



Louisa Street, Openshaw

Flood Risk Assessment & Drainage Strategy

September 2022



Project Information	
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Client:	Westchurch Homes
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Approval Record	
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02	05/09/2022	Second issue – Updated with MCC data

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Contents

Introduction.....	1
Existing Conditions	1
Development Proposals	3
Flood Zone Classification and Policy Context.....	3
Consultation.....	4
Sources of Flooding and Probability.....	6
Surface Water Management	8
Maintenance.....	10
Foul Drainage.....	11
Conclusions.....	12
Recommendations.....	12

Appendices

Appendix A	Location Plan and Aerial Image
Appendix B	Topographical Information
Appendix C	BGS Borehole Record
Appendix D	United Utilities Sewer Plan
Appendix E	MCC Asset Map
Appendix F	Proposed Site Plan
Appendix G	EA Flood Maps
Appendix H	LLFA Consultation Response
Appendix I	United Utilities Pre-development Enquiry Response
Appendix J	ReFH2 Greenfield & Brownfield Runoff Rates
Appendix K	MicroDrainage Attenuation Storage Estimate
Appendix L	Concept Drainage Sketch
Appendix M	Maintenance Schedule
Appendix N	Concept Designers Risk Assessment (cDRA)

Introduction

Waterco has been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in relation to a proposed residential development at Louisa Street, Openshaw, Manchester, M11 1AD.

The purpose of this report is to outline the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk (if any). This report has been prepared in accordance with the guidance contained in the National Planning Policy Framework (NPPF) and the National Planning Practice Guidance (NPPG): Flood Risk and Coastal Change.

From April 2015, Manchester City Council as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Strategy. The aim of the Sustainable Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

Existing Conditions

The site covers an area of approximately 9,059m² and is located at National Grid Reference: 388594, 397620. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed August 2022) shows that the site comprises hardstanding in the form of roads and remnant building slabs associated with its former industrial use.

The site is bordered by industrial units, Ferris Street and residential properties to the north, Louisa Street with residential properties beyond to the east, communal green space to the south, and a public footpath with residential properties beyond to the west. Access to the site is provided from Louisa Street in the east.

Local Topography

Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR data shows that the site is relatively flat with levels ranging from approximately 77.53m AOD in the south-east to approximately 77.14m AOD in the north-west. A LiDAR extract is included in Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by superficial deposits of Devensian Till, generally comprising diamicton. The superficial deposits are identified as being underlain by the Chester Formation consisting of sandstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

The closest historical BGS borehole record (BGS reference: SJ89NE1124) is located approximately 10m north-west of the site (NGR 388540, 397710) and is included in Appendix C. The borehole record indicates that:

- Made Ground (fill) was observed from ground level to 0.79metres below ground level (m bgl);
- Compact to dense brown silty sand (moist) was observed from 0.79m bgl to 9.32m bgl.

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping (accessed August 2022), the Devensian Till is classified as a Secondary Undifferentiated Aquifer. Secondary Undifferentiated Aquifers are assigned in 'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.

The underlying Chester formation is described as a Principal Aquifer. Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping (accessed August 2022), indicates that the site is not located within a Groundwater Source Protection Zone.

The Cranfield University 'Soilscapes' map (accessed August 2022) indicates that the site is underlain by 'slowly permeable seasonally wet loamy and clayey soils'.

Local Drainage

Public sewer records have been obtained from United Utilities and are included in Appendix D. The United Utilities sewer records show that there is a 300mm public combined sewer located to the north of the site in Ferris Street. There is also a 300mm public combined sewer north of the site within the rear gardens of residential properties. Both sewers flow north and join a 375mm public combined sewer in Sexa Street.

There are also two 450mm public combined sewers located to the east of the site in Louisa Street. The public combined sewers flow north and south respectively.

Public combined manhole 5703, located approximately 80m north of the site (where the 300mm public combined sewer in Ferris Street joins the 380mm public combined sewer in Sexa Street) has an identified cover level of 76.78m AOD and an invert level of 69.53m AOD.

An LLFA Data Screen has been obtained from Manchester City Council (MCC) in August 2022. Maps identifying the possible location of a culverted watercourse near to the site are included in Appendix E. A culverted watercourse identified as 'Corn Brook Tributary – Openshaw' is located approximately 10m south of the site and flows west in this location.

MCC strongly recommends that a comprehensive site investigation is undertaken to determine the precise location of any assets.

Development Proposals

The proposed development is for 71no. residential properties (houses and apartments) with associated access roads, driveways, gardens and amenity space for the proposed apartment block. A proposed development plan is included in Appendix F.

Hardstanding will comprise approximately 5,180m² or 57.2% of the total site area. The remaining permeable, soft landscaped areas will occupy approximately 3,879m² or 42.8% of the total site area. Measurements have been taken from a PDF copy of the 'Proposed Site Plan' and are approximate only.

Flood Zone Classification and Policy Context

The EA 'Flood Map for Planning', included in Appendix G, shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% annual probability of flooding.

In accordance with Table 2 of the NPPG: Flood Risk and Coastal Change, residential developments are considered to be 'more vulnerable'. Table 3 of the NPPG: Flood Risk and Coastal Change, states that 'more vulnerable' development is considered appropriate within Flood Zone 1.

Local Policy

The Manchester City Council Local Development Framework Core Strategy Development Plan Document (Adopted July 2012) contains the following policy relating to flood risk and drainage:

'Policy EN 8-

Adaption to Climate change

All new development will be expected to be adaptable to climate change in terms of the design, layout, siting and function of both buildings and associated external spaces. In achieving developments which are adaptable to climate change developers should have regard to the following, although this is not an exhaustive list:

- *Minimisation of flood risk by appropriate siting, drainage, and treatment of surface areas to ensure rain water permeability;*
- *Reduction in urban heat island effect through the use of Green Infrastructure such as green roofs, green walls, increased tree cover and waterways;*
- *The need to control overheating of buildings through passive design;*
- *The opportunity to provide linked and diverse green space to enhance natural habitats which will assist species adaptation.*

Developers will be permitted to use green infrastructure elements such as green roofs, green walls, street

trees and waterways to contribute to compliance with CO2 mitigation under Policy EN6, subject to sufficient evidence to quantify their contribution to compliance.'

Local guidance documents including the Manchester City Council Level 1 (March 2010) and Level 2 (March 2011) Strategic Flood Risk Assessment (SFRA), and the Manchester City Council Preliminary Flood Risk Assessment (PFRA) (May 2011 and its 2017 addendum) have been reviewed and inform this report.

Consultation

A consultation request was submitted to the LLFA in July 2022. A response is included in Appendix H and advises that a culverted ordinary watercourse is positioned directly beneath the site. A map of the culvert location is included in Appendix E.

A pre-development enquiry was submitted to United Utilities (UU) in July 2022. A response is included in Appendix I. UU have stated that:

'Foul Water'

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 300mm diameter public combined sewer within Ferris Street located to the North of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 300mm diameter 3 public combined sewer within Ferris Street located North of the proposed site at a pass forward

flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team.

Sewer Adoptions

You have indicated on your application form that you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title.

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753).'

Sources of Flooding and Probability

Fluvial

Ordnance Survey (OS) mapping does not identify any watercourses within the immediate vicinity of the site. The nearest watercourse identified on OS mapping is the River Medlock, located 1.7km north of the site. The River Medlock is situated approximately 17m below the site and as such does not pose a flood risk to the site.

A culverted watercourse is identified on Manchester City Council mapping (Appendix E) as being located approximately 10m south of the site. The culvert flows west and serves a limited catchment in this location. The site is locally elevated above land to the south in the location of the culvert, therefore any potential flooding arising from the culvert would be contained within lower lying land south of the site and directed west, following the local topography.

The EA 'Historical Flood Risk' map (Appendix G) indicates that there are no records of historic flooding at or near to the site.

It can therefore be concluded that the risk of fluvial flooding is very low.

Tidal

The site is situated at a minimum of approximately 77.14m AOD and is significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

Surface water flooding occurs when rainwater does not drain away through the normal drainage system or soak into the ground. It is usually associated with high intensity rainfall events but can also occur with lower intensity rainfall or melting snow where the ground is saturated, frozen or developed, resulting in overland flow and ponding in depressions in topography. Surface water flooding can occur anywhere without warning. However, flow paths can be determined by consideration of contours and relative levels.

The EA 'Flood Risk from Surface Water' map (Appendix G) indicates that the site is at very low risk of surface

water flooding, meaning it has a less than 0.1% annual probability of flooding.

Any potential surface water flooding arising at or near to the site would be directed south and towards the area of public open space south of the site which is situated at a lower elevation to the site. There are no distinct flow routes in the area which would direct any potential surface water flooding towards the site.

There are no records of surface water flooding at or near to the site. It can therefore be concluded that the risk of surface water flooding is very low.

Sewer

Flooding from sewers can occur when a sewer is overwhelmed by heavy rainfall, becomes blocked, is damaged, or is of inadequate capacity. Flooding is mostly applicable to combined and surface water sewers.

The UU sewer records show that there is a 300mm public combined sewer located to the north of the site in Ferris Street. There is also a 300mm public combined sewer north of the site within the rear gardens of residential properties. Both sewers flow north and join a 380mm public combined sewer in Sexa Street.

There are also two 450mm public combined sewers located to the east of the site in Louisa Street. The public combined sewers flow north and south respectively.

Any potential flooding arising from the 300mm public combined sewers north of the site would be directed north-west, away from the site, following the local topography. Any potential flooding arising from the 450mm public combined sewers in Louisa Street would be contained within the road by kerb heights and would be directed towards lower lying land south of the site.

There are no records of sewer flooding at or near to the site. It can therefore be concluded that the risk of sewer flooding is very low.

Groundwater

Groundwater flooding occurs when water levels underneath the ground rise above normal levels. Prolonged heavy rainfall soaks into the ground and can cause the ground to become saturated. This results in rising groundwater levels which leads to flooding above ground.

As discussed above, the site is underlain by superficial deposits of diamicton, the impermeable nature of which would limit the vertical migration of groundwater.

There are no records of groundwater flooding at or near to the site. It can therefore be concluded that the risk of groundwater flooding is very low.

Artificial Sources

Ashton Canal is located approximately 520m north of the site. The canal is not locally elevated above surrounding ground and as such there is no risk from a canal breach. Canals are controlled watercourses, and the risk of overtopping is very low.

The EA 'Flood Risk from Reservoirs' map (Appendix G) shows that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that there is a low risk of flooding from artificial sources.

Summary of Potential Flooding

It can be concluded that the risk of flooding from all sources is low. Therefore, no site-specific flood risk mitigation measures are considered necessary. In accordance with Building Regulations, finished floor levels should be set 150mm above surrounding ground levels.

Surface Water Management

The site currently comprises of hardstanding in the form of access roads and the remnant concrete slabs of previous industrial buildings. It is assumed that surface water either drains to the public combined sewer or to a culverted watercourse.

The proposed development will introduce 5,180m² of hardstanding in the form of buildings and roads.

In order to comply with local and national guidance, surface water runoff should be restricted to the greenfield runoff rate where practical.

Greenfield and brownfield runoff rates have been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method. A summary of the runoff rates for a range of events is provided as Appendix J. The 1 in 1 year greenfield runoff rate for the 0.906 ha site is 6.3 l/s. The 1 in 1 year brownfield runoff rate for the 0.906ha development site is 20.42 l/s.

Where discharge is made to a culverted watercourse, a discharge rate of 6.3 l/s is proposed. Where discharge to the public combined sewer is required, a discharge rate of 5 l/s has been stipulated by United Utilities. A discharge rate of 5 l/s has been used to inform this Drainage Strategy.

Attenuation Storage

In order to achieve a discharge rate of 5 l/s, attenuation storage will be required. An attenuation storage estimate has been provided using MicroDrainage and is included in Appendix K. An estimated storage volume of 366m³ will be required to accommodate the 1 in 100 year plus 45% Climate Change (CC) event. The storage estimate is based on a discharge rate of 5 l/s, storage within a tank structure, an impermeable drainage area of 5,180m², a design head of 1.2m and hydro-brake flow control.

The attenuation volume is provided for indicative purposes only and should be verified at the detailed design stage.

Attenuation storage will be provided within an underground attenuation tank located beneath the amenity area in the northern extent of the site. There is also potential for attenuation storage to be provided within oversized pipes beneath the access road.

Discharge Method

Paragraph 080 of the NPPG: Flood Risk and Coastal Change sets out the following hierarchy of drainage options: into the ground (infiltration); to a surface water body; to a surface water sewer, highway drain or another drainage system; to a combined sewer.

Infiltration

The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above, the site is underlain by superficial deposits of Devensian Till, generally comprising diamicton. The impermeable nature of diamicton would limit the infiltration potential of the underlying strata.

Subject to ground contamination, infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of infiltration techniques.

Watercourse

Where infiltration techniques are not suitable, a connection to watercourse is the next consideration. A culverted watercourse is identified on MCC mapping (Appendix E) approximately 10m south of the site. No details regarding the culvert are available.

Where possible, a connection to the culverted watercourse will be made, this is subject to survey to confirm the culvert location, condition and invert depth. Where a connection to the culvert is made, a discharge rate of 6.3 l/s will apply and attenuation storage would be provided within oversized pipes beneath the access road.

Sewer

Where disposal of surface water to watercourse is not possible, a connection to the public sewer system is the final consideration. There is a 300mm public combined sewer located to the north of the site in Ferris Street. A connection to this sewer appears to be a feasible option. As agreed with United Utilities, surface water discharge to the public sewer system should be limited to a rate of 5 l/s.

No cover or invert levels are provided for the head of the public sewer system in Ferris Street. Public combined manhole 5703, located approximately 80m north of the site (where the 300mm public combined sewer in Ferris Street joins the 380mm public combined sewer in Sexa Street) has an identified cover level of 76.78m AOD and an invert level of 69.53m AOD. A gravity connection is therefore achievable to manhole 5703.

Concept Surface Water Drainage Scheme

Where infiltration techniques are not feasible, discharge to a culverted watercourse will be explored. Should discharge to the culverted watercourse not be possible, surface water runoff will be discharged to the 300mm public combined sewer located to the north of the site in Ferris Street at a limited rate of 5 l/s. Surface water runoff up to the 1 in 100 year plus 45% climate change allowance event will be attenuated on site. A total attenuation volume of 366m³ will be required to achieve the discharge rate and will be provided in the form of an attenuation tank located beneath an area of open space in the northern extent of the site. A concept

drainage sketch based on discharge to the public combined sewer is included in Appendix L.

The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the development.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 45% CC event. Storm events in excess of the 1 in 100 year plus 45% CC event should be permitted to produce temporary shallow depth flooding within the access roads and landscaped areas. Finished floor levels will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, with low traffic roads classified as having a 'low' pollution hazard level. Table 1 shows the pollution hazard indices for each land use.

Table 1 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Very Low	0.2	0.2	0.05
Low Traffic Roads	Low	0.5	0.4	0.4

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2

* Indices values range from 0-1.

Runoff will be directed to an attenuation tank. Sufficient treatment will be provided in the form of a proprietary treatment system such as the SDS Aqua Swirl located upstream of an attenuation tank. Table 2 shows that a proprietary treatment system such as the SDS Aqua Swirl provides sufficient treatment.

Table 2 – SuDS Mitigation Indices

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
SDS Aqua Swirl	0.8	0.5	0.7

Data provided by the manufacturer.

Maintenance

The drainage system will be offered for adoption to United Utilities who will then be responsible for maintenance. Should United Utilities not adopt elements of the drainage system such as the attenuation tank, maintenance can be arranged through appointment of a site management company.

A maintenance schedule for an attenuation tank is included in Appendix M.

Foul Drainage

Correspondence from United Utilities (Appendix I) states that:

'Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 300mm diameter public combined sewer within Ferris Street located to the North of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.'

It is proposed to discharge foul flows to the public combined sewer in Ferris Street north of the site. No cover or invert levels are provided for the head of the public sewer system in Ferris Street. Public combined manhole 5703, located approximately 80m north of the site (where the 300mm public combined sewer in Ferris Street joins the 380mm public combined sewer in Sexa Street) has an identified cover level of 76.78m AOD and an invert level of 69.53m AOD. A gravity connection is therefore achievable to manhole 5703.

Conclusions

The proposed development is for 71 dwellings consisting of houses and apartments with associated access roads, driveways, gardens and amenity space for the proposed apartment block.

The Environment Agency 'Flood Map for Planning' map shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% (1 in 1000) annual probability of flooding.

The risk of flooding from all sources has been assessed and the flood risk to the site is considered to be very low. Therefore, no site-specific flood risk mitigation measures are considered necessary.

The proposed development will include impermeable drainage area in the form of buildings and roads. In order to comply with local and national guidance, surface water will be managed on site through the use of flow control and attenuation to accommodate storm events up to and including the 1 in 100 year plus 45% climate change event.

All methods of surface water discharge have been assessed. Where infiltration techniques are not possible, a connection to the culverted watercourse will be made, this is subject to survey to confirm the culvert location, condition and invert depth. Where a connection to the culvert is made, a discharge rate of 6.3 l/s will apply.

Should discharge to the culverted watercourse not be possible, surface water runoff will be discharged to the 300mm public combined sewer located to the north of the site in Ferris Street at a limited rate of 5 l/s.

Attenuation storage will be required on site in order to restrict surface water discharge to 5 l/s. Attenuation can be provided in the form of an underground attenuation tank located beneath an amenity area in the northern extent of the site.

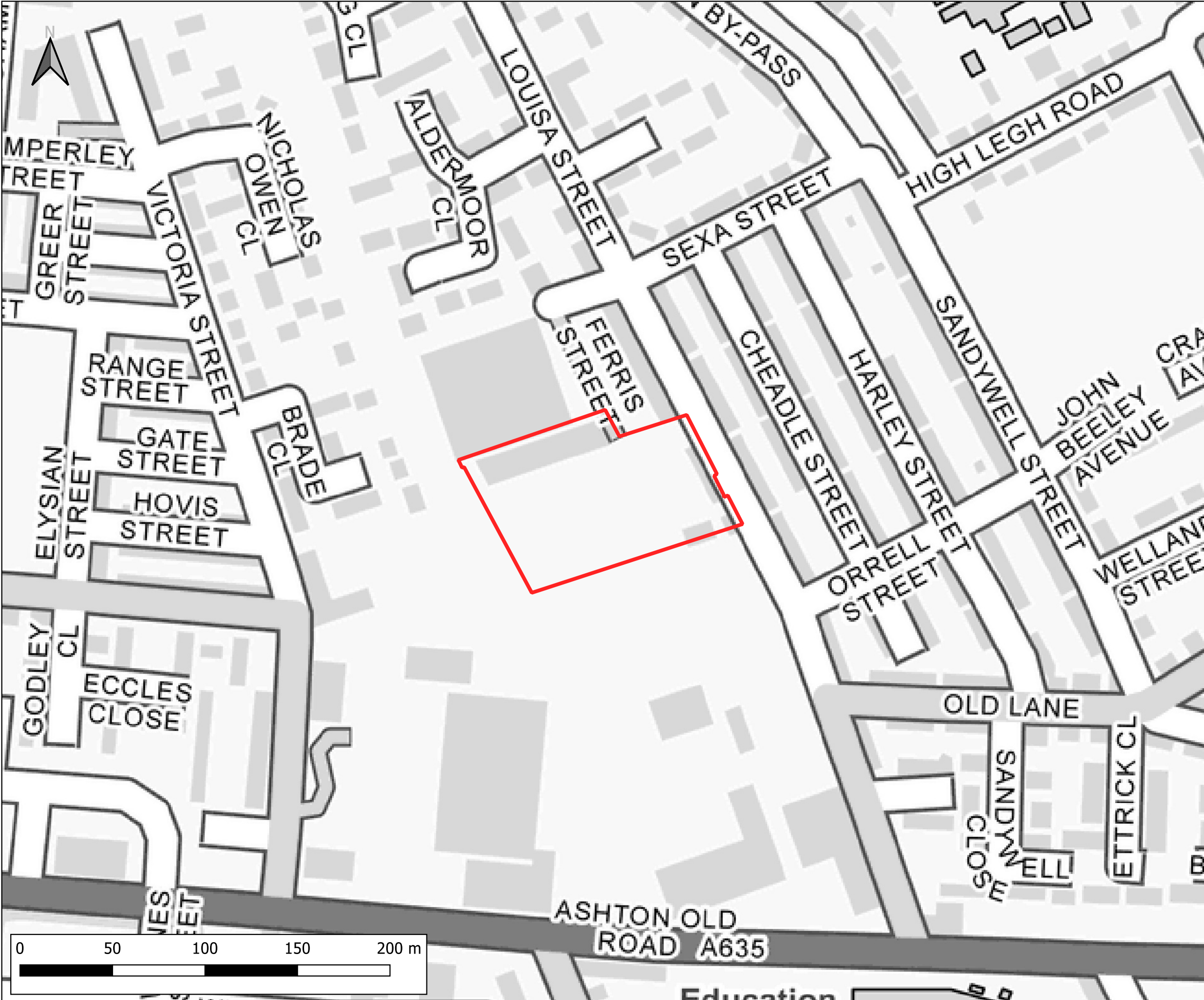
United Utilities have confirmed that foul flows can discharge to the 300mm public foul sewer in Ferris Street. A gravity connection appears feasible.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix N.

Recommendations

1. Set finished floor levels 150mm above surrounding ground levels.
2. Undertake BRE 365 infiltration testing to determine the suitability of infiltration techniques (subject to ground contamination).
3. Verify the attenuation volumes included in this report when undertaking detailed drainage design.

Appendix A Location Plan and Aerial Image



Notes:

1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies

CLIENT:			
Westchurch Homes			
 www.waterco.co.uk			
SCHEME:			
Louisa Street, Openshaw			
PLOT TITLE:			
Location Plan			
PLOT STATUS:		DATE:	
FINAL		23-08-2022	
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	AW	NJ	1:2000
PLOT NAME:			REVISION:
14921_Location_Plan			-



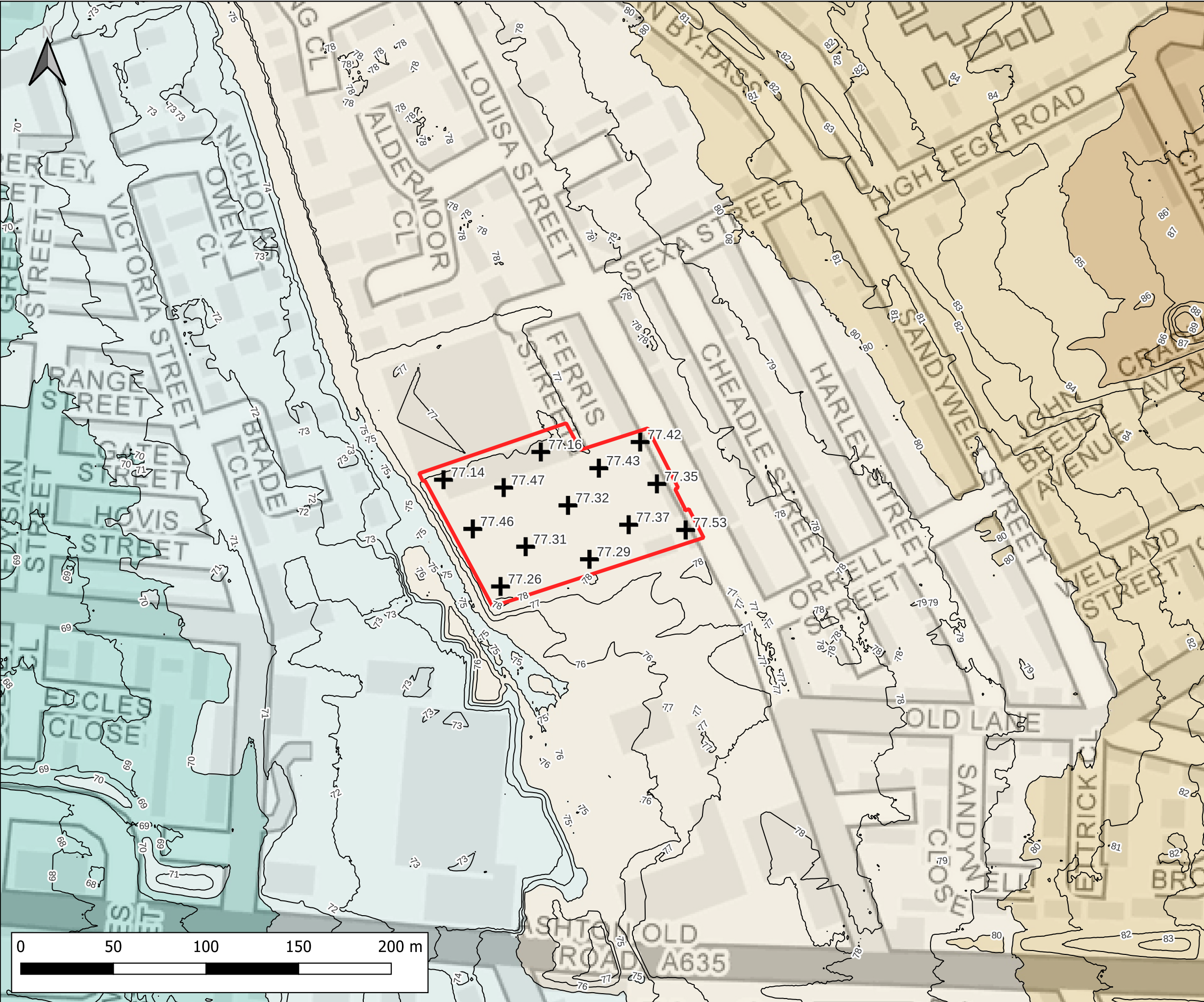
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

CLIENT:			
Westchurch Homes			
 www.waterco.co.uk			
SCHEME:			
Louisa Street, Openshaw			
PLOT TITLE:			
Aerial Plan			
PLOT STATUS:			DATE:
FINAL			23-08-2022
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	AW	NJ	1:2000
PLOT NAME:			REVISION:
14921_Aerial_Plan			-

Appendix B Topographical Information



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Site Levels (m AOD)

Ground Elevations (m AOD)

	<= 65
	65 - 70
	70 - 75
	75 - 80
	80 - 85
	85 - 90
	> 90

CLIENT:

Westchurch Homes

www.waterco.co.uk

SCHEME:

Louisa Street, Openshaw

PLOT TITLE:

LiDAR Plan
1m Resolution
Data from Environment Agency

PLOT STATUS:		FINAL		DATE:	23-08-2022
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DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	AW	NJ	1:2000

PLOT NAME:	14921_LiDAR_Plan	REVISION:	-
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Appendix C BGS Borehole Record

SOIL SURVEYS LTD.
MANCHESTER

BOREHOLE No. 10

EXPLORATORY BORING RECORD

SJ89NE 1124

SITE Manchester

Ref.: 69/229

8854
9771

Boring Method Shell

Ground Level O.D.

DATE	DIA. OF CASING & DEPTH BELOW G.L.	WATER LEVEL MORNING & EVENING	DEPTH OF STRATA BELOW G.L.	STRATA APPROX. SCALE 5 FT. TO ONE INCH	NO. OF SAMP	TYPE OF SAMP	PENETRATION OF SAMPLER OR CORE BARREL		NO. OF BLOWS	CORE RECOVERY
							FROM	TO		
4.2.70	8"	Dry	1'0	Road Setts	1	O	1'0			
					2	O	2'6			
				Soft clay, shales etc.	3	O	6'0			
				FILL	4	O	10'0			
			2'6		5	O	14'0			
					6	X	15'6	16'6	75	
					7	O	19'0			
					8	O	23'0			
				Compact to dense brown silty sand	9	X	25'6	26'6	71	
				(moist)	10	O	28'0			
					11	X	29'6	30'6	73	
4.2.70	29'0	Dry	30'6							

Samples shown thus: Disturbed O. Undisturbed U. Standard Pen. Test X. Water W. Bulk B.

WATER STRUCK AT THE FOLLOWING DEPTHS	DEPTH OF CASING WHEN SEALED N.S. — NOT SEALED	ESTIMATED SEEPAGE	WATER ADDED AT FOLLOWING DEPTHS TO ASSIST BORING	WATER LEVEL IN CASING/UNCASING BOREHOLE ON COMPLETION		
				DATE	WATER LEVEL	DEPTH OF CASING
1. Nil						
2.						
3.						
4.						
5.						
6.						

REMARKS:

Appendix D United Utilities Sewer Plan

Waterco

Waterco
Eden Court,,
Ruthin, Denbighshire
LL15 1NJ

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: 14921- Louisa Street Works, Openshaw
Our Ref: UUPS-ORD-415842
Date: 25/07/2022**

Dear Sirs

Location: Louisa Street Works Openshaw

I acknowledge with thanks your request dated 22/07/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	
3709	74.6	FO	71.92	150			VC	13.17034	1 in 150	7103	79.85	FO	70.85	100			VC	27.7085	1 in 12	
6819		CO	71.92	150			VC	4.77231		4706		FO	70.85	100			VC	7.706321		
3810	71.55	SW	69.96	300			VC	2.473863	1 in 2	2607	68.87	FO	68.3	225			VC	47.09565	1 in 96	
4705	74.29	FO	72.71	225			VC	33.94479	1 in 153	3370		CO	69.64	300			VC	45.65656	1 in 10	
6807		CO	72.08	225			VC	5.917015		5712		FO	70	0			VC	8.928234		
3542		FO	72.08	150			VC	1.468807		5501		FO	70	0			VC	17.46425		
4702	72.19	SW	70.64	300			VC	63.54072	1 in 205	3516		FO	69.1	100			VC	15.12795		
4614	70.53	FO	72.08	150			VC	18.20077	1 in 39	18704	76.67	CO	69.1	375			VC	37.74723	1 in 270	
4905	74.33	FO	72.08	150			VC	29.59862	1 in 148	3603	71.11	CO	68.08	300			VC	65.3183	1 in 48	
3812	72.55	FO	69.79	1 in 33			CO	33.94537	1 in 33	3330		CO	69.2	375			VC	22.15504	1 in 101	
4612	71.38	FO	0	150			VC	51.52017		3303	67.88	SW	64.61	450			BR	75.10559	1 in 70	
3713	72.25	FO	70.43	150			VC	16.6235	1 in 119	3606	69.84	CO	68.64	230			VC	18.02776	1 in 10	
4904	74.49	FO	71.88	150			VC	22.84362	1 in 153	3613	68.7	CO	65.92	300			VC	40.11234	1 in 25	
5711	74.47	SW	72.49	225			VC	43.45028	1 in 107	4301	72.79	CO	69.08	300			VC	50.52101	1 in 268	
4613	69.99	FO	68.04	150			VC	10.31255		3602	69.73	CO	66.72	300			VC	38.0526	1 in 91	
3307		CO	72.08	150			VC	18.51		3604	79.29	CO	77.45	230			VC	7.792161		
4807	74.66	SW	72.01	300			VC	59.22091	1 in 227	7412		FO	74.32	150			VC	5.569096		
4605	71.93	FO	70.36	150			VC	9.24107	1 in 53	7508	79.34	CO	76.34	230			VC	51	1 in 205	
5812		CO	72.08	150			VC	6.076007		7402	71.5	CO	68.37	300			VC	5.946272	1 in 92	
5506		CO	0	300			VC	55.47234		7501	78.19	CO	76.53	230			VC	10.63015	1 in 8	
4904	74.48	FO	72.49	150			VC	16.05241	1 in 146	3602	69.84	CO	71.63	450			BR	58.13777	1 in 51	
4607	69.51	SW	67.28	300			VC	6.843536		7504	77.29	CO	74.71	375			VC	25.63201	1 in 99	
5805	74.56	FO	72.8	150			VC	44.53219	1 in 86	44706	71.46	CO	70.24	230			VC	31.14462	1 in 31	
5502		CO	0	300			VC	12.75014		3612	70.89	CO	69.84	230			VC	61.75963		
8305		CO	225				VC	5.247283		3608	70.03	CO	69.03	230			VC	12	1 in 31	
8807	74.42	SW	72.19	300			VC	25.45002	1 in 319	8802	79.68	CO	77.22	300			VC	50.15874	1 in 100	
4805	74.76	FO	71.08	150			VC	9.345306	1 in 134	5834		CO	69.85	150			VC	13.01674	1 in 42	
8814		CO	72.08	150			BR	11.584		3601	71.25	CO	76.55	380			VC	38.11854	1 in 16	
8415		CO	72.08	150			VC	15.13448	1 in 22	7801	82	CO	76.55	380			VC	12.54159	1 in 203	
4611	72.16	FO	70.34	150			VC	30.04509		7302	78.28	CO	76.72	150			VC	6.053386	1 in 82	
3813	71.55	FO	68.77	300			CO	6.68271	1 in 34	3701	71.62	CO	68.32	450			BR	3.62279	1 in 275	
4904	74.55	SW	71.55	375			BR	14.05842	1 in 351	8817		CO	76.93	150			VC	10.56667	1 in 47	
5505		CO	72.08	150			VC	71.10891		719691	80.93	CO	76.92	300			VC	71.79691	1 in 48	
6815		CO	72.08	150			VC	11.48368		4505	70.8	CO	69.92	300			VC	96.34667	1 in 123	
3811	72.88	FO	69.89	150			VC	14.0735	1 in 141	4704	78.36	CO	75.51	300			VC	56.79709	1 in 65	
6805		CO	72.08	150			VC	11.2715	1 in 1	7609	77.94	CO	75.84	300			VC	53.65563	1 in 61	
3809	72.2	SW	70.33	300			VC	14.96957	1 in 100	6909		CO	75.5	100			PVC	3.641551		
6829		CO	72.08	150			VC	20.97321	1 in 100	3400	68.24	CO	64.41	800			BR	107.6569	1 in 128	
8807		CO	72.08	150			VC	14.24068		6715905		7400	77.53	CO	76.12	225		VC	8.946222	1 in 129
8807		CO	72.08	150			VC	6.715905		8800	79.3	CO	76.93	150			VC	69.46222	1 in 100	
4904	74.51	FO	70.92	150			VC	58.97725	1 in 40	6800	78.13	CO	75.87	300			VC	45.17743	1 in 76	
4911	74.6	SW	72.9	225			VC	43.14355	1 in 150	6301	78.13	CO	75.53	300			VC	97.98799	1 in 100	
5818		CO	72.08	150			VC	3.552777		6905	79.05	CO	77.68	230			VC	45.65656	1 in 26	
6818		CO	72.08	150			VC	3.950123		3301	64.91	CO	61.8	300			VC	36.35932	1 in 173	
6713		CO	72.08	150			VC	12.78175		8414		CO	70.7	150			VC	8.79898	1 in 68	
4908	74.31	SW	72.37	150			BR	18.16551	1 in 151	3403	68.98	CO	65.15	300			VC	5.09902	1 in 102	
3714		CO	72.08	150			VC	13.01311	1 in 16	6706	78.92	CO	77.07	230			VC	45.17743	1 in 100	
4909	74.4	SW	72.37	150			BR	32.38168		6828		CO	76.76	150			VC	3.340506	1 in 26	
4906	74.78	FO	71.75	150			VC	13.68652	1 in 86	7007	70.95	CO	66.76	300			VC	59.21149	1 in 173	
4617		CO	72.08	150			VC	8.55903		5800	77.39	CO	71.34	300			VC	36.35932	1 in 93	
6817		CO	72.08	150			VC	8.45099		3407	69.33	CO	66.09	375			VC	25.17936	1 in 233	
4801	74.59	FO	71.66	150			VC	24.33071	1 in 144	4701	76.67	CO	69.96	375			VC	25.63201	1 in 41	
6717		CO	72.08	150			VC	19.88179		9807		CO	76.93	150			PVC	13.97892	1 in 233	
3808	72.55	SW	70.25	300			VC	11.8761	1 in 148	7403	78.1	CO	75.05	300			VC	49.01723	1 in 44	
4906	74.68	FO	72.9	150			VC	41.91563		7501		CO	75.51	300			VC	6.444452	1 in 41	
4608	69.9	SW	68.54	300			VC	47.18612	1 in 37	4300	73.06	SW	66.61	375			VC	81.3941		
4704	74.98	FO	72.43	150			BR	34.5768	1 in 150											
4903	74.4	SW	72.43	150			BR	31.62278												
4616		CO	72.08	150			VC	7.452441												
6804		CO	72.08	150			VC	18.75428												
4504	72.66	SW	70.9	150			VC	20.28807	1 in 38											
6711		CO	72.08	150			PVC	14.63031												
6707	73.49	CO	72.2	150			VC	6.447042												
4610	72.1	SW	70.68	150			VC	41.11518	1 in 147											
6819		CO	72.08	150			VC	31.40906	1 in 15											
4619		CO	72.08	150			VC	12.59958												
6806	74.44	FO	71.83	150			VC	9.31947												
4804	74.74	FO	71.03	150			VC	26.33326	1 in 155											
5710	74.59	SW	72.23	150			VC	55.52413	1 in 147											
4802	74.63	FO	72.40	150			VC	14.42117	1 in 361											
5714		CO	72.08	150			VC	62.88441	1 in 153											
3510		CO	72.08	150			VC	6.424744												
4808	74.57	SW	72.11	300			VC	12.14108												
8408		CO	72.08	150			VC	23.50743	1 in 235											
3519		CO	72.08	150			VC	31.44667												
7601	76.31	CO	76.31	300			VC	10.15714												
6703		CO	76.31	300			VC	45.65085	1 in 123											
6607		CO	76.31	300			VC	44.26118	1 in 15											
3610	66.59	CO	66.59	230			VC	2.20485												
3604	71.31	CO	67.65	230			VC	29.96965												
3611	68.34	CO	68.34	230			VC	12	1 in 46											
3509	66.85	SW	66.85	230			VC	38.1964	1 in 135											
4702	72.19	FO	70.29	150			VC	91.87879	1 in 110											
7302	80.15	FO	70.29	150			VC	68.429	1 in 10											
3801	71.7	SW	66.72	150			VC	4												

Appendix E MCC Asset Map



**MANCHESTER
CITY COUNCIL**

Lead Local Flood Authority

Highways Service
Growth and Neighbourhoods Directorate
Manchester City Council
PO Box 532
Town Hall
Manchester
M60 2LA

Email: floodriskmanagement@manchester.gov.uk

DATE 30/08/2022

Dear Sir or Madam,

RE: Our Ref: MCC030/08/2022

We acknowledge with thanks your payment received on 22/08/2022 for our LLFA data screen service.

Please find enclosed plan showing the results of the data screen. The position of features shown on this plan is approximate only and is given in accordance with the best information currently available.

The enclosed plan cannot be used to substitute a competent site investigation.

The enclosed plan is being provided to you subject to Manchester City Council's terms and conditions which are shown attached.

I trust the above meets your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter, please do not hesitate to contact us.

Yours Faithfully,

A handwritten signature in black ink, appearing to read 'N. A. Bayliss-Rowe'.

Neil Bayliss-Rowe, Highways Development Control & Flood Risk Manager, Lead Local Flood Authority

TERMS AND CONDITIONS – LLFA DATA SCREEN

These provisions apply to LLFA data supplied by Manchester City Council (“MCC”).

TERMS AND CONDITIONS:

- This data Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- MCC has taken all reasonable care to compile this data Map. This data Map and any information supplied with it is provided for general guidance only and MCC makes no representation, undertaking or warranty of any kind as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position of any culverted assets shown on the data Map are approximate only. MCC strongly recommends that a comprehensive site investigation is undertaken in addition to reviewing this data Map to determine and ensure the precise location of any assets. The exact location, positions and depths should be obtained by an appropriate survey which may include but shall not be limited to GPR and CCTV.
- The data screened may be modified over time without notice and therefore this data Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the data Map have been made subsequent to issue and prior to any works being carried out.
- This data Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) or for the purpose of determining the suitability of a point of connection to discharge.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising from damages of any kind caused to assets by reason of the actual position and/or existence of assets being different from those shown on the data Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent MCC from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

DATA SCREEN SYMBOLOGY

Bridge

-  Good
-  Fair
-  Poor
-  Very Poor
-  Unknown

Trash Screen

-  Good
-  Fair
-  Poor
-  Very Poor
-  Unknown

Culvert Orifice

-  Very Good
-  Good
-  Fair
-  Poor
-  Very Poor
-  Unknown

Culvert Conduit

-  CCTV surveyed
-  Not CCTV surveyed
-  Ordinary Watercourse Conduit
-  MCC SuDS
-  MCC Flood Incident Points
-  MCC Section 19 Report
-  MCC Flood Incident Polygons
-  MCC Local Authority Boundary

Supplementary Information where available:

Critical Drainage Area – The Site is within the Conurbation Core CDA.

Flood Incidents –

5 m north of Site: blocked highway gully/drain (25/02/2022).

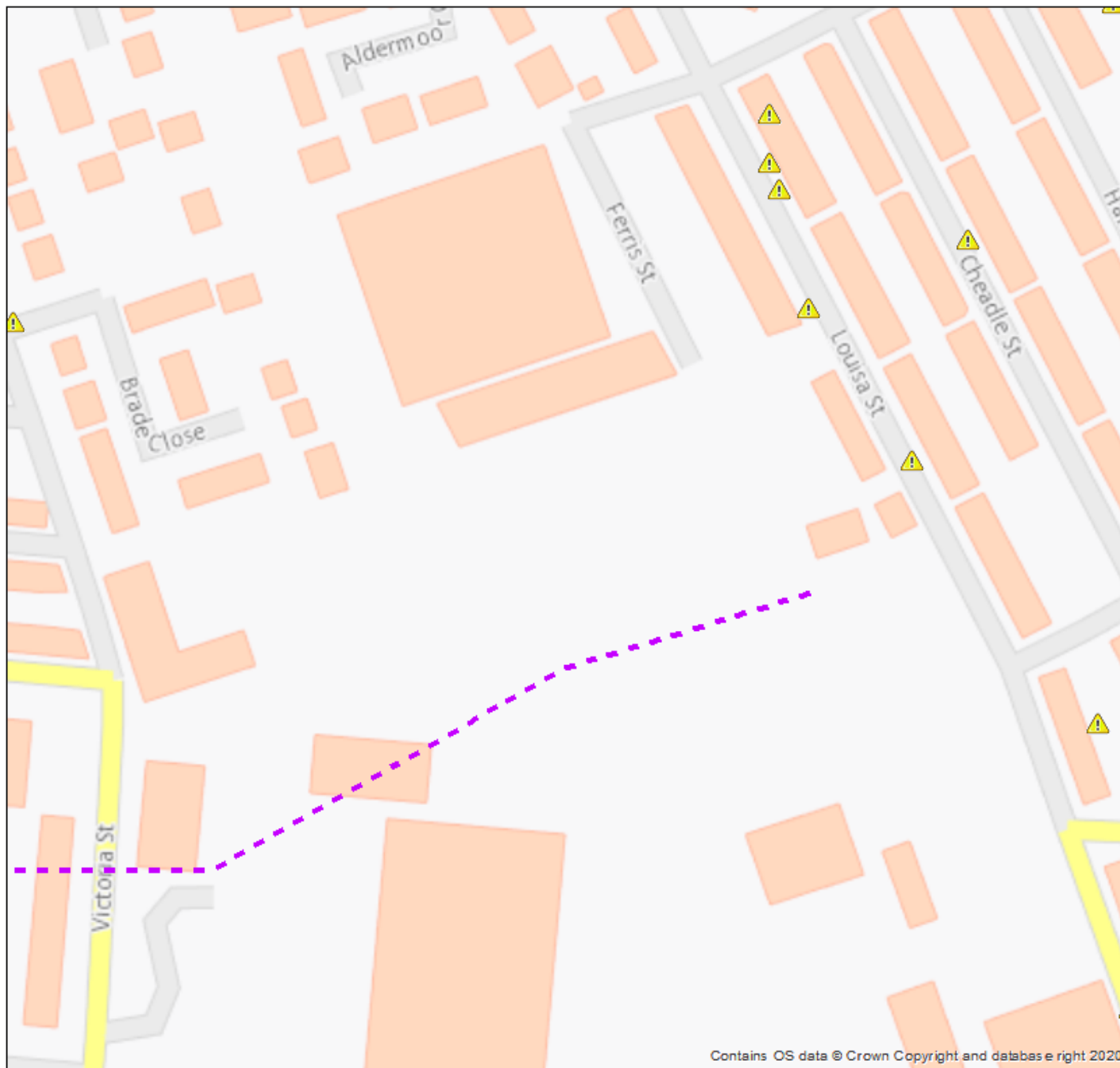
10 m east of Site: blocked highway gully/drain (05/06/2022).

Culvert Conduits – Our asset register highlights the “Corn Brook Tributary – Openshaw” ordinary watercourse culvert may be in close proximity to the Site (approximately 10 m south of the Site). This asset has not been verified with survey by MCC. Historic OS mapping annotates culverts in the vicinity.

Survey and Design Archive – An extract of the 1984 major drainage survey is included. The indicative ordinary watercourse culvert is not recorded in this survey.

Any other information identified by LLFA officer during screening –

Due to the indicative culvert risk, we would request that the applicant informs the onsite contractor to remain observant and to take the appropriate safety precautions during excavation works. If any major unknown drainage assets are found beneath the site, then further investigation works should take place to identify the asset and MCC should be contacted immediately.



**MANCHESTER
CITY COUNCIL**

LLFA DATA SCREEN

Address/Site Ref:

Louisa Street

Our Ref:

MCC030/08/2022

Author: Manchester City Council LLFA

Date: 30/08/2022

Scale: 1:1,593

The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

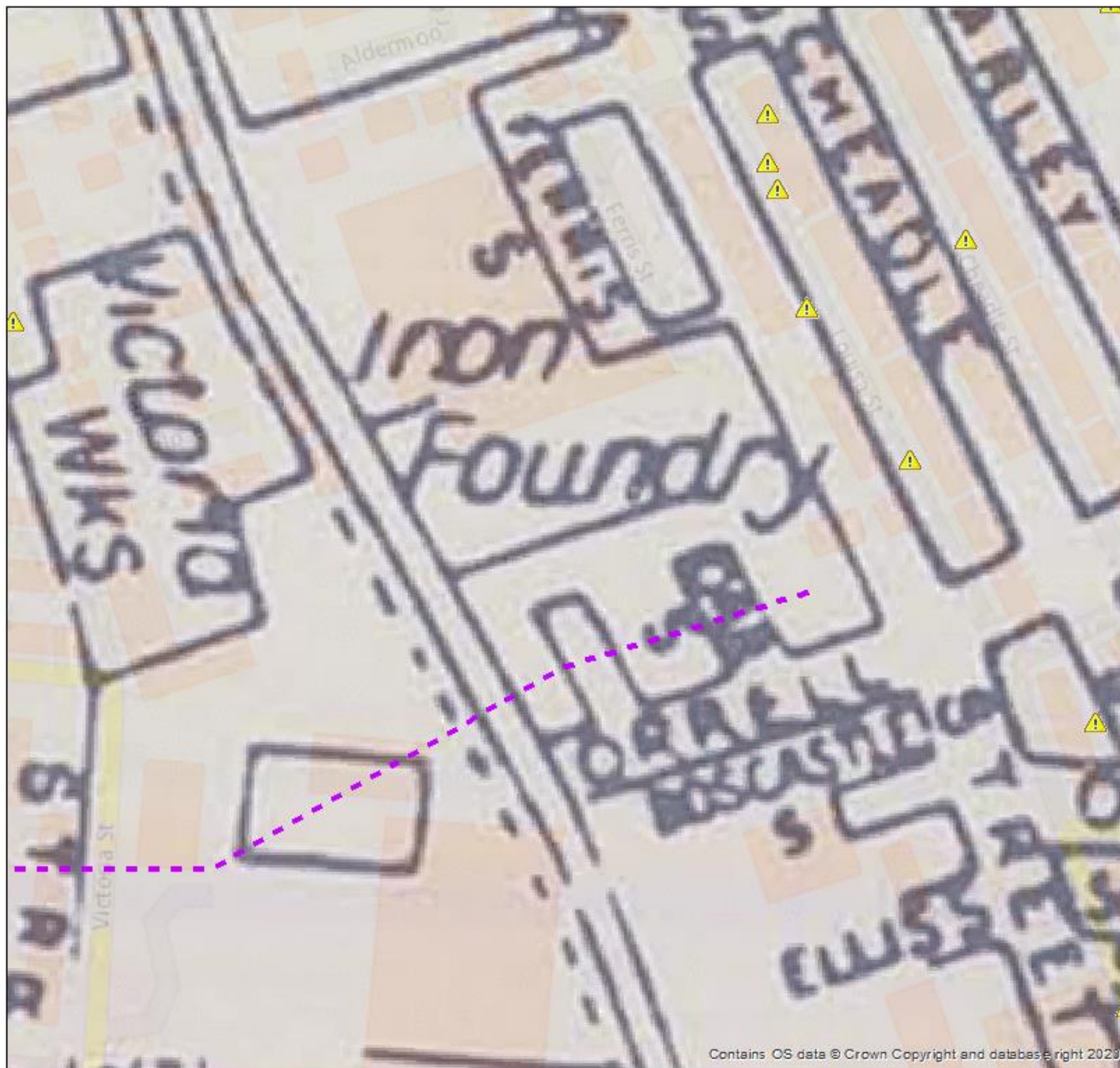
0 10 20 40
Meters

N



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Contains OS data © Crown Copyright and database right 2020



**MANCHESTER
CITY COUNCIL**

LLFA DATA SCREEN

Address/Site Ref:

Louisa Street

Our Ref: **MCC030/08/2022**

Author: Manchester City Council LLFA

Date: 30/08/2022

Scale: 1:1,593

The position of features shown on this plan is approximate only and is given in accordance with the best information currently available. Manchester City Council will not accept liability for any loss or damage caused by the actual position being different from those shown.

0 10 20 40
Meters

N



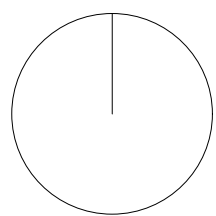
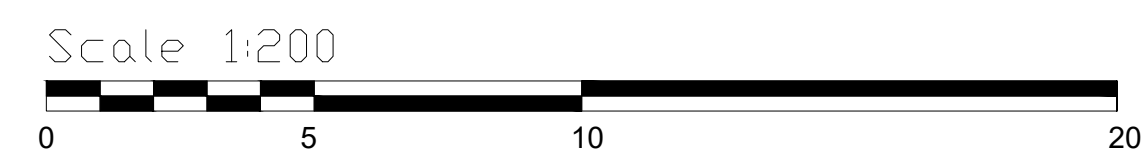
Contains OS data © Crown Copyright and database right 2022.

Contains OS data © Crown Copyright and database right 2020

Appendix F Proposed Site Plan



Proposed Site Plan



Louisa Street, Openshaw

Disclaimer:

Do not scale from this drawing. All dimensions and levels are to be checked on site. All areas are approximate and are for information only. This drawing is to be read in conjunction with all other relevant documents and all works are to comply with the current Building regulations, British Standards and Codes of Practice etc. All details of the existing structure are to be verified by others on site prior to any works commencing. The copyright of this drawing and all works executed from this drawing remain the property of View Associates Ltd. Any 3rd party survey information contained on this drawing is not the responsibility of View Associates Ltd. This drawing was created from existing information by Worthington Ashworth Jackson Walker – Somerford Farm Park – September 2015. All dimensions should be checked on site.

Revision: Description:

Date:

By:

Client:

Westchurch Homes Ltd

Drawing Title:

Proposed Site Plan

Drawing Number:

(PL)001 REV E

Drawn By:

HH

Checked By:

IJ

Stage:

Planning

Date:

15.08.2022

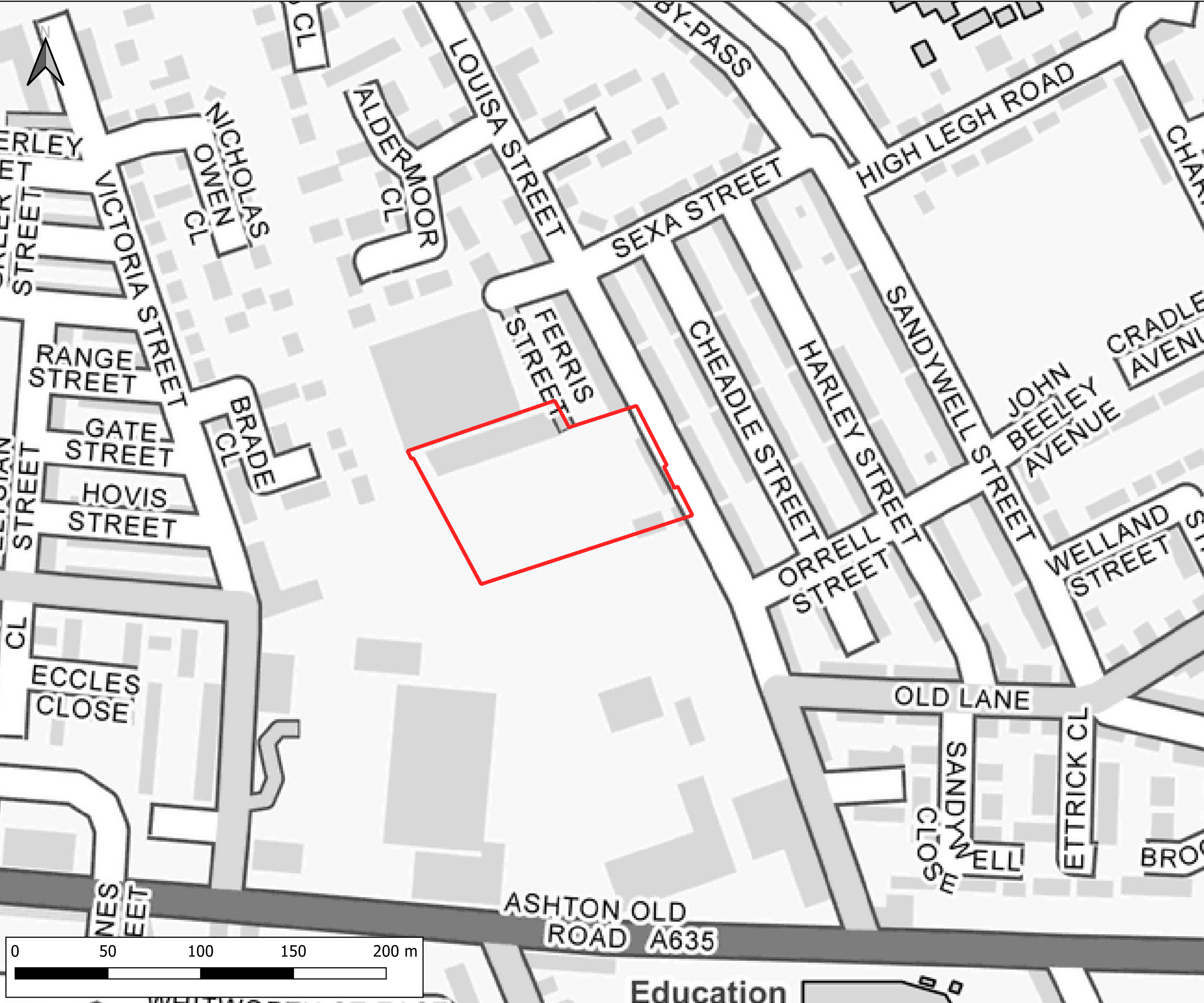
Scale:

1:200 @ A0



T 0161 941 7458
W viewassociates.co.uk
View Associates Ltd
Suite A, Kings Court
Railway Street
Altrincham WA14 2RD

Appendix G EA Flood Maps

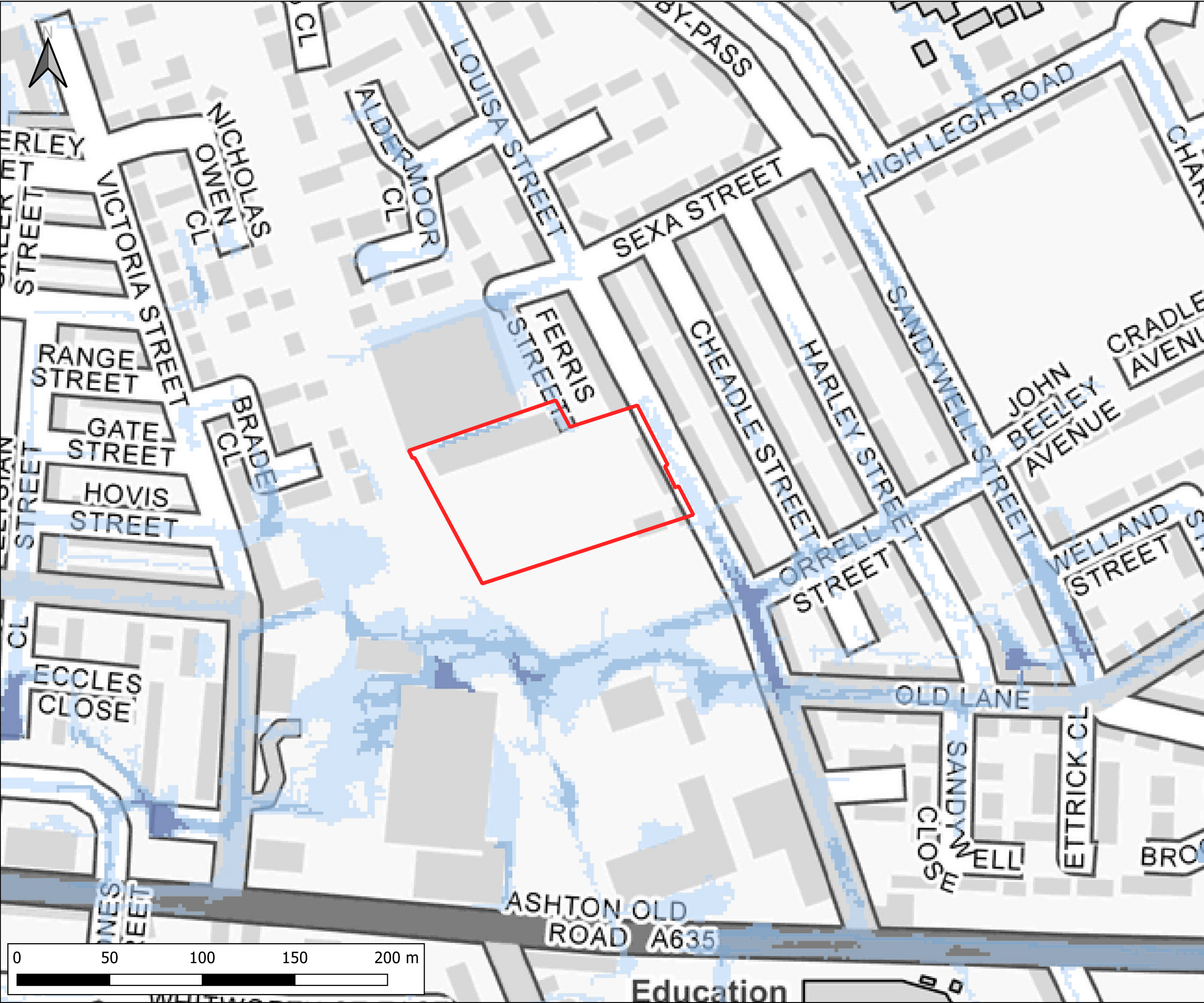


Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Main Rivers
- Flood Defences
- Flood Storage Areas
- Areas Benefitting from Defences
- Flood Zone 1
- Flood Zone 2
- Flood Zone 3

CLIENT: Westchurch Homes			
 www.waterco.co.uk			
SCHEME: Louisa Street, Openshaw			
PLOT TITLE: EA Flood Map for Planning Data accessed August 2022			
PLOT STATUS: FINAL			DATE: 23-08-2022
DRAWN: AM	CHECKED: AW	APPROVED: NJ	PLOT SCALE AT A3: 1:2000
PLOT NAME: 14921_EA_FMP			REVISION: -



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

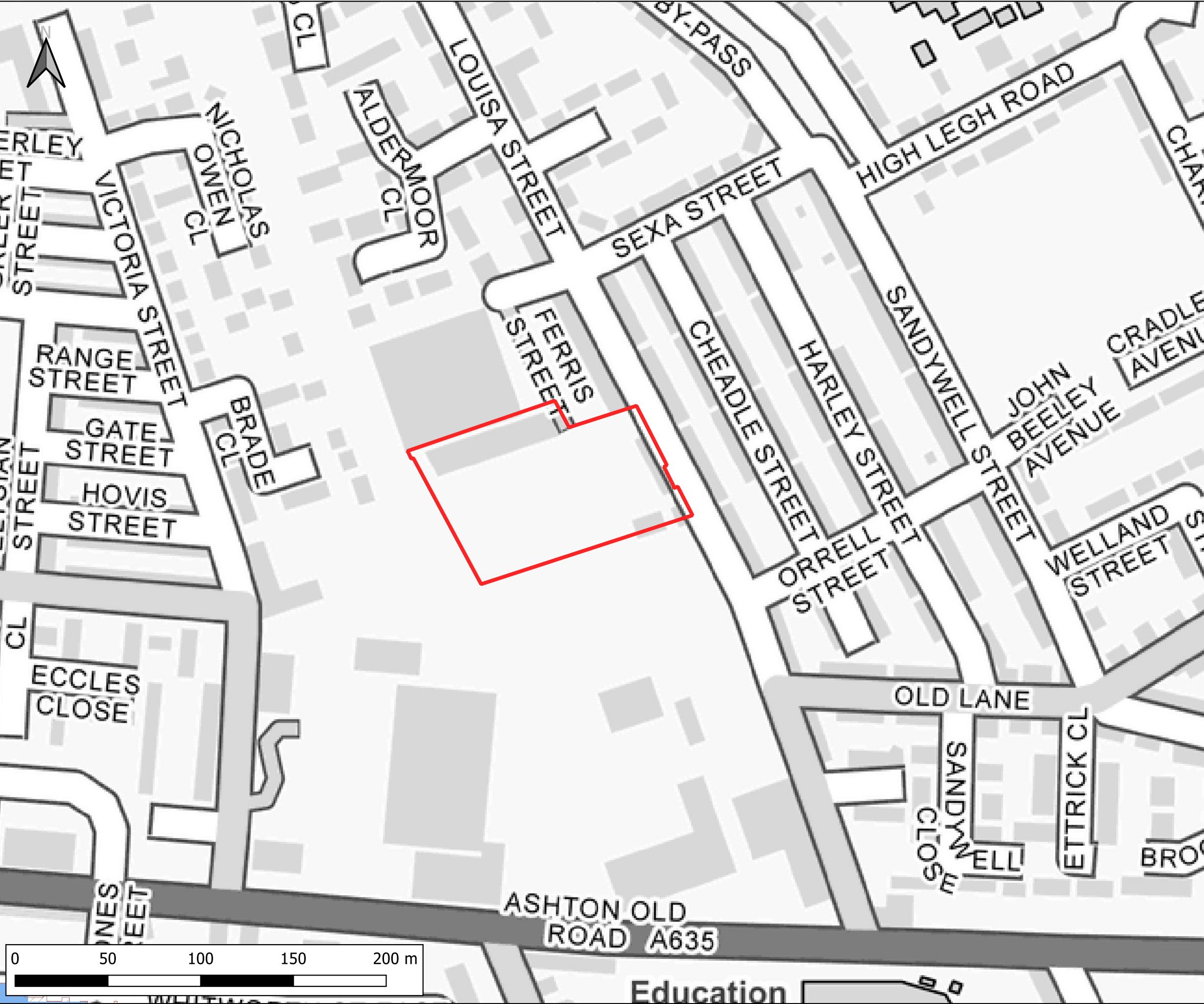
Flood Risk from Surface Water

High

Medium

Low

CLIENT:			
Westchurch Homes			
 www.waterco.co.uk			
SCHEME:			
Louisa Street, Openshaw			
PLOT TITLE:			
EA Flood Risk from Surface Water Data accessed August 2022			
PLOT STATUS:			DATE:
FINAL			23-08-2022
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	AW	NJ	1:2000
PLOT NAME:			REVISION:
14921_EA_Flood_Risk_from_Surface_Water			-

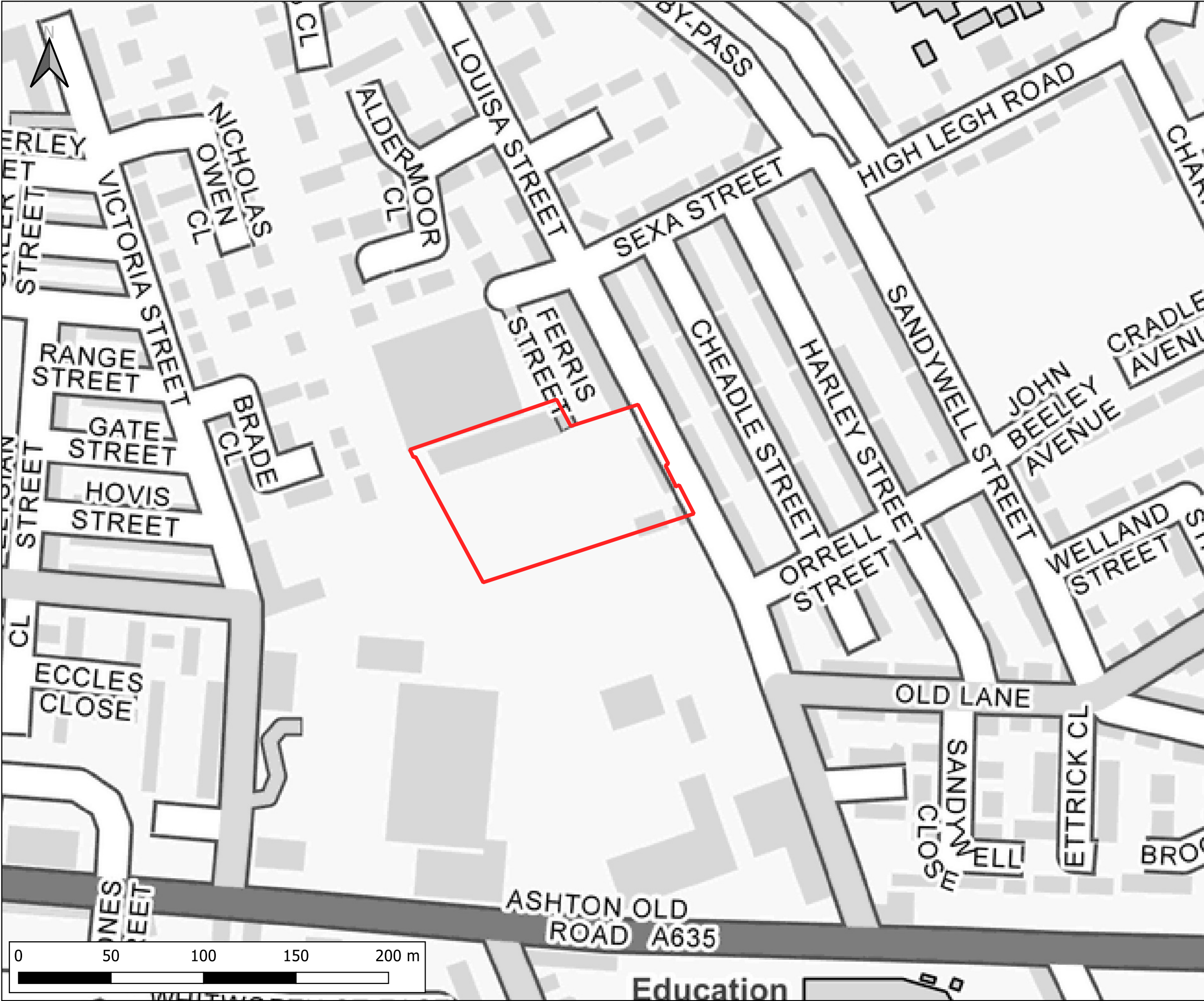


Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- When river levels are normal
- When there is also flooding from rivers

CLIENT: Westchurch Homes			
 www.waterco.co.uk			
SCHEME: Louisa Street, Openshaw			
PLOT TITLE: EA Flood Risk from Reservoirs Data accessed August 2022			
PLOT STATUS: FINAL			DATE: 23-08-2022
DRAWN: AM	CHECKED: AW	APPROVED: NJ	PLOT SCALE AT A3: 1:2000
PLOT NAME: 14921_EA_Flood_Risk_from_Reservoirs			REVISION: -



Notes:

1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

2) The Historic Flood Map is a GIS layer showing the maximum extent of individual Recorded Flood Outlines from river, the sea and groundwater springs that meet a set criteria. It shows areas of land that have previously been subject to flooding in England. This excludes flooding from surface water, except in areas where it is impossible to determine whether the source is fluvial or surface water but the dominant source is fluvial.

3) If an area is not covered by the Historic Flood Map it does not mean that the area has never flooded, only that the EA do not currently have records of flooding in this area that meet the criteria for inclusion.

4) The Historic Flood Map takes into account the presence of defences, structures, and other infrastructure where they existed at the time of flooding. It will include flood extents that may have been affected by overtopping, breaches or blockages.

LEGEND

-  Site Boundary
-  Historic Flood Extent



CLIENT:			
Westchurch Homes			
 www.waterco.co.uk			
SCHEME:			
Louisa Street, Openshaw			
PLOT TITLE:			
EA Historic Flood Risk Data accessed August 2022			
PLOT STATUS:			DATE:
FINAL			23-08-2022
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
AM	AW	NJ	1:2000
PLOT NAME:			REVISION:
14921_EA_Historic_Flood_Risk			-

Appendix H LLFA Consultation Response

Lead Local Flood Authority - Manchester City Council

[SuDS Requirements for New Developments](#) [Update 2019](#)

The Government has strengthened planning policy on the provision of sustainable drainage systems (SuDS) for 'major' planning applications which is being introduced from 6 April 2015 (Paragraph 103 of National Planning Policy Framework and Ministerial Statement on SuDS).

Changes were made to the Town and Country Planning Policy and Guidance to give Local Authority Planning Departments the responsibility for ensuring that new developments are drained in a sustainable way, through the planning process, in consultation with the Lead Local Flood Authorities. As per the guidance issued by the Department of Communities and Local Government (DCLG), all 'major' planning applications being determined from 6 April 2015, must consider sustainable drainage systems.

Decisions about the suitability of sustainable drainage provision are made by the Local Planning Authority. However, under the new consultation arrangements Manchester City Council, in its role as Lead Local Flood Authority, is a statutory consultee for all major applications with regards to sustainable drainage. All 'major' planning applications submitted from 15 April 2015 are required to include a Surface Water Drainage Statement.

Developers submitting the planning application to Manchester City Council are advised to:

- Assess the suitability of sustainable drainage systems in accordance with: paragraphs 051, 079 and 080 of the revised NPPF Planning Practice Guidance (PPG) for Flood Risk and Coastal Change.
- Design sustainable drainage systems in line with national Non-Statutory Technical Standards for SuDS: <https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards> and local policies DM1, EN08, EN14 and EN17 of the Core Strategy.
- Implement strategy that supports surface water runoff control as near to its source as possible through a sustainable drainage approach to surface water management, preferably through green types of SuDS wherever practicable.
- Maximise use of Green Infrastructure to manage surface water runoff (sustainable drainage systems – SuDS) as feasibility of use of green types of SuDS will be evaluated by LLFA during planning application stage. Even on sites where infiltration is not possible due to the unfavourable soil conditions, utilisation of attenuating types of SuDS should be maximised as part of green infrastructure in order to bring surface water runoff peak and volume reduction but also provide additional environmental and social benefits in line with Policies DM1, EN08, EN14 and EN17 of the Core Strategy. Developers are encouraged to look into CIRIA SuDS Manual 2015 for details of these systems to manage surface water runoff.
- Assess surface water attenuation requirements that offer a reduction in surface water runoff rate in line with the 'Manchester City, Salford City and Trafford Councils Level 2 Hybrid SFRA, User Guide, Final, dated May 2010'. (Section 3.4.1 Critical Drainage Areas, page 31). Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates.

http://www.manchester.gov.uk/downloads/download/3871/strategic_flood_risk_assessment-manchester_salford_trafford

- Submit hydraulic calculations and drawings to support the design along with proposed standards of operation and maintenance in accordance with paragraph 081 of NPF (PPG).
- It will be essential that the type of sustainable drainage system for a site, along with details of its extent/position, is identified at the design stage of the whole scheme. This information will be required for both outline and full applications so it is clearly demonstrated that the SuDS can be accommodated within the development that is proposed. It will no longer be acceptable to leave the design of SuDS to a later stage to be dealt with by planning conditions.

Applicants are strongly advised to discuss their proposals with relevant planning officers at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.

Minimum requirements for approval

In order to avoid objection, the following three elements of evidence are required:

- Surface Water Management Statement for the site is submitted that is in line with requirement of NPPF PPG Paragraph 079:
 - “New development should only be considered appropriate in areas at risk of flooding if priority has been given to the use of green types of sustainable drainage systems as a primary mean of surface water management that could be accompanied by traditional attenuation systems if volumes required. Additionally, and more widely, when considering major development, as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2015, sustainable drainage systems should be provided unless demonstrated to be inappropriate”.
 - The strategy should be accompanied by at least an outline layout of the proposed drainage systems with space allocation for the proposed attenuation in line with relevant flow reduction requirements.
- Evidence that drainage hierarchy has been applied in line with NPPF PPG Paragraph 080. The aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:
 - into the ground (infiltration);
 - to a surface water body;
 - to a surface water sewer, highway drain, or another drainage system;
 - to a combined sewer.
- Evidence that one viable solution for draining the site is secured and agreed in principle with relevant authority:
 - Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground

investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.

- Where surface water is connected to Main River, any works within or adjacent to the river that would affect it would require consent from Environment Agency. An email of acceptance of proposed flows and/or new connection will suffice.
- Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.

Where surface water is connected to the ordinary watercourse, agreement in principle from Manchester City Council as Lead Local Flood Authority is required. Please note that all new connections to the watercourses shall comply with reduction of flows to Greenfield runoff rates. An email of acceptance of proposed flows and/or new connection will suffice.

- Where surface water is connected to ordinary watercourse, any works within or adjacent to the watercourse that would affect it would require consent from Manchester City Council as Lead Local Flood Authority. Consent forms can be obtained on the website at:

http://www.manchester.gov.uk/downloads/download/5567/land_drainage_consent_and_guidance.com

Avoiding or discharging drainage condition

- Evidence of consideration of green SuDS solution wherever practicable and viable in line with NPPF PPG Paragraph 051. SuDS should be designed to:
 - reduce the causes and impacts of flooding;
 - remove pollutants from urban run-off at source;
 - combine water management with green space with benefits for amenity, recreation and wildlife wherever practicable.
- For Greenfield site developments, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. to the Greenfield runoff rates;
- For Brownfield site developments, for all sites located within Conurbation Core Critical Drainage Areas, details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates with an aim to reduce to Greenfield runoff rates wherever practicable;
- Where surface water runoff is to be disposed through infiltration, details of surface water attenuation that is adequate for infiltration capacity of the underlying soil is required. This capacity has to be assessed through site investigation carried out in line with Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Half emptying time of proposed attenuation within 24 hours should be achieved.

- Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event in any part of a building; The NPPF suggests that ‘for events with a return-period in excess of 30 years, surface flooding of open spaces such as landscaped areas or car parks is acceptable for short periods, but the layout and landscaping of the site should aim to route water away from any vulnerable property, and avoid creating hazards to access and egress routes. No flooding of property should occur as a result of a one in 100 year storm event (including an appropriate allowance for climate change)’.
- Assessment of overland flow routes for extreme events that is diverted away from buildings providing long and cross sections for the proposed drainage system and finished floor levels;
- Evidence that runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonably practical to the Greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment;
- Hydraulic calculation of the proposed drainage system;
- Design construction drawings of proposed SuDS elements and flow controls;
- For sites where proposed development would cause unusual pollution risk to surface water (large car park areas (>50 parking spaces) or industrial estates), evidence of pollution control measures (preferably through SuDS) is required.
- Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.

SuDS Maintenance

Maintenance of SuDS is essential for its proper operation and a clear management and maintenance plan for the lifetime of the development is required as part of the planning application.

In considering a development that includes a sustainable drainage system, Manchester City Council as local planning authority will want to be satisfied that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance. Information sought by Manchester City Council would be no more than necessary, having regard to the nature and scale of the development concerned in line with NPPF Paragraph 081.

In some instances where no clear adoption of the drainage system is proposed, a drainage maintenance condition could be attached to the planning applications. In order to discharge this condition, the following evidence should be provided following *construction*:

- Verification report providing photographic evidence of construction as per design drawings;
- As built construction drawings if different from design construction drawings;

- Management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.

Applicants are strongly advised to discuss their proposals with relevant planning officers at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.

Ryan Moore

From: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Sent: 17 August 2022 10:21
To: Adam McCulloch
Subject: RE: Consultation request for proposed residential area.
Attachments: Manchester City Council - SuDS Requirement for Developers 2019.pdf;
PrePayment_Letter - Louisa Street.pdf

Good Morning Adam,

Having looked over our records there appears to be culverted ordinary watercourse positioned directly beneath the site. Therefore I would recommend that you purchase a MCC data screen of the site (how to do this is highlighted below).

As part of the new MCC data screening process, we are able to supply copies of maps illustrating known/historic culverts and open watercourses within close proximity to the concerning site, as well as known local flood incidents and identifying critical drainage areas. I will advise you that MCC now charges for delivery of this information. Therefore, I have attached a prepayment letter which summarises what information will be included as part of the data screening.

If you would like us to progress with the data screen then we would request that you please follow the below link to formally submit the request (note, the form should also take you through to the payment section).

<https://manchester.civicapayforms.co.uk/Sales/LaunchInternet.aspx?saleform=llfa>

In terms of discharge rates we would need to see evidence of calculations to accompany the below before we can agree anything formally. I have also attached the SuDS requirements for developers document which should be referred to when writing the drainage strategy for the site.

Kind Regards,

Oliver

Oliver Timmins
Engineer (Flood Risk Management)

Lead Local Flood Authority
Highways
Growth & Development and Neighbourhoods Directorate
Manchester City Council
PO Box 532 Town Hall
Manchester
M60 2LA

Web: <http://www.manchester.gov.uk>

From: Adam McCulloch <adam.mcculloch@waterco.co.uk>
Sent: 29 July 2022 11:39
To: Flood Risk Management <floodriskmanagement@manchester.gov.uk>
Subject: RE: Consultation request for proposed residential area.

You don't often get email from adam.mcculloch@waterco.co.uk. [Learn why this is important](#)

Proposed residential development at Louisa Street Works, Openshaw, M11 1AD. Grid reference: 388594, 397620.

Dear Sir/Madam,

We are currently preparing a Flood Risk Assessment & Drainage Strategy for the site located at the above address. The proposed development is for 70 No. residential properties. Please find attached a site location plan and a proposed development plan for your reference.

We are seeking initial LLFA comments in relation to surface water drainage and flood risk.

Attenuation will be provided for the 1 in 100 year plus 45% climate change event, in the form of oversized pipes, or within an attenuation tank beneath the roads. Surface water will discharge to the surface water network at a limited greenfield (1 in 1 year) rate of 6.3 l/s. Please can you advise if this is acceptable and advise on the percentage of urban creep to consider.

Furthermore, please can you advise if you have any records of historical flooding affecting the site.

If you have any questions or require any further information to process my request, please do not hesitate to contact me.

Kind regards,

Adam McCulloch
Environmental Consultant

Teams: adam.mcculloch@waterco.co.uk

We're recruiting! For more information, please take a look at our [website](#).



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Your personal data is very important to us. Please refer to our privacy notice at: www.manchester.gov.uk/privacy for further information.

This footnote also confirms that this email message has been swept for the presence of computer viruses.

Appendix I United Utilities Pre-development Enquiry Response

Ryan Moore

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 05 August 2022 12:16
To: Adam McCulloch
Subject: PDE for: Louisa Street Works UU Ref : 02563976

Categories: Filed by Mail Manager

Good afternoon Adam,

Pre Development Enquiry for: Louisa Street Works UU Reference Number : 02563976

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 300mm diameter public combined sewer within Ferris Street located to the North of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Please ensure all proposed manhole chambers cover levels and finished floor levels are higher than the receiving public sewer.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**

3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

United Utilities acknowledge that the nearest watercourse is a significant distance off-site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 300mm diameter

public combined sewer within Ferris Street located North of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

Sewer Adoptions

You have indicated on your application form that you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-adoptions/>

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

<https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/>

A free copy of the new Design & Construction Guidance can be downloaded via the link below:

<https://www.water.org.uk/sewerage-sector-guidance-approved-documents/>

Many thanks and kind regards,



Mohammed Aljafarawi (He/Him)

Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

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Appendix J ReFH2 Greenfield & Brownfield Runoff Rates

DOCUMENT VERIFICATION RECORD	
Project:	Louisa Street, Openshaw
Client:	Westchurch Homes
Report Title:	14921 – Flood Risk Assessment & Drainage Strategy
Date:	20 th August 2022

DOCUMENT REVIEW & APPROVAL	
Author:	Adam McCulloch
Checker:	Aled Williams BSc (Hons) MCIWEM C.WEM
Approver:	Nigel Jones BEng (Hons) CEng MICE

ReFH2 RUNOFF RATES*		
Return Period (Years)	Urbanised Peak Flow (l/s)	As-rural Peak Flow (l/s)
1	20.42	6.27
2	23.30	7.13
5	33.33	10.21
10	41.08	12.66
30	55.61	17.43
50	63.87	20.25
75	71.35	22.86
100	77.15	24.92
200	92.42	30.54
1000	131.96	46.42

*Runoff Rates printed from the ReFH Flood Modelling software package

Appendix K MicroDrainage Attenuation Storage Estimate

Waterco Ltd					Page 1
Eden Court		14921			
Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year + 45% CC			
Date 01/08/2022		Designed by AM			
File 1 in 100 year +45% CC a...		Checked by AW			
XP Solutions		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+45%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.207	0.407	5.0	142.7	O K
30 min Summer	9.336	0.536	5.0	188.3	O K
60 min Summer	9.474	0.674	5.0	236.6	O K
120 min Summer	9.586	0.786	5.0	275.9	O K
180 min Summer	9.644	0.844	5.0	296.1	O K
240 min Summer	9.677	0.877	5.0	307.7	O K
360 min Summer	9.705	0.905	5.0	317.7	Flood Risk
480 min Summer	9.707	0.907	5.0	318.2	Flood Risk
600 min Summer	9.696	0.896	5.0	314.4	O K
720 min Summer	9.683	0.883	5.0	310.1	O K
960 min Summer	9.657	0.857	5.0	300.7	O K
1440 min Summer	9.598	0.798	5.0	280.2	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
15 min Summer	150.156	0.0	144.3	16	
30 min Summer	100.240	0.0	192.5	31	
60 min Summer	64.284	0.0	249.6	62	
120 min Summer	38.783	0.0	301.2	122	
180 min Summer	28.715	0.0	334.4	182	
240 min Summer	23.142	0.0	359.3	240	
360 min Summer	17.001	0.0	395.7	360	
480 min Summer	13.620	0.0	422.5	480	
600 min Summer	11.455	0.0	444.0	560	
720 min Summer	9.938	0.0	462.1	612	
960 min Summer	7.941	0.0	491.9	740	
1440 min Summer	5.776	0.0	535.5	1008	
©1982-2020 Innovyze					

Waterco Ltd					Page 2
Eden Court		14921			
Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year + 45% CC			
Date 01/08/2022		Designed by AM			
File 1 in 100 year +45% CC a...		Checked by AW			
XP Solutions		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+45%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
2160 min Summer	9.499	0.699	5.0	245.4	O K
2880 min Summer	9.406	0.606	5.0	212.8	O K
4320 min Summer	9.256	0.456	5.0	159.9	O K
5760 min Summer	9.145	0.345	5.0	121.0	O K
7200 min Summer	9.067	0.267	4.9	93.7	O K
8640 min Summer	9.013	0.213	4.8	74.9	O K
10080 min Summer	8.975	0.175	4.6	61.5	O K
15 min Winter	9.256	0.456	5.0	160.1	O K
30 min Winter	9.402	0.602	5.0	211.5	O K
60 min Winter	9.560	0.760	5.0	266.7	O K
120 min Winter	9.687	0.887	5.0	311.5	O K
180 min Winter	9.755	0.955	5.0	335.2	Flood Risk
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
2160 min Summer	4.198	0.0	586.9	1408	
2880 min Summer	3.351	0.0	624.7	1788	
4320 min Summer	2.446	0.0	683.7	2548	
5760 min Summer	1.964	0.0	732.5	3232	
7200 min Summer	1.665	0.0	776.2	3896	
8640 min Summer	1.459	0.0	816.1	4592	
10080 min Summer	1.307	0.0	853.0	5256	
15 min Winter	150.156	0.0	161.6	16	
30 min Winter	100.240	0.0	215.5	31	
60 min Winter	64.284	0.0	279.5	62	
120 min Winter	38.783	0.0	337.3	120	
180 min Winter	28.715	0.0	374.4	178	
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Eden Court		14921			
Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year + 45% CC			
Date 01/08/2022		Designed by AM			
File 1 in 100 year +45% CC a...		Checked by AW			
XP Solutions		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+45%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (1/s)	Max Volume (m³)	Status
240 min Winter	9.795	0.995	5.0	349.3	Flood Risk
360 min Winter	9.834	1.034	5.0	362.8	Flood Risk
480 min Winter	9.842	1.042	5.0	365.9	Flood Risk
600 min Winter	9.836	1.036	5.0	363.8	Flood Risk
720 min Winter	9.822	1.022	5.0	358.6	Flood Risk
960 min Winter	9.785	0.985	5.0	345.6	Flood Risk
1440 min Winter	9.709	0.909	5.0	319.1	Flood Risk
2160 min Winter	9.579	0.779	5.0	273.3	O K
2880 min Winter	9.425	0.625	5.0	219.3	O K
4320 min Winter	9.196	0.396	5.0	138.9	O K
5760 min Winter	9.052	0.252	4.9	88.5	O K
7200 min Winter	8.972	0.172	4.6	60.3	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
240 min Winter	23.142	0.0	402.2	236	
360 min Winter	17.001	0.0	443.0	350	
480 min Winter	13.620	0.0	473.0	462	
600 min Winter	11.455	0.0	497.0	572	
720 min Winter	9.938	0.0	517.2	676	
960 min Winter	7.941	0.0	550.4	770	
1440 min Winter	5.776	0.0	598.7	1080	
2160 min Winter	4.198	0.0	657.4	1552	
2880 min Winter	3.351	0.0	699.6	1932	
4320 min Winter	2.446	0.0	765.9	2640	
5760 min Winter	1.964	0.0	820.6	3336	
7200 min Winter	1.665	0.0	869.4	3960	
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Lon Parcwr Business Park		Attenuation Storage			
Denbighshire LL15 1NJ		1 in 100 year + 45% CC			
Date 01/08/2022		Designed by AM			
File 1 in 100 year +45% CC a...		Checked by AW			
XP Solutions		Source Control 2020.1.3			
<u>Summary of Results for 100 year Return Period (+45%)</u>					
Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
8640 min Winter	8.928	0.128	4.3	44.8	O K
10080 min Winter	8.911	0.111	3.9	38.8	O K
Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	
8640 min Winter	1.459	0.0	914.0	4576	
10080 min Winter	1.307	0.0	955.5	5216	
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Waterco Ltd		Page 5
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14921 Attenuation Storage 1 in 100 year + 45% CC	
Date 01/08/2022 File 1 in 100 year +45% CC a...	Designed by AM Checked by AW	
XP Solutions Source Control 2020.1.3		

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 388594 397620 SJ 88594 97620
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+45

Time Area Diagram

Total Area (ha) 0.518

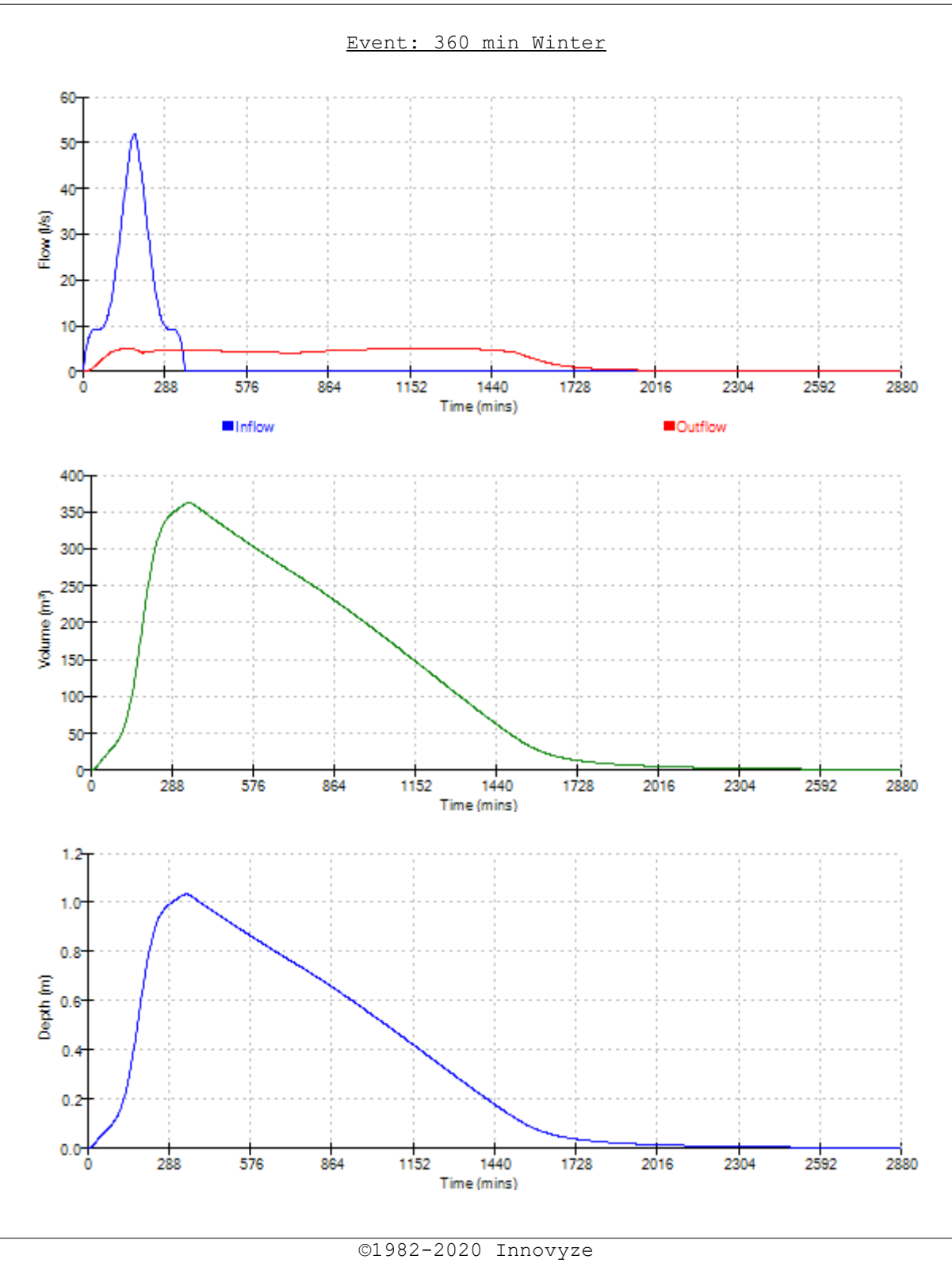
Time (mins)	Area
From:	To: (ha)
0	1 0.518

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Eden Court	14921																								
Lon Parcwr Business Park	Attenuation Storage																								
Denbighshire LL15 1NJ	1 in 100 year + 45% CC																								
Date 01/08/2022	Designed by AM																								
File 1 in 100 year +45% CC a...	Checked by AW																								
XP Solutions	Source Control 2020.1.3																								
Model Details Storage is Online Cover Level (m) 10.000 Tank or Pond Structure Invert Level (m) 8.800 <table><thead><tr><th>Depth (m)</th><th>Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th></tr></thead><tbody><tr><td>0.000</td><td>351.0</td><td>1.200</td><td>351.0</td></tr></tbody></table> Hydro-Brake® Optimum Outflow Control Unit Reference MD-SHE-0103-5000-1200-5000 Design Head (m)1.200 Design Flow (l/s)5.0 Flush-Flo™Calculated ObjectiveMinimise upstream storage ApplicationSurface Sump AvailableYes Diameter (mm)103 Invert Level (m)8.795 Minimum Outlet Pipe Diameter (mm)150 Suggested Manhole Diameter (mm)1200 <table><thead><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>Design Point (Calculated)</td><td>1.200</td><td>5.0</td></tr><tr><td>Flush-Flo™</td><td>0.354</td><td>5.0</td></tr><tr><td>Kick-Flo®</td><td>0.745</td><td>4.0</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>4.4</td></tr></tbody></table> The hydrological calculations have been based on the Head/ Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated			Depth (m)	Area (m²)	Depth (m)	Area (m²)	0.000	351.0	1.200	351.0	Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	1.200	5.0	Flush-Flo™	0.354	5.0	Kick-Flo®	0.745	4.0	Mean Flow over Head Range	-	4.4
Depth (m)	Area (m²)	Depth (m)	Area (m²)																						
0.000	351.0	1.200	351.0																						
Control Points	Head (m)	Flow (l/s)																							
Design Point (Calculated)	1.200	5.0																							
Flush-Flo™	0.354	5.0																							
Kick-Flo®	0.745	4.0																							
Mean Flow over Head Range	-	4.4																							
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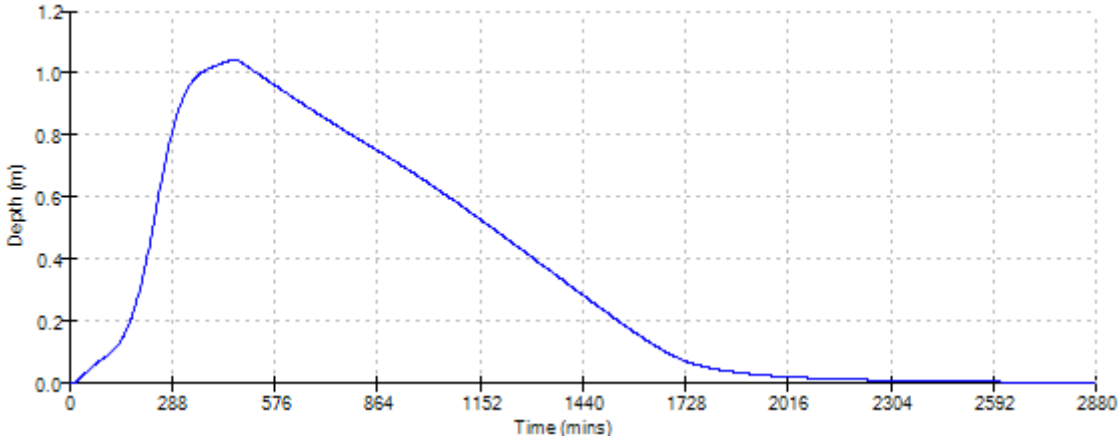
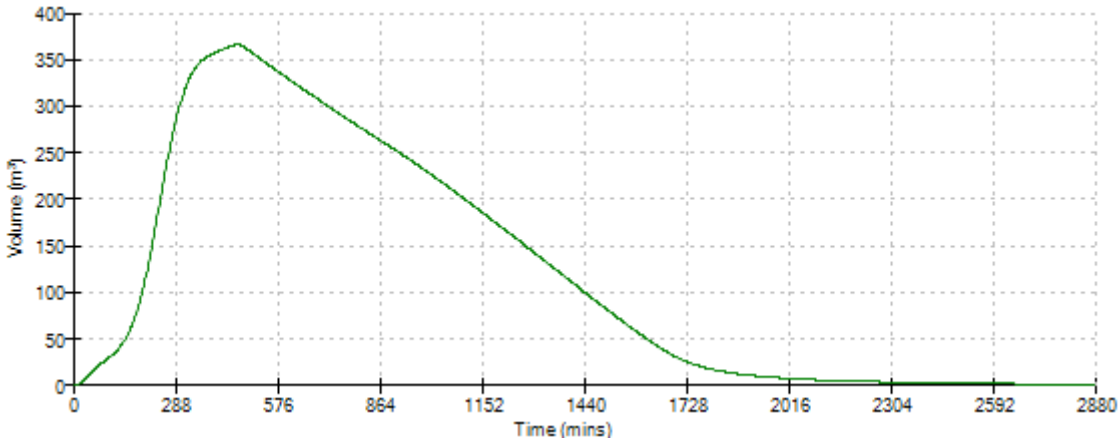
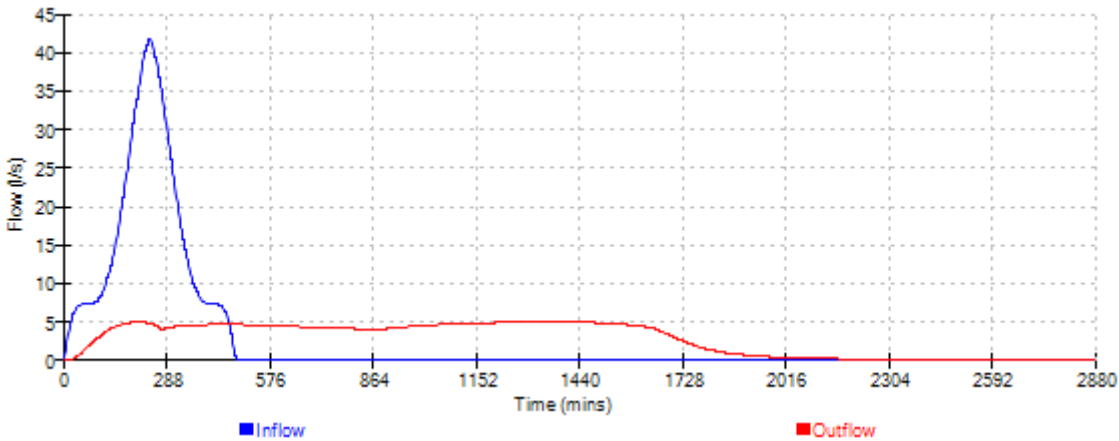
Waterco Ltd		Page 7			
Eden Court	14921				
Lon Parcwr Business Park	Attenuation Storage				
Denbighshire LL15 1NJ	1 in 100 year + 45% CC				
Date 01/08/2022	Designed by AM				
File 1 in 100 year +45% CC a...	Checked by AW				
XP Solutions		Source Control 2020.1.3			
<u>Hydro-Brake® Optimum Outflow Control</u>					
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.4	1.600	5.7	5.000	9.8
0.200	4.7	1.800	6.0	5.500	10.2
0.300	5.0	2.000	6.3	6.000	10.7
0.400	5.0	2.200	6.6	6.500	11.1
0.500	4.9	2.400	6.9	7.000	11.5
0.600	4.7	2.600	7.2	7.500	11.8
0.800	4.1	3.000	7.7	8.000	12.2
1.000	4.6	3.500	8.3	8.500	12.6
1.200	5.0	4.000	8.8	9.000	12.9
1.400	5.4	4.500	9.3	9.500	13.3
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Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14921	
	Attenuation Storage 1 in 100 year + 45% CC	
Date 01/08/2022	Designed by AM	
File 1 in 100 year +45% CC a...	Checked by AW	
XP Solutions		Source Control 2020.1.3

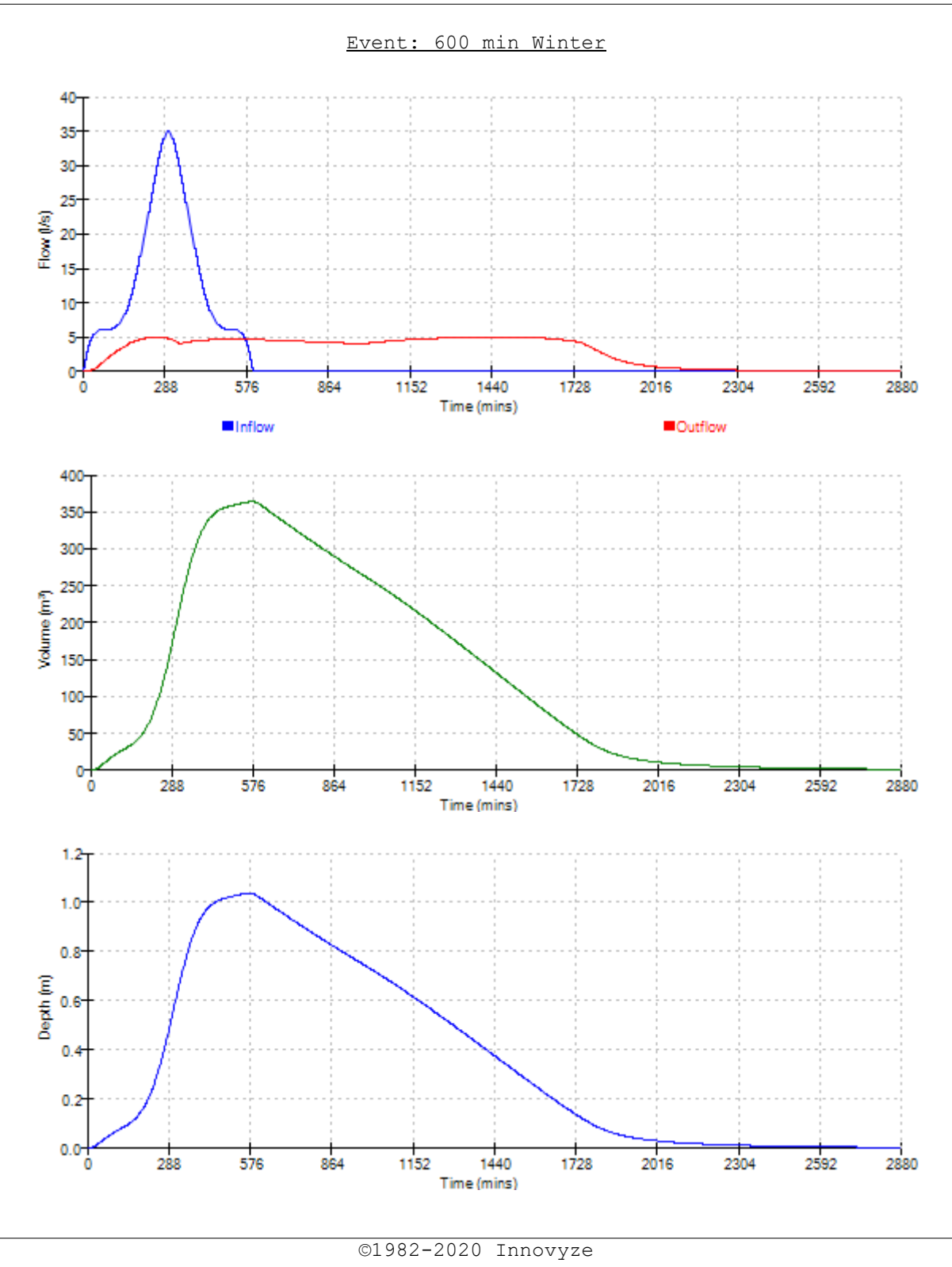


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Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	14921	
	Attenuation Storage 1 in 100 year + 45% CC	
Date 01/08/2022	Designed by AM	
File 1 in 100 year +45% CC a...	Checked by AW	
XP Solutions	Source Control 2020.1.3	

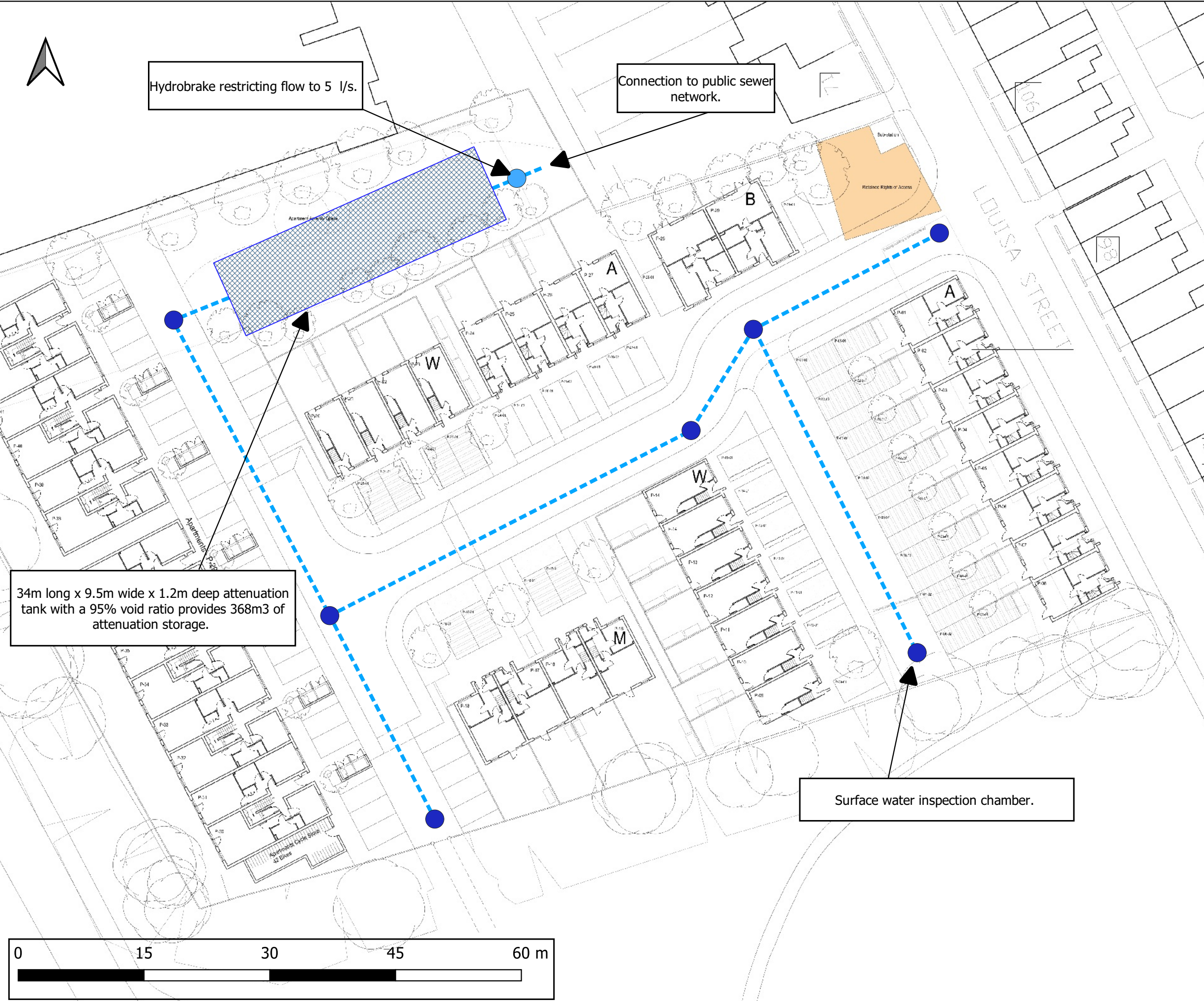
Event: 480 min Winter



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	Attenuation Storage 1 in 100 year + 45% CC	
Date 01/08/2022	Designed by AM	
File 1 in 100 year +45% CC a...	Checked by AW	
XP Solutions		Source Control 2020.1.3



Appendix L Concept Drainage Sketch



Notes:

- 1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
- 2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
- 3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
- 4) This drawing is an ammendment of the 'Proposed Site Plan, Revision B' by 'View Associates Ltd'. This drawing provides a concept only and is not intended for detailed design.

- LEGEND**
- Attenuation tank
 - Surface Water Drain
 - Flow Chamber Control
 - Surface Water Inspection Chamber

CLIENT:		Westchurch Homes	
		 www.waterco.co.uk	
SCHEME:		Louisa Street, Openshaw	
PLOT TITLE:		Concept Drainage Sketch	
PLOT STATUS:		FINAL	DATE: 23-08-2022
DRAWN: AM	CHECKED: AW	APPROVED: NJ	PLOT SCALE AT A3: 1:400
PLOT NAME: 14921_Flood_Evacuation_Plan			REVISION: -

Appendix M Maintenance Schedule

Operation and Maintenance Requirements for Attenuation Storage Tanks

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Ref. Table 21.3, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Appendix N Concept Designers Risk Assessment (cDRA)

Project: Louisa Street Works, Openshaw
Client: Westchurch Homes
Report Reference: 14921-FRA & Drainage Strategy-01

Project No: 14921

Prepared by:	Adam McCulloch	Date:	04/08/2022
Checked by:	Aled Williams	Date:	23/08/2022
Reviewed by:	Nigel Jones	Date:	23/08/2022

Requirement:

The Construction (Design and Management) Regulations 2015 (CDM 2015) place an obligation on the Designer to take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under CDM. The Designer has undertaken this assessment to identify any extra-ordinary risks, or those that would not be expected on this particular project by an experienced and competent Contractor. The aim is to avoid needless paperwork and bureaucracy and ensure the assessment is project specific, relevant and proportionate to the risk.

DRA Summary

Each of the following risk areas has been considered using the question below. Is a risk present which is considered to be **extra-ordinary or unexpected** in this instance?

If **YES** - A detailed risk assessment is required at design stage

If **UNKNOWN** - Insufficient information has been provided at concept design stage and the risks are unknown. Further consideration must be given at design stage(s)

If **NO** - No further action is required.

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Yes	Potential for contamination from previous site use
2	Hazardous Environment	Unknown	
3	Existing Working Environment	Unknown	Existing industrial units north of site
4	Existing Services	Unknown	Likely in place serving previous site use
5	Proximity to Other Structure(s)	Unknown	Existing industrial units north of site
6	Near Waterbody / flood risk	Unknown	Potential culverted watercourse on / near site
7	Proximity to Other Activities	Unknown	
8	Sequence of Construction	Unknown	
9	Access	Unknown	
10	Interfaces	Unknown	
11	Confined Space Working	Unknown	
12	Maintenance Considerations	Unknown	
13	Working at Height	Unknown	
14	Steep Slopes	No	
15	Demolition / Refurbishment / Repair	Unknown	
16	Welfare	Unknown	
17	Occupational Health	Unknown	
18	Environmental Issues	Unknown	
19	Other Significant Hazards not Identified Above	Unknown	
20	Residual Risk to Future Users	Unknown	