



Flood Risk Assessment & Drainage Strategy at

**Bungalows
Marled Hey
Liverpool
L28 0QL**

Client: ForLiving

Reference: 34465-SUT-ZZ-00-RP-S-0001

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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 at Marled Hey, Liverpool it is necessary to prepare a site-specific flood risk assessment to ensure the flood risk is appropriately considered to protect people and the property from flooding.
- 1.2 The development boundary, Figure 1, is 0.06 hectares and situated within Flood Zone 1 as defined by the Environment Agency.
- 1.3 The National Planning Policy Framework (NPPF) Paragraph 168 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 previously developed land which includes a hardstanding parking area with existing garages and a grassed area.
- 1.5 The proposed site is to be developed with 2 bungalows with associated resident parking. The proposed site plan is provided in appendix A for reference.
- 1.6 The development site is located along Marled Hey in Liverpool. The location data for the site is:

Post Code:	L28 0QR		
Grid Reference:	SJ 42212 93515		
Coordinates:	X: 342212	Y: 393515	
Latitude:	53°26'07"N	Longitude:	002°52'17"W
What3Words:	signal.update.after		

Table 1 – Location details



Figure 1: Site Boundary

- 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 site falls within Flood Zone 1.

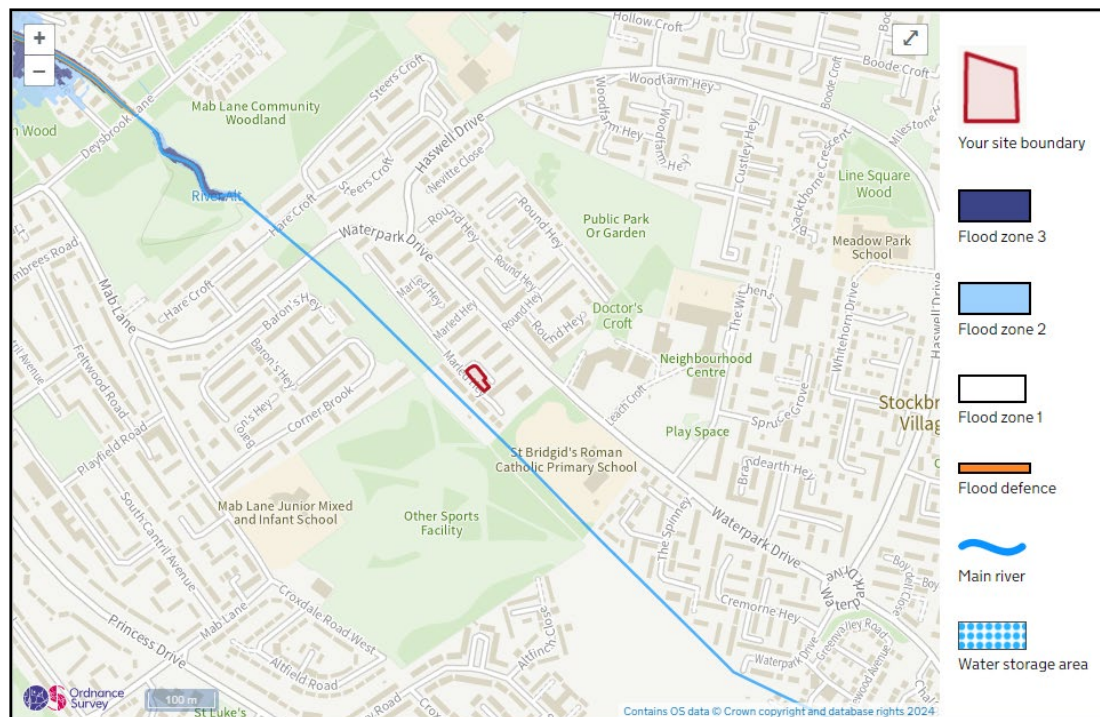


Figure 2: Environment Agency Flood Map for Planning

2 Planning Context

- 2.1. The National Planning Policy Framework expects local planning authorities to protect people and property from flooding. In fulfilling their duty local planning authorities are to ensure the following steps are followed prior to granting planning permission:
- Assess flood risk
 - o 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.
 - o Sites greater than 1 hectare or in areas of flood risk must have a Site-Specific Flood Risk Assessment prepared.
 - Avoid flood risk
 - o The LPA should apply the sequential test to, as far as practicable, locate development sites in area at the least risk of flooding, and if required carry out the exception test.
 - Manage and mitigate flood risk
 - o 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.
 - o 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:
- Demonstrating that it is consistent with the NPPF.
 - Providing an assessment of:
 - Whether any proposed development is likely to be affected by flooding from any source.
 - Whether it will increase flood risk elsewhere.
 - The measures to deal with these effects and risks.
 - 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.
 - Designs which reduce flood risk to the development and elsewhere, by incorporating sustainable drainage systems and where necessary flood resilience measures.
 - 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 site generally slopes from east to west. The maximum elevation is 22.62m AOD, the minimum elevation is 21.69m AOD. The topographic survey is included within the appendix A for reference.
- 3.2 A review of grid reference finder confirms there is the River Alt approximately 0.4km west from the development site, an extract of the Map is in figure 3.

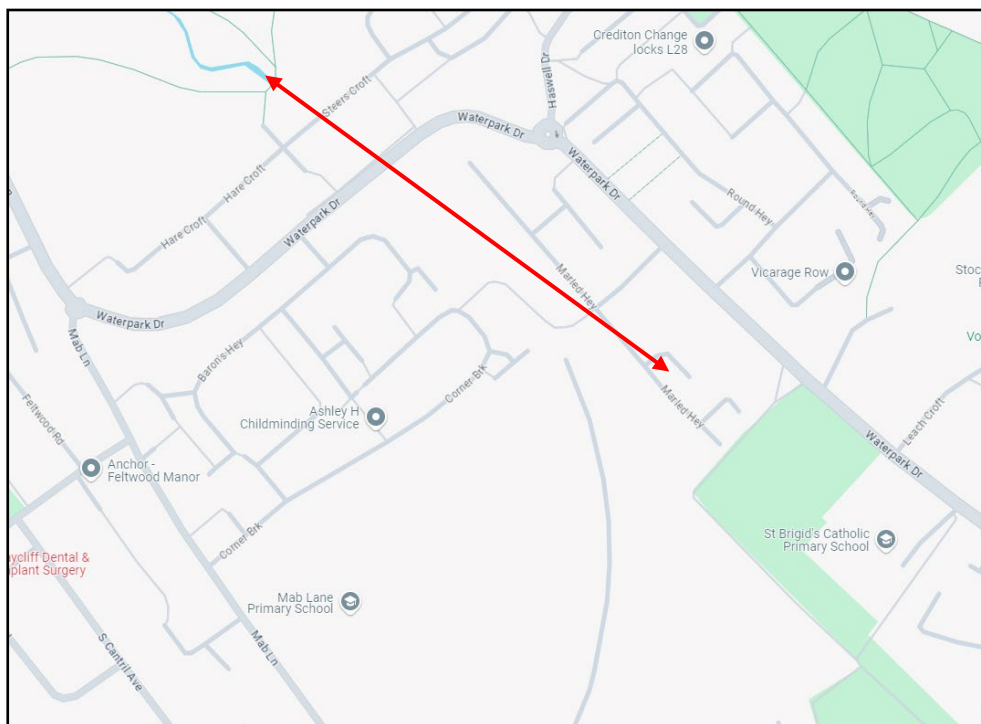


Figure 3: Existing Watercourse. (Source: Google Maps)

- 3.3 The British Geological Survey (BGS) Geology of Britain viewer defines the bedrock geology as Etruria Formation - Mudstone. The superficial deposits are classed as Till, Devensian – Diamicton.
- 3.4 The National Soils Resources Institute, through the Soilscales web viewer, identify the soil type as Soilscape 18, Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
- 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 confirm that the site is in Flood Zone 1 due to the low risk posed by sea or river or surface water flooding.
- 3.5.3 According to the NPPF Annex 3 : Flood risk vulnerability classification building residential use is classed as 'more vulnerable'.
- 3.5.4 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 fall within Flood Zone 1.

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 4: Table 3 from the NPPF Technical Guide illustrating site classification.

- 3.6 Sources of Flooding
- 3.6.1 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.

- 3.6.2 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.
- 3.6.3 Every flood will have different consequences on people, property and the environment depends on the land use.
- 3.7 Flooding from the River and the Sea
- 3.7.1 Flooding from rivers or the sea is classed as a very low/no risk for the development site as seen in Figure 5 as it is not situated near the sea or a river.

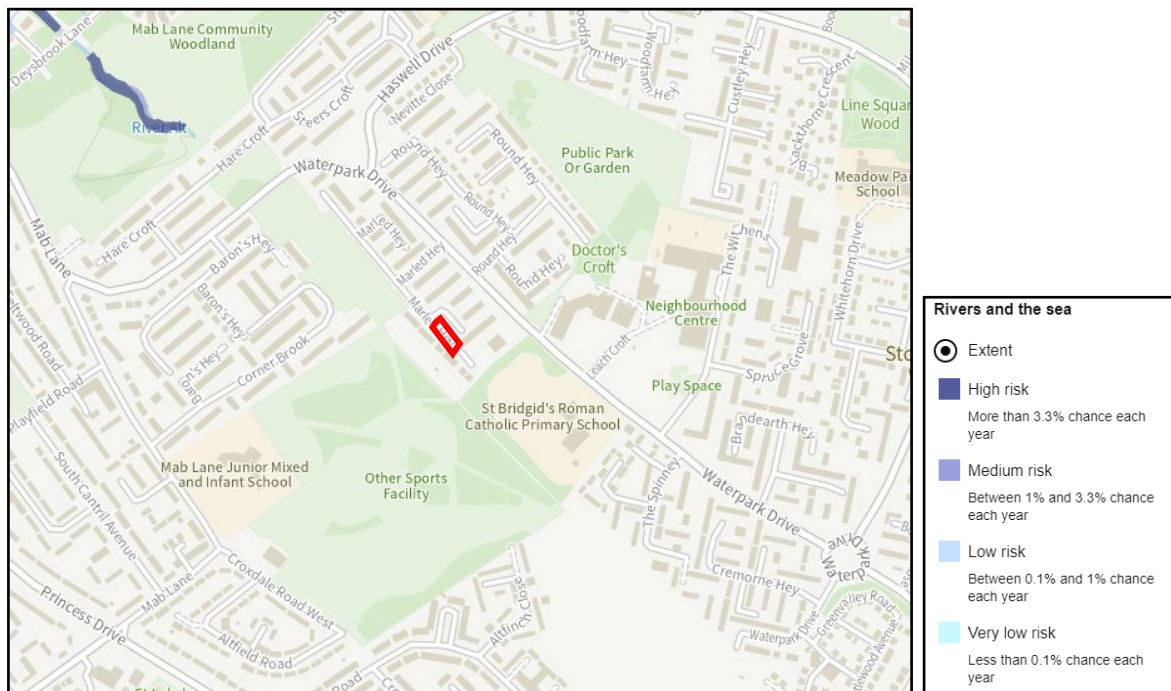


Figure 5: Environment Agency Flood Map - Extents of Flooding from Rivers or the Sea

- 3.8 Flooding from Surface Water
- 3.8.1 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.
- 3.8.2 The Environment Agency provides surface water flood maps for the high (greater than 3.3% AEP), medium (1% AEP) and low (0.1% AEP) risk scenarios. All 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.
- 3.8.3 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. The following assessment 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.

- 3.8.4 The extent of surface water flooding, Figure 6, indicates that there is a medium/low risk of surface water flooding occurring within the site boundary. The surface water flood risk is shown occurring to the south of the site along the road, and just into the south of the development area. The flooding along the road has a low-risk chance of flooding over the kerb line onto the development area and only occurs for the 0.1 – 1% AEP event.
- 3.8.5 The surface water flooding for the 0.1 – 1% AEP event is noted being less than 300mm on the Environment Agency Low Risk Surface Water Flood Map, Appendix C.

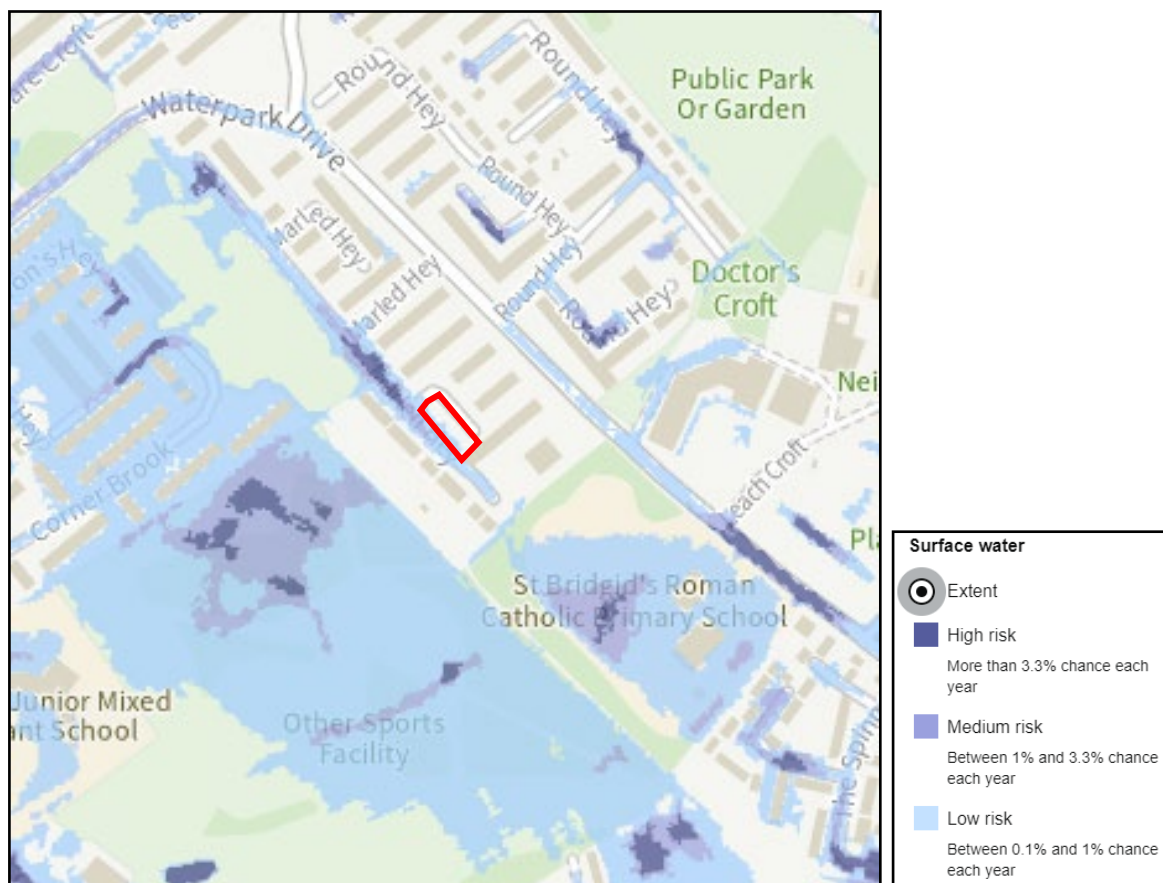


Figure 6: Environment Agency Extent of Surface Water Flooding Map

- 3.8.6 The risk of surface water flooding to the development can be mitigated by ensuring the surface water management network safely manages rainfall events to the required standard. Also, a careful consideration of finished floor levels is made during design .
- 3.8.7 Following implementation of the mitigation measures the risk of surface water flooding to the site can be considered to be low.
- 3.9 Flooding from Sewers
- 3.9.1 Flooding from the sewers occurs when surcharging during periods of excess flow breaks ground, typically at manholes or road gullies. The proposed development is not likely to increase the risk 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.

- 3.9.2 The development area is served by a surface water pipe running around the back to the north of the development site along a side road off the main Marled Hey Road. The private network is to be connected to the existing surface water sewer. There is also a foul drainage network along the front of the development site in the main Marled Hey road to the south of the development site, the private foul will connect into here. An extract from the public sewer record is shown in Figure 7.
- 3.9.3 Drainage for the proposed development will be designed to current best practice for the foul sewers using Approved Document H. Where new surface water drainage for the site is proposed it 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.
- 3.9.4 As the sewers are operated and maintained by United Utilities and the proposed drainage within the site will be designed to the current requirements of the LLFA the site can be considered at low risk of sewer flooding.

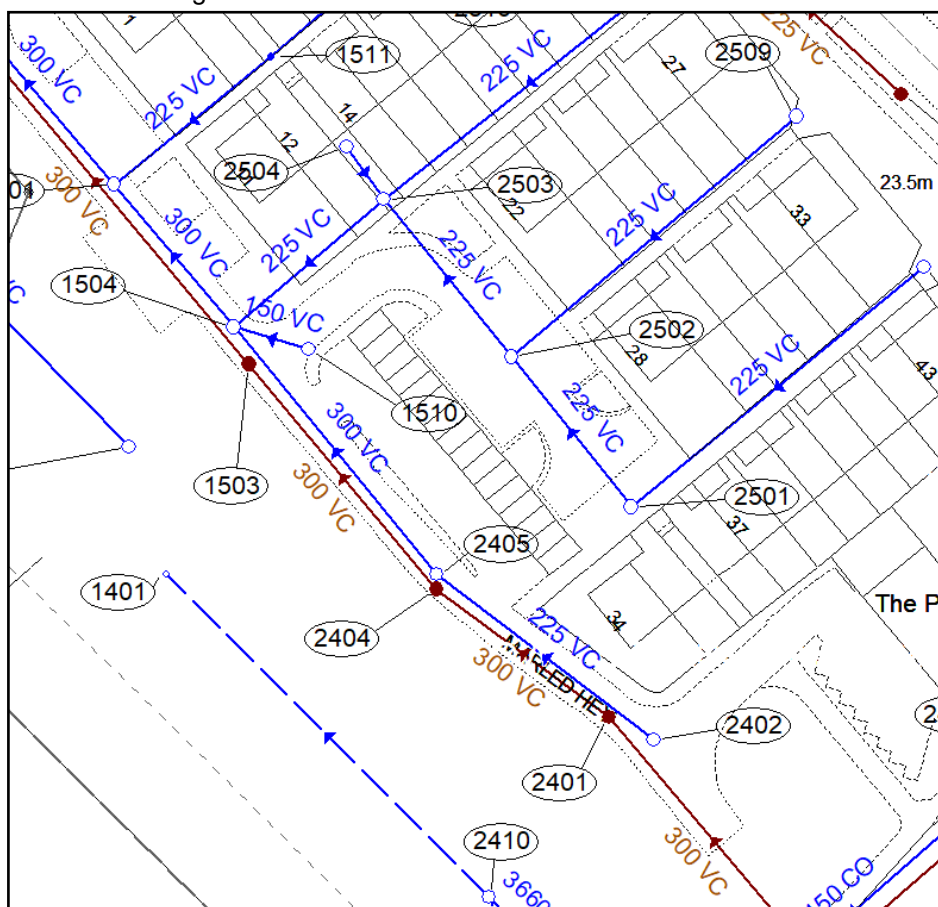


Figure 7: United Utilities Sewer Record Extract.

- 3.10 Flooding from Infrastructure
- 3.10.1 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.
- 3.10.2 There is no risk of flooding associated with infrastructure failure.

3.11 Flooding from Groundwater

- 3.11.1 LCR SDS Strategic Flood Risk Assessment (SFRA) Part A Report Nov 2023 document, groundwater flood map, Figure 8, confirms the site falls within area 3 denoted as being at risk of groundwater emergence. Groundwater levels are between 0.025m and 0.5m below the ground surface in the 100-year return period flood event. Within this zone there is a risk of groundwater flooding to surface and subsurface assets. There is the possibility of groundwater emerging at the surface locally.

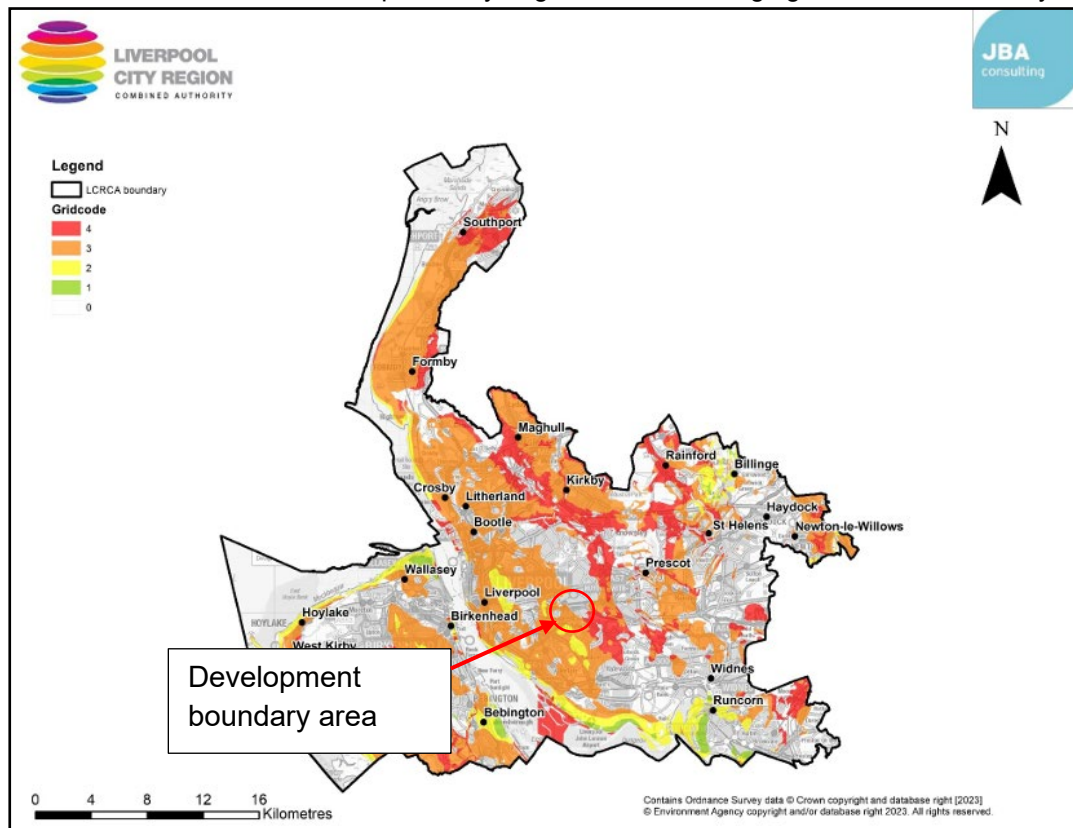


Figure 8: Groundwater Flood Risk (Local flood risk management strategy 2014)

- 3.11.2 The site has sufficient topographic relief for groundwater emergence not to cause a significant risk.
- 3.11.3 There are no other sources of flooding that affect the site. Overall flood risk to the proposed development is considered low.

4 Climate Change

- 4.1 Paragraph 158 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 167 of the NPPF requires all plans to adopt a risk-based approach taking into account 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		
Epoch	Central Allowance	Upper End Allowance
2050s	25%	35%

2070s	30%	40%
1% Annual Exceedance Rainfall Event		
Epoch	Central Allowance	Upper End Allowance
2050s	25%	40%
2070s	30%	45%

Table 1: Climate Change Allowances.

- 4.4 For development with a lifetime between 2061 and 2125 the 2070s epoch 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 Proposed surface water and foul water drainage will connect into existing public drainage networks to the north and south of the site.
- 6.4 The surface water drainage network will be designed taking climate change into consideration and to help ensure the development is safe for its lifetime.
- 6.5 The site is not at risk of any form of flooding.

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 Standards 2, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage (March 2015).
- 7.5 Paragraph 56 of the Planning Practice Guide requires that surface water from development be discharged in line with the discharge hierarchy:
 - 7.5.1 Infiltrate into the ground close to source.
 - 7.5.2 Discharge runoff to a surface water body.
 - 7.5.3 Discharge runoff to a surface water sewer or other surface water drainage system.
 - 7.5.4 Discharge to a combined sewer.
 - 7.5.5 The implementation of the hierarchy will be discussed in greater detail in Section 11.
- 7.6 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:
 - 7.6.1 Take account of advice from the LLFA.
 - 7.6.2 Have appropriate proposed minimum operational standards.
 - 7.6.3 Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - 7.6.4 Where possible, provide multifunctional benefits.
- 7.7 Standards 2, 3, 4, 7, 8 and 9 of the Non-Statutory Technical Standards for Sustainable Drainage System (2015) are:
 - 7.7.1 S2 requires, for greenfield developments, the peak runoff rate from the development to any highway drain, sewer, or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.
 - 7.7.2 S3 requires for sites that were previously developed the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

- 7.7.3 S4 requires, where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer, or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.
- 7.7.4 S7 requires the drainage system be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30-year rainfall event.
- 7.7.5 S8 requires the drainage system to be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100-year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
- 7.7.6 S9 requires the design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall exceeding a 1 in 100-year rainfall event are managed in exceedance routes that minimise the risks to people and property.
- 7.8 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 brownfield land classification as it falls within an area with existing buildings and hard standing areas which will be demolished along with the existing gully's on the development site.
- 8.3 The nearest watercourse to the development is the River Alt approximately 0.4km west of the development site.
- 8.4 The site topography directs runoff to the south.
- 8.5 The Q_{Bar} rate for the total drained areas of the site is 0.23l/s. Calculations are provided in Appendix B.

9 Proposed Site Layout

- 9.1 The proposed site layout is influenced by existing road layout and residential accommodation surrounding the development site.
- 9.2 The proposed site is made up of 2 residential bungalows.
- 9.3 Proposed site levels reflect the existing topography with the site falling gently towards the south.
- 9.4 The proposed FFL is 150mm above existing ground levels.

10 Urban Creep

- 10.1 A 10% urban creep figure has been applied to the proposed design to alleviate any future development that may occur to the proposed site.

11 Proposed Surface Water Drainage

- 11.1 Planning policy requires that the proposed network manage surface water runoff in line with the discharge hierarchy noted in Section 7.
- 11.2 The first level of the hierarchy requires that infiltration solutions be considered for the management of surface water runoff.
 - 11.2.1 Infiltration systems can take the form of soakaways, detention ponds, permeable pavements, bio-retention areas etc.
 - 11.2.2 The Soilscape viewer identified the general area as Soilscape 18, Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils.
 - 11.2.3 Infiltration testing was not carried out on the proposed development site as the Soilscape results indicate that the use of soakaways is not a viable solution for the management of surface water for the development. Infiltration testing to BRE365 may need to be carried out to confirm this.
- 11.3 The second tier of the hierarchy requires surface water to be discharged to a surface water body.
 - 11.3.1 A review of the area surrounding the site has confirmed that there are no watercourses around the development site.
- 11.4 The third tier of the hierarchy requires surface water to runoff to a surface water network, highway drain or other surface water drainage system.
 - 11.4.1 The existing records have confirmed that there is an existing surface water network to the north of the proposed development that the private surface water network can be connected into. This is the preferred point of connection as it is a metre shallower than the connection to the south so minimal excavation would be required.
- 11.5 The fourth tier requires surface water to be discharged to a combined sewer network.
 - 11.5.1 With the private network discharging to a surface water network the development is considered to be managed at level three of the discharge hierarchy.

- 11.6 Details of the proposed drainage strategy are presented on the proposed drainage plans in Appendix A.
- 11.7 United Utilities have confirmed from consultation with Planning that should an infiltration solution not be viable then the development can connect to the public sewer at a maximum pass forward rate of 2 l/s for the site.
- 11.8 The proposed drainage network requires a flow control and attenuation which will take the form of permeable paving, 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.
- 11.9 Attenuation is provided in the form of permeable paving which has been designed with 450mm of stone storage which allows the water to be held prior to discharge to the existing surface water sewer via a vortex control.
- 11.10 The calculations for the proposed drainage strategy network are provided in the Appendix C, for reference, these confirm the permeable paving storage volumes and discharge rates. The calculations confirm the resultant discharges can be managed to satisfy the limiting discharge rate.
- 11.11 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 which is set by the governments climate change allowances area tables.
- 11.12 The proposed surface water drainage network can be considered to fulfil the policy requirements as far as practicable.

12 Water Quality and Interception

- 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 and residential parking areas. The pollution hazard from these land use classifications can be considered low.
- 12.3 Suspended solids from the surface water runoff will be managed through the use of trapped gullies and a sump, prior to the outfall, which will allow suspended solids to settle out.
- 12.4 Permeable paving is to be used as a method to improve water quality. Permeable paving helps to remove hydrocarbons and solids to improve the overall water quality during its storage time within the paving.

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 from up to 2 dwellings is 0.55 l/s based on BS EN 12056.

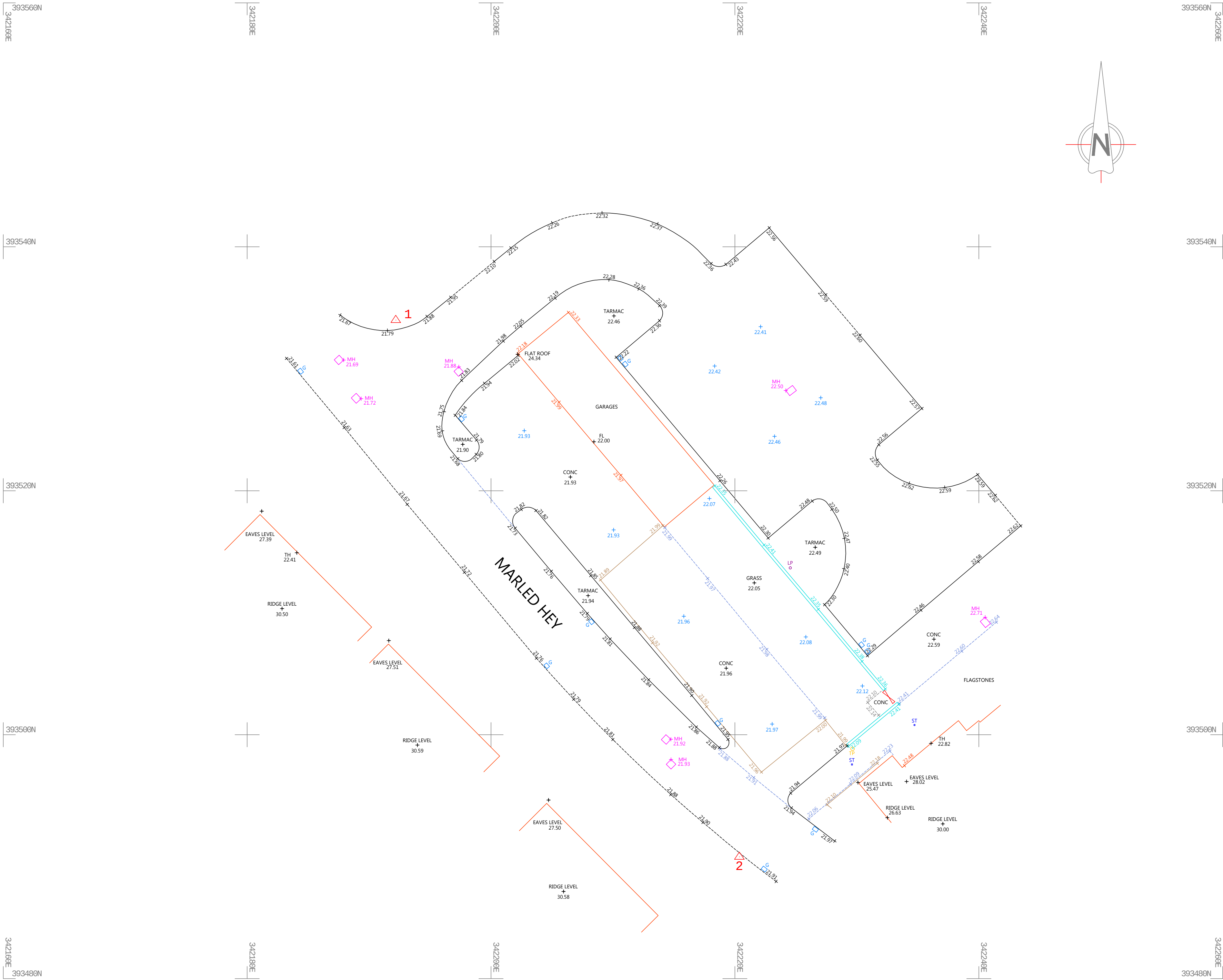
14 Maintenance and Management

- 14.1 The proposed drainage network will be managed by residents, council, and United Utilities.
- 14.2 The piped network, attenuation and flow control will be maintained in accordance with the councils maintenance process.

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 permeable paving which will slow down the flow of surface water into the network and provide interception. The runoff rates are controlled to comply with standards S2 and S3 of the Non-Statutory Technical Standards for Sustainable Drainage Systems, as far as practicable, through the inclusion of flow controls 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, and does not exceed 2l/s.
- 15.4 The proposed drainage network includes SuDS as far as practicable given the layout of the site and constraints set by the existing infrastructure.
- 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 – Drawings



Station	Easting	Northing	Level
1	342192.190	393533.989	21.959
2	342220.359	393489.984	21.937

Abbreviations/Symbols (Measured Building Surveys):

- C: Window Cill Height
- H: Window Head Height
- BH: Beam Height
- DH: Door Height
- COL: Column
- SVP: Soil Vent Pipe
- FL: Floor Level
- TH: Threshold Level
- FL to Ceiling Height
- Vaulted Ceiling

Line types

- Hedge Lines
- Drainage Runs
- Overhead Electricity Cables
- Overhead Telephone Cables

Symbols

- Tree/Bush
- Control Station
- Borehole
- Trial Hole
- Glass House
- Ostom

Abbreviations (Topographic Survey):

- AH: Arch Height
- AV: Air Valve
- BB: Bellha Beacon
- BOL: Electricity Box, Cables Box, Etc.
- BOL: Bollard
- BS: British Telecom Inspection Chamber
- BS: Bus Stop
- BS/LP: Bus Stop / Lamp Post
- CAIV: CATV Inspection Chamber
- CCIV: Closed Circuit Television
- CL: Cellar Light
- C.PIL: Catch Pit
- ER: Earth Road
- EC: Electricity Inspection Chamber
- EP: Electricity Pole
- EH: Fire Hydrant
- FP: Flag Pole
- GV: Gas Valve
- G: Gully
- IC: Inspection Chamber
- KO: Kerb Outlet
- LP: Lamp Post
- LB: Letter Box
- LC: Lighting Column
- MAK: Marker
- MH: Manhole
- MP: Mooring Point
- MS: Mile Stone
- NYNEX: Nynex Inspection Chamber
- O/H: Over Hang
- P: Post
- PO/IC: Post Office Inspection Chamber
- R/S: Road Sign
- RE: Roadside Eye
- RTW: Retaining Wall
- S/P: Sign Post
- SNP: Street Name Plate
- ST: Stop Tap
- SV: Stop Valve
- T: Telecom Inspection Chamber
- TCB: Telephone Call Box
- TH: Threshold Level
- TL: Traffic Light
- TP: Telegraph Pole
- TROUGH: Trough
- WO: Water Outlet
- WM: Water Meter

Fence Descriptions:

- B/W: Barbed Wire
- C/B: Close Boarded
- C/BARRIER: Crash Barrier
- C/L: Chain Link
- C/P: Chestnut Paving
- C/I: Corrugated Iron
- I/R: Iron Rolling
- MIS/C: Miscellaneous
- P/R: Post & Rail
- P/W: Post & Wire
- P/C: Post & Chain
- S/PAL: Steel Palisade
- W/M: Wire Mesh

Survey Notes:

Coordinates and Levels related to Ordnance Survey Datum - GPS OSG86

Revision	Date	Description



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t: 0161 976 1194
www.cpls.co.uk esurvey@cpls.co.uk

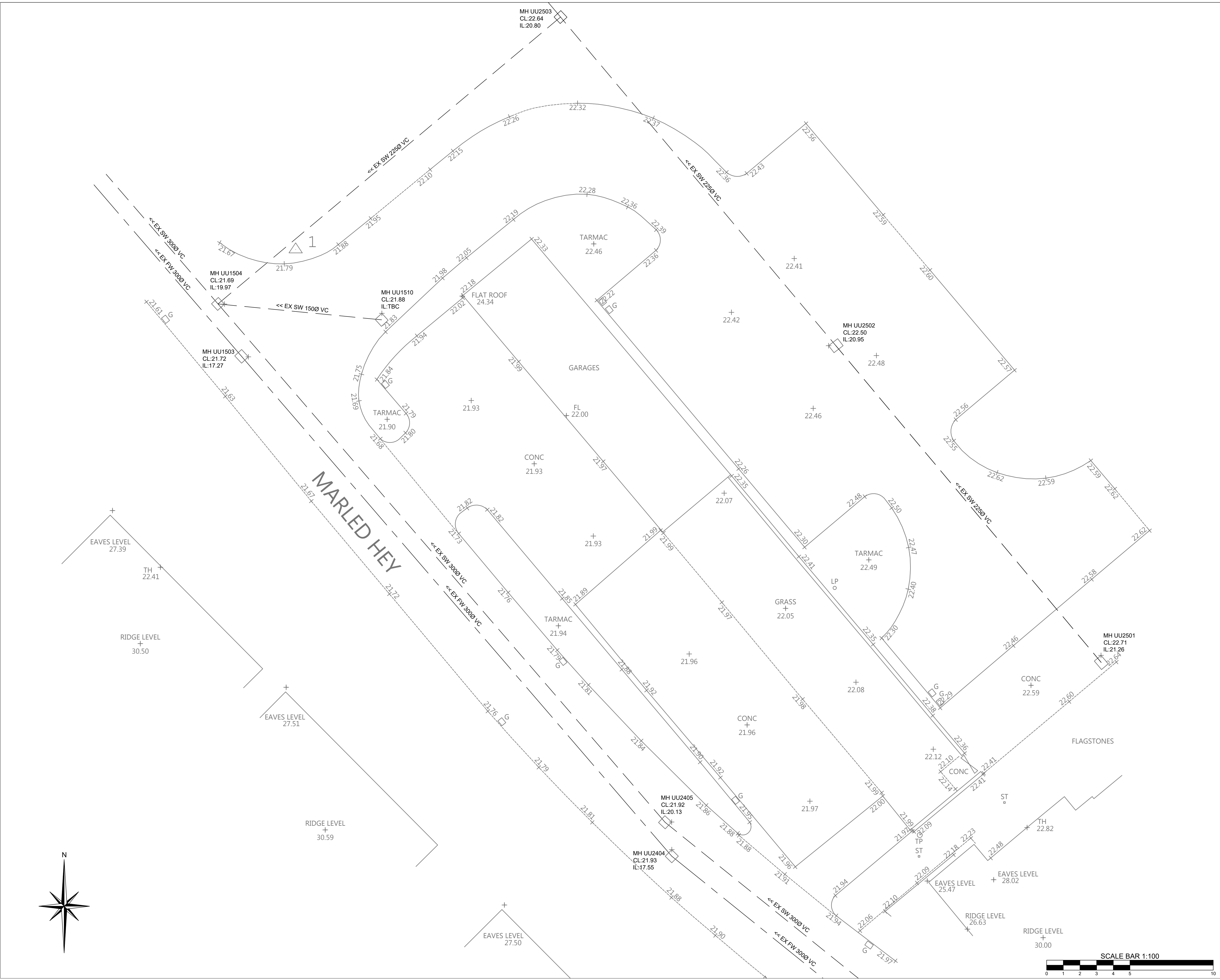
Client

JDA Architects

Project

Marled Hey, Stockbridge Village
Site Survey

Scale	Surveyed By	Date
1:200	J C	12.07.24
Drawing No.	Checked By	Date
120724JC-01	CPLS	15.07.24
	Drawn By	Date
	J C	15.07.24



GENERAL NOTES

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

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

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KEY:

- EXISTING FOUL WATER DRAINAGE
- EXISTING SURFACE WATER DRAINAGE
- EXISTING COMBINED WATER DRAINAGE

P01	PRELIMINARY ISSUE	12.09.24	KW	DS
Rev	Description	Date	By	Chkd

Drawing Status
PRELIMINARY DRAWING

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

Liverpool Head Office: 0151 227 3115
Manchester Office: 0161 817 5180
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Client
FORLIVING

Project
**18 MARLED HEY
LIVERPOOL**

Drawing Title
EXISTING DRAINAGE LAYOUT

Date SEP 24	Drawn By KW	Checked By DS
Scale at A1 1:100		Project Number 34465
Sheet Number 34465-SUT-ZZ-XX-DR-C-6000		Revision P01



Notes

Jennings Design Associates take no responsibility for any dimensions obtained by scaling from this drawing. If no dimension is shown the recipient must ascertain the dimension specifically from the Architect or by site measurement. Supplying this drawing in digital form is solely for convenience and no reliance may be placed on digital data. All data must be checked against hard copy. Dimensions must be checked on site. Any discrepancies must be reported to the Architect immediately. This drawing is copyright of Jennings Design Associates

Landscape Key

- 600 x 600mm paving
- Grass
- Pathways
- Parking
- A 1800mm close boarded fencing
- B Low level metal railing

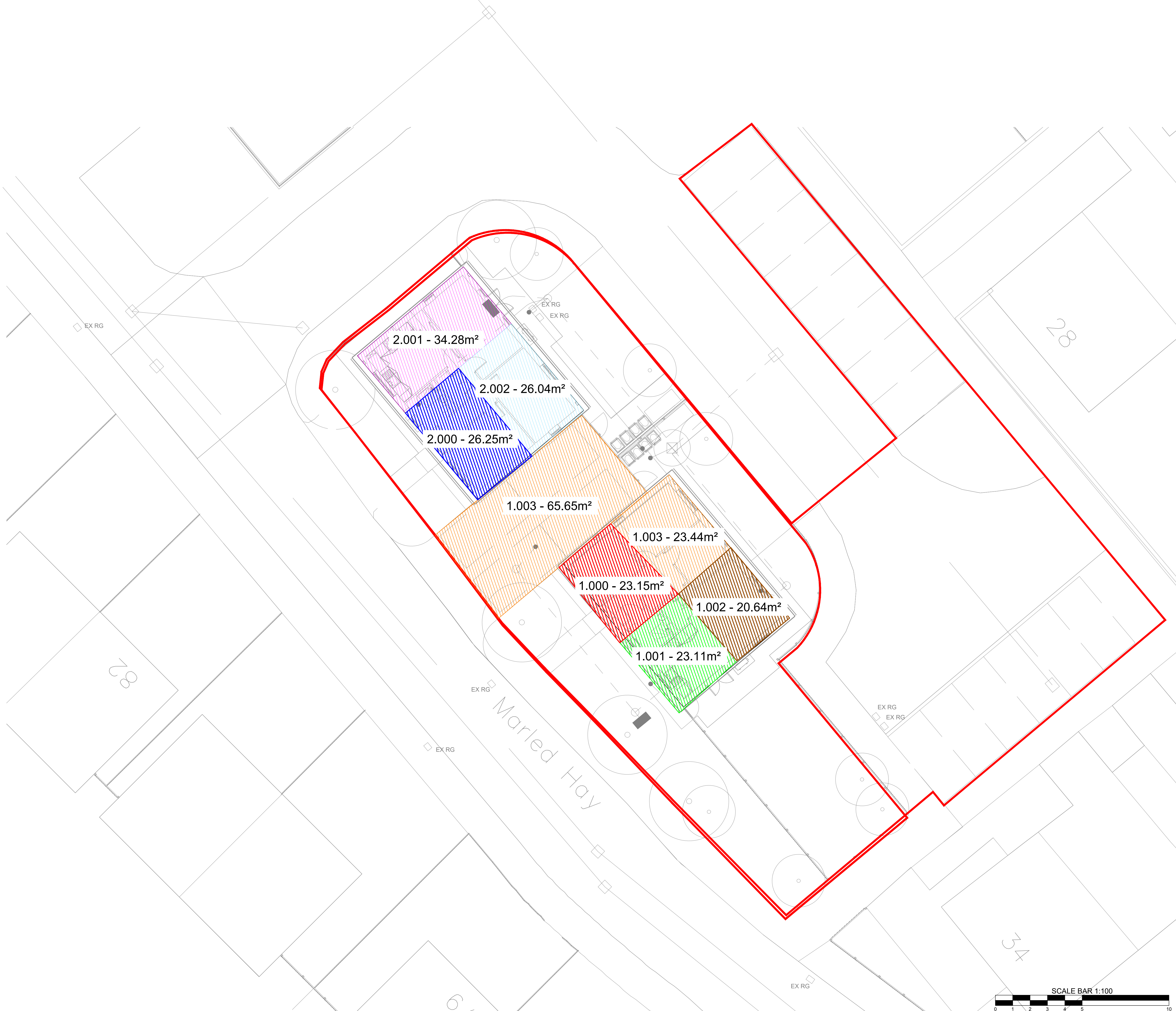
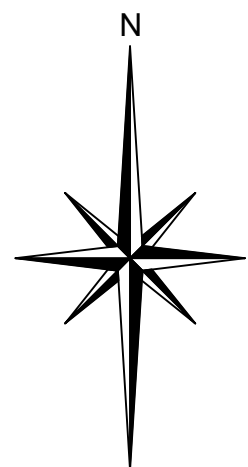
P6	Red line boundary amended to include parking spaces	16/12/24		
P5	Semi option	20/11/23		
P4	Z2 amended to 3B4P house type following client's comments - issued for planning	22/03/23		
P3	JDA DLM error	27/02/23		
P2	JDA DLM error	27/02/23		
P1	Initial Issue	-		
Rev	Description	Date	By	
Revision Schedule				

jda architects
info@jda-architects.com
www.jda-architects.com

manchester: 0161 338 5011
liverpool: 0151 665 0112

Project Details:				
0934 - Marled Hay, Stockbridge Village				
Client: ForViva				
RIBA Workstage: Stage 3 - Planning			Status/Suitability Code: S2	
Scale: 1 : 200	@ Original Size A3	Date: 15/02/23	Drawn by: TY	Chk by: TK
Project Code: 0934-JDA-XX-XX-DR-A-0003	Originator: VolSys	Level: Type	Role: Number	
Description: Site Plan - Proposed				Rev: P6

Site Plan - Proposed
1 : 200



GENERAL NOTES

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

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D.M. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

CATCHMENT KEY:

	1.000 - 23.15m²
	1.001 - 23.11m²
	1.002 - 20.65m²
	1.003 - 89.09m²
	2.000 - 26.65m²
	2.001 - 34.28m²
	2.002 - 26.04m²
TOTAL - 242.97m²	

P02	SITE LAYOUT UPDATED	24.02.25	JG	DS
P01	PRELIMINARY ISSUE	12.09.24	KW	DS
Rev	Description	Date	By	Chkd

Drawing Status
PRELIMINARY DRAWING



Structural & Civil Engineering
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0161 871 5181

North Wales Office: 01753 644 077

London Office: 020 8014 4200



Client
FORLIVING

Project
**18 MARLED HEY
LIVERPOOL**

Drawing Title
PROPOSED CATCHMENT PLAN

Date SEP 24	Drawn By KW	Checked By DS
Scale at A1 1:100	Project Number 34465	Revision
Sheet Number 34465-SUT-ZZ-XX-DR-C-6020	P02	



17 Appendix B – Greenfield runoff calculations

Calculated by: Matt Bowden

Site name: Marled hey

Site location: Liverpool

Site Details

Latitude: 53.43528° N

Longitude: 2.87128° W

Reference: 3620227697

Date: Oct 14 2024 16:14

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.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 0.1

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:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

(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):	869	869
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?

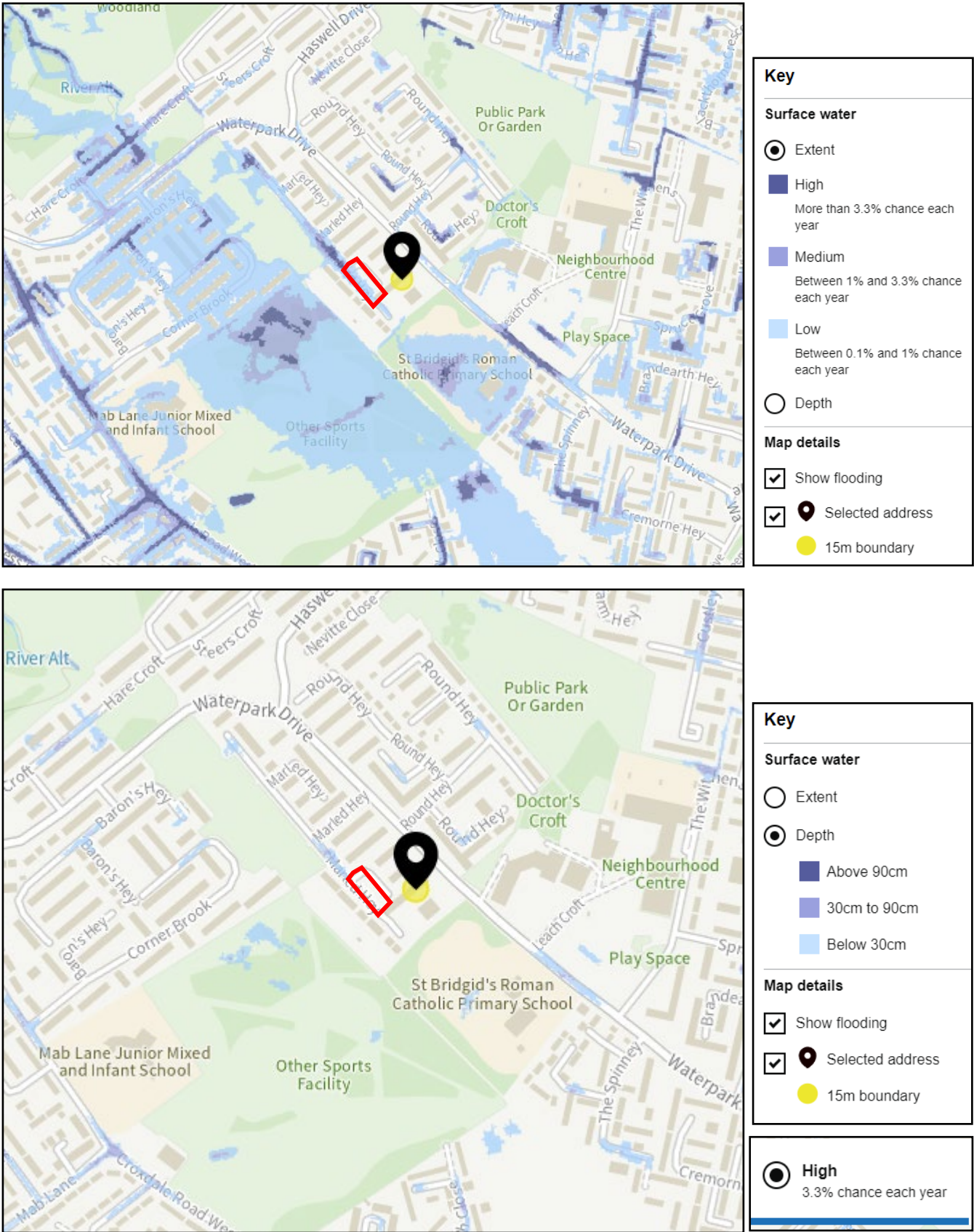
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

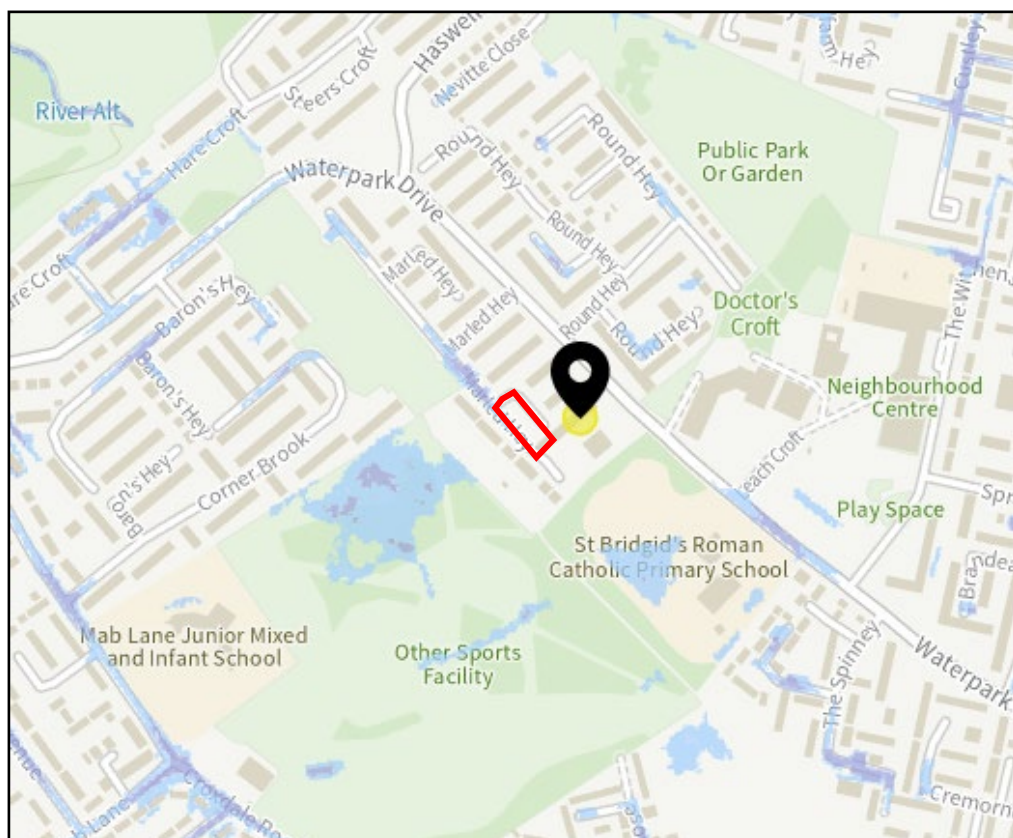
Greenfield runoff rates	Default	Edited
-------------------------	---------	--------

Q_{BAR} (l/s):	0.23	0.23
1 in 1 year (l/s):	0.2	0.2
1 in 30 years (l/s):	0.4	0.4
1 in 100 year (l/s):	0.49	0.49
1 in 200 years (l/s):	0.56	0.56

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.

18 Appendix C – EA Flood maps



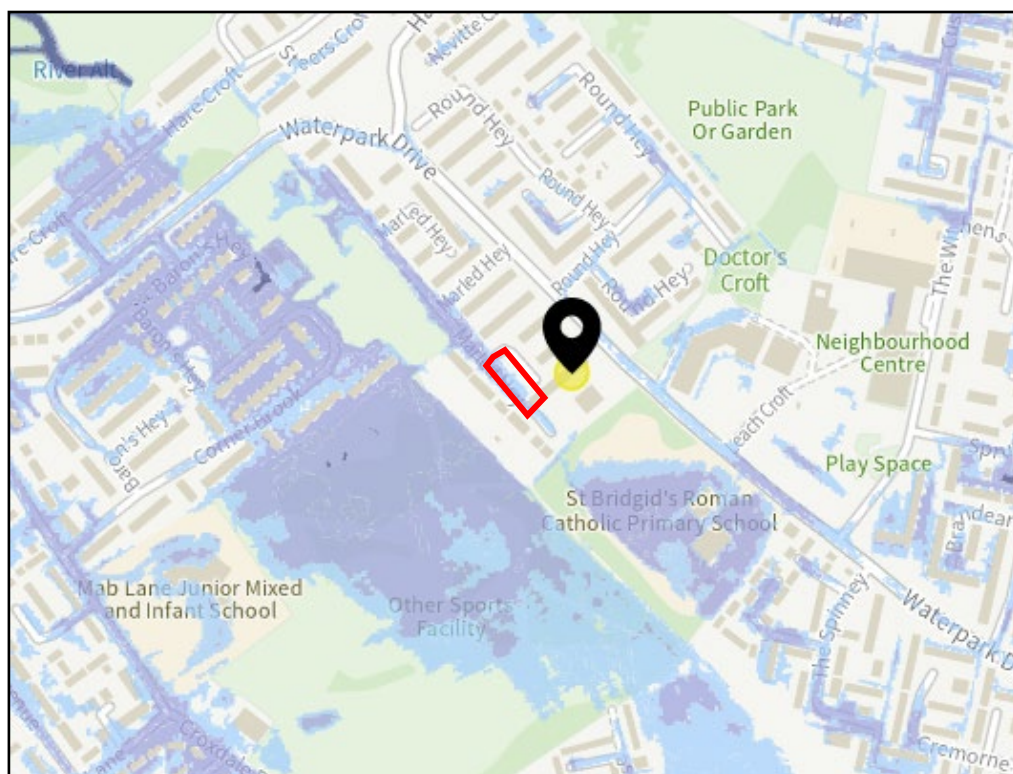
**Key****Surface water**

- Extent
- Depth
 - Above 90cm
 - 30cm to 90cm
 - Below 30cm

Map details

- ☒ Show flooding
- ☒ Selected address
- 15m boundary

- **Medium**
1% chance each year

**Key****Surface water**

- Extent
- Depth
 - Above 90cm
 - 30cm to 90cm
 - Below 30cm

Map details

- ☒ Show flooding
- ☒ Selected address
- 15m boundary

- **Low**
0.1% chance each year

19 Appendix D – Drainage calculations

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Junctions Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
PS1	Manhole	342213.717	393512.266	21.970	0.550	21.420	Circular	0.450
PS2	Manhole	342219.231	393507.147	21.850	0.530	21.320	Circular	0.450
PS3	Manhole	342226.097	393512.958	21.850	0.620	21.230	Circular	0.450
PS4	Manhole	342218.933	393523.301	22.250	1.150	21.100	Circular	2.100
PS5	Manhole	342206.671	393534.039	21.850	0.580	21.270	Circular	0.450
OUTFALL	Manhole	342224.607	393528.215	22.500	1.550	20.950	Circular	1.200
Manhole	Manhole	342203.500	393521.680	21.950	0.510	21.440	Circular	0.450
Manhole (1)	Manhole	342199.779	393528.241	21.850	0.490	21.360	Circular	0.450

Name	Lock
PS1	None
PS2	None
PS3	None
PS4	None
PS5	None
OUTFALL	None
Manhole	None
Manhole (1)	None

Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
PS1	Inlet	Catchment Area (1)	(None)	No Restriction
PS2	Inlet	1.001 (1) 1.000	(None)	No Restriction
PS3	Inlet	1.001	(None)	No Restriction
	Inlet (1)	Catchment Area (2)	(None)	No Restriction
PS4	Inlet	1.002 2.000 1.003 1.000 Pipe (2)	(None)	No Restriction
PS5	Inlet	2.000 (1) Pipe (1)	(None)	No Restriction
OUTFALL	Inlet	1.003	(None)	No Restriction
Manhole	Inlet	Catchment Area	(None)	No Restriction
Manhole (1)	Inlet	Pipe	(None)	No Restriction
	Inlet (1)	2.000	(None)	No Restriction

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Junctions Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
PS1	Outlet	1.000	Free Discharge
PS2	Outlet	1.001	Free Discharge
PS3	Outlet	1.002	Free Discharge
PS4	Outlet	1.003	Hydro-Brake®
	Invert Level (m)	21.100	
	Design Depth (m)	0.900	
	Design Flow (L/s)	2.0	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	☒	
	Unit Reference	SHE-0069-2000-0900-2000	
PS5	Outlet	2.000	Free Discharge
Manhole	Outlet	Pipe	Free Discharge
Manhole (1)	Outlet	Pipe (1)	Free Discharge

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Stormwater Controls Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





Porous Paving

Type : Porous Paving

Dimensions	
Exceedance Level (m)	21.850
Depth (m)	0.530
Base Level (m)	21.320
Paving Layer Depth (mm)	130
Membrane Percolation (m/hr)	360.0
Porosity (%)	30
Length (m)	12.626
Long. Slope (1:X)	400.00
Width (m)	5.198
Total Volume (m³)	7.875

Advanced	
Conductivity (m/hr)	50.0

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Connections Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



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)
1.000	7.524	Pipe	75.237		0.6	100	21.970	21.420
1.001	8.995	Pipe	99.950		0.6	100	21.850	21.320
1.002	12.581	Pipe	96.688		0.6	100	21.850	21.230
1.003	7.505	Pipe	50.077		0.6	150	22.250	21.100
2.000	16.299	Pipe	95.809		0.6	100	21.850	21.270
Pipe	7.542	Pipe	94.279		0.6	100	21.950	21.440
Pipe (1)	9.007	Pipe	100.075		0.6	100	21.850	21.360
Pipe (2)	8.588	Pipe	39.013		0.6	100	21.882	21.320

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
1.000	21.850	21.320		None		(None)	(None)
1.001	21.850	21.230		None		(None)	(None)
1.002	22.250	21.100		None		(None)	(None)
1.003	22.500	20.950		None	2.2	(None)	(None)
2.000	22.250	21.100		None		(None)	(None)
Pipe	21.850	21.360		None		(None)	(None)
Pipe (1)	21.850	21.270		None		(None)	(None)
Pipe (2)	22.250	21.100		None		(None)	(None)

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Inflow Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
1.000	PS4		Time of Concentration	0.007	100	10	110	0.007
1.001 (1)	PS2		Time of Concentration	0.002	100	10	110	0.003
1.003	PS4		Time of Concentration	0.002	100	10	110	0.003
2.000	Manhole (1)		Time of Concentration	0.003	100	10	110	0.004
2.000 (1)	PS5		Time of Concentration	0.003	100	10	110	0.003
Catchment Area	Manhole		Time of Concentration	0.003	100	10	110	0.003
Catchment Area (1)	PS1		Time of Concentration	0.002	100	10	110	0.003
Catchment Area (2)	PS3		Time of Concentration	0.002	100	10	110	0.002
TOTAL		0.0		0.024				0.027

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Network Design Criteria Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐
--------------	--------------------------

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025			
	Designed by: JG	Checked by: DS	Approved By: DS	
Report Details: Type: Outfall Details Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
OUTFALL	Free Discharge			

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Title: Rainfall Analysis Criteria	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	10
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Inflows Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
1.000	FSR: 2 years: +0 %: 15 mins: Summer	0.01	1.6	0.696
1.003	FSR: 2 years: +0 %: 15 mins: Summer	0.00	0.6	0.248
2.000	FSR: 2 years: +0 %: 15 mins: Summer	0.00	0.8	0.364
2.000 (1)	FSR: 2 years: +0 %: 15 mins: Summer	0.00	0.6	0.275
1.001 (1)	FSR: 2 years: +0 %: 15 mins: Summer	0.00	0.6	0.248
Catchment Area	FSR: 2 years: +0 %: 15 mins: Winter	0.00	0.5	0.236
Catchment Area (1)	FSR: 2 years: +0 %: 15 mins: Winter	0.00	0.4	0.206
Catchment Area (2)	FSR: 2 years: +0 %: 15 mins: Winter	0.00	0.4	0.185

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Inflows Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
1.000	FSR: 30 years: +0 %: 15 mins: Summer	0.01	3.0	1.320
1.003	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.1	0.470
2.000	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.6	0.685
2.000 (1)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.2	0.524
1.001 (1)	FSR: 30 years: +0 %: 15 mins: Summer	0.00	1.1	0.464
Catchment Area	FSR: 30 years: +0 %: 15 mins: Winter	0.00	1.0	0.443
Catchment Area (1)	FSR: 30 years: +0 %: 15 mins: Winter	0.00	0.8	0.392
Catchment Area (2)	FSR: 30 years: +0 %: 15 mins: Winter	0.00	0.8	0.347

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Inflows Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



FSR: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
1.000	FSR: 100 years: +0 %: 15 mins: Summer	0.01	3.9	1.709
1.003	FSR: 100 years: +0 %: 15 mins: Summer	0.00	1.4	0.608
2.000	FSR: 100 years: +0 %: 15 mins: Summer	0.00	2.0	0.892
2.000 (1)	FSR: 100 years: +0 %: 15 mins: Summer	0.00	1.6	0.680
1.001 (1)	FSR: 100 years: +0 %: 15 mins: Summer	0.00	1.4	0.602
Catchment Area	FSR: 100 years: +0 %: 15 mins: Winter	0.00	1.2	0.578
Catchment Area (1)	FSR: 100 years: +0 %: 15 mins: Winter	0.00	1.1	0.509
Catchment Area (2)	FSR: 100 years: +0 %: 15 mins: Winter	0.00	1.0	0.449

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Inflows Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		



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

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
1.000	FSR: 100 years: +45 %: 15 mins: Summer	0.01	5.7	2.478
1.003	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.0	0.884
2.000	FSR: 100 years: +45 %: 15 mins: Summer	0.00	3.0	1.291
2.000 (1)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.2	0.980
1.001 (1)	FSR: 100 years: +45 %: 15 mins: Summer	0.00	2.0	0.875
Catchment Area	FSR: 100 years: +45 %: 15 mins: Winter	0.00	1.8	0.836
Catchment Area (1)	FSR: 100 years: +45 %: 15 mins: Winter	0.00	1.6	0.734
Catchment Area (2)	FSR: 100 years: +45 %: 15 mins: Winter	0.00	1.4	0.653

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Junctions Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 2 years: Increase Rainfall (%): +0: 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
PS1	FSR: 2 years: +0 %: 15 mins: Winter	21.97 0	21.42 0	21.437	0.017	0.4	0.003	0.000	0.4	0.205	OK
PS2	FSR: 2 years: +0 %: 15 mins: Summer	21.85 0	21.32 0	21.347	0.027	1.0	0.004	0.000	0.9	0.426	OK
PS3	FSR: 2 years: +0 %: 15 mins: Winter	21.85 0	21.23 0	21.333	0.103	1.3	0.016	0.000	1.2	0.626	Surcharged
PS4	FSR: 2 years: +0 %: 15 mins: Winter	22.25 0	21.10 0	21.332	0.232	5.0	0.803	0.000	2.0	2.271	Surcharged
PS5	FSR: 2 years: +0 %: 15 mins: Winter	21.85 0	21.27 0	21.334	0.064	1.8	0.010	0.000	1.7	0.863	OK
OUTFALL	FSR: 2 years: +0 %: 15 mins: Winter	22.50 0	20.95 0	20.978	0.028	2.0	0.000	0.000	2.0	2.168	OK
Manhole	FSR: 2 years: +0 %: 15 mins: Winter	21.95 0	21.44 0	21.459	0.019	0.5	0.003	0.000	0.5	0.234	OK
Manhole (1)	FSR: 2 years: +0 %: 15 mins: Summer	21.85 0	21.36 0	21.391	0.031	1.3	0.005	0.000	1.2	0.569	OK

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Junctions Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 30 years: Increase Rainfall (%): +0: 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
PS1	FSR: 30 years: +0 %: 30 mins: Winter	21.97 0	21.42 0	21.476	0.056	0.6	0.009	0.000	0.5	0.508	OK
PS2	FSR: 30 years: +0 %: 30 mins: Winter	21.85 0	21.32 0	21.476	0.156	1.2	0.025	0.000	1.1	1.111	Surcharged
PS3	FSR: 30 years: +0 %: 30 mins: Winter	21.85 0	21.23 0	21.475	0.245	1.6	0.039	0.000	1.0	1.562	Surcharged
PS4	FSR: 30 years: +0 %: 30 mins: Winter	22.25 0	21.10 0	21.474	0.374	5.3	1.296	0.000	2.0	6.748	Surcharged
PS5	FSR: 30 years: +0 %: 30 mins: Winter	21.85 0	21.27 0	21.477	0.207	2.3	0.033	0.000	1.7	2.161	Surcharged
OUTFALL	FSR: 30 years: +0 %: 15 mins: Summer	22.50 0	20.95 0	20.978	0.028	2.0	0.000	0.000	2.0	2.802	OK
Manhole	FSR: 30 years: +0 %: 30 mins: Winter	21.95 0	21.44 0	21.479	0.039	0.6	0.006	0.000	0.6	0.580	OK
Manhole (1)	FSR: 30 years: +0 %: 30 mins: Winter	21.85 0	21.36 0	21.478	0.118	1.6	0.019	0.000	1.5	1.483	Surcharged

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
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Report Details: Type: Junctions Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 100 years: Increase Rainfall (%): +0: 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
PS1	FSR: 100 years: +0 %: 30 mins: Winter	21.970	21.420	21.570	0.150	0.7	0.024	0.000	0.7	0.663	Surcharged
PS2	FSR: 100 years: +0 %: 30 mins: Winter	21.850	21.320	21.570	0.250	1.5	0.040	0.000	0.7	1.413	Flood Risk
PS3	FSR: 100 years: +0 %: 30 mins: Winter	21.850	21.230	21.570	0.340	1.4	0.054	0.000	0.9	1.860	Flood Risk
PS4	FSR: 100 years: +0 %: 30 mins: Winter	22.250	21.100	21.568	0.469	6.0	1.623	0.000	2.0	7.780	Surcharged
PS5	FSR: 100 years: +0 %: 30 mins: Winter	21.850	21.270	21.571	0.301	2.4	0.048	0.000	1.9	2.709	Flood Risk
OUTFALL	FSR: 100 years: +0 %: 30 mins: Winter	22.500	20.950	20.978	0.028	2.0	0.000	0.000	2.0	6.057	OK
Manhole	FSR: 100 years: +0 %: 30 mins: Winter	21.950	21.440	21.572	0.132	0.8	0.021	0.000	0.8	0.753	Surcharged
Manhole (1)	FSR: 100 years: +0 %: 30 mins: Winter	21.850	21.360	21.572	0.212	2.1	0.034	0.000	1.5	1.922	Flood Risk

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
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Report Details: Type: Junctions Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 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
PS1	FSR: 100 years: +45 %: 60 mins: Winter	21.97 0	21.42 0	21.746	0.326	0.8	0.052	0.000	0.5	1.216	Flood Risk
PS2	FSR: 100 years: +45 %: 60 mins: Winter	21.85 0	21.32 0	21.745	0.425	1.2	0.068	0.000	0.8	2.655	Flood Risk
PS3	FSR: 100 years: +45 %: 60 mins: Winter	21.85 0	21.23 0	21.743	0.513	1.4	0.082	0.000	1.2	3.642	Flood Risk
PS4	FSR: 100 years: +45 %: 30 mins: Winter	22.25 0	21.10 0	21.738	0.639	8.3	2.212	0.000	2.0	9.311	Surcharged
PS5	FSR: 100 years: +45 %: 30 mins: Winter	21.85 0	21.27 0	21.751	0.481	3.0	0.076	0.000	2.3	3.382	Flood Risk
OUTFALL	FSR: 100 years: +45 %: 60 mins: Winter	22.50 0	20.95 0	20.978	0.028	2.0	0.000	0.000	2.0	11.990	OK
Manhole	FSR: 100 years: +45 %: 30 mins: Winter	21.95 0	21.44 0	21.755	0.315	1.2	0.050	0.000	0.5	0.954	Flood Risk
Manhole (1)	FSR: 100 years: +45 %: 30 mins: Winter	21.85 0	21.36 0	21.754	0.394	2.3	0.063	0.000	1.6	2.425	Flood Risk

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 2 years: Increase Rainfall (%): +0: 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. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 2 years: +0 %: 15 mins: Winter	21.352	21.332	0.000	0.012	0.3	0.080	0.000	0.000	0.1	0.064	98.980	OK

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
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Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 30 years: Increase Rainfall (%): +0: 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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 30 years: +0 %: 30 mins: Winter	21.352	21.474	0.000	0.154	2.3	1.022	0.000	0.000	0.9	0.972	87.028	OK

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 100 years: Increase Rainfall (%): +0: 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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 100 years: +0 %: 30 mins: Winter	21.352	21.569	0.000	0.249	2.7	1.687	0.000	0.000	0.9	1.275	78.574	OK

Marled Hey, Liverpool: SW Calcs	Date: 24/02/2025		
	Designed by: JG	Checked by: DS	Approved By: DS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Sutcliffe: 18-20 Harrington Street Liverpool L29QA		





FSR: 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. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FSR: 100 years: +45 %: 60 mins: Winter	21.382	21.875	0.031	0.555	2.9	4.053	0.548	0.000	0.9	2.704	48.540	Flood