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FLOOD RISK ASSESSMENT AND SURFACE WATER DRAINAGE STRATEGY

FOR THE

PROPOSED EXTENSION TO WATERS BUILDING CREWE ROAD, WYTHENSHAWE, MANCHESTER

HOLOGIC®

OCTOBER 2019

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1 Introduction

The Waters site is located on the Oaks Business Park, Crewe Road, Wythenshawe, Manchester. The proposed development consists of a two phased extension to the existing building to its north west side, along with the provision of an associated service yard and new staff entrance and car park off Wythenshawe Road.

This Flood Risk Assessment and Surface Water Drainage Strategy Report has been produced in accordance with the 2018 National Planning Policy Framework (NPPF) and the associated Technical Guidance (TG), both contained within the 2018 Planning Practice Guidance (PPG). The report includes the surface water drainage design strategy for the disposal of surface water generated from the proposed development.

The comments and opinions contained in this report including the conclusions and recommendations are based on the following information:

(i) Existing OS plans.
(ii) Topographical survey of existing levels.
(iii) Environment Agency Flood Plans.
(iv) Government Flood Plans.
(v) United Utilities sewer record plans.

This report is prepared solely for the use of Hologic and their advisers.

2 Site Information

2.1 Existing Site

The existing Waters site is located at Oaks Business Park, Crewe Road, Wythenshawe, Manchester M23 9HZ. A site location plan is attached under **Appendix A**.

The site is bound by Crewe Road and the existing Hologic factory unit to the south, with other business units, associated landscaping and a sports field beyond. A pond is also located to the south side of Crewe Road. To the north west, the site is bound by Wythenshawe Road with residential properties beyond. To the north east lies some residential properties and three ponds located within a wooded area. It is understood that these ponds are used for private fishing.

The Bridgewater Canal runs approximately 2.20Km to the north west of the site and the Baguley brook runs approximately 250m to the north and east of the site.

Both vehicular and pedestrian access is currently taken into the site via Crewe Road.

The Waters site is approximately 1.43 Ha in total area and accommodates existing buildings and associated service/storage yard and car parking areas. The development area is the north west portion of the Waters site with an area of approximately 0.89 Ha. The existing hard standing area within the development site is approximately 1,636m^2 and the existing grassed area is approximately 7,264m^2.

It is noted that the development area and existing hard standing area includes a portion of the existing Waters building that currently discharges into existing surface water drainage that will be diverted to discharge into the proposed drainage system. The portion of the Waters building that is served by the existing drainage to be diverted is an estimate, and further site investigations are to be undertaken to confirm an accurate area served by this existing drainage for detailed design purposes.

The topographical survey shows the development area is generally flat lying having a ground level of approximately 30.20m AOD to the east of the site and a ground level of 29.50m AOD to the west of the site, giving a gradient across the site of circa 1 in 140.

An existing site layout plan showing the existing building and existing ground levels is attached under **Appendix B.**

2.2 Proposed Development

The proposed development consists of a two phased extension to the existing building to its north west side, along with the provision of an associated service yard and new staff entrance and car park off Wythenshawe Road.

The Phase 1 building extension includes an extension to the existing yard area giving a total proposed hard standing area of 3,445m^2. The Phase 2 building extension is 1,280m^2 in area and the proposed staff car park and service yard extension is 3,188m^2 in area. For the development site as a whole, this results in an additional hard standing area of 7,913m^2.

Both vehicular and pedestrian access will continue to be taken via Crewe Road which will primarily be for delivery vehicles. A new access to the site will be taken off Wythenshawe Road, which will primarily be for pedestrian access and staff/visitor car parking.

A proposed site layout plan is attached under **Appendix C**.

2.3 Flood Zone Classification

Flood mapping for Rivers has been obtained from the Environment Agency website and a copy of the Environment Agency Flood Map is attached under **Appendix D**.

The Environment Agency flood mapping for Rivers shows that the whole of the site is located within a Flood Zone 1 area which has an annual probability of flooding from rivers of less than 1 in 1000 (a <0.1% chance of flooding in any given year).

The proposed re-development, being a warehouse extension, is considered to be classed as ‘general industry’ and ‘storage and distribution’ use, and would therefore be classed as a Less Vulnerable development in accordance with Table 2 : Flood Risk Vulnerability Classification, of the PPG, associated with the NPPF. Table 3 : Flood Risk Vulnerability and Flood Zone Compatibility, of the PPG, associated with the NPPF shows that, an exceptions test is not required and the development is appropriate for a Less Vulnerable development within Flood Zone 1.

3 Possible Sources of Flooding

3.1 Fluvial (Rivers)

Fluvial sources of flooding include the inundation of floodplains from rivers and watercourses, inundation of areas outside the floodplain due to the influence of bridges, embankments and other features which artificially raise water levels, overtopping or breaching of defences, blockages of culverts, flood channels or flood corridors.

The Bridgewater Canal runs approximately 2.20Km to the north west of the site and the Baguley brook runs approximately 250m to the north and east of the site.

The Environment Agency flood mapping for Rivers shows that whole of the site is located within a Flood Zone 1 area which has an annual probability of flooding from rivers of less than 1 in 1000 (a <0.1% chance of flooding in any given year).

The Government long term flood risk mapping for reservoirs shows that whole of the site is outside of zone indicated to be affected due to the failure of reservoirs.

The site is therefore not shown to be affected by fluvial flooding.

A copy of the Environment Agency Flood Map and Government long term flood risk mapping for reservoirs, is attached under **Appendix D**.

3.2 Tidal

The area and associated Rivers are not subject to tidal events.

3.3 Surface Water

Flooding from surface water can include sheet run off from adjacent land and surcharged sewers being combined, foul or surface water sewers.

The site is bound by Highway land to the north west and south, and it is considered that as the drainage systems within these roads are adopted, they will be adequately maintained. Should some flooding occur in the adjacent carriageways, it is considered that this will be held within the kerbing of the adjacent carriageways.

The existing Hologic site is located to the south and it is understood that the drainage systems within this site are adequately maintained under a company maintenance system.

To the east of the site are existing fishing ponds and a wooded area. The ground levels and performance of the ponds is not known, as such reference to the Government long term flood risk mapping has been made.

The Government long term flood risk mapping shows that an area adjacent to the site access off Crewe Road, along with the most western corner of the site may be subject to a low risk of flooding from surface water. Low risk means that each year the area has a chance of flooding of between 0.1% and 1% (between 1 in 100 and 1 in 1000 years). A medium risk zone is also shown in the most westerly corner of the site and this means that each year the area has a chance of flooding of between 1% and 3.3% (between 1 in 30 and 1 in 100 years).

The Government long term flood risk mapping for surface water comes with the proviso that flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. This information is suitable as a general indicator of an areas flood risk and identifying approximate extent and depths of flooding. information therefore needs to be treated with some assessment and caution.

The site has no history of flooding from surcharged sewers or sheet run off and is shown to be at a low risk of flooding, with the low lying western corner being the area most at risk. As such, the site is considered not to be at a significant risk from flooding from surface water.

A copy of the Government long term flood risk mapping for surface water, is attached under **Appendix D**.

3.4 Ground Water

Flooding from groundwater can include the water table rising above ground level after prolonged rainfall, remote from a watercourse, low lying areas underlain by permeable rock (aquifers), seepage directly into properties, and groundwater recovery after pumping has ceased from mining or industry.

The Phase 2 Site Investigation Report, entitled Proposed Building Extension at Hologic, Crewe Road, Wythenshawe, Manchester and dated 30th October 2018, indicates that groundwater was struck at a depth of between 1.9m and 2.2m below ground level and subsequent groundwater monitoring encountered groundwater at depths between 2.55m and 2.63m below ground level.

Therefore, there is no evidence of groundwater issues on the site.

3.5 Infrastructure Failure

Flooding from the failure of reservoirs, canals, industrial processes, burst water mains, blocked sewers or failed pumping stations.

With reference to the United Utilities sewer record plans, a 375mm diameter surface water sewer is shown to run within the carriageway of Crewe Road and then run within the site ownership boundary in a north westerly direction adjacent to the south western boundary of the site, and is shown to pick up surface water discharge from the existing building on the site and the existing building from the adjacent Hologic site, along with an additional section of Crewe Road. This sewer is shown to have a depth to invert of approximately 2.5m

The 375mm diameter surface water sewer is shown to connect onto a 1400mm diameter surface water sewer at the western corner of the site. The 1400mm diameter sewer is shown to run within the site ownership boundary in a north easterly direction along the north western boundary of the site. The sewer then turns 90 degrees to run out of the site boundary and run in a northerly direction within Tunshill Road. This sewer is shown to have a depth to invert of approximately 4.5m at the western corner of the site, but no invert levels are available for the remainder of the sewer within the site boundary.

A combined sewer is shown within the carriageway of Crewe Road, running in an easterly direction. Topographical survey information shows this sewer as 225mm diameter, located at a depth of approximately 1.3m to invert.

A copy of the United Utilities sewer records, are attached under **Appendix E**.

As these drainage systems are adopted, it is considered that these systems are likely to be adequately maintained and monitored. Likewise, the on site private drainage network is adequately maintained and monitored by Hologic.

As such, the site is considered not to be a significant risk from infrastructure failure or flooding of existing sewers.

4 Development Drainage Strategy

An increase in formally drained impermeable area could increase flood risk to a wider catchment.

The existing development site area which is to accommodate the building extension, yard and car parking areas consists predominantly of grassed and permeable surfacing areas. It has a site area of 8,900m^2 containing an existing impermeable area of 1,636m^2.

The proposed development will result in an impermeable surface area of up to 7,913m^2, resulting in an increase in impermeable surfacing. As such the surface water discharging from the proposed development will need to be designed in accordance with the NPPF Non-statutory Technical Standards for sustainable drainage systems.

4.1 Surface Water Drainage Hierarchy

The NPPF Non-statutory Technical Standards for sustainable drainage systems, and Part H of the Building Regulations, requires the following order of priority to be considered when designing the surface water drainage for a development.

a) an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable,
b) a watercourse, or where that is not reasonably practicable,
c) a sewer

Discharge Via Infiltration

A Phase 2 Site Investigation Report, entitled Proposed Building Extension at Hologic, Crewe Road, Wythenshawe, Manchester and dated 30th October 2018, indicates that there is a 0.20m - 0.25m thick layer of topsoil over granular deposits of glaciofluvial deposits of sand, gravels and silts. A consistent layer of peat was encountered between 1.70, and 2.00m bgl in all completed boreholes. Although the peat is only a thin layer, in the region of 200mm thick, it is stated that the peat is likely to degrade and compress over time which will lead to significant settlement.

Groundwater was generally encountered at approximately 2.5m

The Phase 2 Site Investigation Report does not contain infiltration testing or confirm whether it is acceptable to use infiltration as a suitable method of disposal of surface water generated from the development site. It is considered that although the materials appear to be suitable for infiltration purposes, there may be issues with the silt content and also issues with discharging over the peat layer, encouraging settlement issues.

As such, it is recommended that infiltration testing is undertaken on the site to confirm infiltration rates and an assessment is undertaken to confirm the affect of infiltration in the vicinity of the peat layer. If infiltration is shown to be a suitable method for the disposal of surface water then this method is to be used.

A copy of the Phase 2 Site Investigation Report is attached under **Appendix F.**

Discharge to Watercourse

There are no watercourses accessible for connection from the site. As such, it is not considered a viable option for the discharge of surface water.

Discharge to Sewer

If it is not feasible to discharge the surface water generated by the proposed development via infiltration, due to the presence of the peat layer or silt content, it will be proposed to discharge the surface water into the existing United Utilities sewer network which runs within the site boundary.

However, the use of permeable paving within car parking areas as a sealed system may be viable and should be considered in the detailed design process, to provide source control and offer some improvement to water quality as it passes through the permeable paving by filtrating pollutants and the like. It is not recommended that permeable paving is used within the service yard area due to its usage by heavy goods vehicles and the tight turning manoeuvres that will be undertaken.

4.2 Surface Water Drainage Design Criteria

The NPPF Non-statutory Technical Standards for sustainable drainage systems requires the peak run off rate from a development for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should be as close as reasonably practical to the greenfield runoff for the same rainfall event but should never exceed the rate of discharge from the development prior to redevelopment for that event.

The site is not located within the Conurbation Core Critical Drainage Area identified in the Manchester Trafford and Salford Strategic Flood Risk Assessment.

The greenfield discharge from the site, based on the proposed development area of 8,900m^2 with an impermeable area of 1,636m^2, has been calculated using the Micro Drainage Rural Runoff Calculator. The discharge for a 1 in 1 year storm event is

calculated as 3.5 l/s and the discharge from a 1 in 100 year storm event is calculated as 7.7 l/s. Qbar is shown as 3.0 l/s rural and 4 l/s urban.

The site however is a brownfield site containing existing hardstanding areas measuring 1,636m^2. Using the Micro Drainage network and simulation design package, the brownfield discharge for a 1 in 1 year storm event is calculated as 21.6 l/s and the brownfield discharge from a 1 in 100 year storm event is calculated as 66.9 l/s.

If drainage via infiltration is not feasible for the site, it is proposed that the discharge to sewer should be restricted to 20 l/s which provides a 7.5% betterment to the current 1 in 1 year storm event and a 67% betterment to the current 1 in 100 year storm event. This meets the criteria that the discharge should never exceed the rate of discharge from the development prior to redevelopment for that event, whilst offering a significant betterment to the larger storm events.

The surface water generated by this flow restriction is to be attenuated for a 1 in 100 year storm plus a 40% allowance for climate change.

A copy of the Micro Drainage calculations are attached under **Appendix G**.

4.3 Attenuation Volume Estimate

The surface water generated by the proposed flow restriction of 20 l/s is to be attenuated for a 1 in 100 year storm plus a 40% allowance for climate change.

Using the measured contributing site area of 7,913m^2, and a limited discharge of 20l/s, the volume of surface water attenuation required to accommodate a 1 in 100 year storm event plus a 40% allowance for climate change is approximately 306m^3.

This volume of water can be attenuated in a suitable facility such as underground tanks or in the open graded sub base to the permeable car park system. If it is necessary not to allow the surface water to be infiltrated onto the peat layer then the storage facility will need to be lined with an impermeable membrane to prevent any infiltration into the ground.

A proportion of the volume can be stored above ground on the surface of the car park for the larger storm events, to a maximum water depth of 100mm, subject to car park levels.

A copy of the Micro Drainage calculations are attached under **Appendix G**.

4.4 Potential for Sustainable Drainage Systems

A review of the potential SuDS techniques and application within the proposed development has been undertaken in accordance with CIRIA report C753, to determine whether each technique could be viable for the site. The items considered potentially viable for the site are shaded green, with items requiring further investigation shaded in yellow.

Green Roof	This system would require a low pitch or flat roof and there is no such roof proposed development as the roof needs to tie into the existing pitch roof.
Infiltration systems	Subject to further testing. Infiltration systems to be provided if further investigation works show infiltration to be a viable option for the disposal of surface water, with respect to infiltration rates, presence of silt and infiltration above the peat layer. Infiltration system should not be built within a minimum of 5m from the building or road or in unstable land.
Proprietary Treatment Systems	The use of pervious paving systems for car parking areas to be considered to aid water quality and provide source control.
Filter Strips, Filter Drains and Swales	These items are not considered feasible for this site due to limited space available, particularly to car parking areas where they would be most appropriate.
Bio-Retention Systems and Trees	There is limited space to deliver a suitable system and along with high maintenance costs this system is not favourable.
Pervious pavements	The use of pervious paving systems for car parking areas to be considered to aid water quality and provide source control.
Attenuation Storage Tanks	Attenuation storage can be provided under the car parking areas. The location of any storage tank will need to avoid the existing surface water sewer and associated easements.

Detention Basins	There is insufficient space available on the site to incorporate this feature to provide a sufficient volume of storage.
Ponds and Wetlands	There is insufficient space available on the site to incorporate this feature to provide a sufficient volume of storage.

4.5 Flow Paths and Flood Exceedance Routes

The drainage strategy has been proposed to significantly reduce the surface water discharge from the site in the larger storm events, with the resulting surface water attenuation provided to accommodate a 1 in 100 year storm plus a 40% allowance for climate change. It is unlikely that this design storm event is exceeded and the system floods under these circumstances.

If the proposed drainage facilities were to fail or their capacity exceeded, the proposed site levels and drainage are likely to follow the existing contours of the site and run generally towards the west, to the low point on the site, thereby maintaining existing flow paths and flood exceedance routes.

4.6 Off Site Works and Consents

All drainage serving the proposed development area is located and connected within the site boundary, therefore no offsite works or consents are required in relation to this surface water drainage system.

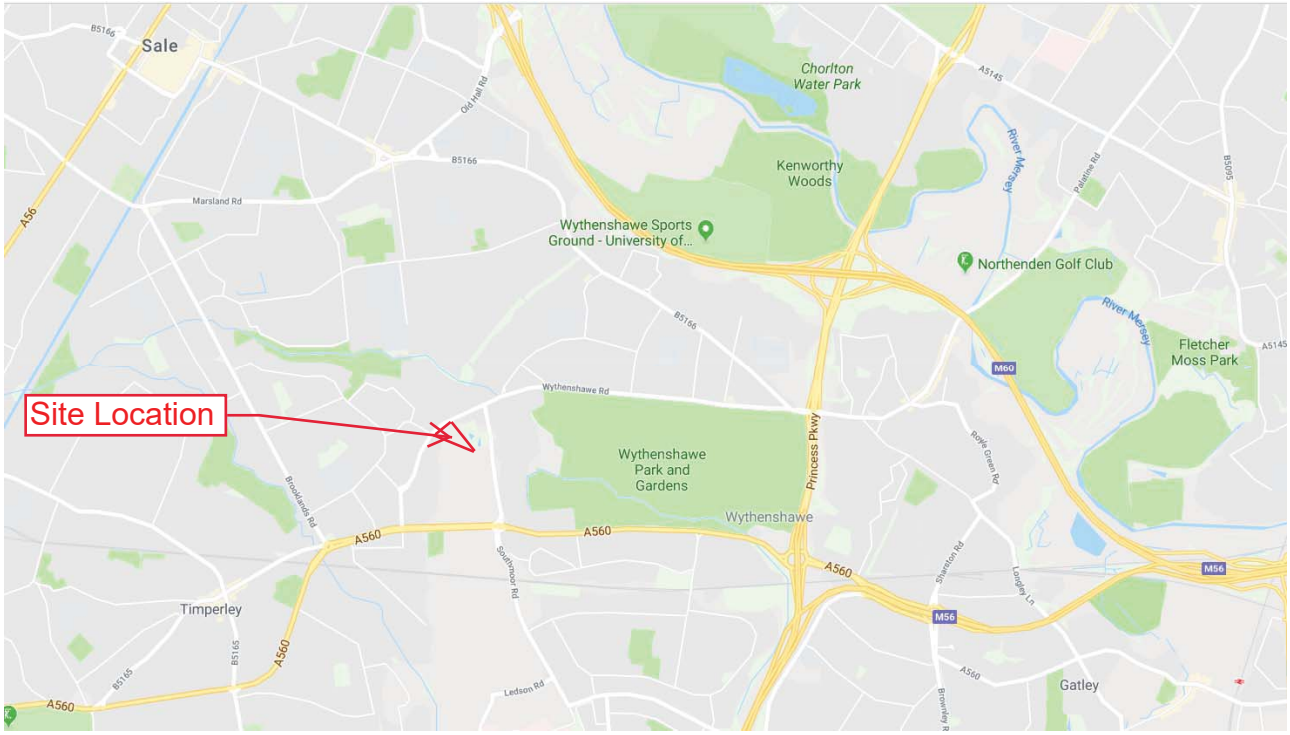
4.7 Management and Maintenance

The management and maintenance regime for the drainage systems will be undertaken by the site owner/occupier under a Maintenance and Management Plan.

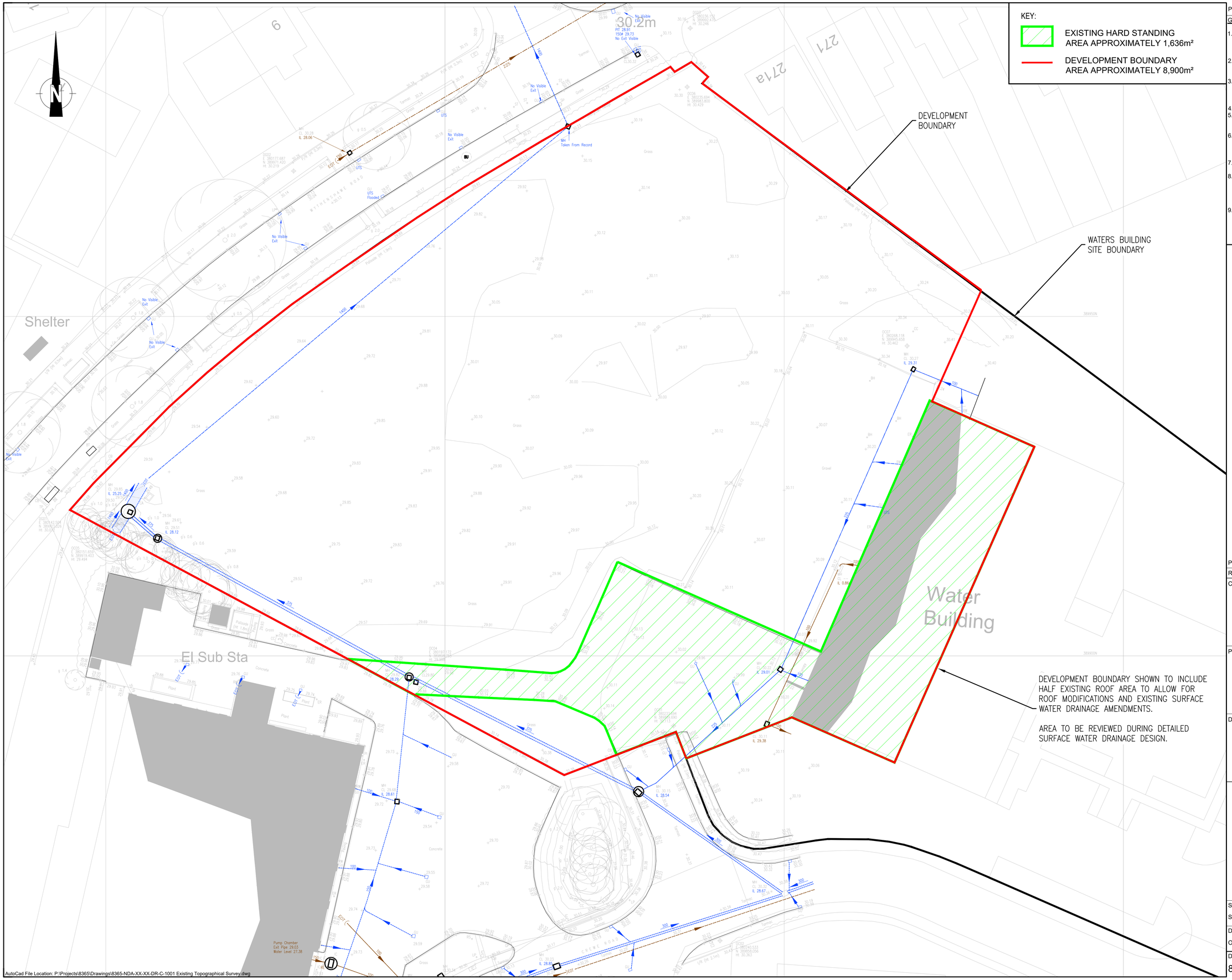
Appendix A – Site Location Plan

Waters Site, Oaks Business Park, Crewe Road, Wythenshawe, Manchester

Site Location Plan



Appendix B – Existing Site Layout and Water Building Location



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9. Calculations and drawings of all Contractor designed structural items associated with NDA's design responsibilities shall be submitted to the Engineer for comment at least 10 days prior to manufacture. Any comments made by NDA do not absolve the Contractor of his design responsibilities.

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P1	10/10/19	First Issue	AF

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PROJECT

Proposed Extension to Waters Building
Crewe Road, Wythenshawe

DRAWING TITLE

Existing Site Layout and Water Building Location

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Appendix C – Proposed Layout Plan

KEY:

- PHASE 1 BUILDING EXTENSION AND YARD AREA AREA APPROXIMATELY 3,445m²
- PHASE 2 BUILDING EXTENSION AREA APPROXIMATELY 1,280m²
- STAFF CAR PARK AND YARD EXTENSION AREA APPROXIMATELY 3,188m²
- DEVELOPMENT BOUNDARY AREA APPROXIMATELY 8,900m²

DEVELOPMENT BOUNDARY

WATERS BUILDING SITE BOUNDARY

80 New Car Parking Spaces

FLOOD EXCEEDANCE ROUTE

PERVIOUS CAR PARK CONSTRUCTION, STORAGE CIRCA 150m³

Shelter

El Sub Sta

Water Building

Bay 1
Bay 2
Bay 3
Bay 4
Bay 5
Bay 6

Indicative Retaining Wall

Line of services taken from N D Oliver 10315_001drawing

DEVELOPMENT BOUNDARY SHOWN TO INCLUDE HALF EXISTING ROOF AREA TO ALLOW FOR ROOF MODIFICATIONS AND EXISTING SURFACE WATER DRAINAGE AMENDMENTS.

AREA TO BE REVIEWED DURING DETAILED SURFACE WATER DRAINAGE DESIGN.

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Proposed Extension to Waters Building Crewe Road, Wythenshawe

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Proposed Layout Plan

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Appendix D – Environment Agency and Government Flood Plans

Environment Agency

Flood map for planning

Your reference
U19-2825

Location (easting/northing)
380207/389915

Scale
1:2500

Created
20 Aug 2019 13:19

- Selected point
- Flood zone 3
- Flood zone 3: areas benefitting from flood defences
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Flood storage area

0 20 40 60m

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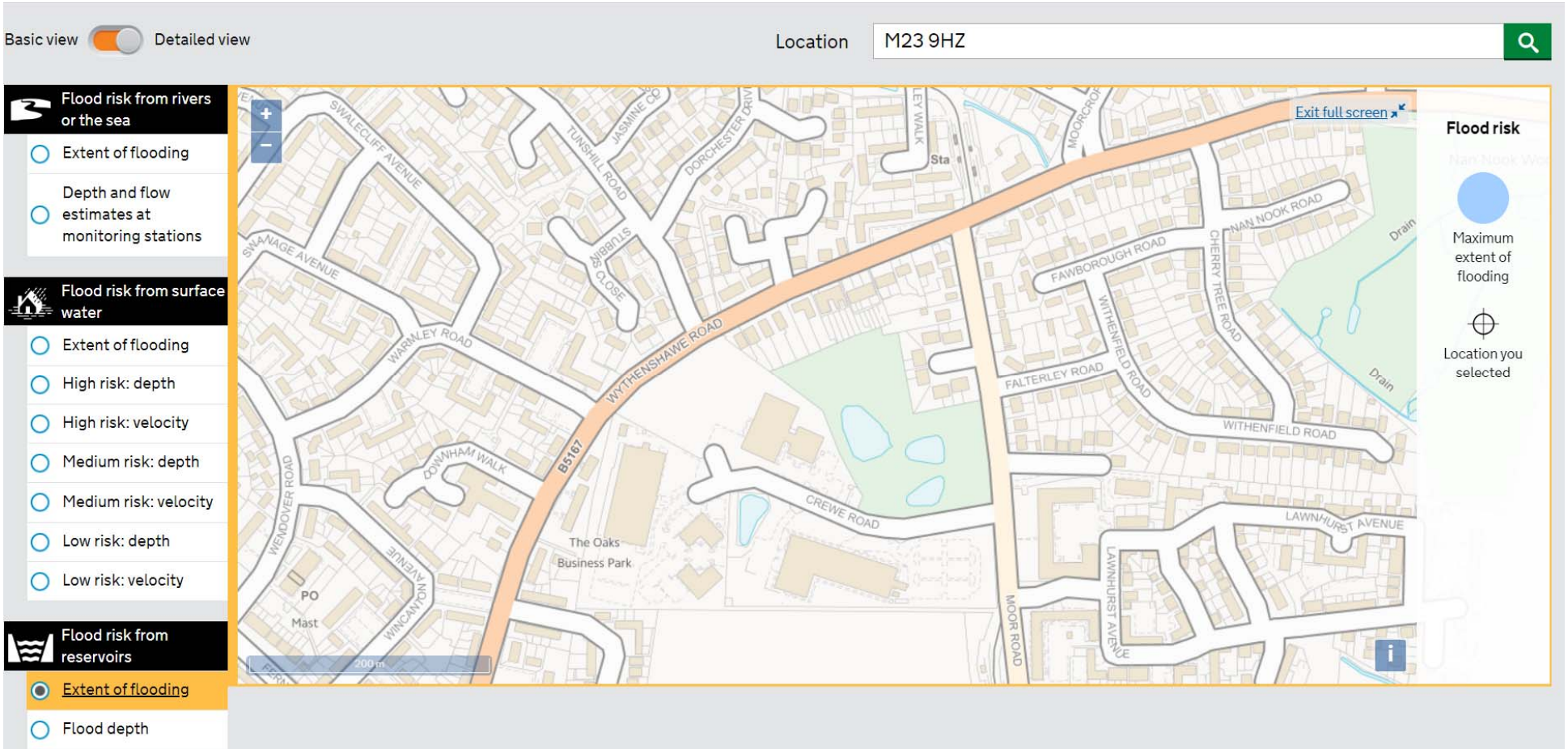
Waters Building, Crewe Road,
Wythenshawe, Manchester
8365

Flood Risk From Reservoirs



Waters Building, Crewe Road,
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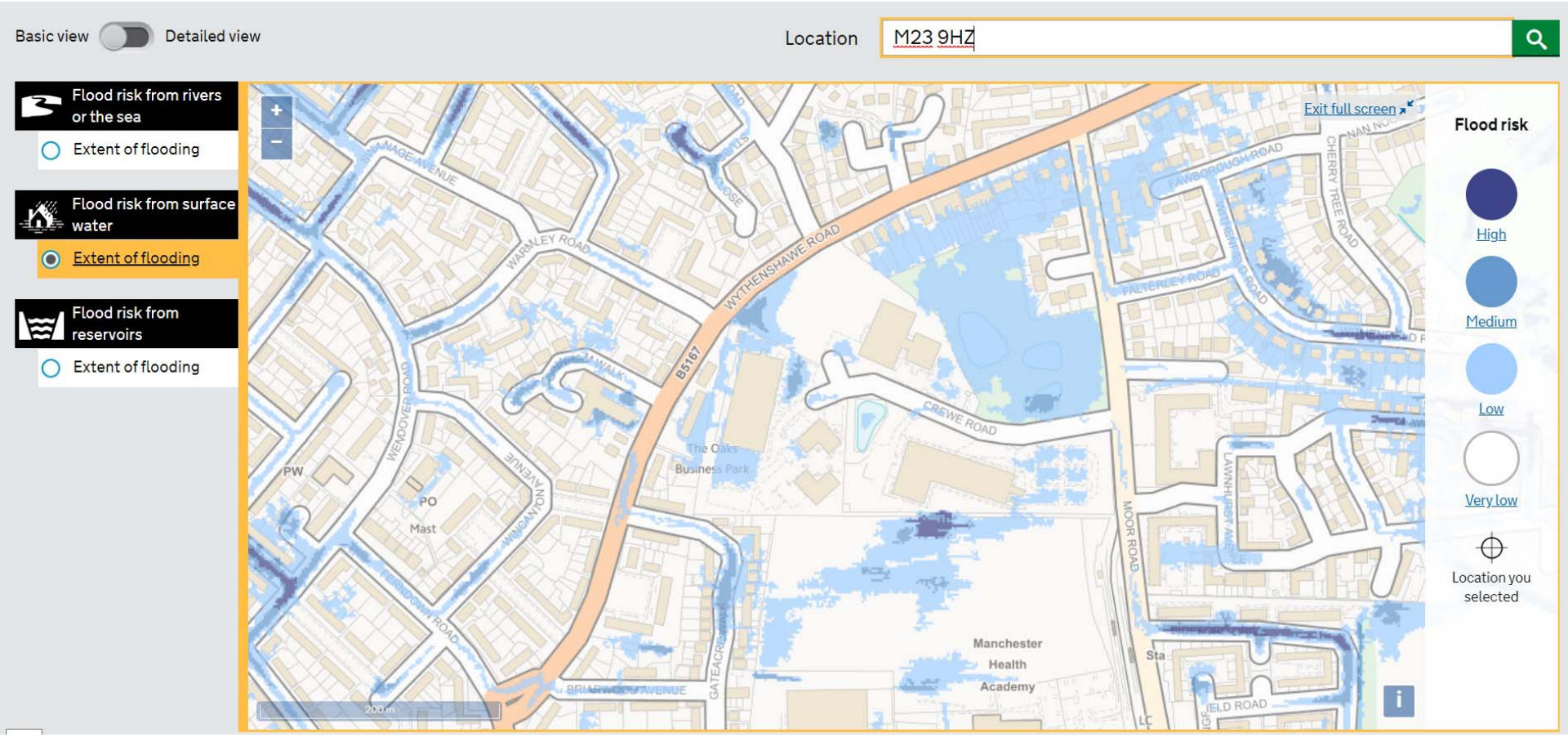
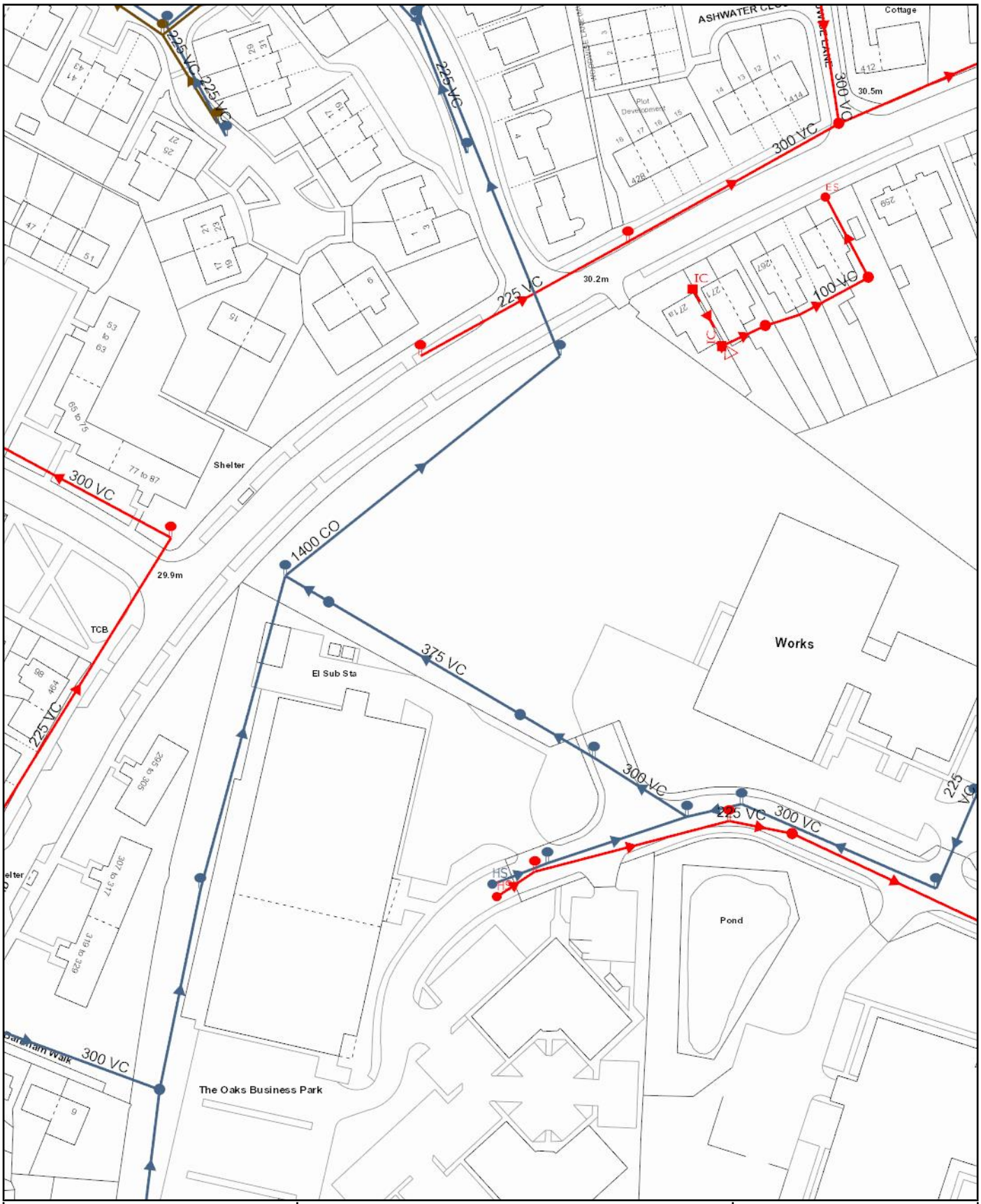
8365

Flood Risk From Surface Water



Appendix E – United Utility Sewer Records



Scale: 1:1250 **Date:** 21/08/2019	**SEWER RECORDS**	United Utilities helping life flow smoothly
Address or Site Reference: hologic **Printed by:** Property Searches		

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

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Appendix E – Phase II Site Investigation Report