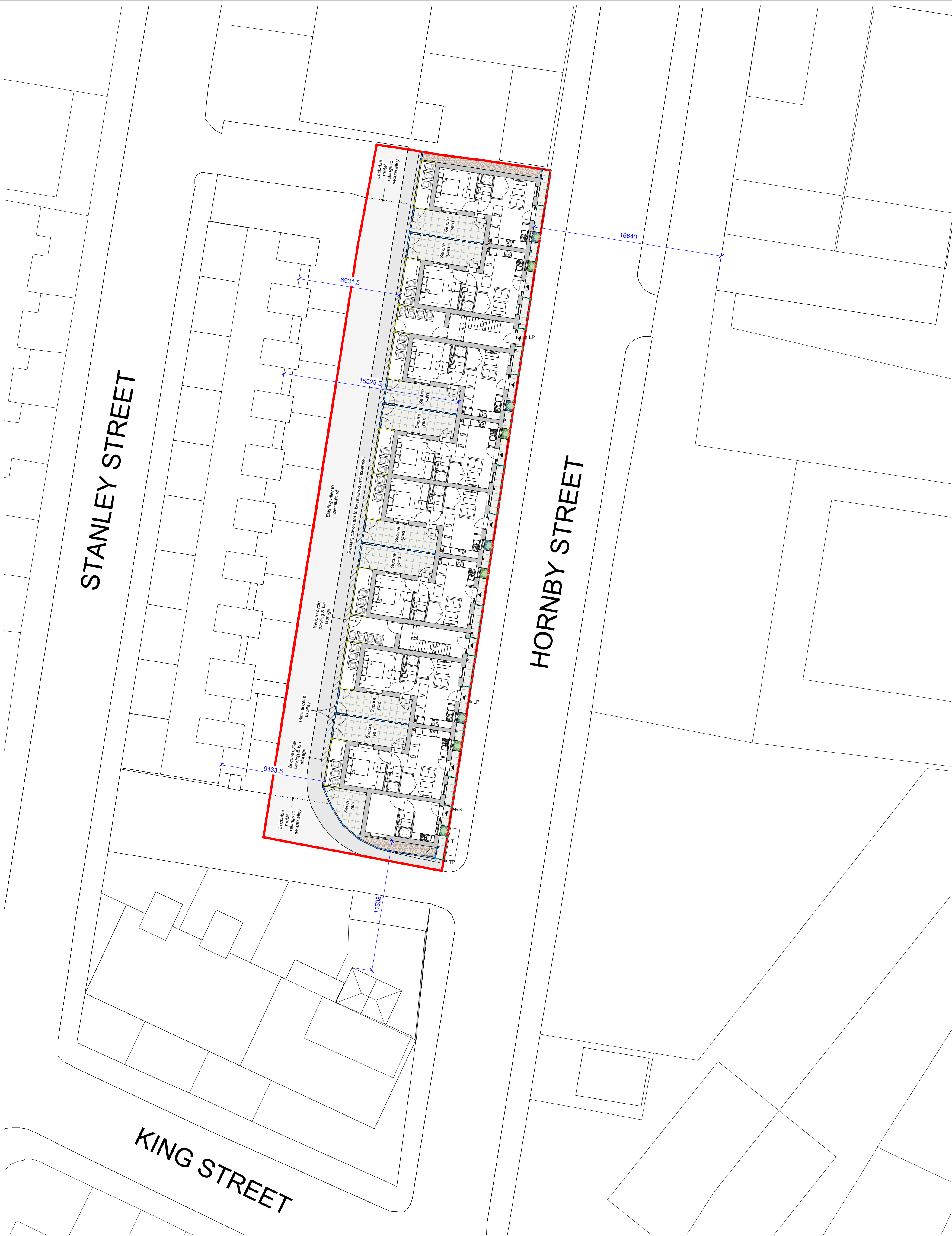
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This report has been produced broadly in accordance with the National Planning Policy Framework (NPPF) as well as the EA Guidance on Flood Risk, Rochdale Borough Council Preliminary Flood Risk Assessment, The Greater Manchester SFRA and the CIRIA SuDS Manual.

APPENDIX A – ARCHITECT PLANS



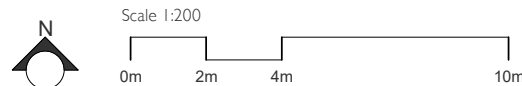
Proposed Site Plan
1 : 200

Site Plan Legend

- Planting in planters to the front of dwellings
- Paving to front gardens and secure yards
- Existing pavement to be retained
- Extension to existing pavement
- Existing alley to be retained
- Maintenance strip
- Lampost / telegraph pole (lamposts to be re-located)
- Road Sign (to be re-located)
- Telecom Inspection Chamber

- Site boundary 0.1Ha
- Overlooking distances

- Full height close boarded timber fence
- Half height metal railings
- Single brick wall (to attach to roof)



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DRAWING TO BE READ IN CONJUNCTION WITH THE HEALTH & SAFETY PLAN, AND ALL RELEVANT RISK ASSESSMENTS AND THE FOLLOWING DRAWINGS:

DRAFT

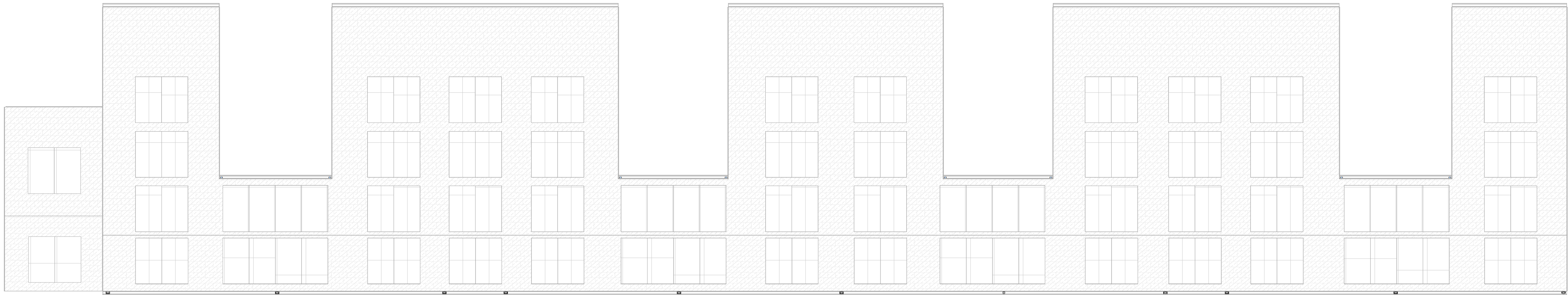
P03	18.12.23	Revised to add annotations and site key.
P02	28.11.23	Revised in line with clients comments for DTM.
P01	24.11.23	Draft issue for comment.

Rev	Date	By	Remarks			
Client: Cornerstone Place						
Project Name: Hornby Street, Heywood						
Drawing Name: Proposed Site Plan						
Drawing Purpose: Preliminary						
IR no.	Project Number: 23-031	Drawing Number: 02	Revision: P03			
Project	Origin	Vol/Sys	Level	Type	Role	Number
Status	Scale @ A1	Drawn	Checked	Date		
As indicated	JH	AJD	Nov 2023			

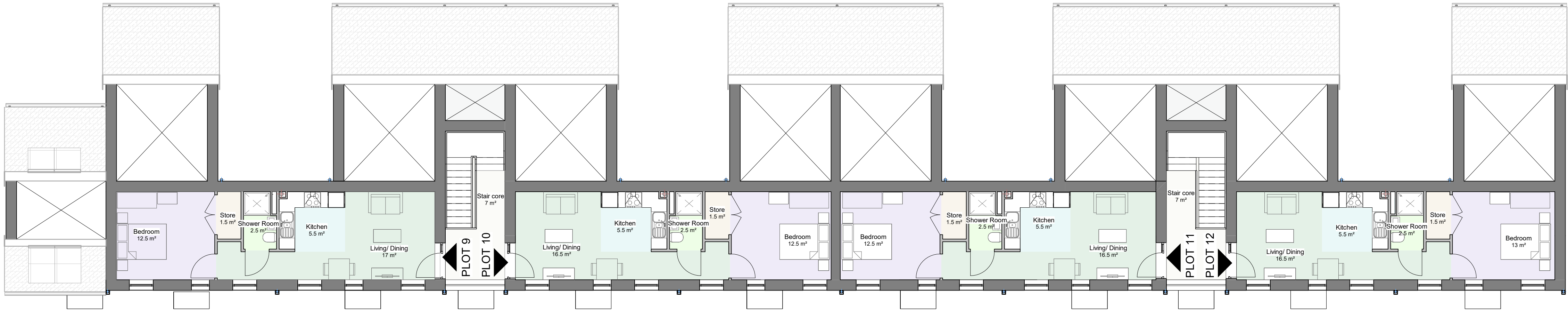
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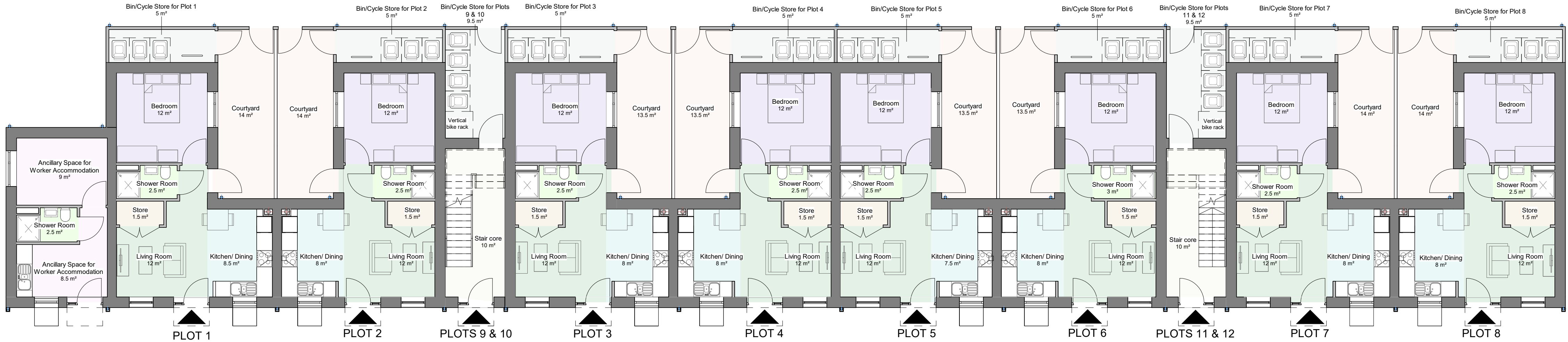
Lower Ground Floor,
4 Jordan Street,
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Roof Plan
1:100



First Floor Plan
1:100



Ground Floor Plan
1:100



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DRAFT

P05 18.12.23 Ancillary space renamed to 'ancillary space for worker accommodation' as requested by planning officer.
P04 13.12.23 Revised in line with client comments from DTM.
P03 06.12.23 Revised in line with clients comments.
P02 28.11.23 Revised in line with client comments from DTM.
P01 24.11.23 Draft Issue for Comment.

Rev Date By Remarks

Client:		Cornerstone Place					
Project Name:		Hornby Street, Heywood					
Drawing Name:		Proposed Block Plan					
Drawing Purpose:		Preliminary					
Dwg no.	Project	Origin	Vol/Sys	Level	Type	Role	Number
23-031	Project Number:	23-031	TRI dwg no:	11	Revision	P05	
Status	Scale @ A1	Drawn	Checked	Date			
1 : 100	JH	AJD	Nov 2023				
Tel: 0161 272 3500		E-mail: studio@trianglearchitects.co.uk		Web: www.trianglearchitects.co.uk		Twitter: @TriangleArch	
Lower Ground Floor, 4 Jordan Street, Manchester, M15 4PY							

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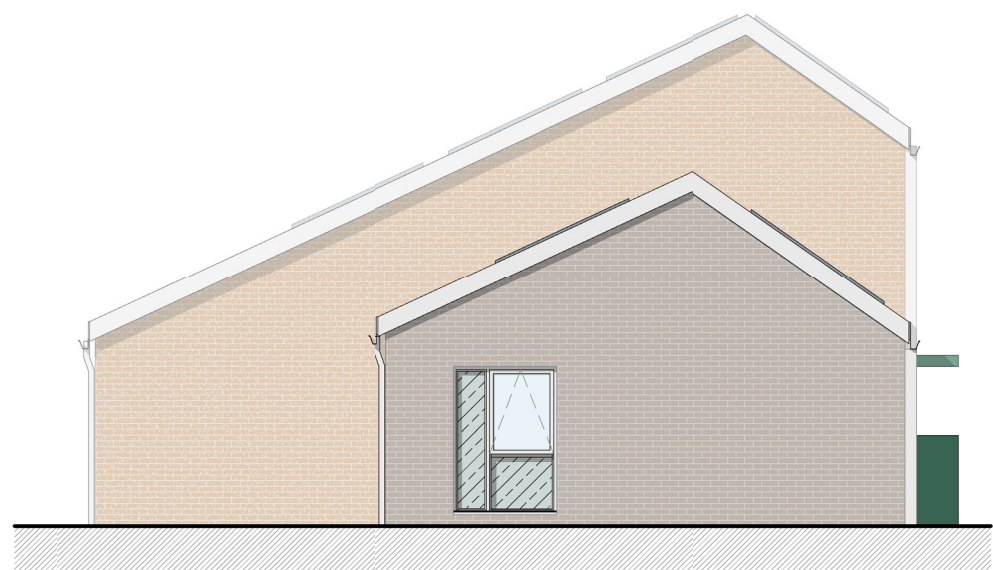
■ DRAWING TO BE READ IN CONJUNCTION WITH THE HEALTH & SAFETY PLAN, AND ALL RELEVANT RISK ASSESSMENTS AND THE FOLLOWING DRAWINGS:



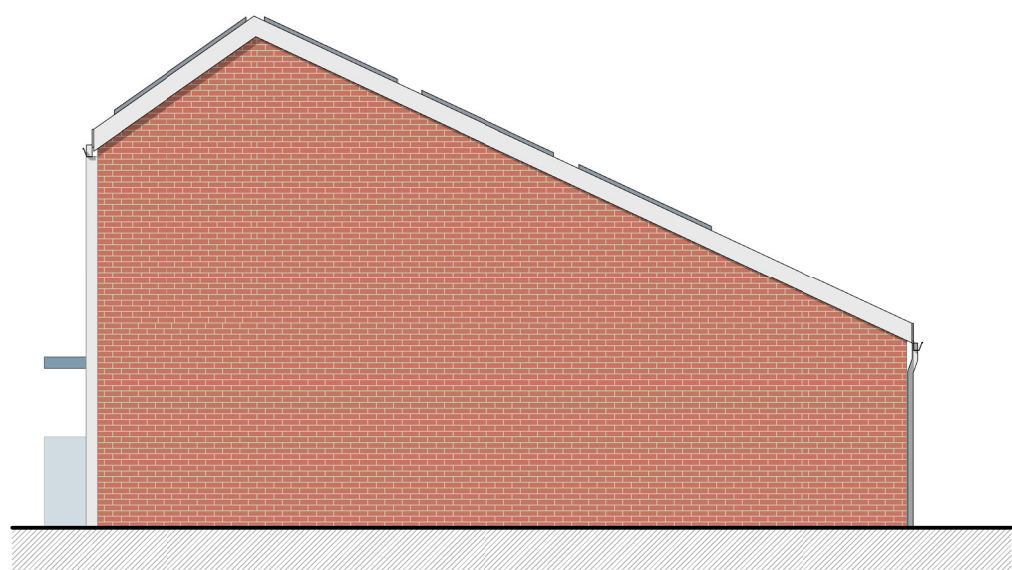
Front Block Elevation
1:100



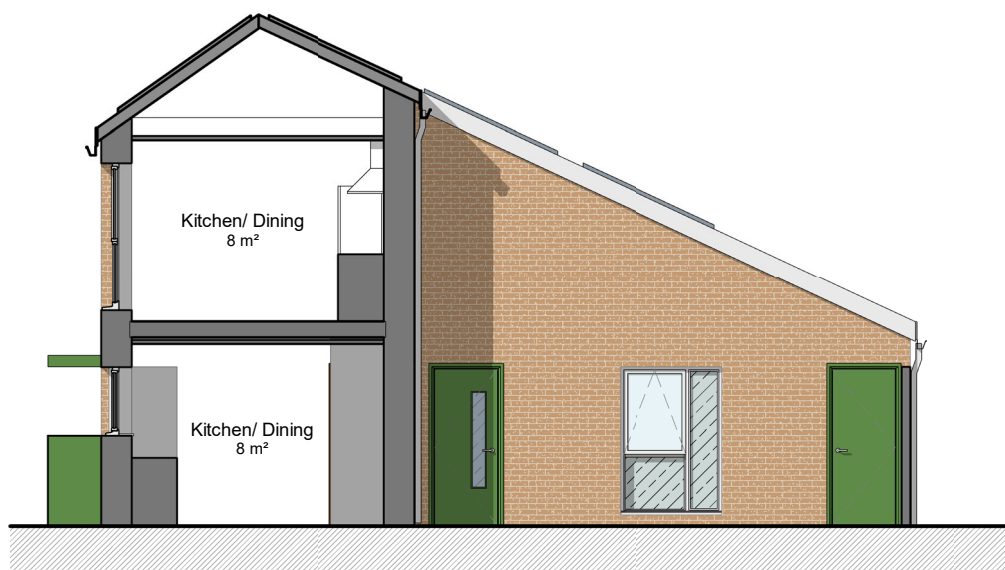
Rear Block Elevation
1:100



Side 1 Elevation
1:100



Side 2 Elevation
1:100



External Courtyard Elevation
1:100

DRAFT

P05	18.12.23	Revised in line with client comments.
P04	13.12.23	Revised in line with clients comments from DTM.
P03	06.12.23	Revised in line with Clients comments
P02	28.11.23	Revised in line with client comments from DTM.
P01	24.11.23	Draft Issue for Comment.

Rev Date By Remarks

Client:		Cornerstone Place	
Project Name:		Hornby Street, Heywood	
Drawing Name:		Proposed Block Elevations	
Drawing Purpose:		Preliminary	
Rev no.	Project	Origin	Vol/Sys
	Level	Type	Role
Project Number:	23-031		Revision
	21		P05
Status	Scale @ A1	Drawn	Checked
1 : 100	JH	AJD	Dec 2023



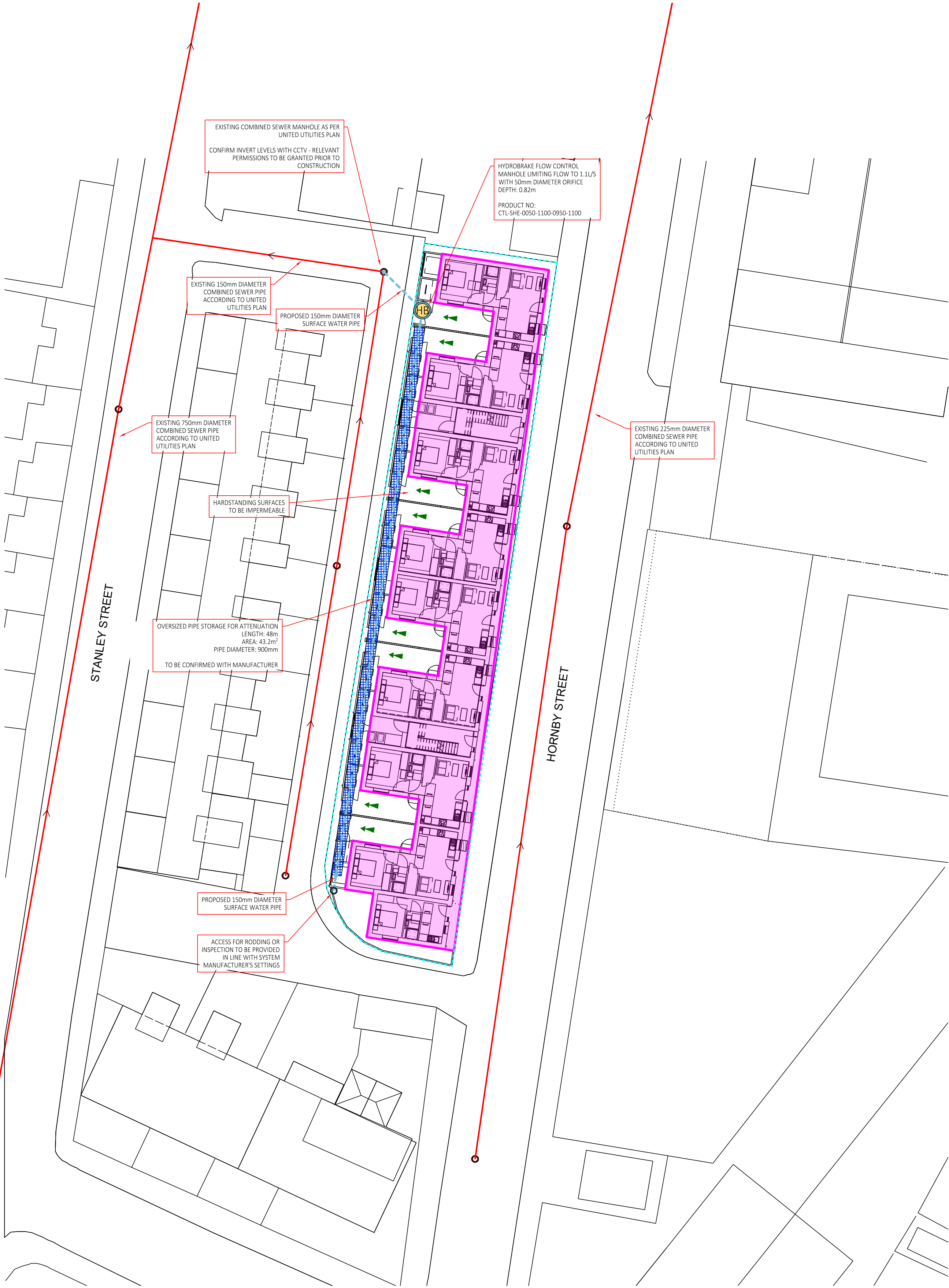
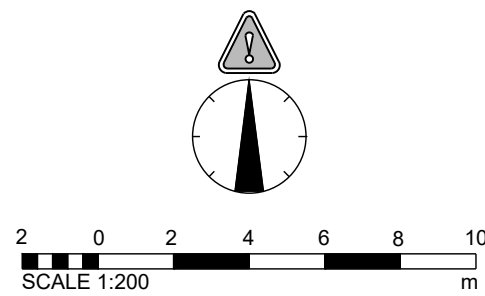
APPENDIX B – DRAINAGE STRATEGY

NOTES

- This drawing shall be read in conjunction with the civil engineering specification, and all relevant Architect's and Engineer's drawings.
- This document must not be altered, reproduced or distributed without prior written consent of the originator.
- Do not scale from this document – use figured dimensions only. All dimensions must be checked on site prior to commencement of any related works.
- Contractor to provide and have an approved method statement prior to works.
- All setting out to be in accordance with the Architects drawings. Any discrepancies between QED Structures and the Architects drawings to be referred to the Architect before proceeding. Dimensions must not be scaled.
- All levels are in metres above ordnance datum.
- The Contractor is to comply full with CDM regulations in the course of constructing the works.
- At the commencement of the works, the Contractor is to carry out trial pits and liaise with utility companies in order to establish the exact position of all existing utility plant in the vicinity of the works and take adequate precautions for their protection.
- The Contractor is to refer to Health and Safety Executive 'Note 47 – Avoiding Danger from Underground Services' and 'Document C56 – Avoiding Danger from Overhead Electric Lines.'
- Works on or adjacent to existing public highway will be executed in accordance with the Traffic Safety Code for Road Works and Traffic Signs Manual: Chapter 8.
- The Contractor will ascertain the CBR value of the subgrade in order to determine the required sub-base / capping thickness. Prior to laying any material, the subgrade must be inspected and any soft spots removed and filled with 6F2 capping material.
- Prior to the construction of any drainage works, the Contractor is to confirm the invert levels of existing manholes, drains and sewers. Any variations from the designed levels shown on the drawings must be reported to the Drainage Engineer in advance of construction works commencing. All new sewers and drains are to be laid in sequence starting from the outfall location.
- All drainage to be installed in accordance with relevant Building Regulation documents and current Sewers for Adoption. Connections to public sewers are to be agreed and inspection by the Water Authority.
- All drain and sewer pipes are Ø100mm and laid soffit to soffit, unless shown otherwise.
- Invert to base of soil stack bends to be 450mm below lowest branch connection for up to three storey buildings; for buildings up to five storeys, the invert to the base of soil stack bends should not be less than 750mm. All foul and surface water drainage stacks are to have above ground rodding access. Refer to above ground drainage layout(s) by others.
- All below ground connections are to match above ground outlet size, minimum Ø100mm. SVPs are to project 100mm above finished floor level.
- All internal manholes and inspection chambers to have double sealed recessed covers to suit floor finishes as defined by the Architect.
- All external covers in non-asphalt areas are to have recessed covers to suit the paving material.
- A CCTV survey and report in WINCAN format for all new drainage will be required prior to 'as built' drawing being issued.
- The Contractor is responsible for the traffic safety and management associated with the construction of the works. Works will not commence on the existing highway until their traffic management proposals have been agreed with Highway Authority.
- Where the works involve the obstruction of a footway, the Contractor will provide an alternative safe footway properly signed, guarded and lit.
- Where one-way traffic is unavoidable, traffic will be controlled by a proper system of vehicle-actuated traffic signals or manual stop / go signs and during the hours of darkness, by a proper system of vehicle-actuated traffic signals, all to the approval of Highway Authority.
- 65mm Minimum thickness tactile paving, coloured buff will be incorporated at all pedestrian crossings in accordance with the Department for Transport and Regions document "Guidance on the Use of Tactile Paving Surfaces." (DETR No. 1998)
- All signs and road markings will be in accordance with the "Traffic Signs Regulations and General Directions 2016". (TSRGD 2016)
- All excavation and backfilling work in the existing highway to be in accordance with the provisions of the New Street Works Act 1991 or that specified on the working drawings.
- All highways works to be carried out in accordance with Highway Authority's highway standards, to the satisfaction of the Highway Authority Section 278 Inspector and in accordance with the Specification for Highway Works.
- Gullies, gully connections, drains, manholes, catch pit, soakaways, headwalls and other drainage structures intended to convey only highway water are to be constructed in accordance with the specification of Highway Authority and to the satisfaction of the Highway Inspector.
- Where existing junctions and accesses are to remain in operation within the works during the construction process, the Contractor will ensure that access to these units remains available at all times.
- Highways in the vicinity of the works must be kept free from mud, debris and dust falling from vehicles or wheels of vehicles connected with the works. Where the deposits of debris and mud are unavoidable, warning signs must be displayed whilst work is in progress and affected carriageways / footways must be regularly cleaned.

Source:

- Topographical survey by ?
Drawing No. ? dated ?
- Architect's layout by ?
Drawing No. ? dated ?



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- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, SERVICE ENGINEERS, SPECIALISTS, QED STRUCTURES DRAWINGS, SPECIFICATIONS AND BILL OF QUANTITIES.
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- ALL DIMENSIONS ARE TO BE CHECKED ON SITE, ANY DISCREPANCIES RE TO BE REPORTED IMMEDIATELY TO QED STRUCTURES FOR CLARIFICATION BEFORE THE AFFECTED WORK COMMENCES.
- THE CONTRACTOR IS RESPONSIBLE FOR ALL TEMPORARY WORKS AND FOR THE STABILITY OF THE WORKS IN PROGRESS.

LEGEND	
	PROPOSED SW PIPE RUN
	PROPOSED HYDROBRAKE MANHOLE
	PROPOSED SW MANHOLE/INSPECTION CHAMBER
	PROPOSED STORAGE/ATTENUATION
	PROPOSED ROOFED AREA
	EXISTING PUBLIC COMBINED RUN - RETAINED
	EXISTING COMBINED PUBLIC INSPECTION CHAMBER / MANHOLE - RETAINED
	EXCEEDANCE FLOW
	SITE EXTENTS

P01	Issued for information	13/12/23	AW	MN
REV	DESCRIPTION	DATE	BY	APP

CONSULTING CIVIL AND
STRUCTURAL ENGINEERS
TEL +44 (0) 1273 033680

QED PROJECT No.
23-510

CLIENT
Cornerstone Place

PROJECT
Hornby Street
Heywood
OL10 1BH

TITLE
Surface Water Draiange Strategy
Overall Layout

DRAWN AW	ENGINEER MN	CHECKED BY MN	APPROVED BY MN
-------------	----------------	------------------	-------------------

DATE APPROVED 13/12/2023 SCALE @ A1 1:200

STATUS
S4 - Suitable for Stage Approval

DRAWING No. 23-510-QED-XX-XX-DR-C-01	REVISION P01
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APPENDIX C – CALCULATIONS

Calculated by:	Mark Naumann
Site name:	Hornby Street
Site location:	Heywood

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.59028° N
Longitude:	2.21749° W
Reference:	2159662681
Date:	Dec 13 2023 16:47

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.072
-----------------------	-------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1078	1078
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Default

Edited

Q_{BAR} (l/s):	0.58	0.58
1 in 1 year (l/s):	0.5	0.5
1 in 30 years (l/s):	0.98	0.98
1 in 100 year (l/s):	1.2	1.2
1 in 200 years (l/s):	1.37	1.37

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
2HB			122.000	1200	85.956	32.325	2.825
EXISTING			122.000	1200	82.619	35.660	2.905
DUMMY1			122.000		85.740	30.911	2.800
DUMMY3			122.000		78.477	-16.539	2.700
MH		5.00	122.000	450	78.282	-17.882	0.700
DUMMY2	0.072	5.00	122.000		82.068	7.028	2.750

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.004	2HB	EXISTING	4.718	0.600	119.175	119.095	0.080	59.0	150	5.64	50.0
1.003	DUMMY1	2HB	1.430	0.600	119.200	119.175	0.025	57.2	150	5.58	50.0
1.000	MH	DUMMY3	1.357	0.600	121.300	120.050	1.250	1.1	150	5.00	50.0
1.001	DUMMY3	DUMMY2	23.839	0.600	119.300	119.250	0.050	476.8	900	5.28	50.0
1.002	DUMMY2	DUMMY1	24.164	0.600	119.250	119.200	0.050	483.3	900	5.56	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.004	1.312	23.2	14.1	2.675	2.755	0.072	0.0	85	1.375
1.003	1.332	23.5	14.1	2.650	2.675	0.072	0.0	84	1.393
1.000	9.752	172.3	0.0	0.550	1.800	0.000	0.0	0	0.000
1.001	1.428	908.4	0.0	1.800	1.850	0.000	0.0	0	0.000
1.002	1.418	902.2	14.1	1.850	1.900	0.072	0.0	77	0.539

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	1440	Check Discharge Volume	x
Analysis Speed	Normal	Additional Storage (m³/ha)	0.0		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	45	0	0

Node 2HB Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	119.175	Product Number	CTL-SHE-0050-1100-0950-1100
Design Depth (m)	0.950	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.1	Min Node Diameter (mm)	1200

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

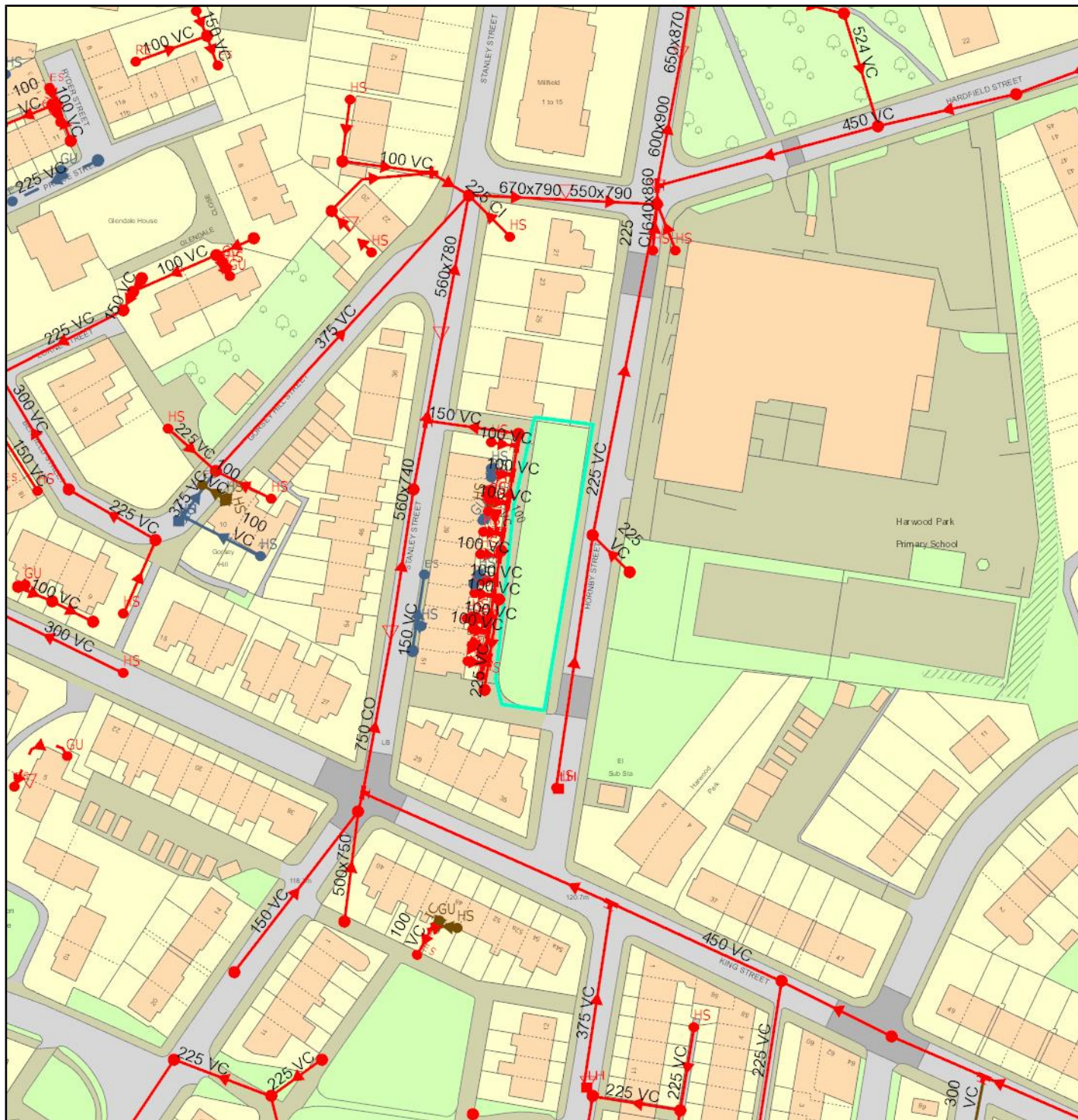
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
180 minute summer	2HB	180	120.030	0.855	2.4	0.9667	0.0000	SURCHARGED
15 minute summer	EXISTING	1	119.095	0.000	1.0	0.0000	0.0000	OK
180 minute summer	DUMMY1	180	120.030	0.830	4.4	0.0000	0.0000	SURCHARGED
180 minute summer	DUMMY3	180	120.030	0.730	3.3	0.0000	0.0000	OK
15 minute summer	MH	1	121.300	0.000	0.0	0.0000	0.0000	OK
180 minute summer	DUMMY2	180	120.030	0.780	13.9	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)
180 minute summer	2HB	Hydro-Brake®	EXISTING	1.1				41.4
180 minute summer	DUMMY1	1.003	2HB	2.4	0.406	0.103	0.0252	
180 minute summer	DUMMY3	1.001	DUMMY2	-3.3	0.018	-0.004	13.5216	
15 minute summer	MH	1.000	DUMMY3	0.0	0.000	0.000	0.0000	
180 minute summer	DUMMY2	1.002	DUMMY1	4.4	0.269	0.005	14.4362	



APPENDIX D – SEWER RECORDS

Land at Hornby Street



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Wastewater Symbolology

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

All point assets follow the standard colour convention: **red** – combined **brown** - foul
blue – surface water **purple** - overflow

Manhole	Side Entry Manhole
Head of System	Outfall
Extent of Survey	Screen Chamber
Rodding Eye	Inspection Chamber
Inlet	Bifurcation Chamber
Discharge Point	Lamp Hole
Vortex	T Junction / Saddle
Penstock	Catchpit
Washout Chamber	Valve Chamber
Valve	Vent Column
Air Valve	Vortex Chamber
Non Return Valve	Penstock Chamber
Soakaway	Network Storage Tank
Gully	Sewer Overflow
Cascade	Ww Treatment Works
Flow Meter	Ww Pumping Station
Hatch Box	Septic Tank
Oil Interceptor	Control Kiosk
Summit	
Drop Shaft	Change of Characteristic
Orifice Plate	