Brassey Street, Liverpool

Flood Risk Assessment & Drainage Strategy

December 2016

Waterco Ltd, Eden Court, Lon Parcwr Business Park, Ruthin, Denbighshire LL15 1NJ
Tel: 01824 702220 **Email:** enquiries@waterco.co.uk **Web:** www.waterco.co.uk

w10232-161215-FRA&Drainage Strategy

DOCUMENT VERIFICATION RECORD

CLIENT:	Eloquent Global Ltd.
SCHEME:	Proposed mixed use development at Brassey Street, Liverpool – Flood Risk Assessment & Drainage Strategy
INSTRUCTION:	The instruction to carry out this Flood Risk Assessment & Drainage Strategy was received from Mr John McCarthy of Eloquent Global Ltd.

DOCUMENT REVIEW & APPROVAL

AUTHOR:	Ifan Jones BSc (Hons) MSc
CHECKER:	Johanne Williams LLB (Hons) PgDip
APPROVER:	Aled Williams BSc (Hons)

ISSUE HISTORY

ISSUE DATE	COMMENTS
18/11/2016	First issue
15/12/2016	Second issue

Contents

Appendices

Tables

Introduction

Waterco Consultants have been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in relation to a proposed mixed use development at Brassey Street, Liverpool, L8 5XP.

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. 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).

From April 2015, Liverpool City Council as a 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 1.109ha development site is located at National Grid reference: 335164E, 388833N. A location plan and an aerial image are included in Appendix A.

Approximately 4,830m² of the total site area will be developed with the remaining 6,260m² retained as parkland.

The site is currently undeveloped. However, historic mapping indicates that the site was previously occupied by industrial units with associated parking and yard area. Building slabs are still present on site. The previous buildings were demolished between 2003 and 2005. The site is bordered by industrial units to the north, residential properties and Gore Street to the east, residential properties and Hill Street to the south, and Brassey Street and industrial premises to the west. Access to the site is provided from Brassey Street.

The site is intersected by a railway tunnel, with an open section of tunnel located immediately east of the developable site area.

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 4,830m² development site slopes from approximately 22.2m AOD in the north-east to approximately 21m AOD in the west. A LiDAR extract is included in Appendix B.

Ground Conditions

Reference to the British Geological Survey online mapping (1:50,000 scale) indicates that the site is underlain by bedrock geology consisting of the Helsby Sandstone Formation. No superficial deposits are identified.

The Environment Agency's (EA) Groundwater Mapping indicates that the sandstone bedrock is classified as a 'Principle Aquifer' defined as '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. In most cases, principal aquifers are aquifers previously designated as major aquifer.'

The EA's online 'Groundwater Source Protection Zones' map indicates that the site is not located within a Groundwater Source Protection Zone.

The Cranfield University 'Soilscapes' map indicates that the site is underlain by 'freely draining sandy soils'.

Local Drainage

Public sewer records have been requested from United Utilities (UU) and are included in Appendix C. The sewer records show that there is a 550mm x 900mm public combined sewer crossing the northern extent of the site from east to west. This sewer joins a 550mm x 900mm public combined sewer which originates from Brassey Street and flows north through the western extent of the site before becoming 675mm x 1050mm.

There is also a 550mm x 900mm public combined sewer crossing through the centre of the site from east to west. This sewer becomes a 225mm public combined sewer before joining the 550mm x 900mm public combined sewer which originates from Brassey Street in the western extent of the site.

Finally, there is a 675mm x 1050mm public combined sewer immediately south of the site. This sewer flows west within Hill Street.

Development Proposals

The proposed development is for the erection of two buildings to include 246 apartments and commercial space. The buildings will be accompanied by 180 subterranean car parking spaces over two levels, bike spaces, landscaped amenity space and enhancement works to the adjacent public park. Development plans are included in Appendix B.

The proposed development will introduce hardstanding areas in the form of buildings, access roads, car parking, bike parking and courtyard area. Hardstanding will comprise 4,830m^2 of the site area.

Flood Zone Classification and Policy Context

The Environment Agency (EA) 'Flood Map for Planning – Rivers and Sea' included in Appendix E shows that the site is located within Flood Zone 1 - an area outside of the extreme flood extent, considered to have a less than 0.1% annual probability of flooding from rivers or the sea.

In accordance with Table 2 of the NPPG: Flood Risk and Coastal Change, residential development is classified as 'more vulnerable', commercial development is classified as 'less vulnerable'. Table 3 of the NPPG states that 'more vulnerable' and 'less vulnerable' developments are considered appropriate within Flood Zone 1. The development therefore passes the flood risk Sequential Test and the Exception Test does not need to be applied.

Local guidance documents including the Liverpool City Council Strategic Flood Risk Assessment (SFRA) (January 2008) and the Liverpool City Council Preliminary Flood Risk Assessment (PFRA) (June 2011) have been reviewed for site specific information.

The Liverpool City Council 'Greenfield / Brownfield Sites Surface Water Management Guidance' document outlines what is required for a Flood Risk Assessment:

The following list sets out key information that should be submitted within a FRA for developments:

- *A location plan that includes geographical features, street names and identifies the catchment, watercourses or other bodies of water in the vicinity.*
- *A plan of the site showing existing site; development proposals; and identification of any structures (e.g. embankments), which may influence local flood flow overland or in any watercourses (e.g. culverts) present on the site.*
- *Site levels of both existing and proposed. Reference to Ordnance Datum, may be required where details of context of the site to its surroundings is needed.*
- *Details of the existing surface water drainage arrangements on site (if any) and the receptor e.g. soakaway, sewer, canal, watercourse etc.*
- *Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development*
- *Information about the surface water disposal measures already in place and estimates of the rates of run-off generated by the surfaces drained.*
- *An assessment of the volume of surface water run-off likely to be generated from the proposed development and confirmation of how any excess volumes would be retained within the development.*
- *Information regarding how the proposed drainage design will perform under the increased frequency and intensity of rainfall that is predicted as a result of climate change (30% for residential development & 20% for non- residential).*
- *Information about other potential sources of flooding, if any, that may affect the site e.g. streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these; including details on how these sources of flooding will be managed safely within the development proposal.*

Consultation

A pre-planning opinion request has been submitted to UU and the LLFA in November 2016.

Correspondence from United Utilities, included in Appendix C, states that *'The foul water flows emanating from the site will be allowed to drain freely in to the public combined sewerage system… The surface water flows generated from this site must drain to soakaway or some other form of infiltration system but if ground conditions confirm that this is not a viable solution then suface water may drain to the adjacent public combined water sewer at a maximum pass forward flow of 38 l/s… A* *public sewer crosses this site and we will require unrestricted access of the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m (refer to table 2.1 SFA) which is measured 3m from the centre line of the pipe. If you cannot achieve this then you may wish to consider diverting the public sewer'.*

Correspondence from representatives of the LLFA, included in Appendix D, states that the site will be classified as a greenfield major development that is less than a hectare. Therefore, in accordance with Liverpool City Council 'Greenfield / Brownfield Sites Surface Water Management *Guidance' 'if a site is greenfield the flow rates from the development will be limited to the equivalent greenfield runoff rates. A minimum flow of 5 l/s can be used when the greenfield run off rate falls below 5 l/s'.*

Sources of Flooding and Probability

Fluvial

The nearest watercourse is the River Mersey which is located approximately 790m west of the site. The River Mersey flows north in this location. There are no other watercourses in the immediate vicinity of the site.

The site is situated at a minimum of 21m AOD and is approximately 15m above the River Mersey. Therefore, any potential flooding of this watercourse would not reach the site. The site is located outside of the 0.1% annual probability flood extent on the EA 'Flood Map for Planning (Rivers and Sea)' and is therefore considered to be at low risk of fluvial flooding.

Tidal

The site is situated at a minimum of 21m AOD and is significantly above sea level. The SFRA 'Predicted Extreme Tide Levels in 2115' map (Appendix E) shows that the site is located outside of the tidal flood extent when applying climate change up to the year 2115. Therefore, the site is at very low risk of 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 E) indicates that the majority of the site is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding. An isolated area of the site, local to the open section of railway tunnel is shown at 'low' risk of surface water flooding, meaning it has between a 1% and 0.1% annual probability of flooding.

There are no records of surface water flooding at or near to the site. Any potential surface water flooding arising at or near to the site would be directed west, away from the site, following the local topography.

It can therefore be concluded that the site is at low risk of surface water flooding.

Sewer Flooding

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 SFRA 'Historical Sewer Flooding' map (Appendix F) shows that there are no records of sewer flooding within the site's postcode sector in the ten years prior to 2008. Any potential flooding arising from the sewer network in Brassey Street to the west or Hill Street to the south of the site would be contained within the highway and directed south-west, away from the site, following the local topography.

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

Groundwater Flooding

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.

The PFRA states that '*records do not show any instances of groundwater flooding*'. The Mersey Catchment Flood Management Plan (CFMP) (December 2009) states that '*there is no known documented evidence of surface flooding from groundwater in the Mersey Estuary CFMP area. We consider the current risk of flooding from this source to be low compared to other sources of flooding*'.

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

Artificial Sources of Flooding

There are no canals within the vicinity of the site. The EA 'Flood Risk from Reservoirs' map (Appendix E) shows that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that there is no risk of flooding from artificial sources.

Summary of Potential Flooding

It can be concluded that the site is at low risk of flooding from all sources. Therefore, no site specific mitigation measures are considered necessary. However, finished ground floor levels of the properties should be set 150mm above surrounding ground levels. The threshold level of the ramp to the subterranean car park should be a minimum of 150mm above adjacent road levels

Surface Water Management

The site is not currently formally drained, however it is assumed that historically surface water drained to the public sewer system in Brassey Street.

The development will introduce 4,830m² of formally drained area in the form of buildings, pathways and courtyards. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

As the site is not currently formally drained, the existing runoff regime is likely to replicate that of the greenfield scenario. Existing greenfield runoff rates have been estimated using the ICP SuDS (Flood Studies Report) method within MicroDrainage (see Appendix E). The existing QBAR Greenfield rate for the 4,830m² developable site area is 2.5 l/s. The 1 in 100 year runoff is 5.2 l/s.

In accordance with council requirements, it is proposed to utilise a flow rate of 5 l/s for the proposed development. This rate ensures that the drainage system is self-cleansing.

Attenuation Storage

In order to achieve a discharge rate of 5 l/s, attenuation storage will be required. A storage estimate is included in Appendix E. An estimated storage volume of 227m³ will be required to accommodate the 1 in 100 year plus 30% Climate Change (CC) event. The storage estimate is based on storage within a tank or pond structure, an impermeable drainage area of 4,830m^2, a design head of 1m and hydro-brake flow control.

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 bedrock geology consisting of the Helsby Sandstone Formation. The soil is also described as freely draining sandy soils.

Infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of soakaways.

In accordance with Building Regulations, soakaways should be located a minimum of 5m from buildings. As such, and when considering the subterranean car park and railway tunnel, there may be limited space on site to accommodate soakaways.

Watercourse

Where soakaways are not suitable a connection to watercourse is the next consideration.

The nearest watercourse is the River Mersey which is located approximately 790m west of the site. The site is separated from the River Mersey by urbanised third party land. Therefore, a connection to the River Mersey will not be achievable.

Sewer

As disposal of surface water to watercourse is not possible, a connection to the public sewer system is the final consideration. A connection to the public sewer network in Brassey Street appears feasible. UU have confirmed that a connection to the public combined sewer would be acceptable should all other means of discharge not be viable. UU Correspondence is included in Appendix C.

Public combined sewer manhole 1801 located immediately north-west of the site has an identified invert level of 16.7m AOD. The minimum site level is approximately 21m AOD, an as such, a gravity connection appears feasible.

Sustainable Drainage Systems

Attenuation storage should be provided in the form of Sustainable Drainage Systems (SuDS) where practical. The following SuDS options have been considered:

Soakaways

As described above, the use of soakaways should be determined by carrying out infiltration tests in accordance with the BRE 365 specification. However, given that the site will be occupied by a subterranean car park, and considering the proximity to a railway tunnel, there may be insufficient space for soakaways.

Swales, detention basins and ponds

The site will be occupied by buildings, a courtyard and a subterranean car park. Therefore space restrictions restrict the use of above ground drainage features such as ponds, basins or swales.

An open surface water attenuation feature such as a pond, basin or a swale in a residential area presents a safety risk.

Rainwater Harvesting

The attenuation benefits provided through the use of rainwater harvesting are considered to be limited, and would only be realised when the tanks were not full. However, rainwater harvesting techniques could be incorporated within the final design.

Green Roofs

The proposed development plans do not identify green roofs.

Porous / Permeable Paving

Attenuation storage can be provided within the sub-grade of permeable paving. Permeable paving could be used within the courtyard area. The amount of storage provided within permeable paving is subject to site gradients and the depth of the sub-grade.

The use of permeable paving will be fully investigated at the detailed drainage design stage.

Underground Attenuation Tanks

Storage could be provided within an underground attenuation tank. The location of the tank will be confirmed once the location of the subterranean car park is confirmed. The tank could be located beneath the car park, resulting in a pumped solution for surface water drainage.

Pumped Solution

Where a pumped solution is necessary, subject to the level of the subterranean car park and siting of the attenuation storage tank, attenuation will be required in the event of pumping system failure. 125m^3 of attenuation is required for every 10,000m^2 of impermeable area, therefore a volume of 60m^3 will be required to accommodate for the failure of the pumping station. This volume is based on an impermeable area of 0.4830ha.

An overall attenuation volume of 227m^3 is required to accommodate the 1 in 100 year plus 30% climate change allowance event. This volume can accommodate the 60m^3 storage requirement in the event of pumping station failure.

The risk of pump failure can be reduced by provision of a stand-by pump, an automated pump exercise regime and pump failure alarm system.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 30% CC event. Storm events in excess of the 1 in 100 year plus 30% CC event should be permitted to produce temporary shallow depth flooding within open courtyard areas or within the car park.

Concept Surface Water Drainage Scheme

Where soakaways are not feasible, surface water runoff will be discharged to the public sewer network in Brassey Street. Surface water runoff up to the 1 in 100 year plus 30% climate change allowance event will be attenuated on site. A total attenuation volume of 227m^3 will be required to achieve the discharge rate and will be provided in the form of an attenuation tank.

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

Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, non-residential car parking is classified as having a 'medium' pollution hazard level. Table 1 below 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
Non-residential parking	Medium	0.7	0.6	0.7

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2
** Indices values range from 0-1.*

Should attenuation be provided in a below ground system (tank storage), treatment will need to be provided by a suitably sized separator.

Maintenance

Maintenance of communal drainage features such as an attenuation tank will be the responsibility of the site owner. Maintenance of shared surface water drainage systems can be arranged through appointment of a site management company.

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

Foul Drainage

Foul flows should be discharged to the public sewer network. UU have stated that foul flows will be allowed to freely drain to the public combined sewerage system. A gravity connection can be achieved.

Other Considerations

Public combined sewers cross through the northern and central extents of the site. UU have stated (see Appendix C) that a 6m clearance, 3m from the centre line of the sewers, should be applied. Where the required easement is not achievable the alternative is to divert the sewers.

Conclusions

The proposal is for the development of two buildings comprising 246 apartments and commercial space. The buildings will be accompanied by 180 subterranean car parking spaces over two levels, with bike spaces, landscaped amenity space and enhancement works to the adjacent public park.

The site is located within Flood Zone 1 on the Environment Agency (EA) 'Flood Map for Planning (Rivers and Sea)' – an area considered to have the lowest probability of fluvial and tidal flooding. The site is shown to be located outside of the extreme 0.1% annual probability flood extent.

The risk of flooding from all sources has been assessed and the flood risk to the site is considered to be low.

The proposed development will introduce impermeable drainage area in the form of buildings, access roads, car parking, bike parking and court yard area. In order to ensure surface water runoff generated by the development will not increase flood risk elsewhere, flow control will be used and attenuation provided on site to accommodate storm events up to and including the 1 in 100 year plus 30% climate change event.

All methods of surface water discharge have been assessed. Where soakaways are not possible, discharge of surface water to the public sewer network appears to be a feasible option.

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 attenuation tank.

Foul flows should be discharged to the public sewer network.

Recommendations

1. Submit this Flood Risk Assessment and Drainage Strategy to the Planning Authority in support of the Planning Application;

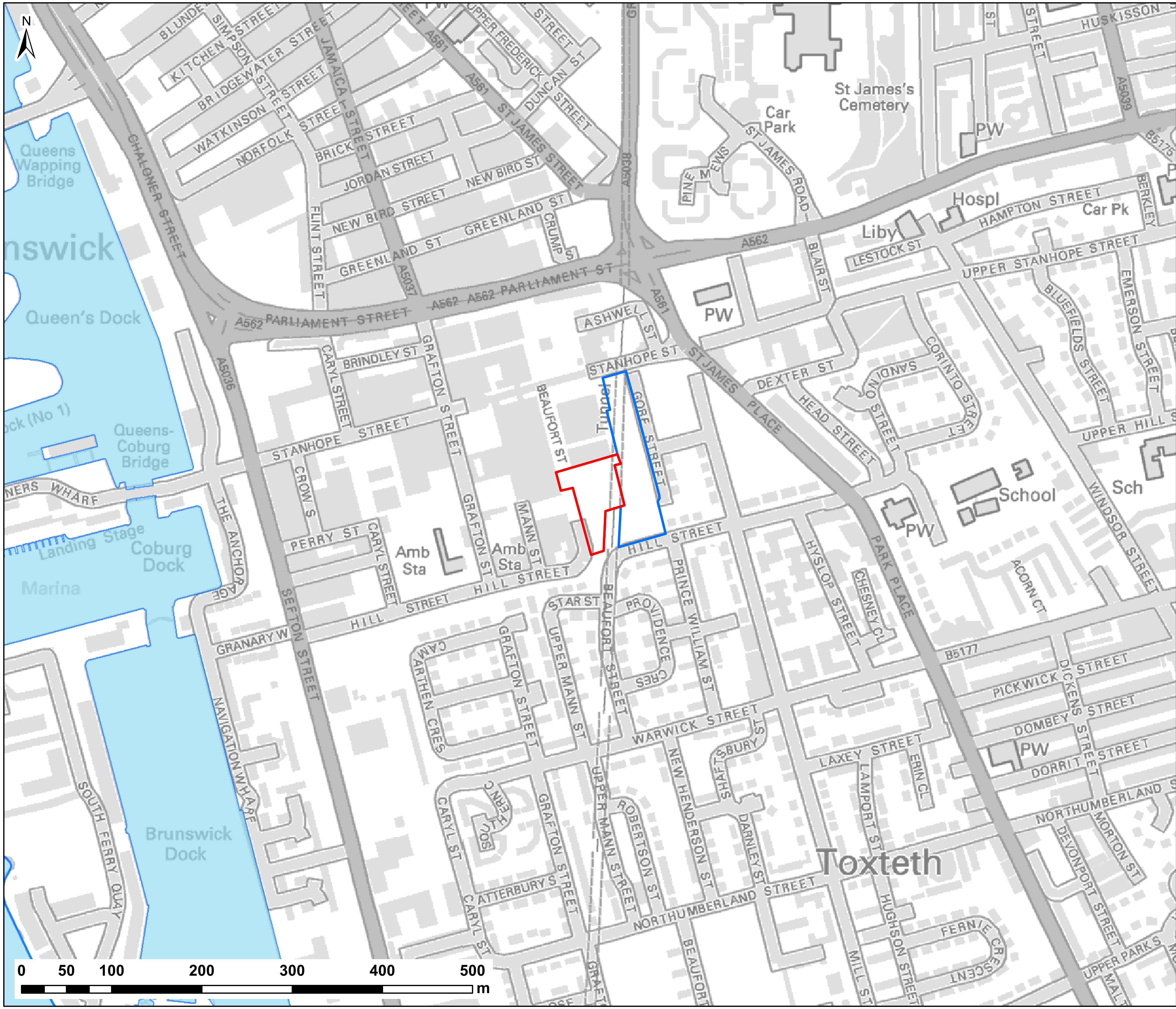
2. Undertake BRE 365 infiltration testing to determine the suitability of infiltration techniques;

3. Verify the attenuation volumes included in this report when undertaking detailed drainage design;

4. Make provision on site for attenuation storage features;

5. Provide a 3m easement from the centreline of the public combined sewers which cross through the site.

Appendix A – Location Plan & Aerial Image



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Landownership
- Waterbodies

CLIENT:

ELOQUENT GLOBAL LTD

waterco consultants

Waterco Ltd
Eden Court, Ruthin, LL15 1NJ
01824 702220
www.waterco.co.uk

SCHEME:

BRASSEY STREET, LIVERPOOL

PLOT TITLE:

LOCATION PLAN

PLOT STATUS: FINAL			DATE: 18/11/2016
DRAWN: RCL	CHECKED: AW	APPROVED: VG	PLOT SCALE @ A3: 1:4,000 (UNLESS STATED OTHERWISE)
PLOT NAME: w10232-Location_Plan			REV: -

NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

Site Boundary

Landownership

CLIENT:

ELOQUENT GLOBAL LTD

waterco consultants

Waterco Ltd
Eden Court, Ruthin, LL15 1NJ
01824 702220
www.waterco.co.uk

SCHEME:

BRASSEY STREET, LIVERPOOL

PLOT TITLE:

AERIAL PLAN

PLOT STATUS:	DATE:
FINAL	18/11/2016

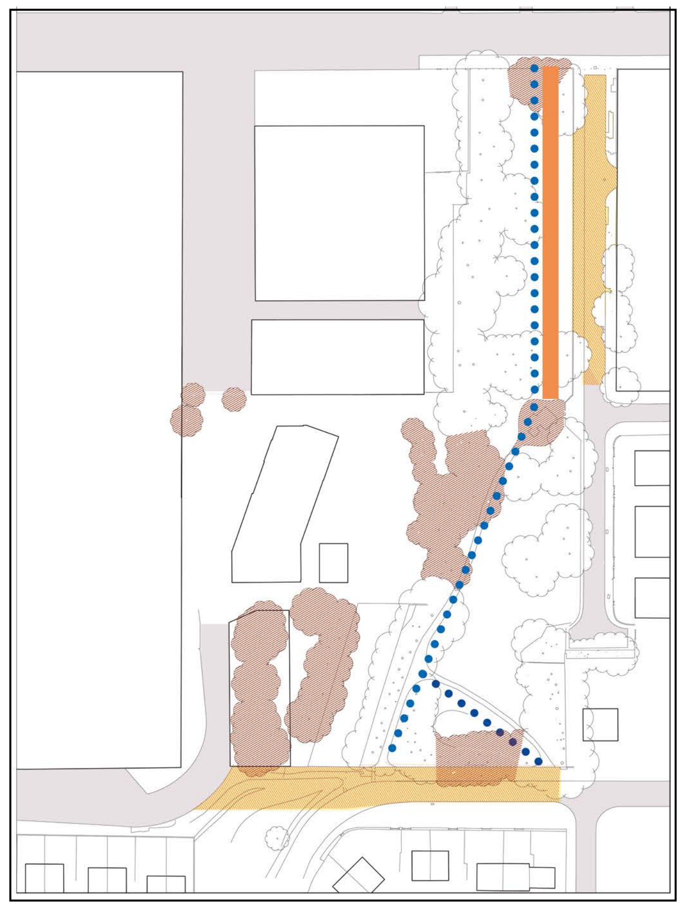
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
RCL	AW	VG	1:4,000 (UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
w10232-Aerial_Plan	-

Appendix B – Development Plan & Topographical Data

GREEN SPACE:
URBAN FACILITATOR

PARK INTERVENTIONS:
KEY CHANGES



TREE REMOVAL
ROAD RESURFACING
LIGHTING PATH
NEW PATHWAY

The park encompasses seveal types of green spaces, that enhance and facilitate the urban usages of adjacent plots;

- PASSING POINT & ROUTE
- HIDDEN/SERENE
- MEETING POINT
- COMMUNITY NODE
- HERITAGE

With these characteristics in mind, our proposal to open up the park is based on the following design principles;

- VISIBILITY
- SAFETY
- BONDARY CONNECTION
- FACILITATED ACTIVITIES

These will be achieved with the following simple measures;

- TREE TRIMMING OR REMOVAL
- LIGHTING
- SHARED SURFACES/IMPROVED SURFACES
- CROSSING POINTS

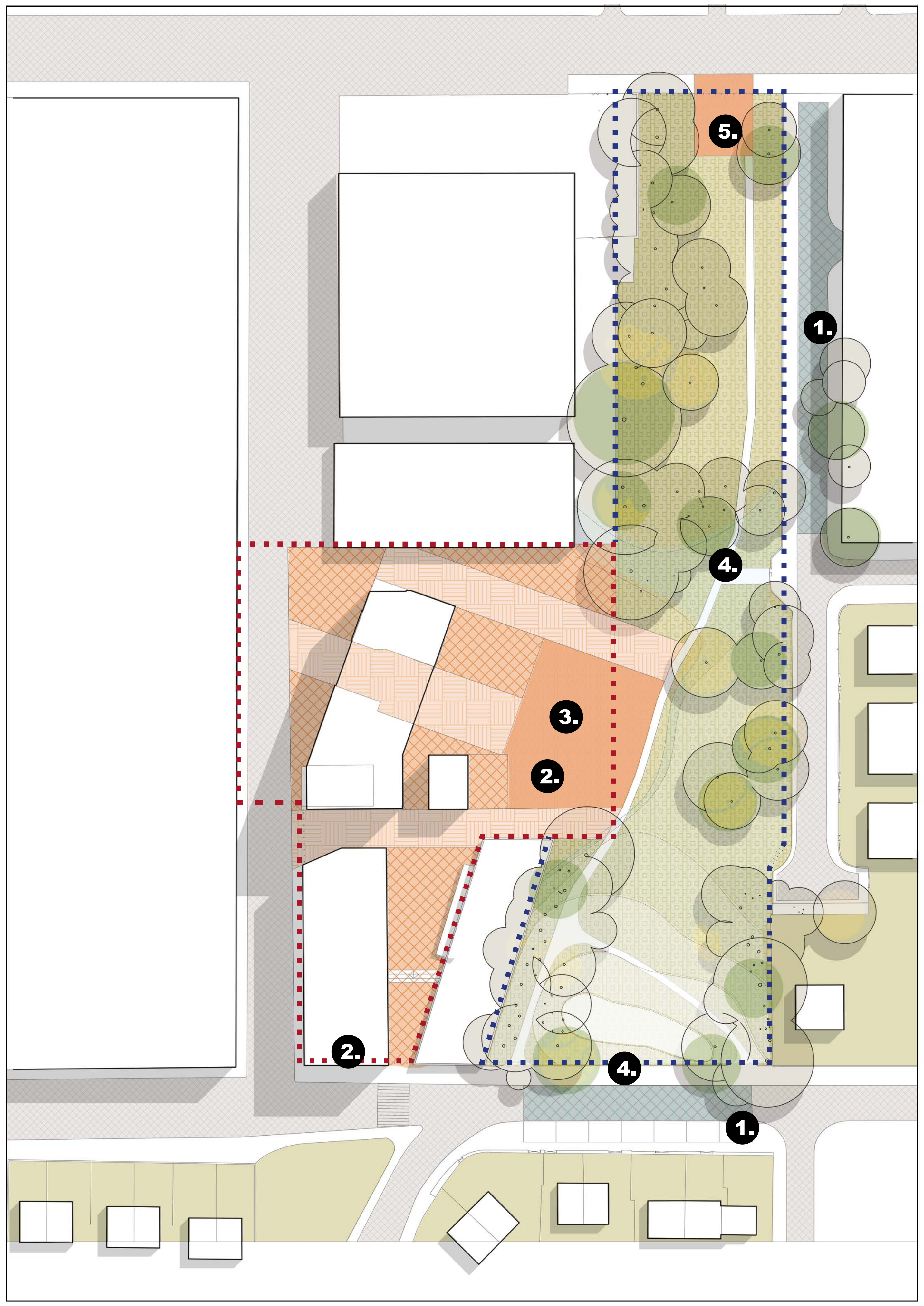
1. INTERFACE:

Interfaces with existing residents should provide privacy whilst also creating a strong link. At Gore Street new trees should be planted for privacy and a partial road closure would prevent unwanted traffic and create a link to the park edge. At Hill street the removal of some trees will provide a visual link for the houses across the road. With the suggested opening of Hill Street, traffic should be calmed using general measures as well as a shared surface that would again blur the park edge.

2. HERITAGE/COMMUNITY:

Within the urban block there have been various historical community uses that the park make reference to firstly in bringing it back into use and secondly with the types of uses proposed. The proposed community space at Hill Street makes reference to the social function of Public Houses that used to line Hill Street. The play area within the park references Caryl Street gardens, a historical community play area located in the area.

KEY NODES:
EDGES AND INTERFACES



3. HIDDEN/SERENE:

To this point the park has been relativley unknown to those who do not live in the immediate area. This characteristic should be enhanced to provide a different type of space within the urban block. The focal point is located in the centre of the park, at the interface between the development and the current park boundary. The form of the building, the wall to the railway and the trees enclose a small urban plaza and play area.

4. PASSING POINT & ROUTE:

At Hill Street, the entrance for local residents is key, as this will become a route through to the station & city centre. At this point safe access and visibility is important. The path through the park needs to be well defined and safely lit, using street lamps or building lighting.

5. MEETING POINT:

The North entrance to the park, opposite what will be James Street station will serve as a key entrance and meeting point from the station. This will be the first or maybe the only interface with the park for many people and should give a glimpse through the whole park.

FOCAL POINT:
LANDSCAPE STRATEGY

NOTES
1. This drawing is copyright of BLOK architecture Ltd
2. Do not scale from this drawing
3. Use figured dimensions only

rev.	date		drn	aud
-	-	-	-	-

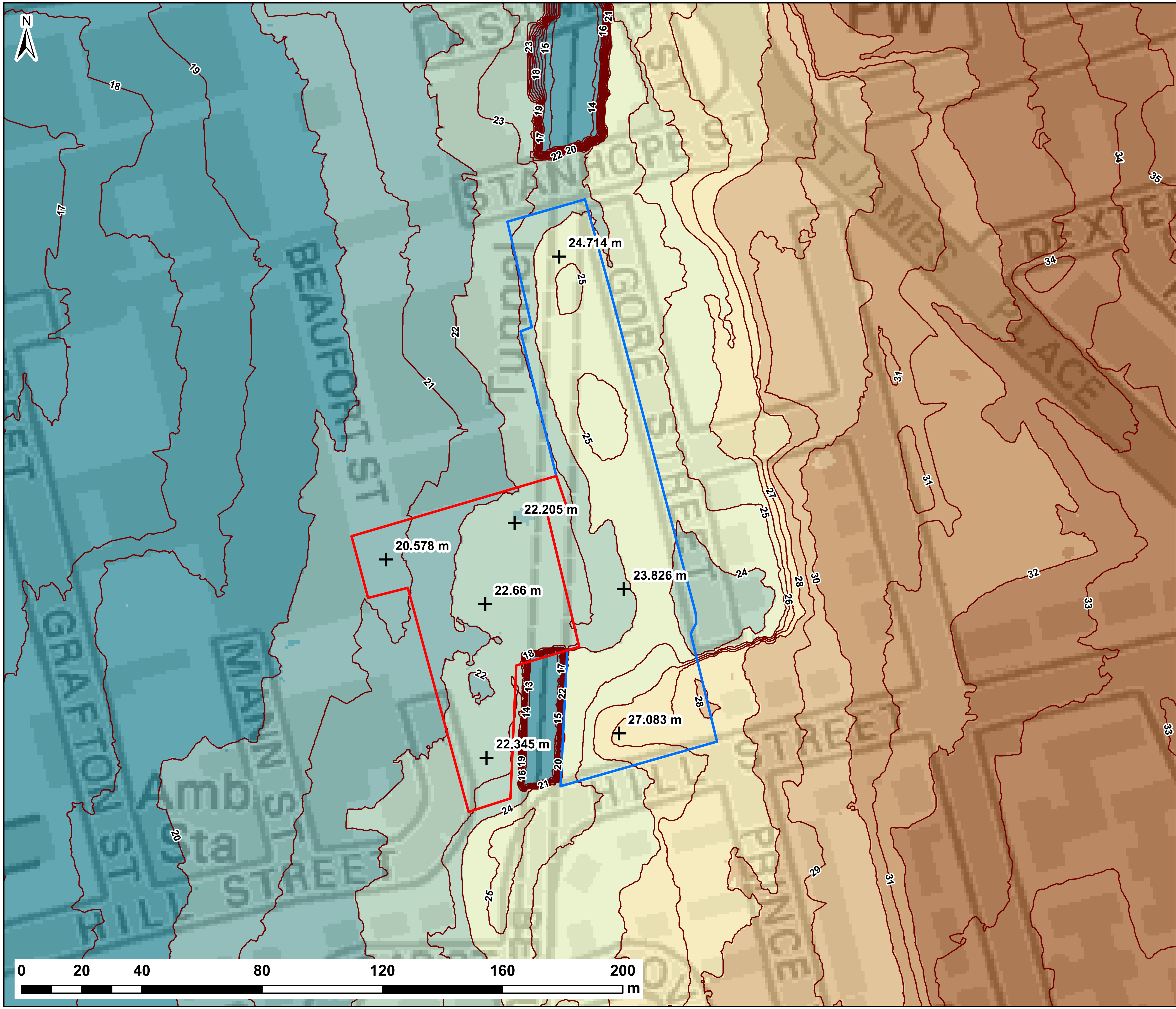
drawing status

PLANNING

Second Floor
Edward Pavilion
Albert Dock
Liverpool
L3 4AF
0151 958 0200
info@blokarchitecture.co.uk
www.blokarchitecture.co.uk

BLOK.

Client	ELOQUENT GROUP	Scale	Drawn	Checked	Date	Issue
		1:200@A1	LA	--	10.11.16	-
Job title	BRASSEY STREET	Job number	Drawing number			
Drawing title	GROUN FLOOR	099	099-MP-PL-PN-00			



NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Landownership
- Spot Level

Ground Elevation (mAOD)

- < 20
- 20 - 22
- 22 - 24
- 24 - 26
- 26 - 28
- 28 - 30
- 30 - 32
- > 32

CLIENT:

ELOQUENT GLOBAL LTD

waterco consultants
Waterco Ltd
Eden Court, Ruthin, LL15 1NJ
01824 702220
www.waterco.co.uk

SCHEME:

BRASSEY STREET, LIVERPOOL

PLOT TITLE:

LIDAR ELEVATIONS (1m RESOLUTION)

PLOT STATUS:			DATE:
FINAL			18/11/2016
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
RCL	AW	VG	1:1,200 (UNLESS STATED OTHERWISE)
PLOT NAME:			REV:
w10232-LiDAR_Elevations			-

Appendix C – United Utilities Sewer Plan and Correspondence

United Utilites Water Limited
Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP
DX 715568 Warrington
Telephone 0370 751 0101

Property.searches@uuplc.co.uk

Waterco Ltd

Eden Court
Lon Parcwr Business Park
Ruthin
LL15 1NJ

Your Ref: W10232
Our Ref: 16/ 1252597
Date: 29/11/2016

FAO: Johanne Williams

Dear Sirs

Location: Brassey Street Liverpool L8 5XP

I acknowledge with thanks your request dated 28/11/16 for information on the location of our services.

Please find enclosed plans showing the approximate position of our 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 our 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 you requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0370 7510101.

Yours Faithfully,

A Simmonds.

Amanda Simmonds
Property Searches Manager

United Utilities

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

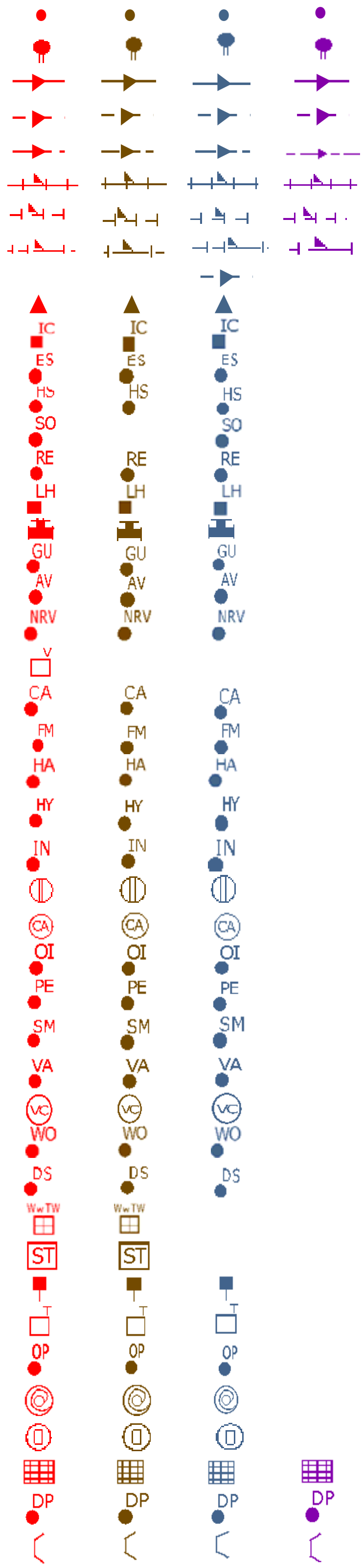
These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self-construction of water mains) (UUWL apparatus)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

TERMS AND CONDITIONS:

1. 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.
2. 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.
3. In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only and given in accordance with the best information available. The nature of the relevant system and/or its actual position may be different from that shown on the plan and UUWL is not liable for any damage caused by incorrect information provided save as stated in section 199 of the Water Industry Act 1991. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.

WASTE WATER SYMBOLOGY

Combined | Foul | Surface | Overflow



- Manhole
- Manhole, side entry
- Public sewer
- Private sewer
- S104 sewer
- Rising Main, public
- Rising Mian, private
- Rising main, S104
- Highway Drain, private
- WW Pumping Station
- Inspection Chamber
- Extent of Survey
- Head of System
- Soakaway
- Rodding Eye
- Lamp Hole
- T Junction/Saddle
- Gulley
- Air Valve
- Non Return Valve
- Sewer Overflow
- Cascade
- Flow Meter
- Hatch Box
- Hydrobrake
- Inlet
- Bifurcation
- Catchpit
- Oil Interceptor
- Penstock
- Summit
- Valve
- Valve chamber
- Washout Chamber
- Drop Shaft
- WW Treatment Works
- Septic Tank
- Vent Column
- Network Storage Tank
- Orifice Plate
- Vortex Chamber
- Penstock Chamber
- Screen Chamber
- Discharge Point
- Outfall

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	SQ	Square
EG	Egg	TR	Trapezoidal
OV	Oval	AR	Arch
FT	Flat Top	BA	Barrel
RE	Rectangular	HO	Horse Shoe
		U	Unspecified

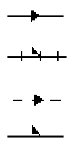
SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	VC	Vitrified Clay
CO	Concrete	PP	Polypropylene
CSB	Concrete Segment	PF	Pitched Fibre
CSU	Concrete Segment	MA	Masonary, Coursed
CC	Concrete Box Culverted	MA	Masonary, Random
PSC	Plastic	RP	Reinforced Plastic
GR	Glass Reinforced	CI	Cast Iron
GRP	Glass Reinforced	SI	Spun Iron
PVC	Polyvinyl Chloride	ST	Steel
PE	Polyethtlene	U	Unspecified

Control Kiosk

Sludge Main

ABANDONED PIPE



- Public Sewer
- Rising Main
- Private Sewer
- Sludge Main

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
0501	21.09	CO	17.19	1067	1676	EG	GRP	46.32	26
0502	21.36	CO	17.37	1025	1500	EG	GRP	11.4	
0503	21.68	CO	18.17	300		CI	VC	9.49	
0504	22	CO	0	300		CI	VC	21.84	
0505	21.25	CO	17.15	550	900	EG	BR	40.54	145
0506	19.26	CO							
0507	20.01	CO							
0601	20.2	CO	16.19	700	1070	EG	BR	53.85	
0602	20.78	CO	16.64	550	900	EG	CO	56.75	126
0604	19.18	CO							
0605	19.36	CO							
0607	20.89	CO	19.29	225		CI	VC	11.18	
0650	20.89	CO	16.8	550	900	EG	BR	9.22	58
0701	19.05	CO							
0702	20.95	CO	17.5	550	900	EG	CO	46.32	26
0703	19.74	CO	16.24	700	1070	EG	BR	9.85	
0704	21.45	CO							
0705	21.66	CO							
0706		CO							
0801	18.07	CO	14.23	550	900	EG	CO	59.67	80
0802	18.94	CO	15.44	550	900	EG	CO	50.7	
0803	17.56	CO	13.95	550	900	EG	BR	42.47	
0901	19.56	CO	15.47	675	1050	EG	BR	10.82	
0902	19.47	CO	15.13	940	1680	EG	BR	22.56	
0903	18.2	CO							
0904	17.2	CO							
0907	19.85	CO							
1503	23.39	CO	19.76	450	700	EG	GRP	11.7	
1504	25.05	CO	22.41	225		CI	VC	19.42	65
1505		CO		150		CI	VC	14.47	
1506	23.01	CO							
1509	24.96	CO	21.06	1067	1676	EG	GRP	9.49	30
1511	24.64	CO							
1516		CO		150		CI	VC	2.25	
1601	22.06	CO	18.46	540	920	EG	VC	22.8	57
1602	22.32	CO							
1603		CO							
1607	22.9	CO							
1608	22.65	CO	18.9	530	820	EG	VC	8.54	
1650	24.91	CO	22.93	300		CI	VC	44.64	154
1651	24.64	CO	22.59	300		CI	VC	52.01	173
1701	22.55	CO	19.13	675	1050	EG	BR	101.16	
1702	22.31	CO	18.74	550	900	EG	CO	32.28	
1750	24.87	CO	22.28	300		CI	VC	41.3	118
1751	24.91	CO							
1752	24.92	CO							
1753	24.99	CO							
1801	20.51	CO	16.7	700	900	EG	CO	20.62	
1802	20.9	CO	17.3	550	900	EG	CO	11.18	
1803	22.2	CO	19.25	550	900	EG	CO	19.65	23
1804	21.78	CO	17.84	550	900	EG	CO	9.06	
1805	23.12	CO	20.09	550	900	EG	CO	26.93	
1806	22.43	CO		225		CI	VC	13.61	
1807		CO							
1808		CO							
1809		CO	0	225		CI	VC	20.62	
1891		CO		550	900	EG		11	
1901	24.08	CO	19.52	1120	2060	EG	VC	19.67	
1902	22.96	CO	19.91	550	900	EG		29.95	1
1903	24.26	CO							
2501	30.07	CO	26.31	1067	1676	EG	GRP	32.28	
2502	26.83	CO	23.25	560	900	EG	GRP	7.28	
2503		CO							
2504		CO	0	460	750	EG	GRP	11.4	
2506		CO							
2509	30.59	CO	29.04	450	750	EG	CO	5.83	25
2510	30.06	CO	28.51	300		CI	VC	49.73	116
2512	30.52	CO	27.13	460	750	EG	CO	13.34	
2601	29.29	CO	28.26	225		CI	VC	10.2	
2602		CO	0	150		CI	VC	9	
2603		CO							
2605	29.68	CO	26.19	500	900	EG	VC	21.84	
2606	29.97	CO	26.5	450	730	EG	VC	17.46	
2607		CO		150		CI	VC	12.28	
2609	29.94	CO	27.71	225		CI	VC	25.71	58
2610	29.2	CO	27.12	225		CI	VC	12.37	
2612		CO		150		CI	VC	5.7	
2613		CO							
2650	26.61	CO	24.49	150		CI	VC	40.8	30
2651	27.56	CO	24.15	225		CI	VC	31.05	97
2652	27.79	CO							
2704	27.62	CO							
2705	28.45	CO	24.65	470	900	EG	VC	44.38	
2706		CO	0	225		CI	VC	15.52	
2710		CO							
2712	28.98	CO	25.31	550	900	EG	CO	20.88	
2750	26.33	CO	23.21	300		CI	VC	36.69	50
2751	26.84	CO							
2801	30.37	CO	29.68	550	900	EG	CO	6.32	
2802	29.72	CO							
2804	24.63	CO	20.93	550	900	EG	CO	46.84	
2805	23.53	CO							
2806	23.53	CO	20.08	300		CI	VC	12	
2807	25.1	CO	22.66	300		CI	VC	28.19	11
2808		CO	0	225		CI	VC	13.6	
2809		CO	0	150		CI	VC	13.34	
2816		CO							
2850	24.8	CO	0	100		CI	VC	48.27	
2901	27.35	CO	22.93	1090	1710	EG	BR	9.22	19
2902	28.87	CO							
2903	24.59	CO	19.81	550	900	EG	CO	9.22	
2904	25.69	CO							
2906	26.18	CO	21.87	1120	1700	EG	BR	16.76	
3501	34.59	CO	29.61	1067	1676	EG	GRP	67.21	20
3502	35.31	CO	31.26	550	900	EG	BR	8.08	
3503	32.93	CO	31.37	225		CI	VC	18.68	16
3504	35.72	CO	32	550	900	EG	BR	59.2	81
3505	35.66	CO	31.43	600	860	EG	BR	5.1	
3507	35.74	CO	31.49	600	900	EG	CO	13	
3601	34.42	CO	30.94	550	820	EG	BR	19.24	
3602	34.41	CO							
3603		CO							
3604	32.91	CO							
3605		CO	0	225		CI	VC	15.81	
3608		CO		150		CI	VC	11.83	
3609		CO							
3611		CO		100		CI	VC	6.46	
3701	32.93	CO	29.13	600	950	EG	CO	61.27	191
3702		CO							
3800		CO	0	550	900	EG	CO	78.12	
3801	33.21	CO	28.81	600	920	EG	CO	11.4	
3802		CO							
3803		CO	0	675		CI	CO	12.84	
3804		CO							
3805	32.04	CO	28.18	550	900	EG	CO	47.8	17
3806	33.68	CO	30	475	825	EG	CO	19.65	
3809		CO							
3810		CO							
3815		CO							
3901	33.97	CO							
3902	31.39	CO	27.69	600	950	EG	CO	5.1	
3903	32.46	CO							
3904	31.57	CO							
4501	36.71	CO	33.01	300		CI	VC	37.11	49
4503	36.23	CO	32.21	300		CI	VC	21.84	109
4600	36.16	CO							
4601	36.6	CO	31.27	1118	1600	EG	GRP	47.93	
4602	34.27	CO	30.16	550	900	EG	BR	10.2	
4603	33.79	CO	30.07	580	630	EG	BR	3.61	
4604	34.3	CO							
4610	35.94	CO							
4700	33.58	CO	32.1	150		CI	CO	21.21	76
4701	35.92	CO	0	550	900	EG	CO	42.05	
4702	34.38	CO	31.82	300		CI	CO	43.31	127
4801	36.74	CO							
4802	34.65	CO							
4803	36.83	CO	32.98	550	900	EG	CO	8.25	43
4804	36.95	CO	33.5	440	500	EG	BR	33.24	
4805		CO	0	1050		CI	CO	10.44	
4806		CO							

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
4811	39.12	CO	36.76	300		CI	VC	80.96	63
4901	37.74	CO							
4902	35.59	CO							
4903	35.59	CO	32.06	550	950	EG	CO	2	
4904	36.8	CO	35.22	225		CI	VC	26.25	109
4905	38.51	CO							
4908		FO							
4909		FO							
4912		CO		150		OV	CI	10.32	
4913		CO		100		OV	CI	8.09	
4914		CO		100		OV	CI	12.39	
0500		CO	0	300		CI	VC	20.59	
0805		CO	15.73	550	900	EG	BR	45.61	26
0909		CO	0	1100	1700	EG	VC	32.29	
0910		CO	0	1125	1650	EG	BR	32.99	
0911		CO	0	1030	1720	EG	BR	3.16	
1500		CO	0	1676		CI	VC	22.11	
1501		CO	0	375		CI	VC	16.28	
1507		CO							
1816		CO							
1817		CO							
1905		CO	0	1080	1690	EG	VC	16.43	
1908		CO							
1910		CO							
1911		CO							
2505		CO							
2604		CO		150		CI	VC	16.63	
2814		CO							
2905		CO							
2908		CO	0	1060	1700	EG	BR	5.39	
2913		CO	22.44	1090	1740	EG	BR	10.2	21
3513		CO							
3607		CO	0	550	900	EG	BR	18.97	
3610		CO	0	1067	1676	EG	GRP	44.25	
3614		SW							
3615		SW							
3811		CO							
3812		CO							
3813		CO							
3908		CO							
3909		CO	0	225		CI	VC	22.8	
4504		CO							
4607		CO							
4608		CO							
4609		CO							
4807		CO	0	1060	1650	EG	CO	37.57	
4809		CO	0	1050	1650	EG	CO	18.7	
4813		CO	32.79	700	1050	EG	CO	8.25	46
4814		CO							
4815		CO	0	150		CI	VC	6.17	
4906		CO	33.13	550	900	EG	CO	3.16	
4907		CO	33.39	350		CI	CO	13	10
6000		CO	0	1676		CI	VC	13.19	
0508		CO							
0509		CO							
0510		CO	0	1067	1676	EG	GRP	9.62	
0606		CO							
0707		CO	0	540	920	EG	CO	17.72	
0708		CO							
0709		CO							
0905		CO							
0906		CO	0	1100	1700	EG	BR	3.16	
1508		CO							
1510		CO							
1512		CO							
1513		CO							
1515		CO							
1609		CO							
1706		CO	0	675	1050	EG	BR	10.2	
1810		CO	0	675	1050	EG	BR	60.88	
1813		CO	0	700	900	EG	CO	8.25	
1814		CO	0	550	900	EG	CO	45.61	
1815		CO							
1906		CO							
1909		CO							
2507		CO							
2508		CO							
2511		CO							
2608		CO	0	470	900	EG	VC	40.26	
2611		CO	0	450	730	EG	VC	30.81	
2706		CO							
2711		CO							
2810		CO							
2811		CO	0	550	900	EG	CO	38.08	
2813		CO							
2815		CO	0	550	900	EG	CO	5.1	
2909		CO							
2911		CO							
3506		CO							
3508		CO	0	300		CI	VC	27.53	
3509		CO							
3511		CO							
3606		CO	0	1067	1676	EG	GRP	9.49	
3612		CO							
3704		CO							
3807		CO	0	550	900	EG	CO	4.12	
3808		CO	0	550	900	EG	CO	21.84	
3814		CO							
3905		CO							
3907		CO							
4703		CO							
4800		CO							
4808		CO							
4810		CO	0	675	1050	EG	CO	32.02	
4812		CO							
4915		CO							
1505		CO							
1604		CO							
1605		CO							
1606		CO							
1610		CO							
1611		CO							
1612		CO							
1704	22.59	CO							
1705		CO							
1710		CO							
3603		CO							
3608		CO							
3702		CO							
3703		CO							
3704		CO							
3802	31.79	CO							
3891		CO							
4502		CO							
4606		CO							

WASTE WATER SYMBOLOGY

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

OS Sheet No: SJ3588NW
Scale: 1:1250 Date: 29/11/2016
275 Nodes
Sheet 1 of 1

United Utilities
helping life flow smoothly

SEWER RECORDS

OS Sheet No: SJ3588NW

Scale: 1:1250 Date: 29/11/2016

Printed By: Property Searches

Johanne Williams

From: Lunt, John <John.Lunt@uuplc.co.uk>
Sent: Friday, December 2, 2016 3:58 PM
To: Johanne Williams
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for Brassey St, Liverpool - Our ref: DE2913
Attachments: DE2913 FW: w10232-Brassey St, Liverpool-Developer enquiry

Importance: High

Categories: Information received

Dear Johanne,

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months.

Foul

The foul water flows emanating from the site will be allowed to drain freely in to the public combined sewerage system.

Surface Water

The surface water flows generated from this site must drain to soak away or some other form of infiltration system but if ground conditions confirm that this is not a viable solution then surface water may drain to the adjacent public combined water sewer at a maximum pass forward flow of 38 l/s.

Connection Application

Although we may discuss and agree discharge points & 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

http://www.unitedutilities.com/connecting-public-sewer.aspx

Sewer Adoption Agreement

You may wish to offer the proposed new sewers for adoption. United Utilities assess adoption application based on Sewers adoption 6th Edition and for any pumping stations our company addenda document. Please refer to link below to obtain further guidance and application pack:

http://www.unitedutilities.com/sewer-adoption.aspx

Existing Sewers Crossing the Site

A public sewer crosses this site and we will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of (6m refer to table 2.1 SFA) which is measured 3m from the centre line of the pipe. If you cannot achieve this then you may wish to consider diverting the public sewer.

Please refer to the link below to obtain full details of the processes involved in sewer diversion.

http://www.unitedutilities.com/sewer-diversion.aspx

Please be aware that on 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.

Please note, 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 of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Regards,

John

John Lunt
Developer Query Engineer
Developer Services and Planning
Operational Services
T: 01925 679411 (Int; 79411)
E-mail: wastewaterdeveloperservices@uuplc.co.uk
United Utilities.com

Appendix D – Council Correspondence

Johanne Williams

From: Jackson, David <David.Jackson3@amey.co.uk>
Sent: Wednesday, December 14, 2016 3:58 PM
To: Johanne Williams
Subject: Re: w10232-Brassey Street, Liverpool
Attachments: NON STATUTORY STANDARDS - INFO REQUIREMENTS.pdf; LCC BROWNFIELD-GREENFIELD-FRA ADVICE.docx

Categories: Information received

Johanne

The site will be classed as greenfield for drainage purposes unless it can be demonstrated that the site (or part of) is served by a drainage system connected to the public sewer network.

If the site is under 1 ha I can confirm this site will not require a FRA but as it is classed as major development a drainage design statement / information will be required in line with guidance note attached.

This is classed as a major development, and for your information I have attached the relevant part of the Non Statutory Technical Standards for Sustainable Drainage: Practice Guide, which has been produced by DEFRA as a supporting document to NPPF, on which the requirements (where applicable) for a planning application for major development with regards to surface water drainage are shown

Thanks

DAVE JACKSON

Engineer | Consulting

Amey

t: 0151 498 6825 l m: 0780 9313978 | e: david.jackson3@amey.co.uk

Unit 3 | Matchworks | 142 Speke Road | Garston | Liverpool | L19 2PH

From: Johanne Williams <Johanne.Williams@waterco.co.uk>
Sent: 09 December 2016 14:14

To: Jackson, David
Subject: w10232-Brassey Street, Liverpool

Proposed mixed use development at Brassey Street, Liverpool, L8 5XP. National Grid reference: 335164E, 388833N.

Dear David,

We have been instructed to undertake a Flood Risk Assessment and Drainage Strategy for the above development and I have been passed your details by Liverpool City Council. Development plans can be provided. The proposed development is for the erection of two buildings to include 246 apartments and commercial space, with below ground parking.

Please could you provide me with pre-planning comments for a site at the above address in relation to flood risk and drainage. Please could you advise if you have any specific requirements regarding discharge rates and Climate Change allowance for attenuation volumes.

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

Kind Regards,

Johanne Williams LLB (Hons) PGDip MCIWEM
Flood Risk Consultant

01824 702220

Waterco consultants

Ruthin - Chester - Manchester - Hyderabad

Assessment, Modelling, Design

LCC GREENFIELD / BROWNFIELD SITES SURFACE WATER MANAGEMENT GUIDANCE

If the site has previously been developed it should be demonstrated that the drainage system is still operational for it to be classed as brownfield. Information should be obtained on the system, e.g. pipe diameters, levels, gradients, lengths, hydraulic controls, etc. These details should be used, along with the contributing area characteristics of the site, to set up a drainage model (or to inform another assessment method) in order to evaluate the peak flow rates at the outfalls from the existing site for the design return period events. The maximum allowed flow from the site should then be derived using the 1:2yr critical rainfall event with a 30% reduction applied to offer improvement.

The limiting discharge figure for the proposed development should be used in the design of the drainage system for the minimum requirement that flows for up to the 1:30yr critical rainfall event are retained within the system and that for the 1:100yr+30% climate change allowance, critical rainfall event there will be no flooding to any buildings and any excess volumes of water will be retained on site.

Notwithstanding the above, the existing site drainage constraints will also be taken into account when agreeing any discharge limits and the proposed flow should not exceed existing pipe capacity. For example if the existing site outfall was a 150mm dia pipe, irrespective of the area being drained, it would have a maximum flow capacity which may be lower than any proposed flows calculated using the above criteria, assuming a free discharge. Therefore discharge to the existing drainage system from the development would be effectively increased from the existing situation which is contrary to Environment Agency and National Planning Policy Framework guidance for flood risk and surface water management.

Where records of the previously developed system are not available and system characteristics cannot otherwise be determined, or if the drainage system is broken or blocked (or no longer operational), then the run-off characteristics should be defined as greenfield.

If a site is classed as greenfield the flow rates from the development will be limited to the equivalent greenfield run off rates. For example the flow rate from the development for the 1:30yr critical rainfall event should not exceed the greenfield run off rate for the site for the 1:30 year rainfall event, likewise for the 1:2 & 1:100 year scenarios. A minimum flow of 5 l/s can be used when the greenfield run off rate falls below 5 l/s.

It should be noted that this discharge figure will satisfy planning requirements but the applicant should consult United Utilities to determine if they have any discharge restrictions, which could be more restrictive.

For all development s over 1ha a FRA (Flood Risk Assessment) will be required which should be based on the requirements as detailed in Environment Agency (Greater Manchester, Merseyside & Cheshire) Local Planning Standing Advice and NPPF guidance. The detail and technical complexity of a FRA will reflect the scale, nature and location of the development.

Where available, reference should be made to the Strategic Flood Risk Assessment (SFRA) for locally specific guidance and information.

The following list sets out key information that should be submitted within a FRA for developments

- A location plan that includes geographical features, street names and identifies the catchment, watercourses or other bodies of water in the vicinity.

- A plan of the site showing existing site; development proposals; and identification of any structures (e.g. embankments), which may influence local flood flow overland or in any watercourses (e.g. culverts) present on the site.

- Site levels of both existing and proposed. Reference to Ordnance Datum, may be required where details of context of the site to its surroundings is needed.

- Details of the existing surface water drainage arrangements on site (if any) and the receptor e.g. soakaway, sewer, canal, watercourse etc.

- Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development

- Information about the surface water disposal measures already in place and estimates of the rates of run-off generated by the surfaces drained.

- An assessment of the volume of surface water run-off likely to be generated from the proposed development and confirmation of how any excess volumes would be retained within the development.

- Information regarding how the proposed drainage design will perform under the increased frequency and intensity of rainfall that is predicted as a result of climate change (30% for residential development & 20% for non- residential).

- Information about other potential sources of flooding, if any, that may affect the site e.g. streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these; including details on how these sources of flooding will be managed safely within the development proposal.

It should be noted that the above list is not exhaustive but provides a framework for the FRA to be prepared.

For developments less than 1 ha a FRA will not be required but a drainage design statement should be provided proportional to the scale of the development and follow the same design principles with regards to the calculating the maximum design flow rates for the site.

In line with NPPF (National Planning Policy Framework) the development of a site should look towards the use of SUDS techniques as a method of reducing the run off from the site, as a result of the development. Government policy strongly encourages a hierarchical approach to the use of sustainable drainage systems in new developments and infiltration methods for private drainage should be used where possible.

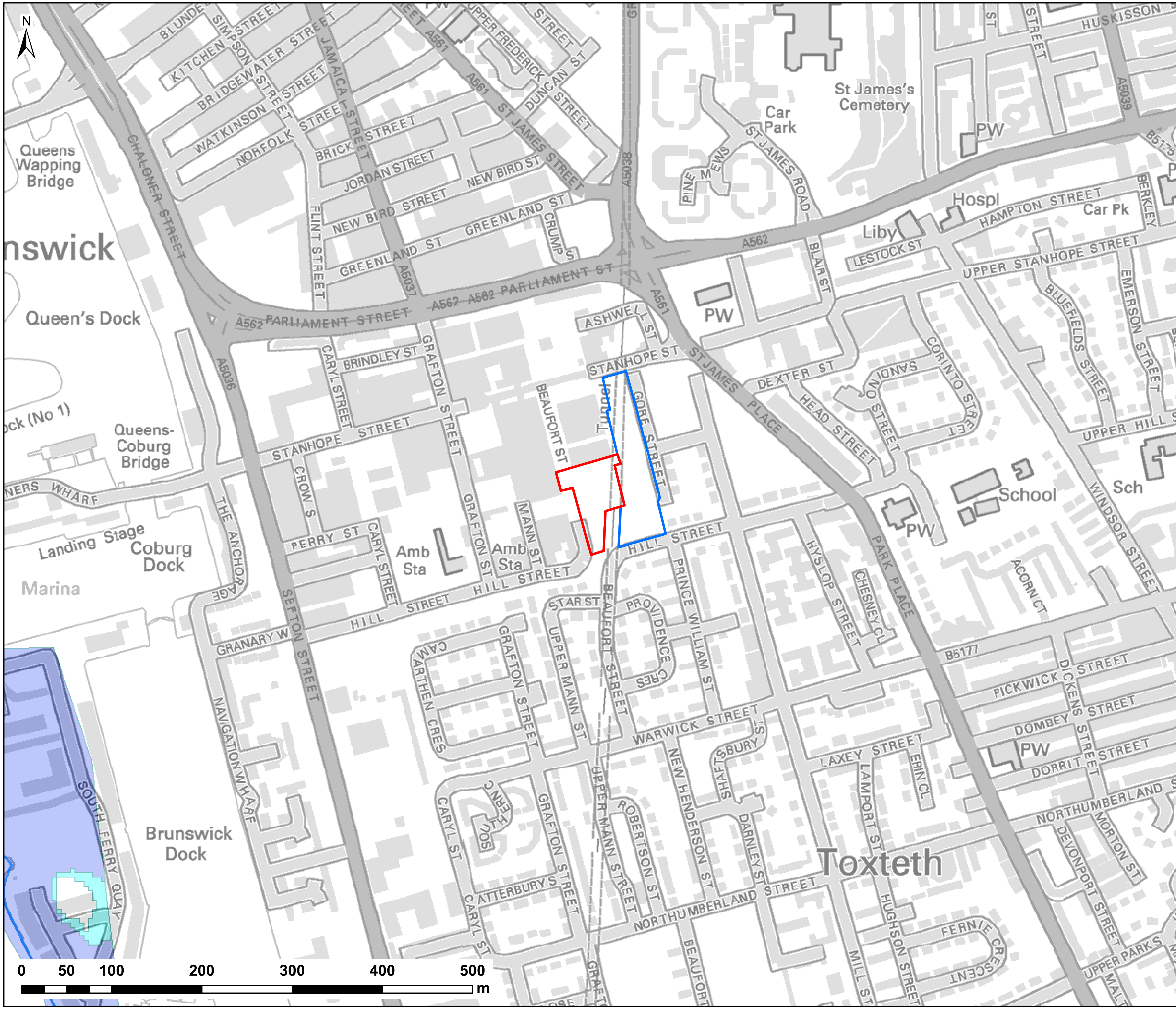
For residential developments greater than 0.5 ha and where the floor space of any building is greater than $1000m^2$ ground Investigations should be carried out to BRE 365 to determine if infiltration drainage methods are practicable and suitable for the sites. A soils report including ground percolation test results and recommendations will need to be submitted within the drainage design statement or FRA, for approval, although any detailed soakaway design information is not required at this stage. If this proves that infiltration drainage is not a viable option, then a positive piped system of surface water run off disposal will need to be provided.

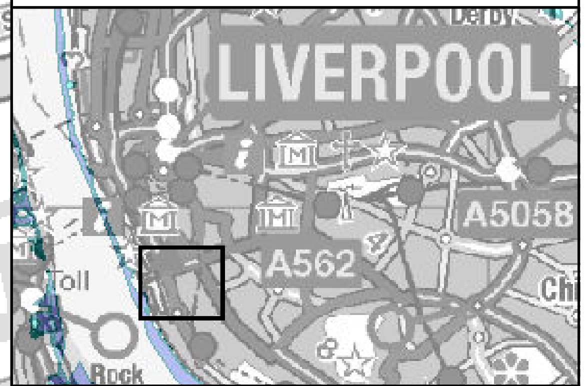
Any soakaway design and the sub ground strata of the sloping site areas shall be considered so as not to cause flooding to any adjoining third party land.

For developments containing prospectively adoptable surface water sewers the following document published by United Utilities should be referred to for guidance related to SUDS

http://www.unitedutilities.com/documents/7010b_S104_Guide_adoption_sewers_2016_WEB_ACC.pdf

Appendix E – Environment Agency Flood Maps





NOTES:
1) ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS STATED OTHERWISE

LEGEND

- Site Boundary
- Landownership
- EA Flood Zone 2
- EA Flood Zone 3

CLIENT:

ELOQUENT GLOBAL LTD

waterco consultants
Waterco Ltd
Eden Court, Ruthin, LL15 1NJ
01824 702220
www.waterco.co.uk

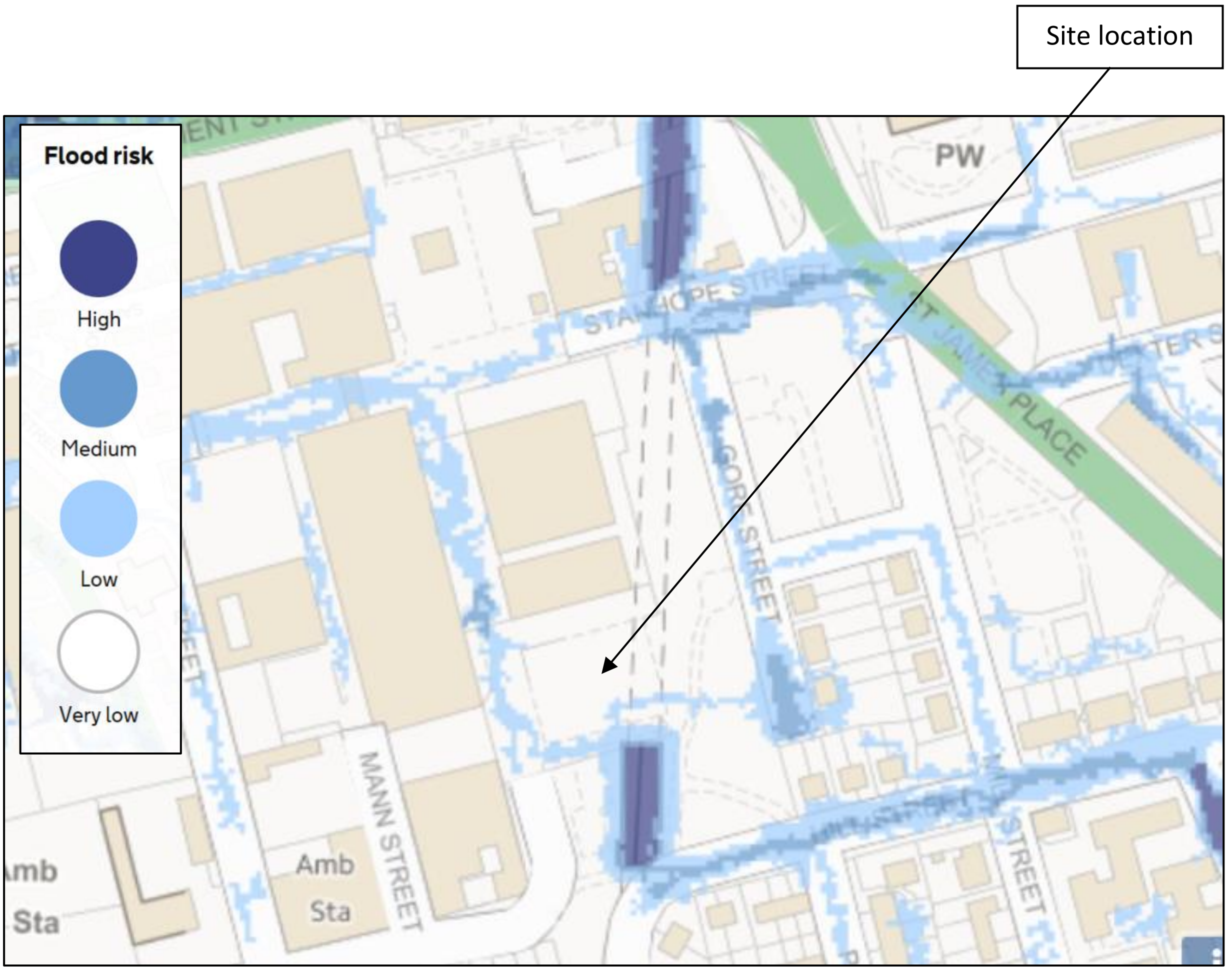
SCHEME:

BRASSEY STREET, LIVERPOOL

PLOT TITLE:

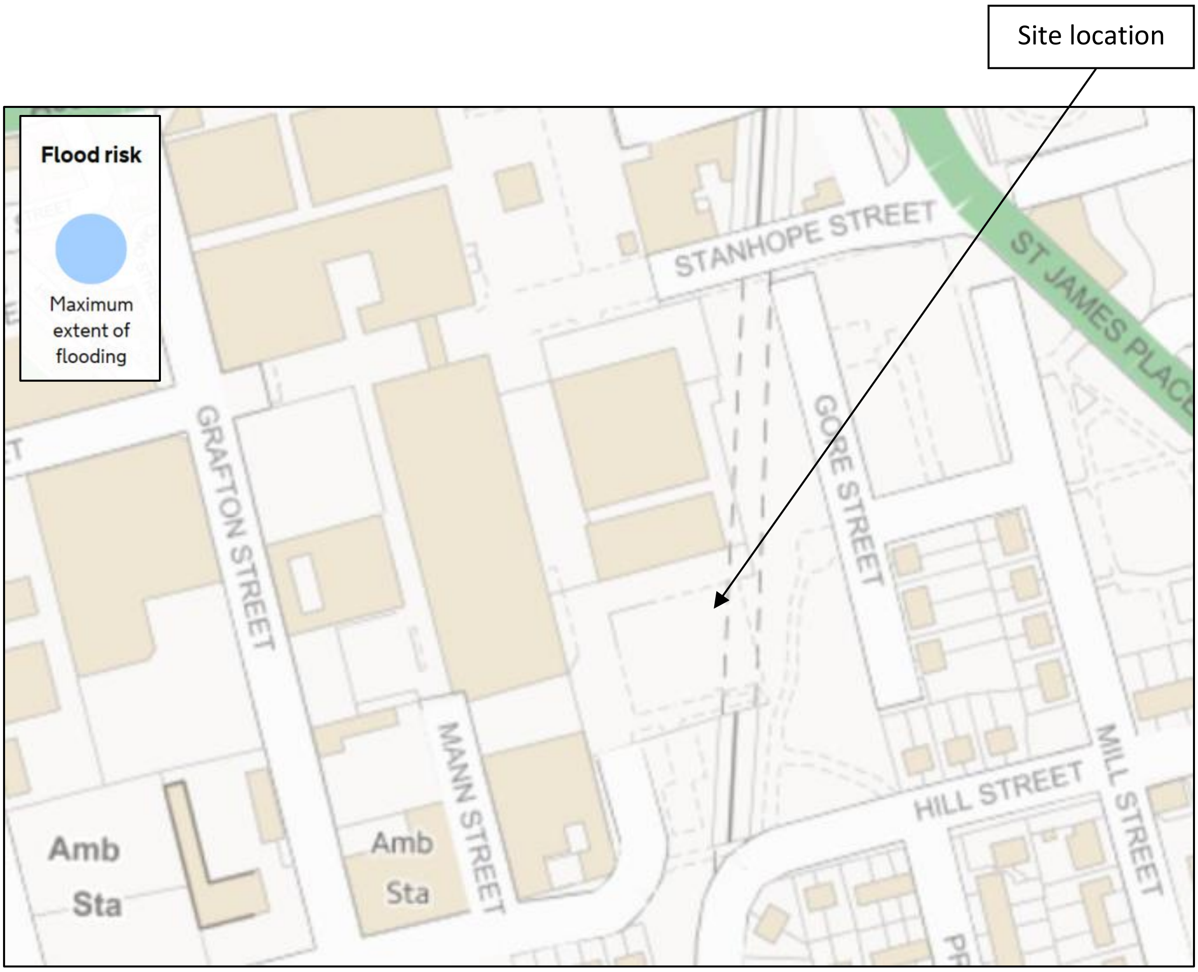
EA FLOOD MAP FOR PLANNING NOVEMBER 2016

PLOT STATUS:			DATE:
FINAL			18/11/2016
DRAWN: RCL	CHECKED: AW	APPROVED: VG	PLOT SCALE @ A3: 1:4,000 (UNLESS STATED OTHERWISE)
PLOT NAME: w10232-EA_FloodMap			REV: -



Environment Agency Flood Risk from Surface Water

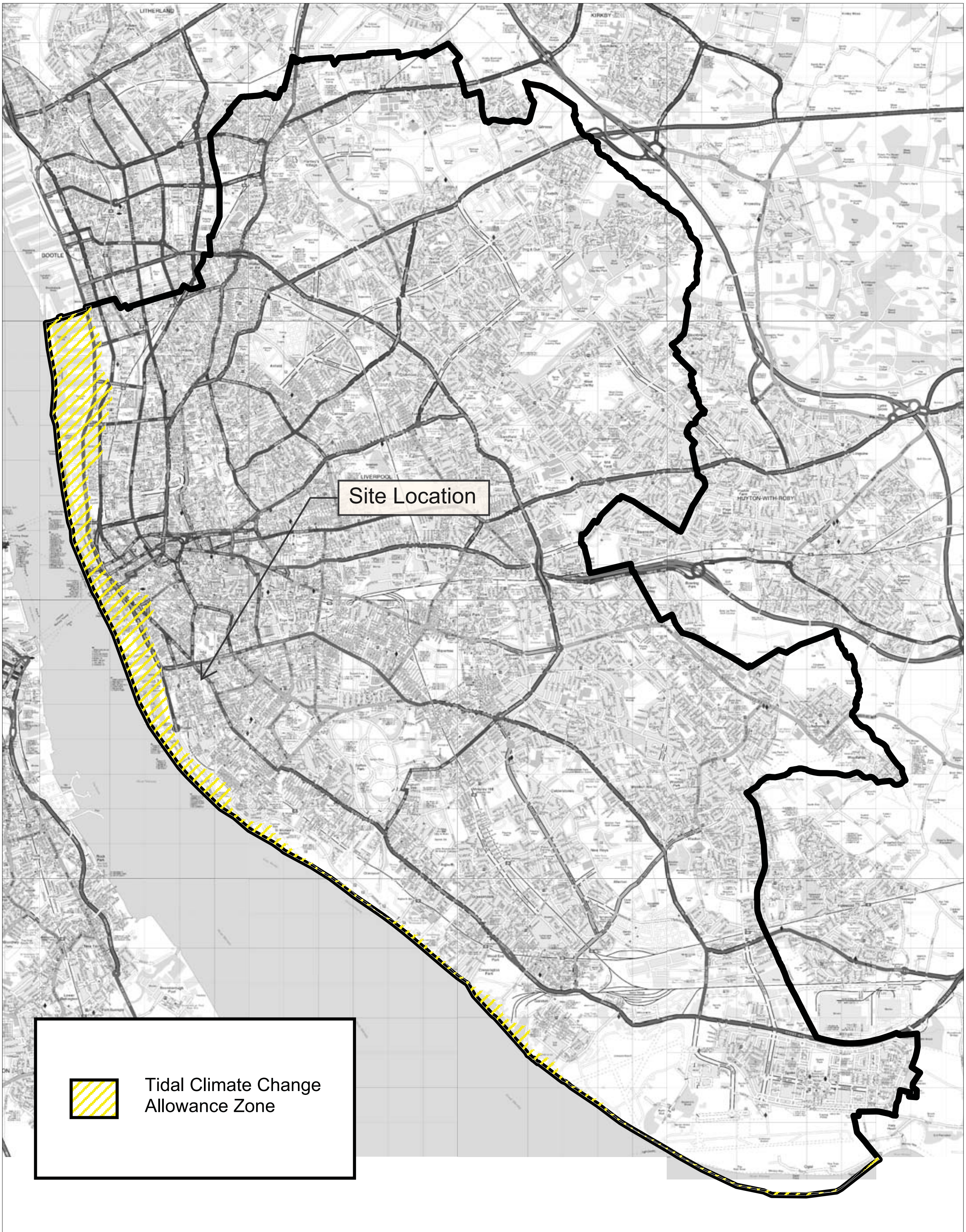
(December 2016)



Environment Agency Flood Risk from Reservoirs

(December 2016)

Appendix F – SFRA Maps



Map 13: Predicted Extreme Tide Levels in 2115

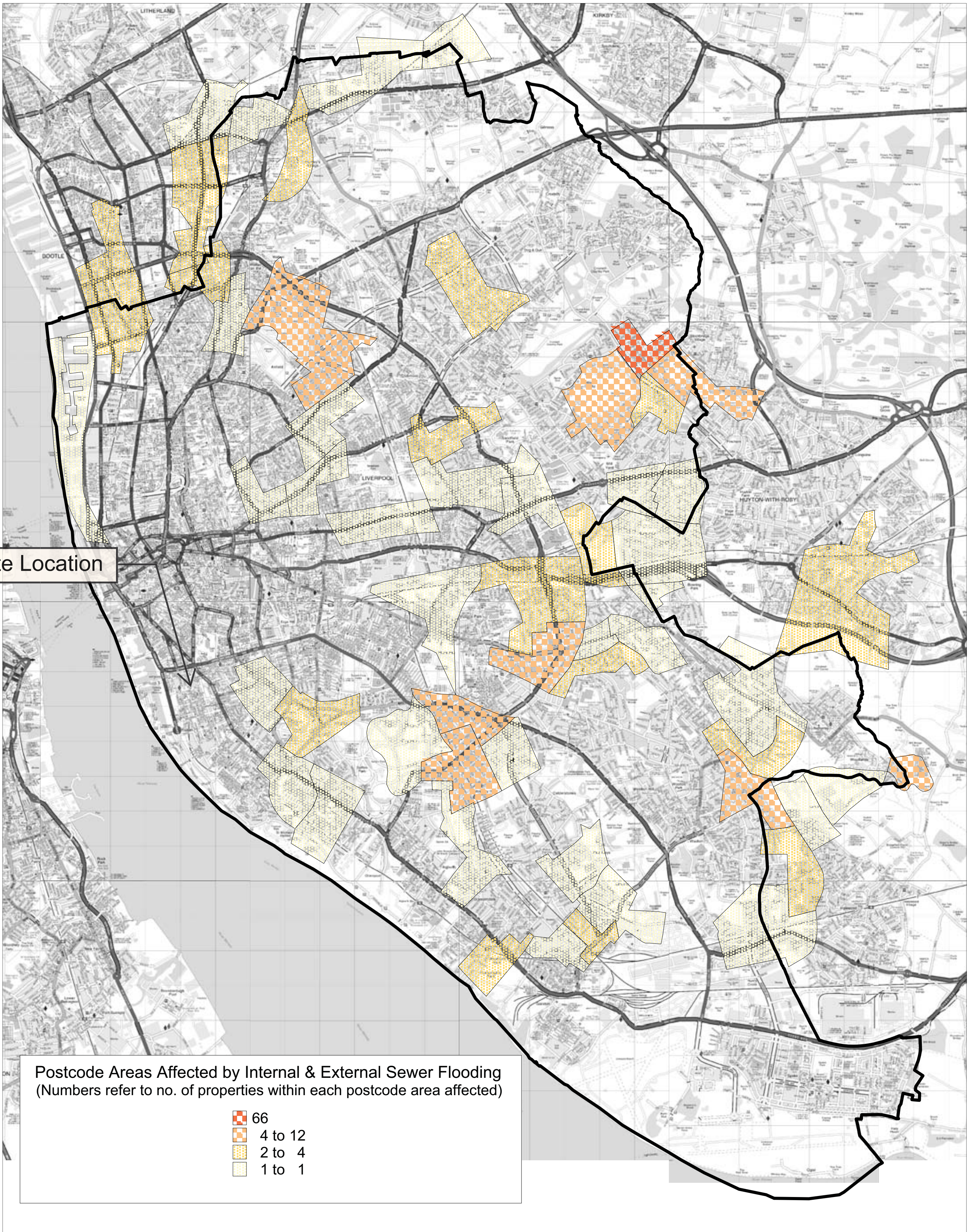
N
W E
S

Date: 08/06/2007
Scale: 1: 75,000

Planning & Building Control, 4th Floor, Millennium House, 60 Victoria Street
Liverpool, L1 6JH Tel: 0151 233 5685 Fax: 0151 233 4290

Status: FINAL

The City of Liverpool



MAP 8: Historical Sewer Flooding

N W E S

Date: 05/10/2006

Scale: 1: 75,000

Planning & Building Control, 4th Floor, Millennium House, 60 Victoria Street Liverpool, L1 6JH Tel: 0151 233 5685 Fax: 0151 233 4290

Status: **FINAL**

The City of Liverpool

Appendix G – MicroDrainage Runoff and Storage Estimates

ICP SUDS Mean Annual Flood

Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.483	Urban	0.000
SAAR (mm)	800	Region Number	Region 10

Results l/s

QBAR Rural	2.5
QBAR Urban	2.5
Q100 years	5.2
Q1 year	2.2
Q30 years	4.2
Q100 years	5.2

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	9.447	0.447	5.0	101.4	O K
30 min Summer	9.583	0.583	5.0	132.3	O K
60 min Summer	9.714	0.714	5.0	162.0	Flood Risk
120 min Summer	9.821	0.821	5.0	186.4	Flood Risk
180 min Summer	9.861	0.861	5.0	195.5	Flood Risk
240 min Summer	9.873	0.873	5.0	198.1	Flood Risk
360 min Summer	9.857	0.857	5.0	194.6	Flood Risk
480 min Summer	9.836	0.836	5.0	189.9	Flood Risk
600 min Summer	9.814	0.814	5.0	184.8	Flood Risk
720 min Summer	9.791	0.791	5.0	179.6	Flood Risk
960 min Summer	9.745	0.745	5.0	169.1	Flood Risk
1440 min Summer	9.650	0.650	5.0	147.7	O K
2160 min Summer	9.500	0.500	5.0	113.6	O K
2880 min Summer	9.384	0.384	5.0	87.3	O K
4320 min Summer	9.230	0.230	4.9	52.3	O K
5760 min Summer	9.152	0.152	4.7	34.4	O K
7200 min Summer	9.117	0.117	4.3	26.5	O K
8640 min Summer	9.101	0.101	3.8	23.0	O K
10080 min Summer	9.090	0.090	3.4	20.5	O K
15 min Winter	9.503	0.503	5.0	114.2	O K
30 min Winter	9.658	0.658	5.0	149.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	117.771	0.0	106.5	26
30 min Summer	77.427	0.0	140.0	40
60 min Summer	48.563	0.0	175.8	68
120 min Summer	29.485	0.0	213.5	126
180 min Summer	21.753	0.0	236.3	184
240 min Summer	17.438	0.0	252.6	242
360 min Summer	12.668	0.0	275.2	332
480 min Summer	10.096	0.0	292.5	390
600 min Summer	8.464	0.0	306.5	454
720 min Summer	7.325	0.0	318.3	520
960 min Summer	5.828	0.0	337.7	660
1440 min Summer	4.215	0.0	366.4	940
2160 min Summer	3.044	0.0	396.9	1308
2880 min Summer	2.414	0.0	419.6	1672
4320 min Summer	1.738	0.0	453.3	2340
5760 min Summer	1.376	0.0	478.4	3008
7200 min Summer	1.147	0.0	498.5	3680
8640 min Summer	0.988	0.0	515.4	4408
10080 min Summer	0.871	0.0	530.0	5144
15 min Winter	117.771	0.0	119.3	26
30 min Winter	77.427	0.0	156.7	40

Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	9.805	0.805	5.0	182.8	Flood Risk
120 min Winter	9.931	0.931	5.0	211.3	Flood Risk
180 min Winter	9.981	0.981	5.0	222.7	Flood Risk
240 min Winter	10.000	1.000	5.0	227.0	Flood Risk
360 min Winter	9.991	0.991	5.0	225.0	Flood Risk
480 min Winter	9.963	0.963	5.0	218.5	Flood Risk
600 min Winter	9.935	0.935	5.0	212.1	Flood Risk
720 min Winter	9.905	0.905	5.0	205.5	Flood Risk
960 min Winter	9.841	0.841	5.0	190.9	Flood Risk
1440 min Winter	9.706	0.706	5.0	160.3	Flood Risk
2160 min Winter	9.476	0.476	5.0	108.1	O K
2880 min Winter	9.311	0.311	5.0	70.6	O K
4320 min Winter	9.144	0.144	4.6	32.6	O K
5760 min Winter	9.103	0.103	3.9	23.4	O K
7200 min Winter	9.087	0.087	3.2	19.7	O K
8640 min Winter	9.077	0.077	2.8	17.5	O K
10080 min Winter	9.070	0.070	2.5	16.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	48.563	0.0	196.9	68
120 min Winter	29.485	0.0	239.1	124
180 min Winter	21.753	0.0	264.7	182
240 min Winter	17.438	0.0	282.9	238
360 min Winter	12.668	0.0	308.3	346
480 min Winter	10.096	0.0	327.6	442
600 min Winter	8.464	0.0	343.3	478
720 min Winter	7.325	0.0	356.5	554
960 min Winter	5.828	0.0	378.2	710
1440 min Winter	4.215	0.0	410.3	1018
2160 min Winter	3.044	0.0	444.5	1396
2880 min Winter	2.414	0.0	470.1	1736
4320 min Winter	1.738	0.0	507.7	2340
5760 min Winter	1.376	0.0	535.8	2976
7200 min Winter	1.147	0.0	558.3	3680
8640 min Winter	0.988	0.0	577.2	4400
10080 min Winter	0.871	0.0	593.6	5144

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.500	Shortest Storm (mins)	15
Ratio R	0.400	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time Area Diagram

Total Area (ha) 0.483

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	0.161	4	8	0.161	8	12	0.161

Model Details

Storage is Online Cover Level (m) 10.000

Tank or Pond Structure

Invert Level (m) 9.000

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	227.0	1.000	227.0

Hydro-Brake Optimum® Outflow Control

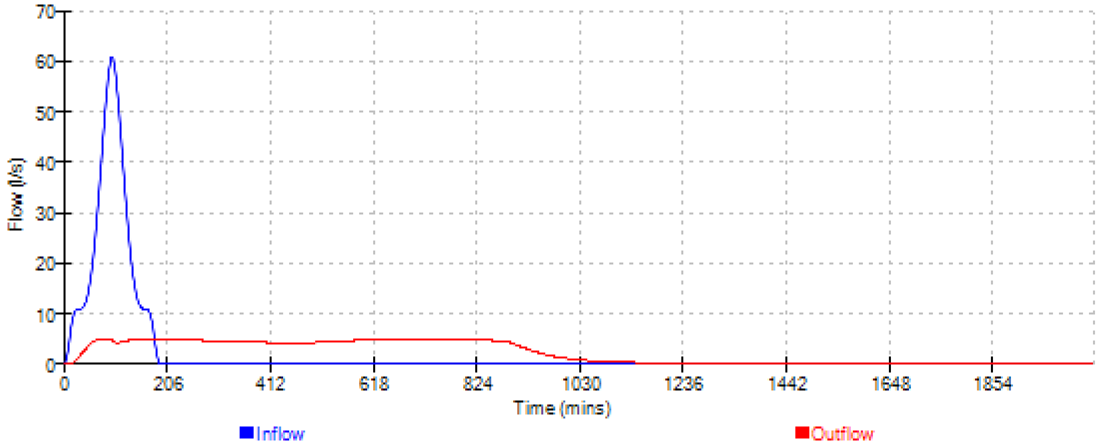
Unit Reference	MD-SHE-0105-5000-1000-5000
Design Head (m)	1.000
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	105
Invert Level (m)	8.995
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

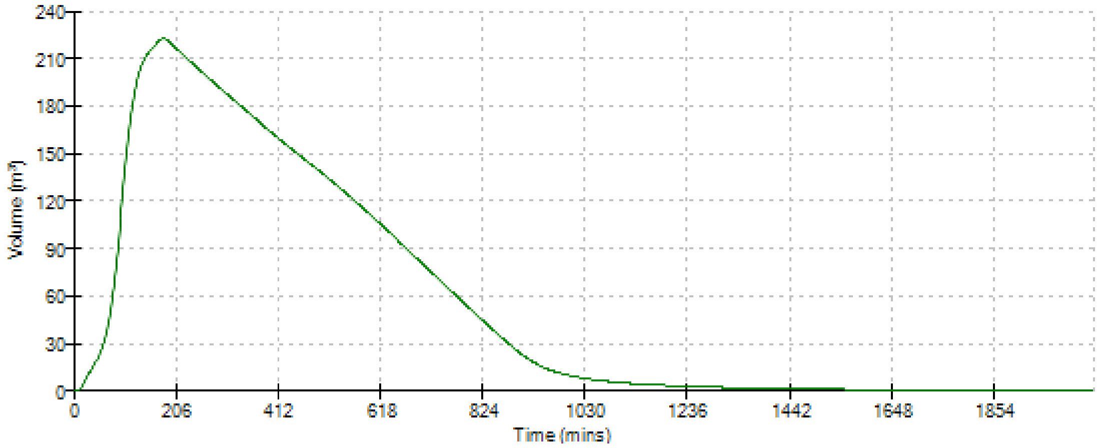
Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.000	5.0
Flush-Flo™	0.296	5.0
Kick-Flo®	0.637	4.1
Mean Flow over Head Range	-	4.3

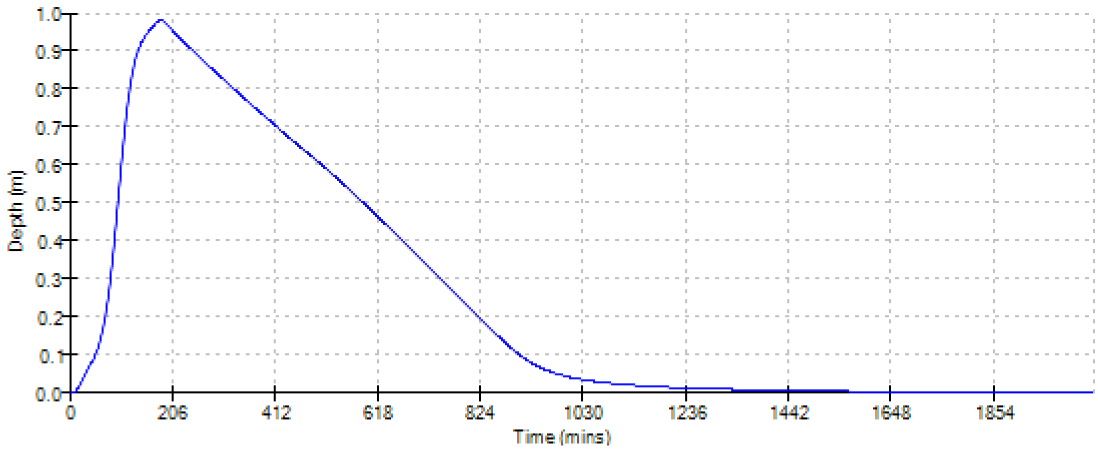
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	3.6	1.200	5.4	3.000	8.4	7.000	12.5
0.200	4.8	1.400	5.8	3.500	9.0	7.500	12.9
0.300	5.0	1.600	6.2	4.000	9.6	8.000	13.3
0.400	4.9	1.800	6.6	4.500	10.1	8.500	13.7
0.500	4.7	2.000	6.9	5.000	10.6	9.000	14.1
0.600	4.3	2.200	7.2	5.500	11.1	9.500	14.5
0.800	4.5	2.400	7.5	6.000	11.6		
1.000	5.0	2.600	7.8	6.500	12.1		

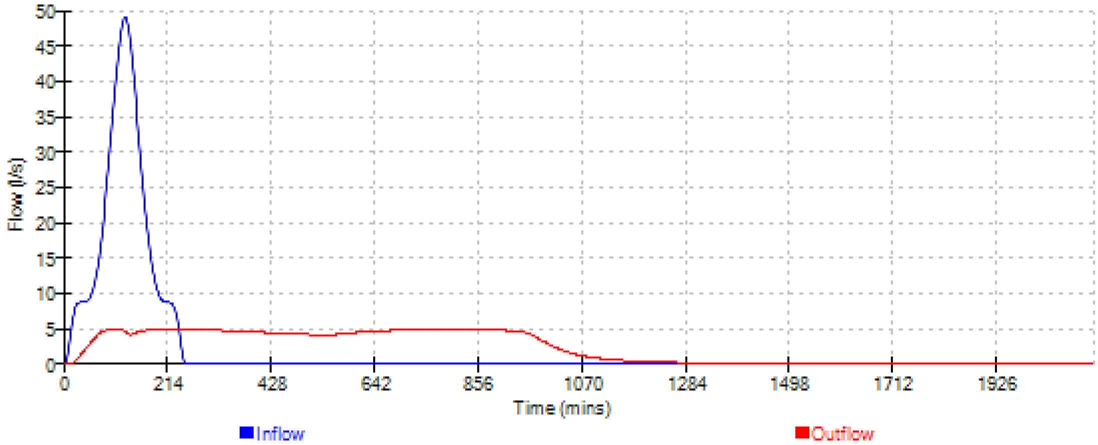
Event: 180 min Winter

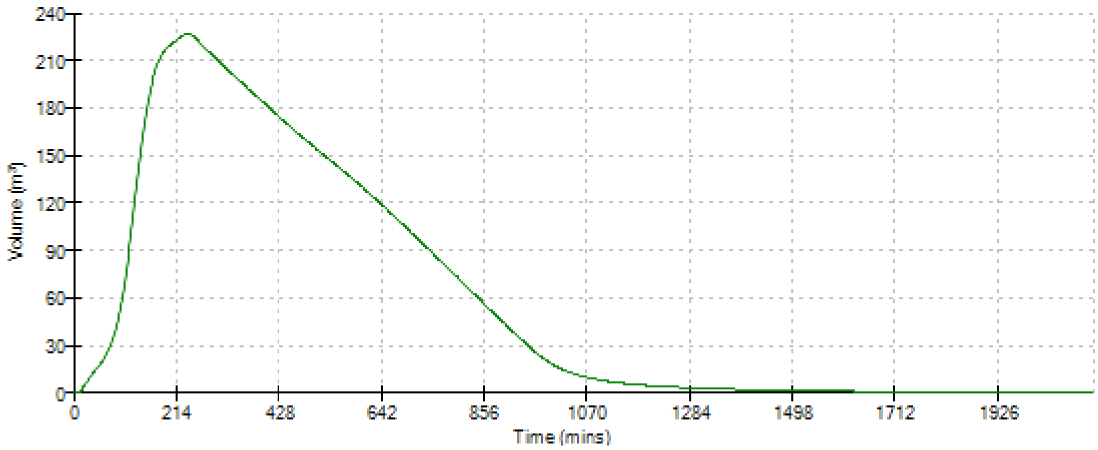


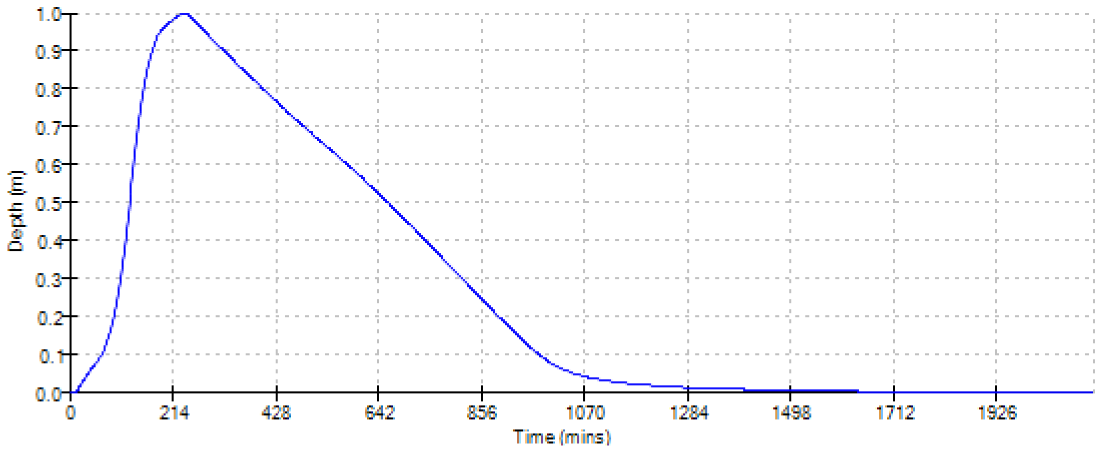




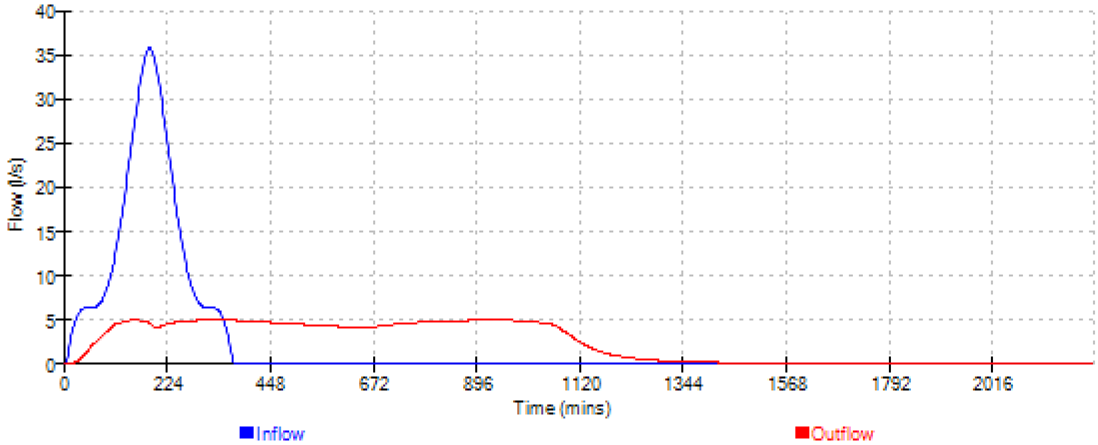
Event: 240 min Winter

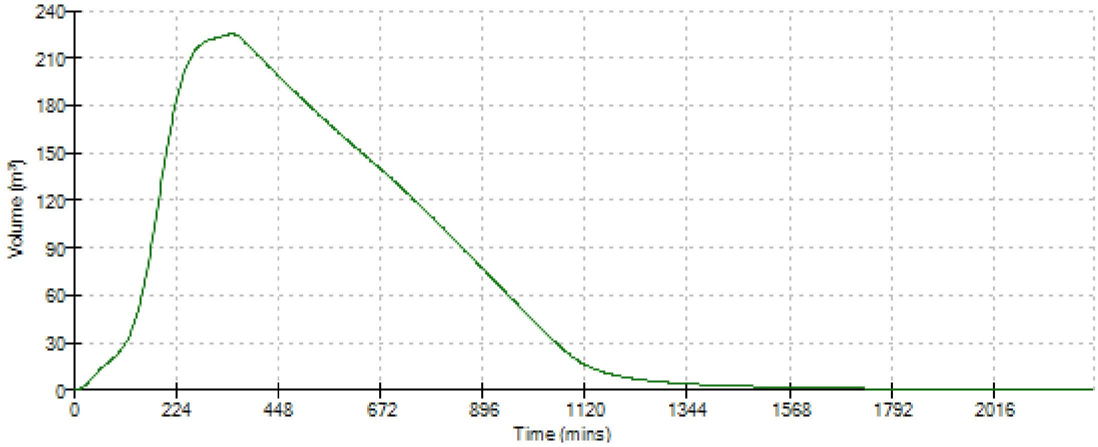


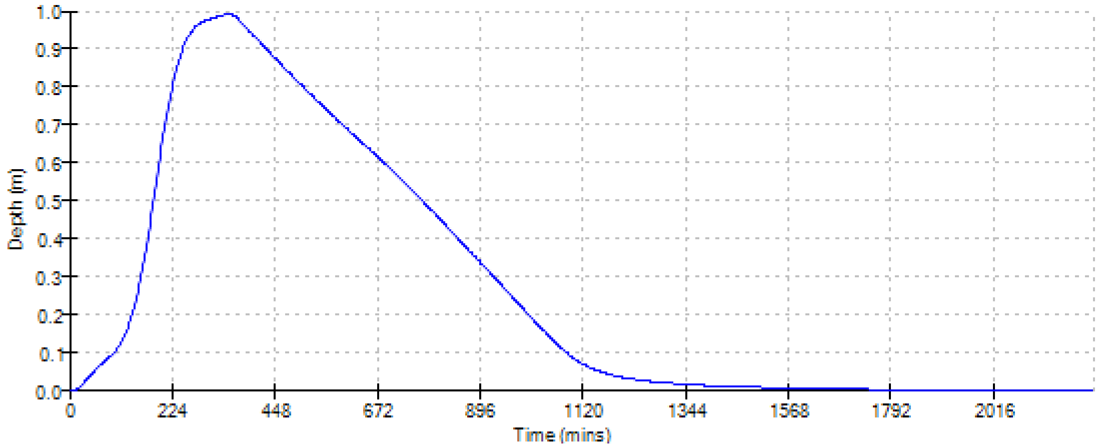




Event: 360 min Winter







Appendix H – 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 ....