



Manchester Road, Rochdale

Flood Risk Assessment & Drainage Strategy

December 2020



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Introduction

Waterco has been commissioned to undertake a Flood Risk Assessment and Drainage Strategy in relation to a proposed residential development at Manchester Road, Rochdale, M24 2SH.

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): Flood Risk and Coastal Change.

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

Existing Conditions

The site covers an area of approximately 89.825ha and is located at National Grid Reference: 389126, 409314. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed December 2020) shows that the majority of the site comprises agricultural land. A garden centre is located in the western extent of the site. Online mapping shows several ponds across the site and an access track from the north to the centre of the site serving an existing farm.

Thornham New Road intersects the site at the northern boundary. Thornham Lane crosses the southern extent of the site. The site is bordered by the M62 to the north, the A627(M) to the east and south and residential settlements of Castleton and Slattocks to the west. Key access points to the site are provided from Thornham New Road, Thornham Lane and the A664 (Rochdale Road).

Local Topography

Topographic levels to metres Above Ordnance Datum (m AOD) have been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). A review of LiDAR data shows that the site and surrounding area generally slopes from east to west, with high points on site of approximately 180m AOD in the north-east and lows of 132m AOD in the south-western extent. A LiDAR extract is included in Appendix B.

Ground Conditions

Reference to the British Geological Survey (BGS) online mapping (1:50,000 scale) [accessed December 2020] indicates that the northern extent of the site is underlain by artificial deposits/infilled ground. The BGS Lexicon describes the strata as consisting of variable composition of a man-made superficial deposits. The

northern and eastern extents of the site are underlain by superficial Devensian Glaciofluvial Deposits generally comprising sands and gravels. The western and southern extents of the site are underlain by superficial deposits of Devensian Till generally comprising sandy, silty clay with pebbles, but can contain gravel-rich, or laminated sand layers. The superficial deposits are identified as being underlain by the Pennine Lower Coal Measures Formation consisting of interbedded mudstones, sandstones and siltstones with coal seams. The mapping also shows bands of Old Lawrence Rock – Sandstone (centre) and Royley Sandstone (south-west).

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

According to the EA's Aquifer Designation data, obtained from MAGIC's online mapping [accessed December 2020], the Glaciofluvial Deposits, Devensian Till and the underlying bedrock are classified as a Secondary A Aquifer. Secondary A Aquifers are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.

The EA map also shows isolated areas of Secondary Undifferentiated Aquifer towards the northern extent and south-eastern extents of the site however, it does not appear to correlate with the geological mapping. Secondary Undifferentiated Aquifers are assigned in 'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.

The EA's 'Source Protection Zones' data, obtained from MAGIC's online mapping [accessed December 2020], indicates that the site is not located within a Groundwater Source Protection Zone.

The Cranfield University 'Soilscapes' map [accessed December 2020] indicates that the site is underlain by '*freely draining... sandy soils*'.

Local Drainage

Public sewer records have been obtained from United Utilities (UU) and are included in Appendix C. The UU sewer records show that there are sewers in built-up areas located adjacent to the western and south-western site boundaries and within Thornham New Road to the north-west and Thornham Lane to the south-west. Key sewers are discussed below.

There is a 300mm public combined sewer running westwards in Thornham Lane. The upstream extent of the sewer starts at manhole 9801. However, the cover level and invert level have not been provided.

There is a 300mm public combined sewer located in Grange Road, adjacent to the western site boundary. The sewer flows westwards and joins a 225mm combined public sewer. The upstream extent of the starts at manhole 5810. Cover and invert levels have not been provided.

There is a 225mm public combined sewer located in Thornham New Road, flowing south-west in this location.

The upstream extent of the starts at manhole 8701. The cover level of manhole 8701 is recorded as 158.36m AOD and the invert level is recorded as 156.73m AOD.

There is a 225/300mm public combined sewer located in Rochdale Road, flowing south in this location. The upstream extent of this combined sewer starts at manhole 5202. Manhole 5001 adjacent to the garden centre in the western extent of the site has an identified cover level of 136.67m AOD and an invert level of 133.37m AOD.

The majority of the site comprises agricultural land it assumed the site currently drains freely through a series of land drains located across the site. The UU plans and Ordnance Survey (OS) mapping show that there are two land drains forming in the western extent of the site. The land drains flow south-west toward the junction of Rochdale Road and Thornham lane following the local topography. It is assumed that the land drains are culverted in the south-western extent of the site and their wider connectivity is unknown. It is recommended that a survey of the onward land drainage to the south-west of the site is undertaken.

Development Proposals

The proposed development is for residential properties with associated infrastructure and landscaping. Proposed development plans are not available at this stage and this report is intended to aid with the master planning process.

The proposed development will introduce in hardstanding areas in the form of buildings and access. For the purpose of this assessment, it is assumed that hardstanding will comprise 35.93ha or 40% of the total site area. It is assumed that the remaining permeable, soft landscaped areas will occupy 53.895ha or 60% of the total site area.

Flood Zone Classification and Policy Context

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

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

Local Policy

The Rochdale Adopted Core Strategy (October 2016) contains the following policy relating to flood risk and drainage:

G8 - Managing water resources and flood risk

'We will ensure that new development (including flood risk mitigation measures) does not lead to any form of increased flooding locally or further downstream, does not impede natural water and flood risk management, is not detrimental to existing or potential flood storage areas, contributes where possible to alleviating existing flood risk, is itself well protected from flood risk and ensures prudent use of water resources. We will require:

- a) Compliance with a 'sequential' approach to new development and flood risk, directing development away from areas of high risk, in accordance with the National Planning Policy Framework;*
- b) Full regard to and compliance with the advice of the Environment Agency (or equivalent agency) and the objectives and priorities for flood risk management set out in the Local Flood Risk Management Strategy, including any mitigation measures recommended for particular sites;*
- c) Full regard to the published evidence of local flood risk and its significance as included In Strategic Flood Risk Assessments, Surface Water Management Plans and other recognised sources of flood risk data and the production of additional Flood Risk Assessments (FRAs) as appropriate;*
- d) Incorporation of appropriate measures for the management of surface and flood water, including flood storage areas, Sustainable Urban Drainage Systems (SUDS) and the protection of 'overland flow paths';*
- e) Compliance with any Surface Water Management Plan or drainage strategies produced, such as for the identified critical drainage areas of Littleborough and Heywood;*
- f) The avoidance of culverting, and support the opening up of existing culverts wherever possible;*
- g) The incorporation of measures for the conservation of water to minimise potable water consumption, including rainwater collection measures, which should be integral to the design of buildings and spaces;*
- h) Development that does not directly or indirectly lead to pollution of existing water resources such as watercourses and groundwater or the derogation of the quantity of groundwater;*
- i) The incorporation of measures to improve water quality; and*
- j) The taking of opportunities to improve the habitat value of watercourses and water bodies.*

In addition, we will identify additional flood storage areas which will be protected from development.'

Following adoption of the Core Strategy (October 2016), some of the policies of the Unitary Development Plan have been saved. The Rochdale Unitary Development Plan was adopted in June 2006. The following policy extracts relate to flood risk and drainage:

Policy EM7 – Development and Flood Risk

‘Development will not be permitted in areas identified as flood plains, or other areas where development could contribute to increased flood risk, unless an appropriate flood risk assessment has been carried out and all of the following criteria are met:

- a) It will not increase the risk of flooding within the flood plain or in adjoining areas by reducing flood storage capacity, increasing flows within a flood plain or through the additional discharge of surface water;*
- b) It will not itself be at risk from flooding;*
- c) Appropriate sustainable drainage systems are used;*
- d) Adequate access adjacent to the water course for maintenance is provided;*
- e) Existing or proposed flood defences are protected;*
- f) It would not result in extensive culverting; and*
- g) Flood defence works required as a consequence of development are provided at the developer’s expense.*

Flood defences and related engineering works must also ensure that recognised ecological, geomorphological, archaeological, landscape and recreational interests associated with a water course or adjacent areas are fully taken into account and appropriate mitigation provided. The sequential test approach and principles set out in PPG 25 ‘Development and Flood Risk’ will be followed in considering development proposals.’

Local guidance documents including the Bury, Rochdale and Oldham Strategic Flood Risk Assessment (SFRA) Level 1 (November 2009), the Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (PFRA) (May 2011) and the Rochdale Borough’s Strategy for Flood Risk Management 2014-2024 (March 2014) and its December 2017 addendum have been reviewed to inform this report.

Consultation

A pre-planning opinion request was submitted to the EA in April 2019. In their response included in Appendix D, the EA have stated that:

‘The site is located within flood zone 1, and near an ordinary watercourse. Therefore, for any further information, you should contact the LLFA (Lead Local Flood Authority).’

A consultation request was submitted to the LLFA in April 2019. A response is included in Appendix E. The LLFA have stated:

‘As far as the Flood Risk Assessment is concerned, we would ask that it covers to an appropriate level of detail

the evidence to show that you have identified the risks of flooding from all sources and how these do/may impact the site, how these will be mitigated through drainage and flood resilience/alleviation measures as appropriate (which should be clearly set out and evidenced in terms of how they will address identified risks and issues) and any residual risks and how they would be mitigated/managed i.e. to show that risk is not passed elsewhere.

As far as historic flooding records in this area are concerned, we do not have any records of flooding in this area although our records are not necessarily complete and you should also check with EA and United Utilities in terms of their records.

We would also like to make the following points:

- a) The proposed development area straddles Thornham New Road and Thornham Road, neither of which are adopted. At the point that Thornham Road joins the main A664 road, gravel gets washed into gullies on the main road, causing blockage, and during rain events large puddles form on Thornham Road (due to poor surfacing) and on the main road (gully blockages).*
- b) A long stretch of Thornham New Road is not adopted. Further information on which parts are adopted / unadopted can be obtained from Rochdale's Highways team*
- c) There are several watercourses across the site, some of which may be drained / culverted. You will need to consult LLFA and Highways' Drainage Officer, but a site visit would be the best way forward after you have provided a topographical survey.'*

A pre-development enquiry request was submitted to UU in April 2019. A response is included in Appendix C. UU have stated that:

'Foul will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself

Surface water from this site should drain to either soak away or directly to watercourse. Discharge rates and consents must be discussed and agreed with all interested parties.'

The site is not located within an Internal Drainage Board (IDB) District.

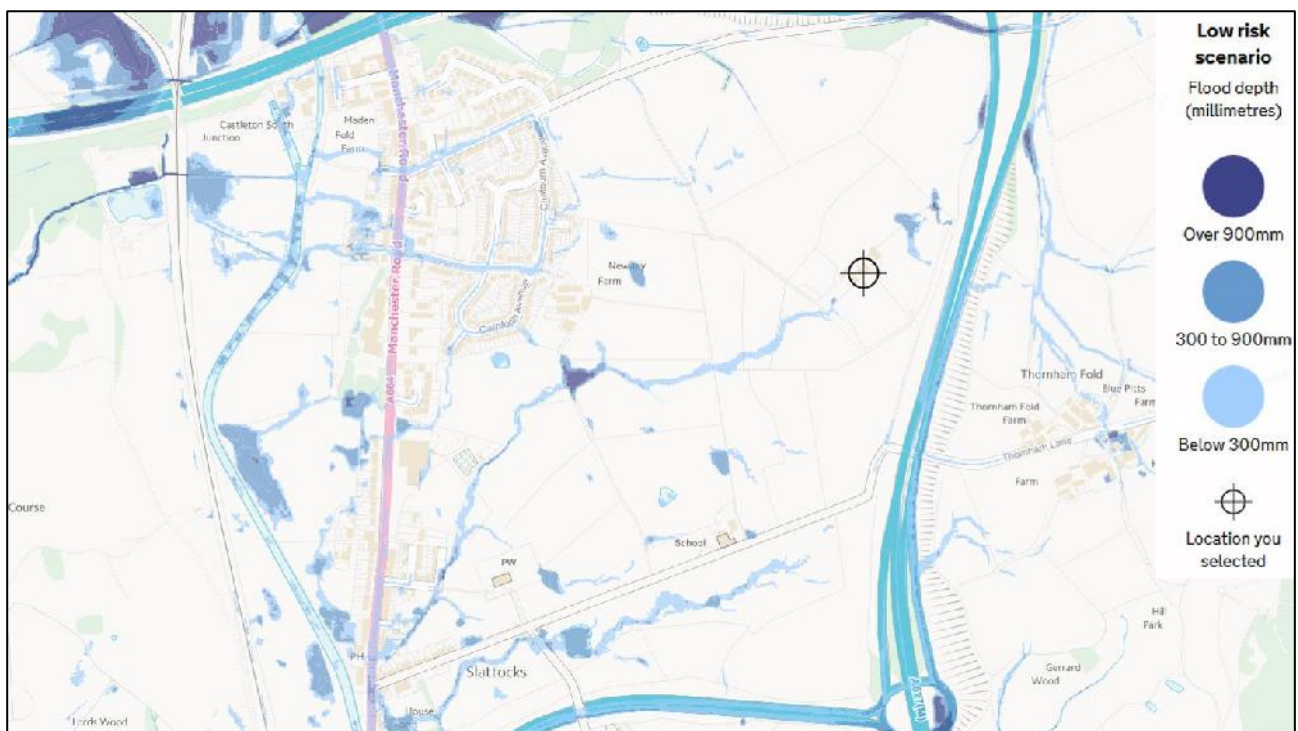
Sources of Flooding and Probability

Fluvial

The Phase I Geo-Environmental Site Assessment produced by REC (dated April 2019), provided by the Client, includes a 'Watercourse Network and River Quality' map. The map identifies the route of two potential culverts onsite. The first potential culvert is associated with a land drain which originates east of the A627, the land drain is shown to flow north-westward before entering a culvert beneath the A627. The mapping contained within the REC report assumes the land drain is culverted beneath the north-eastern extent of the site before outfalling to the north of Thornham New Road. The second culvert is shown within the eastern extent of the site and indicates that one of the land drains in this area is partially culverted within the site boundary.

The site is served by local land drainage (land drains). The land drains are classified as ordinary watercourses and have not been specifically modelled by the EA. However, flood risk from minor watercourses is often identified on surface water mapping, and this appears to be the case in this instance. There are two main surface water flow routes identified within the site boundary. The first flows from east to south-west through the centre of the site, the second flows within the southern extent of the site from east to west, both follow the path of the land drainage in this area. The flood flow routes are identified as having a low (between 1% and 0.1% annual probability of flooding) to high (greater than 3.3% annual probability of flooding) risk of surface water flooding. Detailed online surface water flood mapping provided by the EA and reproduced as Figure 1 below indicate that flood depths are generally below 300mm with isolated areas (ponding) of +900mm.

Figure 1: EA Surface Water Flood Depth Mapping (Low Risk Scenario)



The catchment area of the land drainage is limited, restricted by the A627 to the east of the site and is therefore retained within the site boundary. Therefore, the potential flood risk associated with the land drains is considered to be low. The wider connectivity of the land drains when they enter culverts is not known. It is assumed, given the local topography that they either ultimately discharge to the Rochdale Canal, located 140m west of the site or Whit Brook, which is located approximately 750m south of the site at its nearest point.

Other watercourses in the area include Whit Brook which is located approximately 750m south of the site at its nearest point and flows west in this location. Furthermore, Trub Brook is located approximately 950m west of the site and flows south in this location joining Whit Brook. Both Whit Brook and Trub Brook are designated as Main Rivers. The site is situated entirely within Flood Zone 1 and therefore the risk of fluvial flooding from the local Main Rivers is very low (less than 0.1% annual probability).

The EA 'Historical Flood Map' (Appendix D) indicates that there are no records of historical flooding affecting the site.

The site is therefore considered to be at very low risk of fluvial flooding with an isolated risk related to the existing local land drains.

Tidal

The site is situated at a minimum of approximately 132m AOD and is significantly above sea level. Therefore, there is no risk from tidal flooding.

Surface Water

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

The EA 'Flood Risk from Surface Water' map (Appendix D) indicates that the majority of site is at very low risk of surface water flooding, meaning it has a less than 0.1% annual probability of flooding.

The mapping identifies sporadic isolated areas of low to high risk of surface water flooding. These isolated areas correlate to local topographic low points. Detailed online surface water flood mapping provided by the EA indicate that areas which are predicted to flood predominantly have flood depths of less than 300mm. Flood depths between 300mm - +900mm correlate to the location of existing ponds.

The mapping identifies two distinct surface water flow routes located in the centre and southern extents of the site. The surface water flow routes are correlated to the local land drains on site. This has been discussed in detail in the fluvial section above.

The SFRA mapping, provided in Appendix F, shows medium to low risk of surface flooding adjacent to the access road off Thornham New Road, in the centre of the site. The maps also show areas at low risk of surface

water flooding in the western and south-western extents of the site.

Correspondence with the LLFA (Appendix E) indicates that where Thornham Lane joins the main A664 road, gravel gets washed into gullies on the main road, causing blockage, and during rainfall events large puddles form on Thornham Lane and on the main road. There is potential risk of flooding to Thornham Lane which is shown as part of the site; however, the water is likely to be contained within the kerb level.

Any potential surface water flooding arising at or near to the site would be directed west or south-west, away from the site, following the local topography.

It can therefore be concluded that the risk of surface water flooding is very low to the majority of the site. There is a surface water flood risk associated with land adjacent to the 2no. land drains within the site. The flood extent is local to the land drains.

Sewer

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

Any potential flooding arising from the 300mm sewers in Thornham Lane and Thornham New Road would be directed west, away from the site, following the topography of the roads.

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

Groundwater

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

The northern and eastern extents of the site are underlain by superficial Devensian Glaciofluvial Deposits generally comprising sands and gravels. The western and southern extents of the site are underlain by superficial deposits of Devensian Till.

From a review of freely available OS mapping, no springs or other groundwater emergence features are apparent within the site or the immediate surrounding area.

The SFRA indicates that there are no records of groundwater flooding at or near to the site.

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

Artificial Sources

The Rochdale Canal is located approximately 140m west of the site at its closest point. The canal is not elevated above surrounding ground in this location. Therefore, there is no risk of a breach. Canals are controlled watercourses; therefore, the risk of overtopping is minimal. However, in the unlikely event that there is overtopping, the site is situated at a minimum of 4m above the canal and local topography falls

westward and away from the site. Therefore, there is no risk of overtopping affecting the site. The EA 'Flood Risk from Reservoirs' map (Appendix D) shows that the site is not at risk of flooding from reservoirs.

It can therefore be concluded that the risk of flooding from artificial sources is very low.

Summary of Potential Flooding and Mitigation

It can be concluded that the majority of the site is at low risk of flooding from all sources. However, there are areas of the site that are identified at risk of surface water flooding associated with the existing local land drains. Post-development, the catchment area of the local land drains will be built upon and replaced by an appropriately designed surface water drainage system, removing the flood risk associated with the local land drains. Notwithstanding the above, the proposed development should seek to limit development outside of the areas identified at high risk of surface water flooding.

In accordance with Building Regulations, finished floor levels of the buildings should be set 150mm above surrounding ground levels.

Surface Water Management

The majority of the site currently comprises undeveloped land which is not formally drained. A garden centre is located in the western extent of the site.

For the purpose of this report, it has been assumed the proposed development will introduce hardstanding that will occupy 40% (35.93ha) of the site through the introduction of buildings and access roads.

The introduction of hardstanding will result in an increase in surface water runoff rates and volumes. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

The existing greenfield runoff rates have been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method. A summary of the greenfield runoff rates for a range of events is provided as Appendix G. The existing 1 in 1 year greenfield rate for the 89.825ha development site is 117.4 l/s.

Attenuation Storage

In order to achieve a discharge rate of 117.4 l/s, attenuation storage will be required. Storage estimates have been provided using MicroDrainage and are included in Appendix H. An estimated storage volume of 18,156m³ will be required to accommodate the 1 in 30 year event and 37,425m³ will be required to accommodate the 1 in 100 year plus 40% CC event. This equates to approximately 505m³ per hectare of impermeable area for the 1 in 30 year event and 1,042m³ per hectare of impermeable area for the 1 in 100 year plus 40% CC event. The storage estimates are based on a discharge rate of 117.4 l/s, storage within a tank or pond structure, an impermeable drainage area of 35.93ha, a design head of 2m and hydro brake flow control.

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

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 majority of the site is underlain by superficial Glaciofluvial Deposits (sands and gravels) which are underlain by the Pennine Lower Coal Measures Formation. It can be concluded that soakaways may be suitable for the discharge of surface water runoff.

However, soakaways are unlikely to be suitable in the area identified as being underlain by artificial deposits.

Infiltration tests should be undertaken in accordance with the BRE365 specification to determine the suitability of soakaways. Soakaways should be located a minimum of 5m from habitable dwellings.

Watercourse

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

The nearest watercourses are the land drains which flow through the site. The wider connectivity of the local land drains is not clear and should be confirmed through survey. However, given the local topography, it is assumed that the land drains either ultimately discharge to the Rochdale Canal, located 140m west of the site or Whit Brook which is located approximately 750m south of the site. Discharge to the existing local land drains appears to be feasible. Surface water should discharge to the land drains at the greenfield run-off rate.

Sewer

As described above, a connection to the existing land drainage is likely to be feasible and therefore a connection to the public sewer system would not be required. There are no public surface water sewers in the vicinity of the site.

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.

Swales, detention basins and ponds

Sufficient space should be provided to utilise open surface water attenuation features such as a ponds, basins and / or swales throughout the site. In order to facilitate gravity drainage, attenuation features should be located at the lower western or south-western extents of the site.

Porous / Permeable Paving

Permeable paving could be incorporated within private roads and driveways. Storage would be provided within the sub-grade material prior to controlled release to ground or to the receiving watercourse or sewer.

The provision of storage within the sub-grade material would only be feasible in areas with a proposed gradient of <1 in 20 as detailed within CIRIA RP992/28 (Design Assessment Checklists for Permeable/Porous Pavement). Site gradients should be confirmed at the detailed design stage. The amount of storage provided within permeable paving is subject to sub-grade depth and gradient.

Underground Attenuation Tanks

Storage could be provided within underground attenuation tanks or within oversized pipes. Oversized pipes could be situated within access roads and areas of public open space..

Concept Surface Water Drainage Scheme

Based on the constraints identified onsite, the following discharge options appear to be available to the site. The following list is ordered by preference when considering the drainage hierarchy. The potential drainage

outfall locations are identified on the Drainage Optioneering Sketch, provided as Appendix I:

1. Soakaway;
2. Culverted watercourse/land drains;
3. Rochdale Canal;
4. Public Sewer

Soakaways will be used where practical. Where soakaways are not feasible, surface water runoff will be discharged to the land drains on site and ultimately to the local watercourses or Rochdale Canal, at a rate of 117.4 l/s.

Surface water runoff up to the 1 in 100 year plus 40% climate change allowance event will be attenuated on site. A total attenuation volume of 37,425m³ will be required to achieve the discharge rate and will be provided in the form of detention basins, ponds, permeable paving and /or an attenuation tank / oversized pipes. Attenuation storage should be distributed across the site with larger features located in the western and south-western extents of the site to facilitate gravity drainage.

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

Exceedance Event

Storage will be provided for the 1 in 100 year plus 40% CC event. Storm events in excess of the 1 in 100 year plus 40% CC event should be permitted to produce temporary shallow depth flooding within the access road or landscaped areas. Finished floor levels will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect the buildings.

Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), residential roofs have a 'very low' pollution hazard level, with individual property driveways, residential car parks and low traffic roads classified as having a 'low' pollution hazard level. Roads with greater than 300 traffic movements per day have 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
Individual Property Driveways, Residential Car Parks and Low Traffic Roads	Low	0.5	0.4	0.4
Roads with greater than 300 traffic movements per day	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.

Where practical, runoff from roofs and roads will be directed to detention basins, ponds, swales, permeable paving and/or below ground attenuation tanks. Table 2 below demonstrates that detention basins, swales, ponds and permeable paving provide sufficient treatment to runoff from roofs and low traffic roads.

Table 2 – SuDS Mitigation Indices

Type of SuDS	Mitigation Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Swale	0.5	0.6	0.6

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

Where attenuation is provided in a below ground system (tank storage), treatment will need to be provided by a suitably sized separator. A SUDS treatment train, for example a swale conveying flow prior to discharge to a pond or basin, will be required to provide sufficient treatment to runoff from major roads (with greater than 300 traffic movements per day).

Maintenance

Maintenance of communal drainage features such as detention basins, ponds, swales, permeable paving and attenuation tanks 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. Alternatively, and subject to adoption policy at the time of construction, communal drainage features could be offered for adoption

Maintenance schedules for a soakaway, detention basin, pond, permeable paving, swale and attenuation tank are included in Appendix J. Maintenance of the separator will be as per the manufacturer's guidance.

Other Considerations

Maintenance access to the two land drains on site should be retained. Maintenance access can be ensured by providing an 5m buffer either side of the land drains or culverts.

Foul Drainage

Foul flows should be discharged to the 225mm and / or 300mm public combined sewers in Thornham Lane and Thornham New Road. A new connection should be agreed with United Utilities. Correspondence from UU states *'Foul will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself'*.

A survey of the public combined sewer system to should be undertaken to determine invert levels and ensure a gravity connection can be achieved.

Conclusions

The proposal is for residential development with associated infrastructure.

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

The majority of the site is at low risk of flooding from all sources. However, there are areas of the site that are identified at risk of surface water flooding. This will be mitigated through the inclusion of an appropriately designed surface water drainage system.

The proposed development will introduce impermeable drainage area through the introduction of buildings and access roads. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff 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 40% climate change event.

All methods of surface water discharge have been assessed. Where soakaways are not possible, discharge of surface water to the culverted watercourse/land drains on site at the 1 in 1 year greenfield runoff rate of 117.4 l/s appears to be the most practical option. There is also potential for the use of soakaways subject to infiltration testing.

Attenuation can be provided within ponds, swales, detention basins, oversized pipes and attenuation tanks distributed throughout the site. Larger attenuation storage features should be located in the western or south-western extents of the site to facilitate gravity drainage.

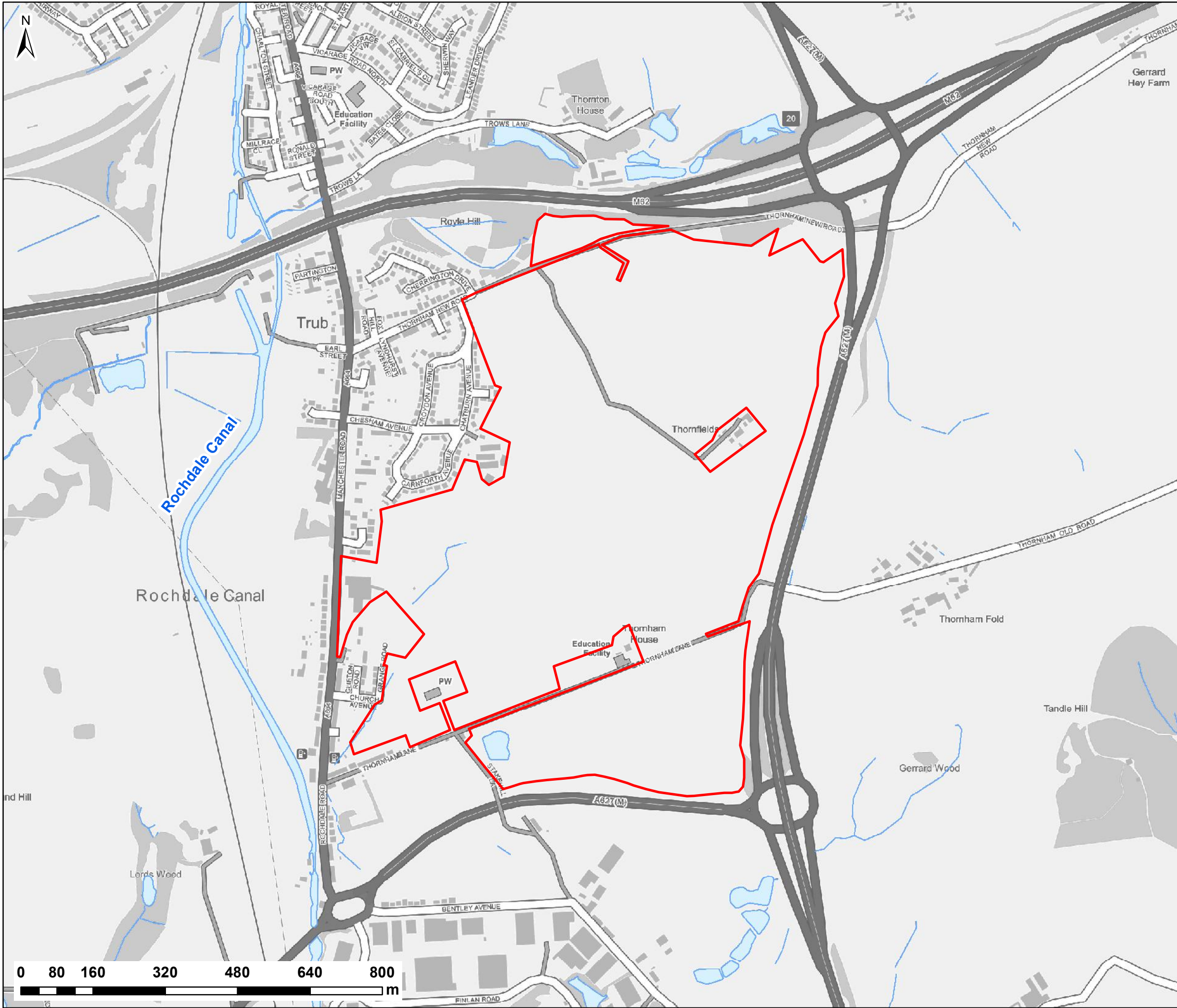
Foul flows should be discharged to the 300mm public combined sewers in Thornham Lane and Thornham New Road. A new connection should be agreed with United Utilities.

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

Recommendations

1. Consider and incorporate the recommendations within this Flood Risk Assessment and Drainage Strategy within the masterplan;
2. Undertake BRE 365 infiltration testing to determine the suitability of infiltration techniques;
3. Undertake a survey of existing local drainage and adjacent public sewerage network;
4. Verify the attenuation volumes included in this report when undertaking detailed drainage design; and
5. Make provision for sustainable drainage features throughout the site with provision for larger attenuation features in the lower western and south-western extents of the site.

Appendix A Location Plan and Aerial Image



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

LEGEND

- Site Boundary
- Watercourses / Water Bodies



CLIENT:
REDROW

Waterco
www.waterco.co.uk

SCHEME:
MANCHESTER ROAD, ROCHDALE

PLOT TITLE:
LOCATION PLAN

PLOT STATUS: FINAL			DATE: 10/12/2020
DRAWN: CM	CHECKED: AW	APPROVED: VG	PLOT SCALE @ A3: 1:8,000 (UNLESS STATED OTHERWISE)
PLOT NAME: 13614-Location_Plan			REV: -



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

LEGEND

Site Boundary



CLIENT:



www.waterco.co.uk

SCHEME:

**MANCHESTER ROAD,
ROCHDALE**

PLOT TITLE:

AERIAL PLAN

PLOT STATUS:

FINAL

DATE:

10/12/2020

DRAWN:

CM

CHECKED:

AW

APPROVED:

VG

PLOT SCALE @ A3:

1:8,000

(UNLESS STATED OTHERWISE)

PLOT NAME:

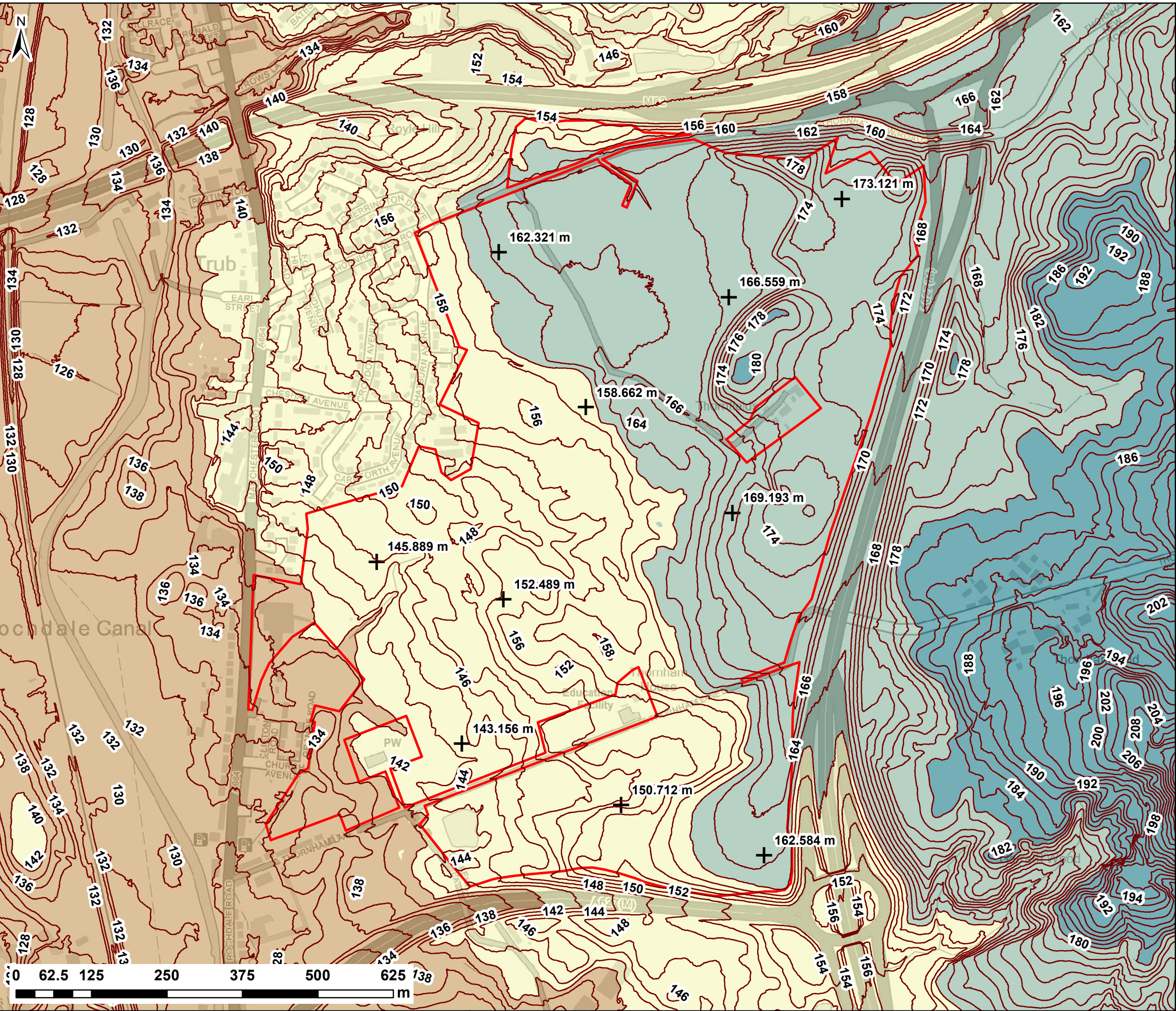
13614-Aerial_Plan

REV:

-

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix B LIDAR Plan



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

LEGEND

Site Boundary

+ Site Levels

Ground Elevation (m AOD)

	< 120
	120 - 140
	140 - 160
	160 - 180
	> 180

CLIENT:

REDROW

Waterco

www.waterco.co.uk

SCHEME:

**MANCHESTER ROAD,
ROCHDALE**

PLOT TITLE:

LIDAR ELEVATIONS
1m RESOLUTION

PLOT STATUS:			DATE:
FINAL			10/12/2020

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	VG	1:6,000 (UNLESS STATED OTHERWISE)

PLOT NAME:	REV:
13614-LIDAR	-

Appendix C UU Sewer Plan and Correspondence

Waterco

**Lon Parcwr
Industrial Estate,
Ruthin,
LL15 1NJ**

FAO:

How to contact us:

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

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: w10926 Manchester Road
Our Ref: UUPS-ORD-96988
Date: 15/04/2019**

Dear Sirs

Location: w10926 Manchester Road

I acknowledge with thanks your request dated 15/04/2019 for information on the location of our services.

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

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

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

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

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

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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



Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad	Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad
------	-------	------	--------	------	-------	--------	-----	--------	------	------	-------	------	--------	------	-------	--------	-----	--------	------

Foul

Surface

Combined

Overflow

Manhole

Manhole, Side Entry

MainSewer, Public

MainSewer, Private

MainSewer, S104

Rising Main, Public

Rising Main, Private

Rising Main, S104

Highway Drain, Private

Foul

Surface

Combined

WW Site Termination

Air Valve

Cascade

Non Return Valve

Extent of Survey

Flow Meter

Gully

Hatch Box

Head of System

Hydrobrake / Vortex

Inlet

Inspection Chamber

Bifurcation

Catchpit

Contaminated Surface Water

WW Pumping Station

Sludge Pumping Station

Sewer Overflow

T Junction/Saddle

LampHole

OilInterceptor

PenStock

Pump

RoddingEye

Soakaway

Summit

Valve

Valve Chamber

Washout Chamber

DropShaft

WW Treatment Works

Septic Tank

Vent Column

Network Storage Tank

Orifice Plate

Vortex Chamber

Penstock Chamber

Blind Manhole

Sludge Main, Public

Sludge Main, Private

Sludge Main, S104

ABANDONED PIPE

MainSewer

Rising Main

Highway Drain

Sludge Main

Foul

Surface

Combined

Overflow

Screen Chamber

Discharge Point

Outfall

Control Kiosk

Unspecified

MANHOLE FUNCTION

FO Foul

SW Surface Water

CO Combined

OV Overflow

SEWER SHAPE

C1 Circular

EG Egg

OV Oval

FT Flat Top

RE Rectangular

SQ Square

TR Trapezoidal

AR Arch

BA Barrel

HO HorseShoe

UN Unspecified

SEWER MATERIAL

AC Asbestos Cement

BR Brick

PE Polyethylene

RP Reinforced Plastic Matrix

CO Concrete

CSB Concrete Segment Bolted

CSU Concrete Segment Unbolted

CC Concrete Box Culverted

PSC Plastic/Steel Composite

GRC Glass Reinforced Concrete

GRP Glass Reinforced Plastic

DI Ductile Iron

PVC Polyvinyl Chloride

CI Cast Iron

SI Spun Iron

ST Steel

VC Vitrified Clay

PP Polypropylene

PF Pitch Fibre

MAC Masonry, Coursed

MAR Masonry, Random

U Unspecified

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. Crown copyright and database rights [2016] Ordnance Survey 100022432.

OS Sheet No: SD8909SW

Scale: 1:1250

Date: 15/04/2019

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Nodes

Sheet 1 of 1

United Utilities

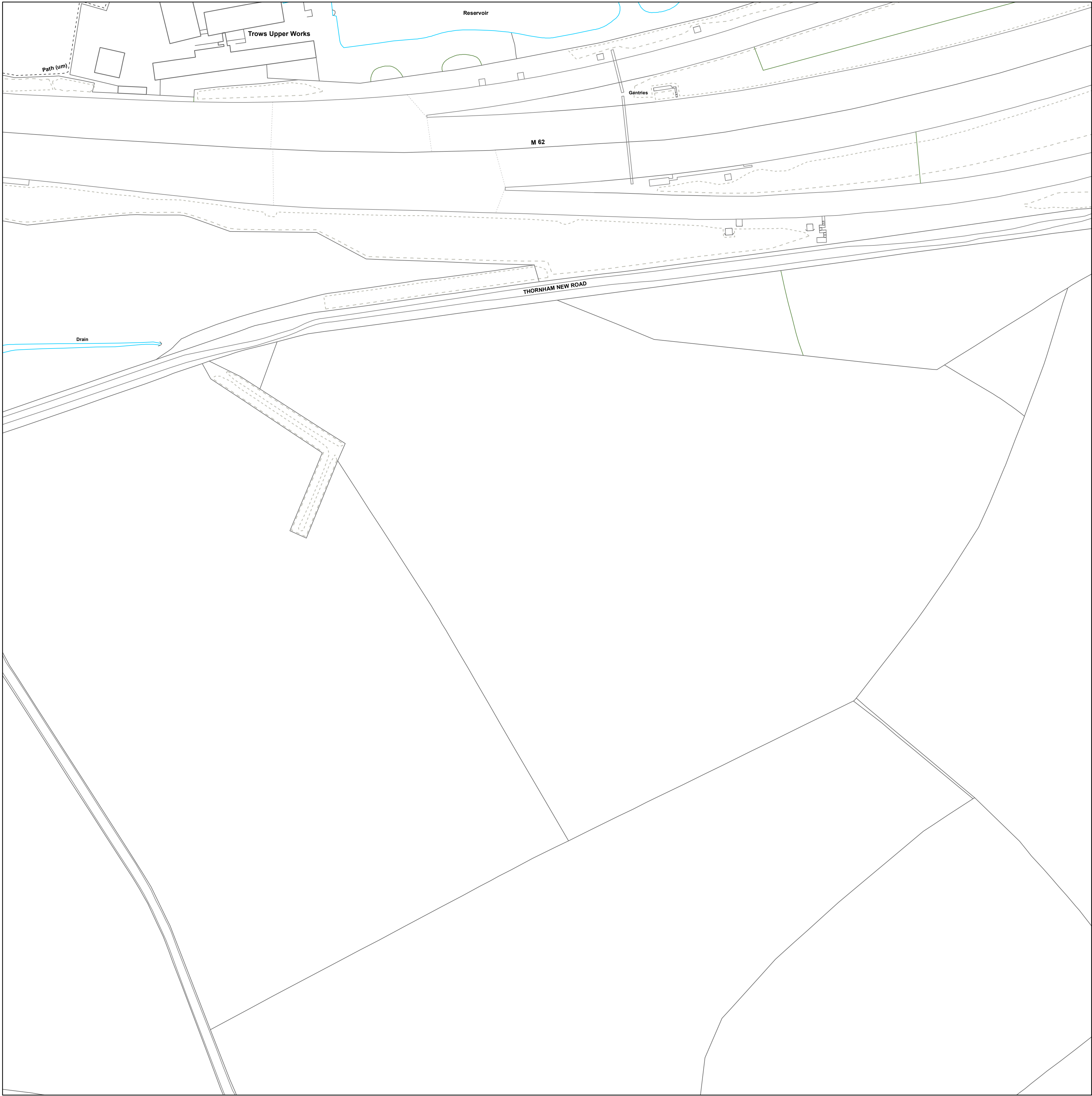
helping life flow smoothly

SEWER RECORDS

OS Sheet No: SD8909SW

Scale: 1:1250 Date: 15/04/2019

Printed By: Property Searches



Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad	Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad
------	-------	------	--------	------	-------	--------	-----	--------	------	------	-------	------	--------	------	-------	--------	-----	--------	------

WASTE WATER SYMOLOGY

Foul	Surface	Combined	Overflow	Manhole
				Manhole
				Manhole, Side Entry
				MainSewer, Public
				MainSewer, Private
				MainSewer, S104
				Rising Main, Public
				Rising Main, Private
				Rising Main, S104
				Highway Drain, Private

			WW Site Termination		Sludge Main, Public
			Air Valve		Sludge Main, Private
			Cascade		Sludge Main, S104
			Non Return Valve		
			Extent of Survey		
			Flow Meter		
			Gully		
			Hatch Box		
			Head of System		
			Hydrobrake / Vortex		
			Inlet		
			Inspection Chamber		
			Bifurcation		
			Catchpit		
			Contaminated Surface Water		
			WW Pumping Station		
			Sludge Pumping Station		
			Sewer Overflow		
			T Junction/Saddle		
			LampHole		
			OilInterceptor		
			PenStock		
			Pump		
			RoddingEye		
			Soakaway		
			Summit		
			Valve		
			Valve Chamber		
			Washout Chamber		
			DropShaft		
			WW Treatment Works		
			Septic Tank		
			Vent Column		
			Network Storage Tank		
			Orifice Plate		
			Vortex Chamber		
			Penstock Chamber		
			Blind Manhole		
					Control Kiosk
					Unspecified

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

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. Crown copyright and database rights [2016] Ordnance Survey 100022432.

OS Sheet No: SD8909NW
Scale: 1:1250 Date: 15/04/2019
0 Nodes
Sheet 1 of 1



SEWER RECORDS

OS Sheet No: SD8909NW

Scale: 1:1250 Date: 15/04/2019

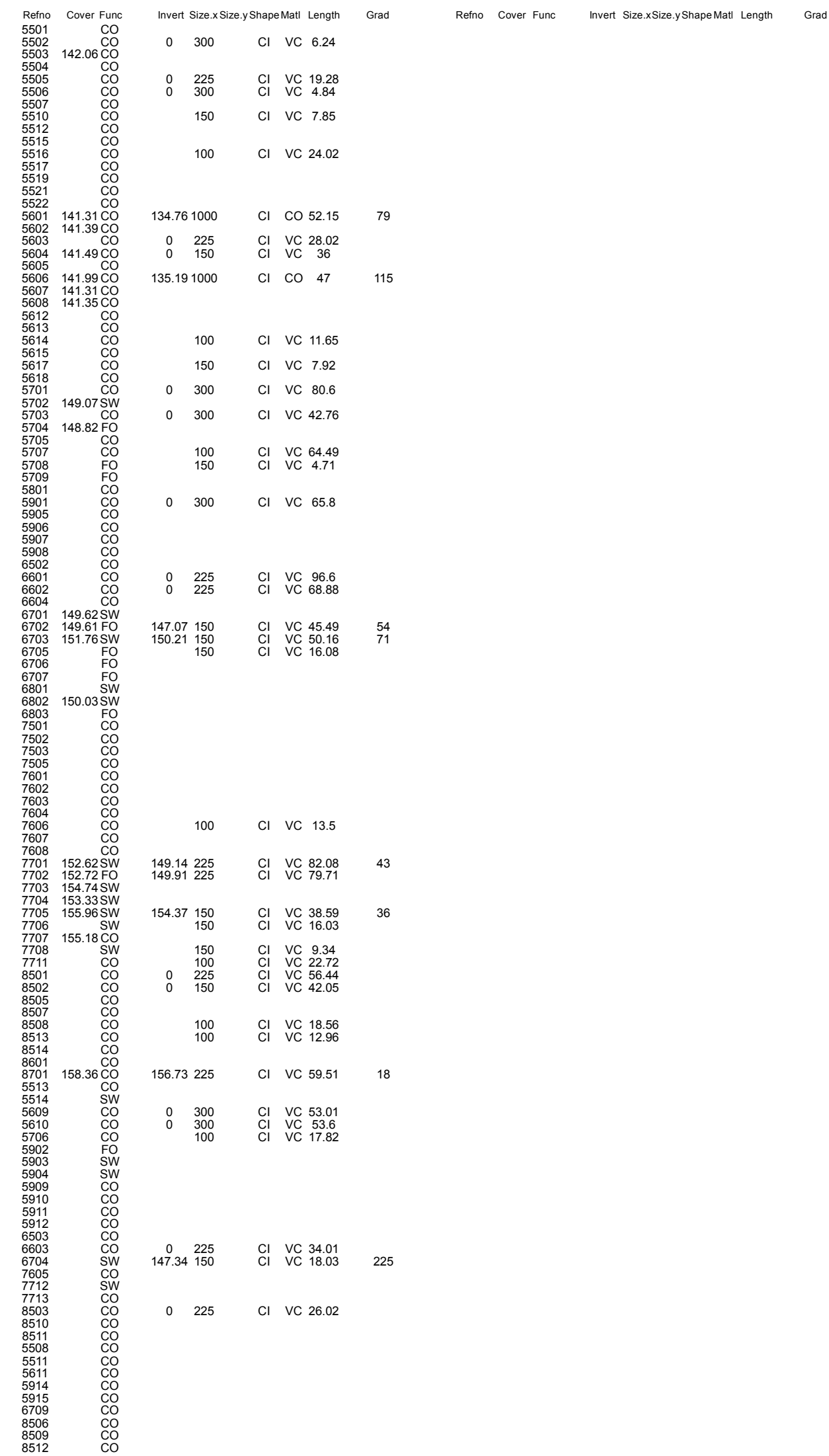
Printed By: Property Searches



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

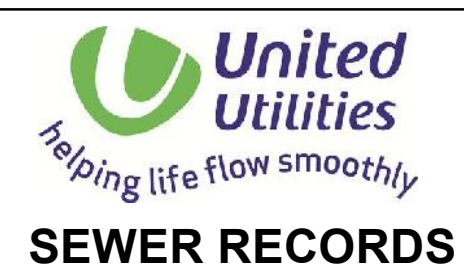
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Sheet 1 of 1

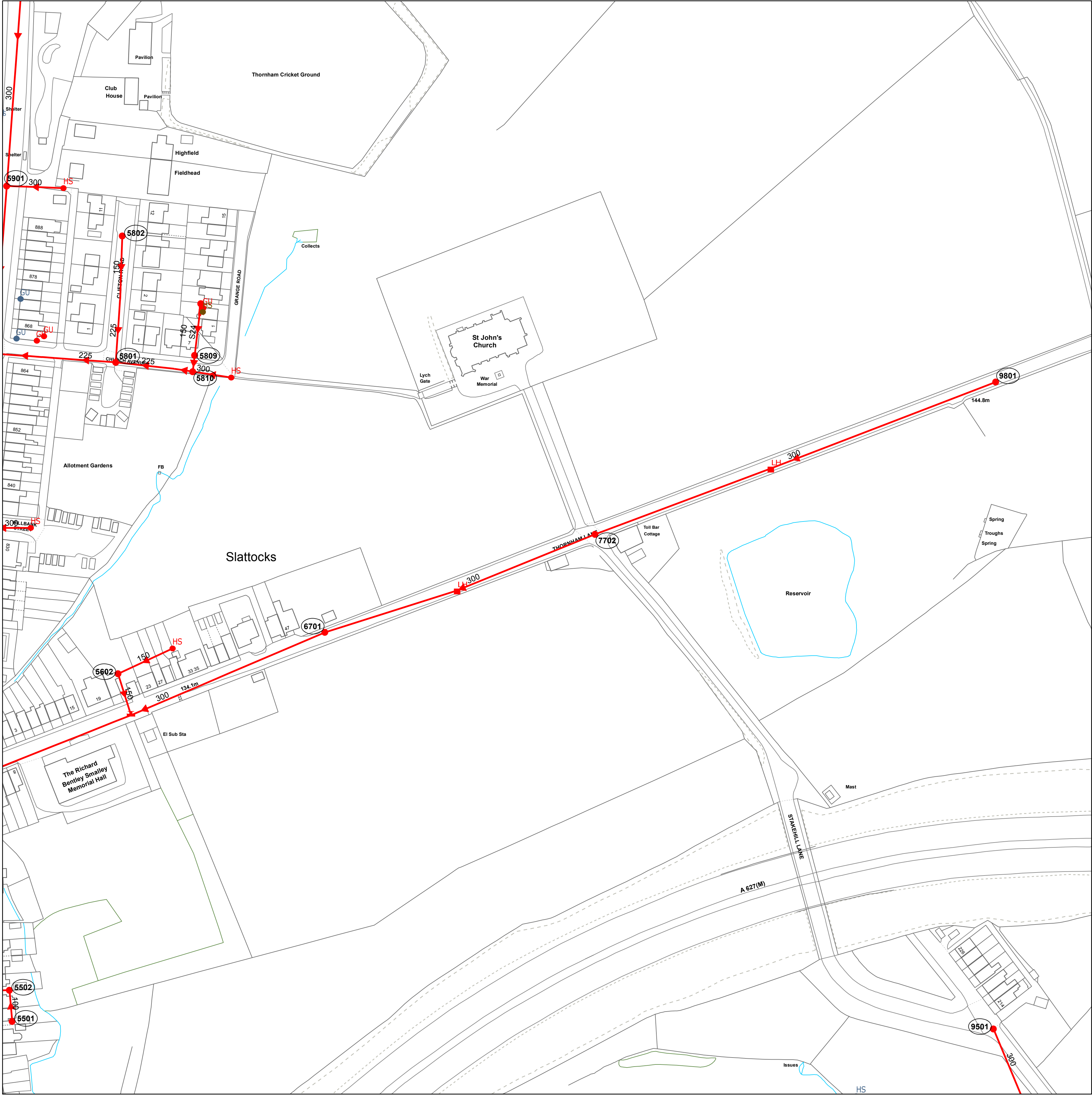




WASTE WATER SYMBOLOGY				
Foul	Surface	Combined	Overflow	
				Manhole
				Manhole, Side Entry
				MainSewer, Public
				MainSewer, Private
				MainSewer, S104
				Rising Main, Public
				Rising Main, Private
				Rising Main, S104
				Highway Drain, Private
Foul	Surface	Combined		
				WW Site Termination
				Air Valve
				Cascade
				Non Return Valve
				Extent of Survey
				Flow Meter
				Gully
				Hatch Box
				Head of System
				Hydrobrake / Vortex
				Inlet
				Inspection Chamber
				Bifurcation
				Catchpit
				Contaminated Surface Water
				WW Pumping Station
				Sludge Pumping Station
				Sewer Overflow
				T Junction/Saddle
				LampHole
				OilInterceptor
				PenStock
				Pump
				RoddingEye
				Soakaway
				Summit
				Valve
				Valve Chamber
				Washout Chamber
				DropShaft
				WW Treatment Works
				Septic Tank
				Vent Column
				Network Storage Tank
				Orifice Plate
				Vortex Chamber
				Penstock Chamber
				Blind Manhole
Foul	Surface	Combined	Overflow	
				Screen Chamber
				Discharge Point
				Outfall
				Control Kiosk
				Unspecified
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				
AS	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: SD8809NE
Scale: 1:1250 Date: 15/04/2019
115 Nodes
Sheet 1 of 1





Refno	Cover	Func	Invert	Size	x	Size	y	Shape	Mat	Length	Grad
5501	CO		100	CI	VC	14.3					
5502	CO		150	CI	VC	9.92					
5602	CO		150	CI	VC	19.9					
5801	133.32	CO									
5802											
5808			150	CI	VC	23.94					
5809			150	CI	VC	7.48					
5810											
5901	134.83	CO	131.53	300	CI	VC	77.23				
6701			0	300	CI	VC	180.71				
7702											
9501	141.9		0	300	CI	VC	129.87				
9801			0	300	CI	VC	196.87				
9701			0	300	CI	VC	26				
5702			150	CI	VC	27.68					
5803			0	225	CI	VC	29.07				
5804			131.84	300	CI	VC	28.07				
5805											
5806											
5807											
5813											
5814											
5815											
5816											
5902			0	300	CI	VC	26.02				
6801			0	300	CI	VC	17.87				
5601											
5811											
5812											
7701											
8701											

Foul

Surface

Combined

Overflow

</

Jennifer Gibson

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 03 May 2019 10:27
To: Jennifer Gibson; Wastewater Developer Services
Subject: RE: w10926 - wastewater development enquiry - 4200025543

Categories: Information received

Dear Customer

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 will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself

Surface water from this site should drain to either soak away or directly to watercourse. Discharge rates and consents must be discussed and agreed with all interested parties.

If you require any further guidance please follow <http://www.unitedutilities.com/builders-developers.aspx>

If you need a make further enquiry relating to this matter please send your enquiry to WastewaterDeveloperServices@uuplc.co.uk Please quote your DEXXXX/42XXXXXXX/GEXXXX reference number

Please Note:- enquiries sent to any other United Utilities e-mail address will be deleted.

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>

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, Planning Conditions and local flood authority guidelines, we would recommend that you liaise and make suitable agreements with the relevant statutory bodies.

Regards

Neil O'Brien

Developer Engineer
Developer Services and Planning

From: Jennifer Gibson [mailto:jennifer.gibson@waterco.co.uk]
Sent: 15 April 2019 13:43
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: w10926 - wastewater development enquiry

Please see attached the wastewater pre development form

Regards,

Jennifer Gibson BSc (Hons), MSc
Environmental Consultant

DDI: 01244 986018
Teams: jennifer.gibson@waterco.co.uk



Assessment, Modelling, Design
Ruthin - Chester - Manchester - London

Shortlisted for awards in the following categories;
'Innovation in Project Management' & 'Impact in Water'



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 Please consider the environment before printing this email.

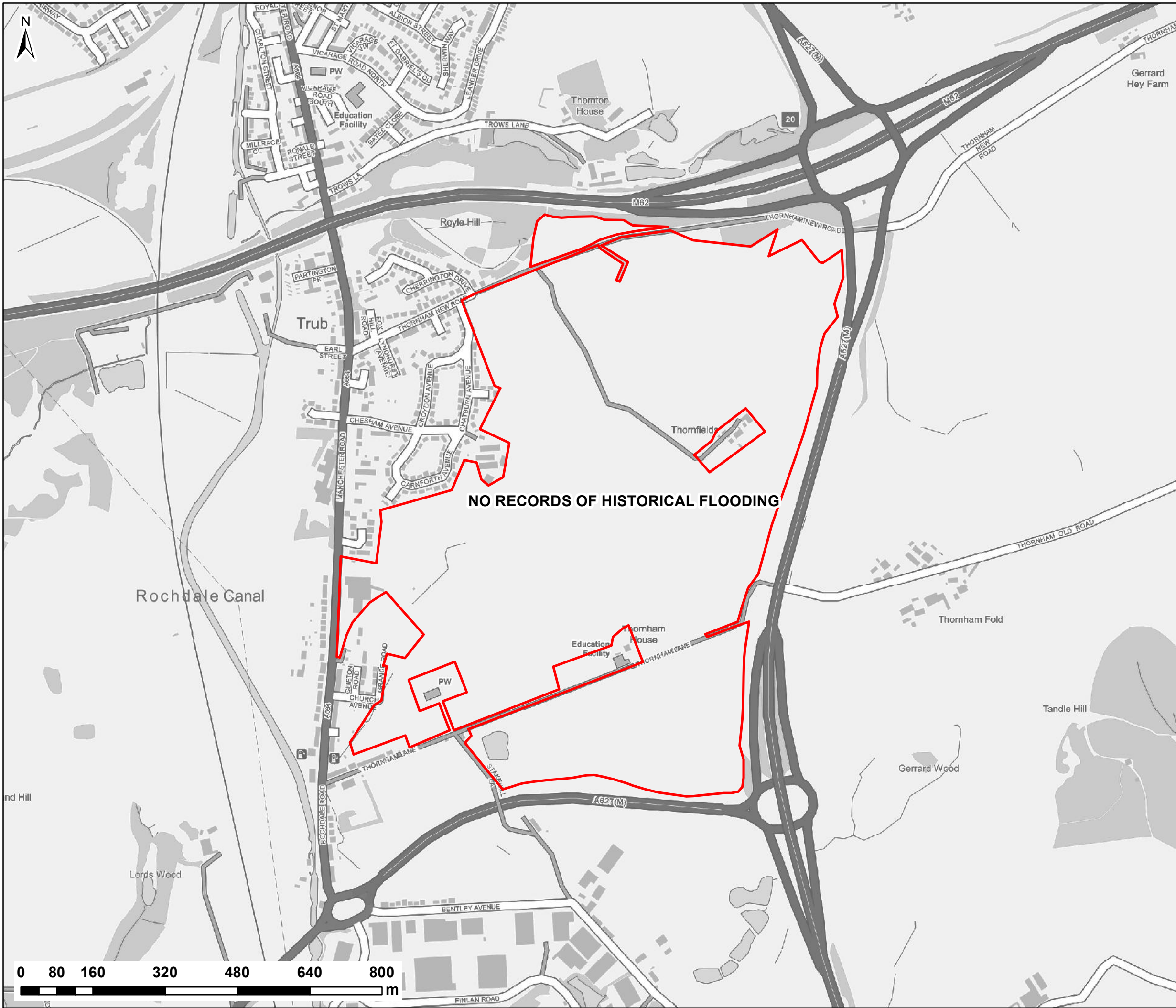
EMGateway3.uuplc.co.uk made the following annotations

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Business Park, Lingley Green Avenue, Great Sankey,
Warrington, WA5 3LP
Registered in England and Wales. Registered No 6559020

www.unitedutilities.com
www.unitedutilities.com/subsidiaries

Appendix D 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
- Historical Flood Map



CLIENT:



www.waterco.co.uk

SCHEME:

**MANCHESTER ROAD,
ROCHDALE**

PLOT TITLE:

EA HISTORICAL FLOOD MAP

PLOT STATUS:

FINAL

DATE:

10/12/2020

DRAWN:

CM

CHECKED:

AW

APPROVED:

VG

PLOT SCALE @ A3:

1:8,000

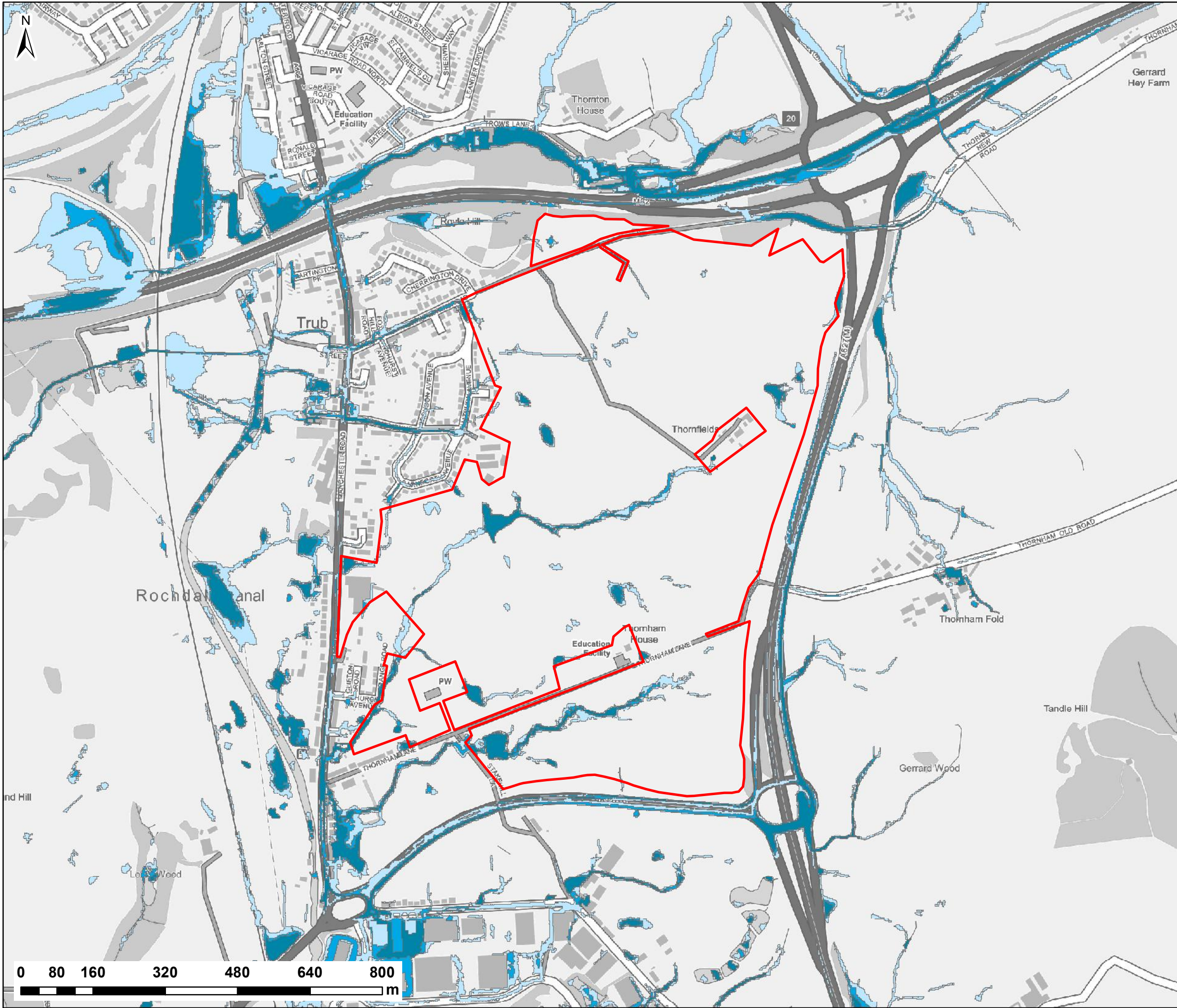
(UNLESS STATED OTHERWISE)

PLOT NAME:

13614-EA_HIST

REV:

-



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

LEGEND

- Site Boundary
- Low (between 0.1% and 1.0%)
- Medium (between 1.0% and 3.3%)
- High (3.3% or greater)



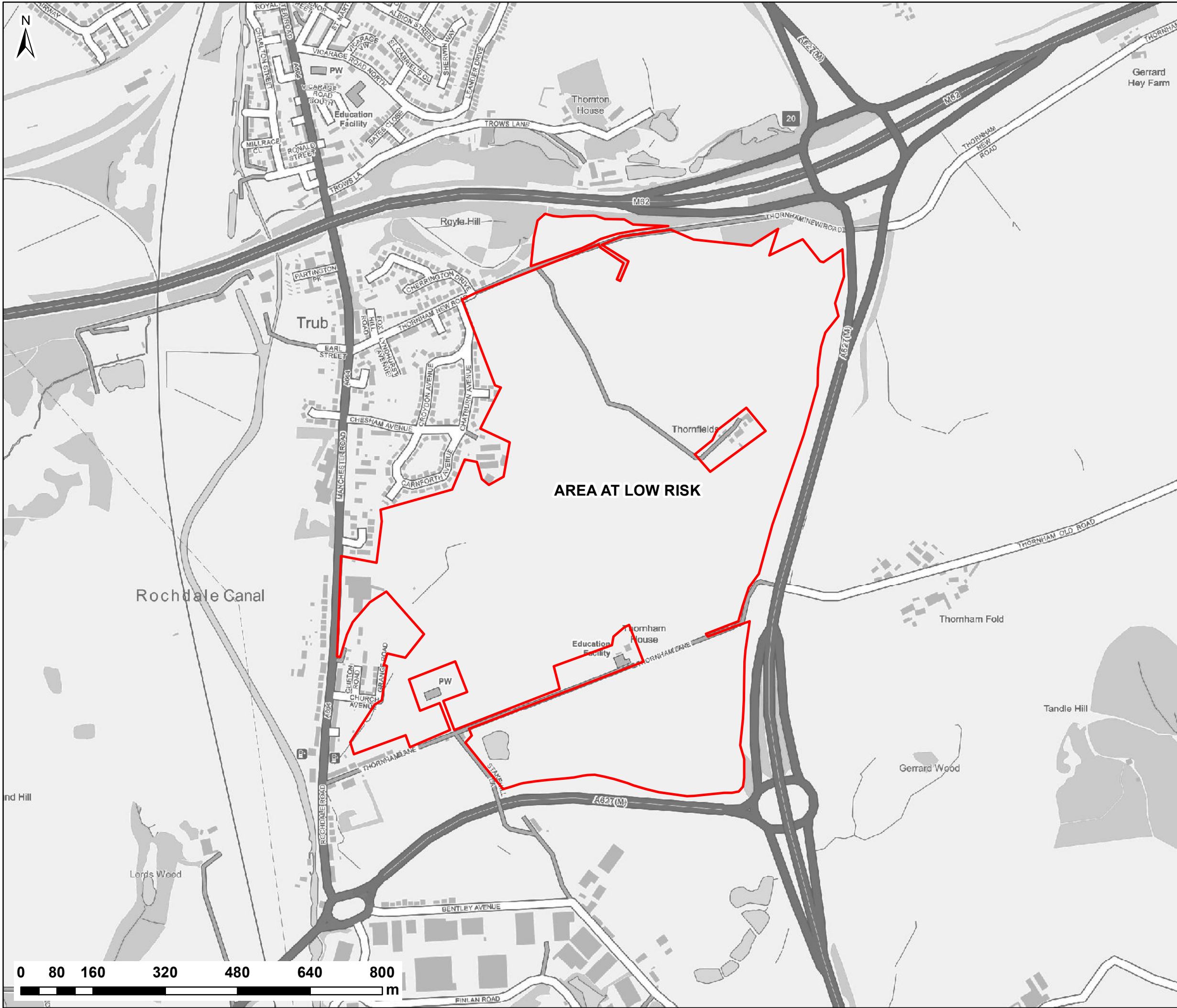
CLIENT:
REDROW

Waterco
www.waterco.co.uk

SCHEME:
MANCHESTER ROAD, ROCHDALE

PLOT TITLE:
EA FLOOD RISK FROM SURFACE WATER
DATA ACCESSED DECEMBER 2020

PLOT STATUS:		DATE:	
FINAL		10/12/2020	
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE @ A3:
CM	AW	VG	1:8,000 (UNLESS STATED OTHERWISE)
PLOT NAME:			REV:
13614-EA_SW			-



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

LEGEND

-  Site Boundary
-  EA Reservoir Flood Map



CLIENT:



www.waterco.co.uk

SCHEME:

**MANCHESTER ROAD,
ROCHDALE**

PLOT TITLE:

**EA FLOOD RISK
FROM RESERVOIRS**
DATA ACCESSED DECEMBER 2020

PLOT STATUS:

FINAL

DATE:

10/12/2020

DRAWN:

CM

CHECKED:

AW

APPROVED:

VG

PLOT SCALE @ A3:

1:8,000

(UNLESS STATED OTHERWISE)

PLOT NAME:

13614-EA_RES

REV:

-

Jennifer Gibson

From: GMMC Info Requests <Inforequests.gmmc@environment-agency.gov.uk>
Sent: 16 April 2019 10:31
To: Jennifer Gibson
Subject: FW: 190413/DT03 FW: w10926 pre-planning opinion
Attachments: Manchester Road location plan.pdf

Categories: Information received

Dear Jennifer,

The site is located within flood zone 1, and near an ordinary watercourse. Therefore, for any further information, you should contact the LLFA (Lead Local Flood Authority).

Kind regards,

Anne
Anne Ball - Customer and Engagement Officer
Greater Manchester, Merseyside and Cheshire
Direct line: 020 302 51232
Mobile: 07769285094
Direct email: Inforequests.GMMC@environment-agency.gov.uk
Office address: Richard Fairclough House, Knutsford Road, Latchford, Warrington, WA4 1HT

From: Enquiries, Unit
Sent: 13 April 2019 08:22
To: jennifer.gibson@waterco.co.uk
Subject: ref:190413/DT03 FW: w10926 pre-planning opinion

Dear Jennifer

I have passed your e-mail to the local customer team who will deal with your request.

The Freedom of Information Act and Environmental Information Regulations state that a public authority must respond to requests for information within 20 working days, but we aim to respond to all enquiries as quickly as we can.

You can find more information about our service commitment by clicking on the link below:

<https://www.gov.uk/government/publications/environment-agency-customer-service-commitment>

You can contact our customer team directly on the contact details below, or call the National Customer Contact Centre on 03708 506506 who will transfer you to the area team.

Please quote your enquiry reference 190413/DT03 in any correspondence with us regarding this matter.

Customers and Engagement
Environment Agency
Greater Manchester, Merseyside and Cheshire Area
Richard Fairclough House
Knutsford Road
Latchford
Warrington
WA4 1HT

Darren Turner

Customer Service Adviser - National Customer Contact Centre

Operations: Regulation, Monitoring and Customer
Environment Agency

(Tel: 03708 506 506

: Web Site: www.gov.uk/environment-agency

Click an icon to keep in touch with us:-



From: Jennifer Gibson [<mailto:jennifer.gibson@waterco.co.uk>]

Sent: 09 April 2019 14:09

To: Enquiries, Unit <enquiries@environment-agency.gov.uk>

Subject: w10926 pre-planning opinion

Site at Manchester Road, Rochdale, M24 2SA. National Grid Reference: 389126, 409144

Please can you provide me with a pre-planning opinion for the proposed development at the above site. A site location plan is attached. The proposed development will be for residential development however, no development plans are available at present.

We note that the site is located within Flood Zone 1. However, please could you advise if there have been any historic flood events that should be considered and if there are any specific requirements for a Flood Risk Assessment and drainage strategy at this site.

If you have any questions or require any further information to process my request please don't hesitate to contact me.

Kind Regards,

Jennifer Gibson BSc (Hons), MSc
Environmental Consultant

DDI: 01244 986018

Teams: jennifer.gibson@waterco.co.uk



Assessment, Modelling, Design

Ruthin - Chester - Manchester - London

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Appendix E LLFA Correspondence

Jennifer Gibson

From: Andrew Eadie <Andrew.Eadie@Rochdale.Gov.UK>
Sent: 17 April 2019 12:43
To: Jennifer Gibson
Cc: Francis Comyn
Subject: W10926 LLFA Opinion

Site at Manchester Road, Rochdale, M24 2SA. National Grid Reference: 389126, 40914

Dear Jennifer,

Further to your email of 9th April, please find below the following comments from Strategic Planning and the Drainage and Flooding Engineer:

As far as the Flood Risk Assessment is concerned, we would ask that it covers to an appropriate level of detail the evidence to show that you have identified the risks of flooding from all sources and how these do/may impact the site, how these will be mitigated through drainage and flood resilience/alleviation measures as appropriate (which should be clearly set out and evidenced in terms of how they will address identified risks and issues) and any residual risks and how they would be mitigated/managed i.e. to show that risk is not passed elsewhere.

Drainage Guidance is provided by United Utilities and Rochdale Council on their websites:-

<https://www.unitedutilities.com/services/builders-developers/pre-development/site-drainage/>

<http://www.rochdale.gov.uk/pdf/2016-01-25-GM-SuDs-Advice.pdf>

In terms of Climate Change allowance, up-to-date Guidance suggests that 40% Climate Change allowance should be used:- <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

As far as historic flooding records in this area are concerned, we do not have any records of flooding in this area although our records are not necessarily complete and you should also check with EA and United Utilities in terms of their records.

We would also like to make the following points :

- a) The proposed development area straddles Thornham New Road and Thornham Road, neither of which are adopted. At the point that Thornham Road joins the main A664 road, gravel gets washed into gullies on the main road, causing blockage, and during rain events large puddles form on Thornham Road (due to poor surfacing) and on the main road (gully blockages).
- b) A long stretch of Thornham New Road is not adopted. Further information on which parts are adopted / unadopted can be obtained from Tracey Lynam in Rochdale's Highways team (tracey.lynam@rochdale.gov.uk).
- c) There are several watercourses across the site, some of which may be drained / culverted. You will need to consult LLFA and Highways' Drainage Officer, but a site visit would be the best way forward after you have provided a topographical survey.

I hope this is useful.

Many thanks

Andrew Eadie

Principal Planning Officer
Planning



 01706 924371

 andrew.eadie@rochdale.gov.uk

Rochdale Borough Council
Floor 3, Number One Riverside
Smith Street, Rochdale, OL16 1XU

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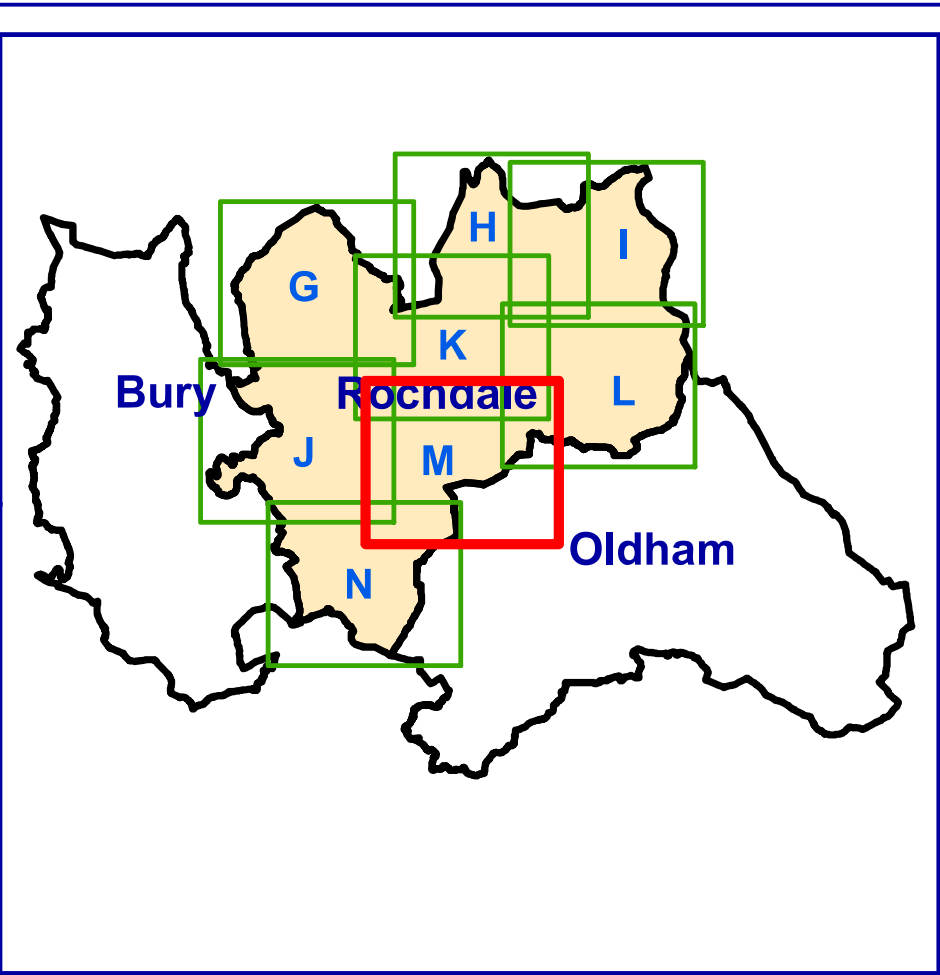
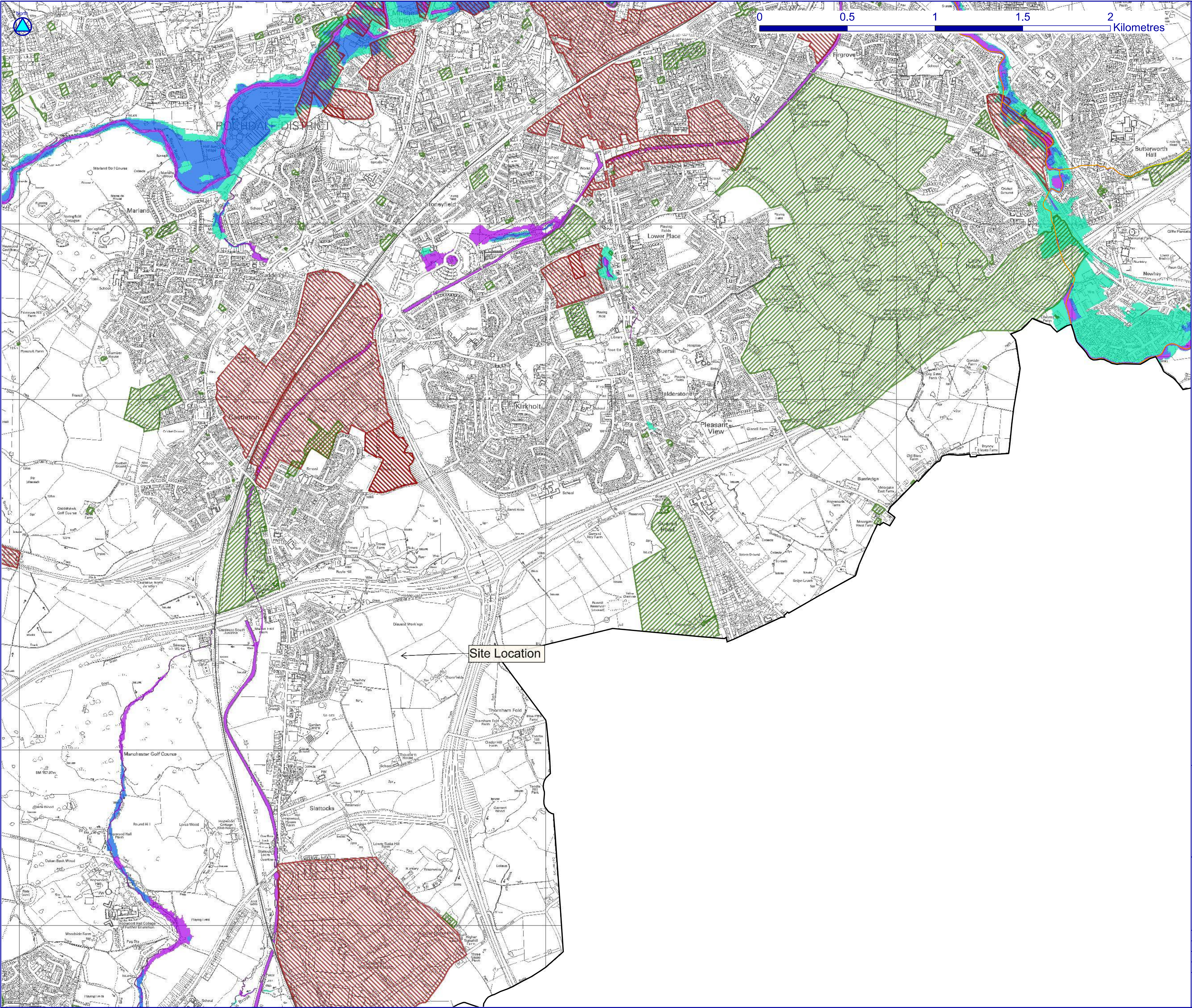


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Appendix F SFRA Maps



- National Centrelines (v7)
- Ordinary Watercourses
- Residential Sites
- Employment Sites
- Historic Flooding Zones
- Flood Zone 3b (Functional)
- Flood Zone 3a (v3-13)
- Flood Zone 2 (v3-13)

This plan has been produced in accordance with PPS25: Development and Flood Risk and its Practice Guide.

It is a Level 1 SFRA key output which shows the LPA area, Main Rivers, ordinary watercourses and flood zones, including the functional floodplain (as defined in annex D table D.1 of PPS25), across the local authority area, as well as all previously allocated development sites (or sites to be considered in the future).

PPS25 divides the country into three basic Flood Zones; Flood Zones 1, 2 and 3, corresponding to areas of low, medium and high flood risk, respectively. The Flood Zones provided are based upon the Environment Agency's Flood Map (version 3.12 issued in January 2009). Therefore they refer to the probability of flooding from rivers, the sea and tidal sources and ignore the presence of defences, because these can be breached, overtopped and may not be in existence for the lifetime of the development. They do not consider other forms of flooding and do not take account of climate change.

This plan should be used to facilitate the undertaking of the Sequential Test by planners and developers according to PPS25 and the Sequential Test sieving process.

The Bury Rochdale and Oldham Level 1 SFRA has produced a further suite of flood risk maps following its assessment of other sources of flooding and the implications of climate change and these should be used in conjunction with the this map and not as an alternative. In time this map is likely to be updated by outputs from this and other studies.



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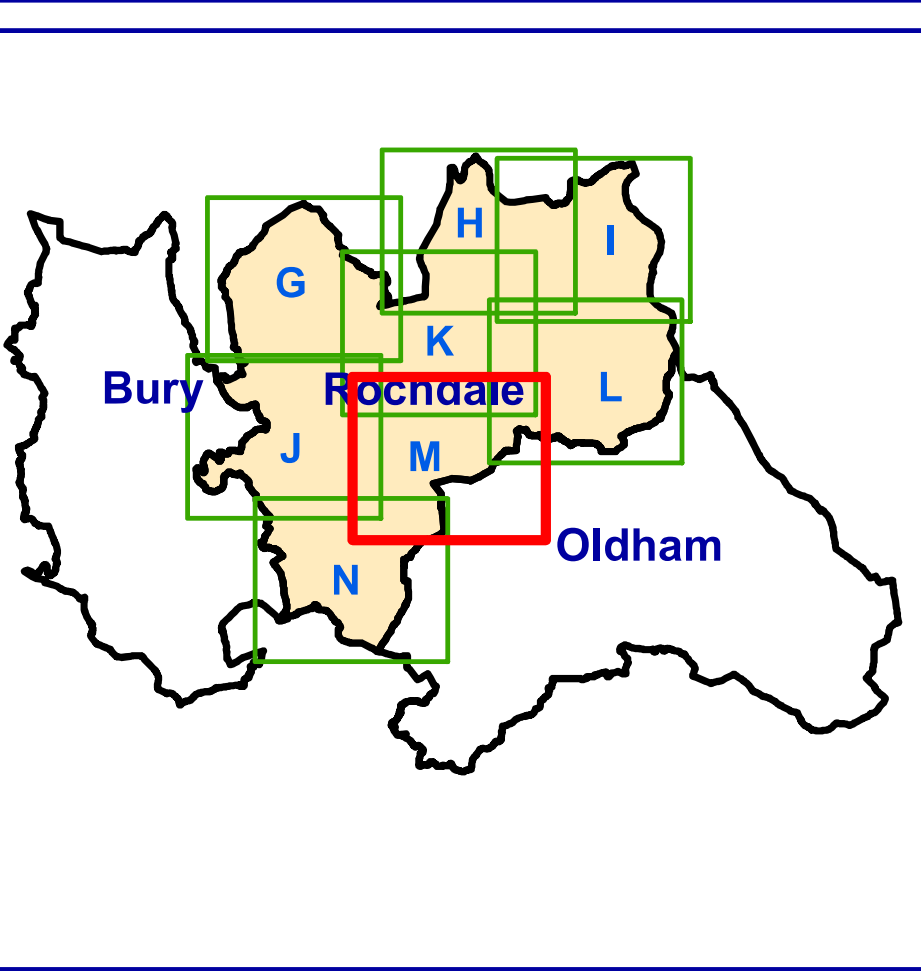
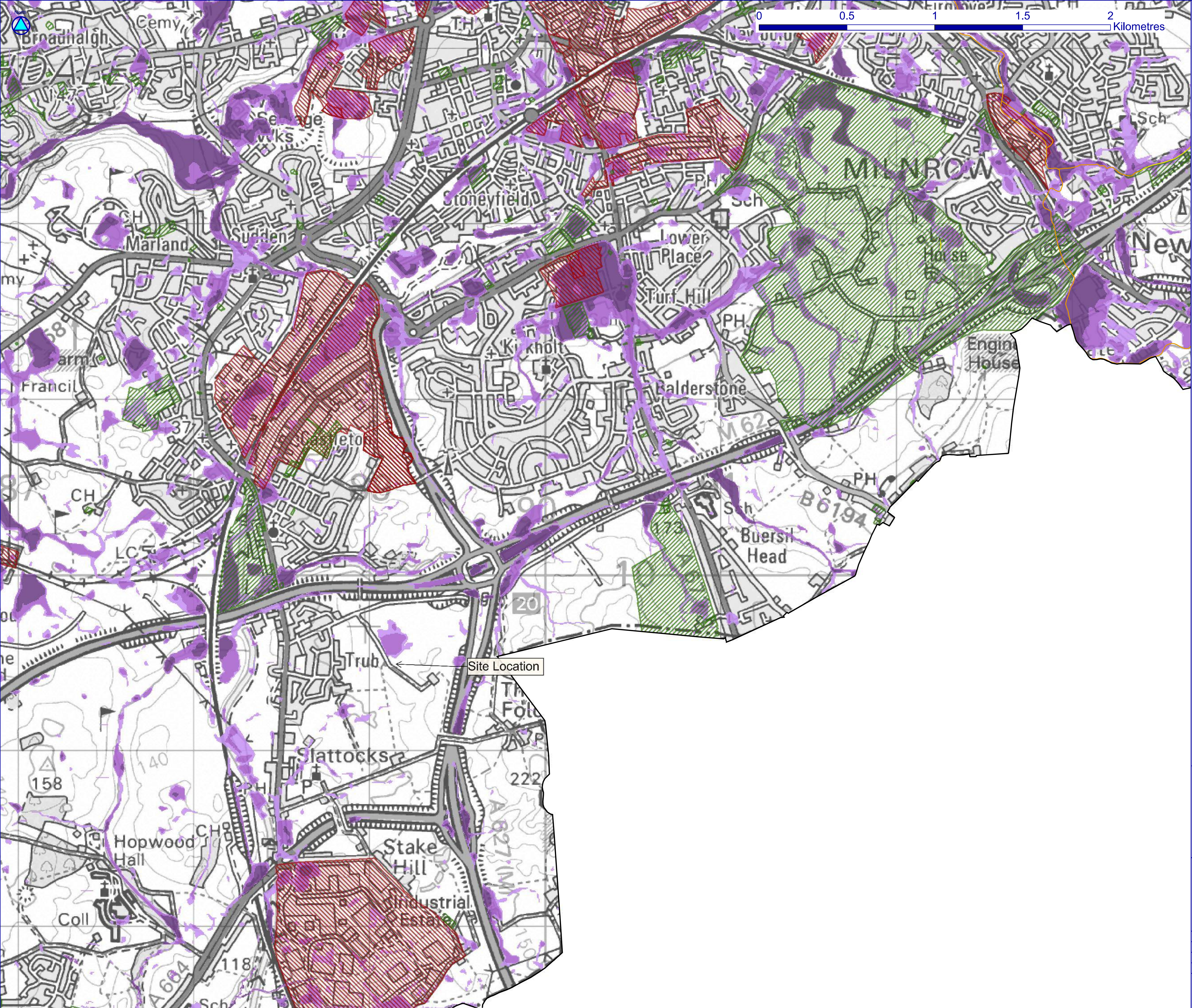
for

Bury, Rochdale & Oldham Strategic Flood Risk Assessment

Rochdale: Flood Zones and Historic Flooding

Drawn by: P Grace	Date: 08-Aug-2009	© Crown Copyright All rights reserved OS Licence Number 100023063
Checked by: C Isherwood	Date: 08-Aug-2009	
Approved by: H O'Callaghan	Date: 08-Aug-2009	
File Name: _ArcView\Mapping\Rochdale_Floodzone_Map.mxd		
Drawing Number: Map 1.2 M (Rochdale)	Status: FINAL	Scale: 1:10,000

Original @ A1



- National Centrelines (v7)
- Ordinary Watercourses
- Residential Sites
- Employment Sites
- High Susceptibility to Surface Water Flooding
- Medium Susceptibility to Surface Water Flooding
- Low Susceptibility to Surface Water Flooding

This plan has been produced in accordance with PPS25: Development and Flood Risk and its Practice Guide.

"Surface water flooding frequently develops quickly and is difficult to predict. It occurs when natural and man-made drainage systems have insufficient capacity to deal with the volume of rainfall. The critical factors for surface water flooding are the volume of rainfall, its intensity, where it falls and the permeability of the surface it falls onto. In urban areas sudden and intense rainfall cannot drain away as quickly as it can in rural areas where vegetation and soil can slow down the process of run-off." PPS26 Practice Guide pg.87

Without detailed sewer models, alternative approaches are required to assess the potential scale and extent of surface water flooding. A 2D modelling software JFLOW has been used to derive the results, which is driven primarily by topography. The model works by evenly distributing a 200 year rainfall event over a digital ground model, which is cell-based. The rainfall inputs convert to flows which flow from higher cells to lower ones. The drainage system is presumed to be at capacity.

The results of the modelling have been divided into the zones; less, intermediate and more representing the susceptible of surface water flooding across the local authority area. This map should be used to assess other sources of flooding within Bury Rochdale and Oldham as illustrated within the Sequential Test sieving process and should be used in conjunction with the PPS25 Flood Zone Map and not as an alternative



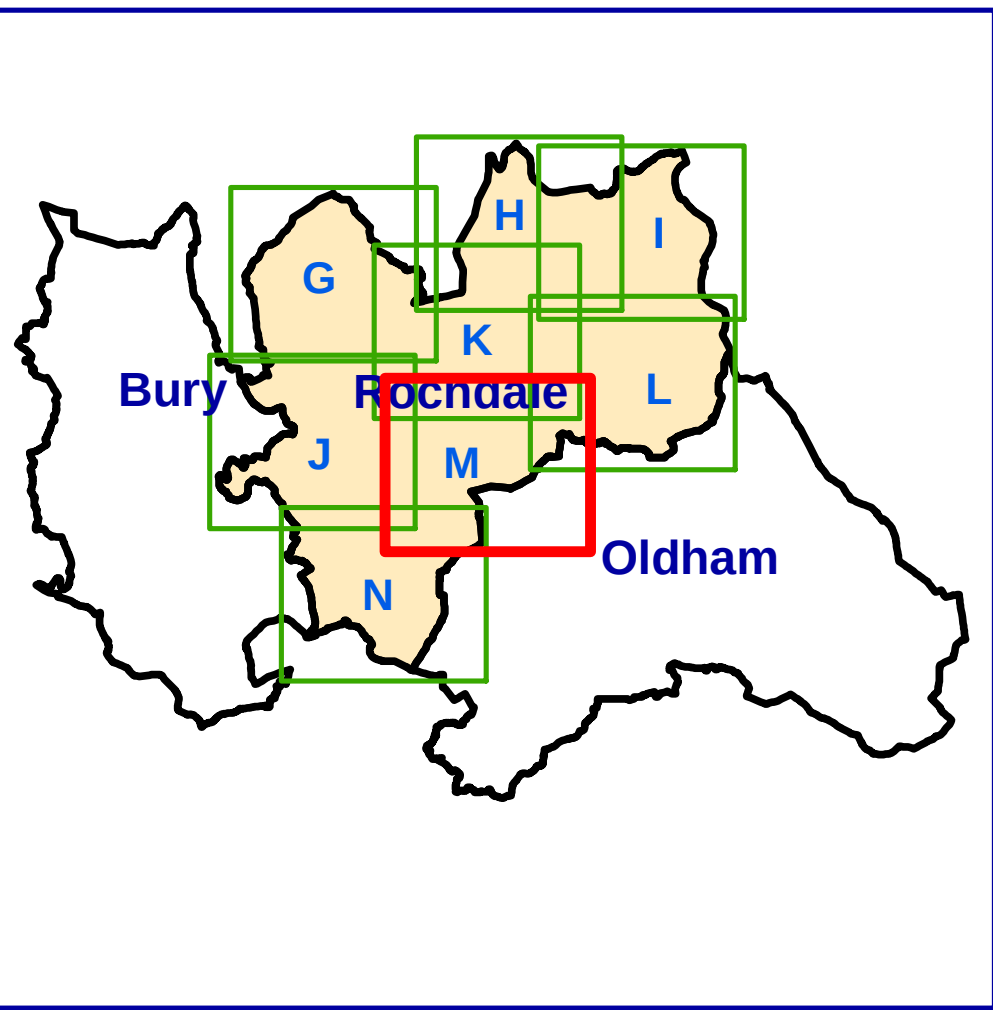
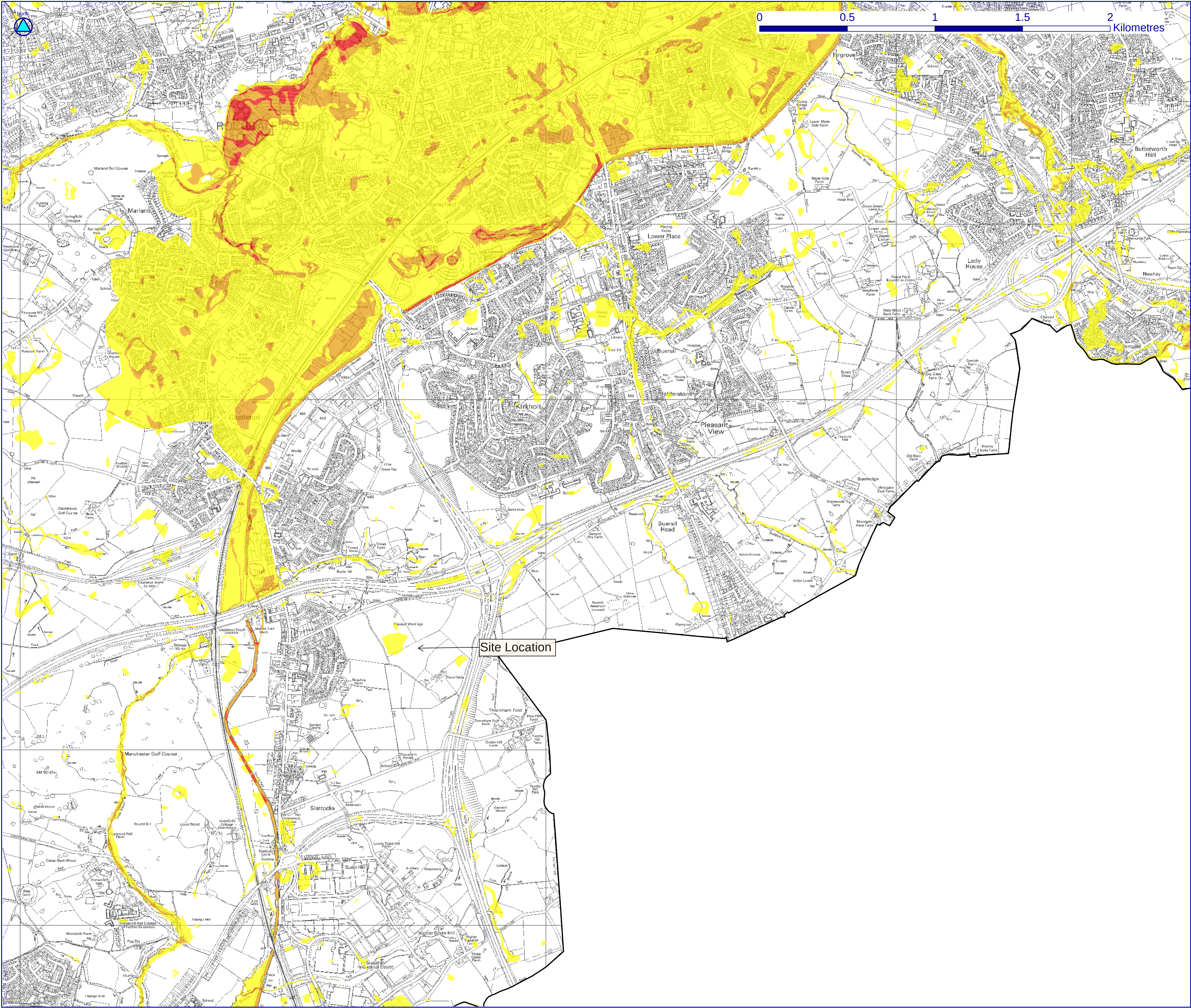
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for			
Bury, Rochdale & Oldham Strategic Flood Risk Assessment			
Rochdale: Surface Water Flooding			
Drawn by:	P Grace	Date:	10-Aug-2009
Checked by:	C Isherwood	Date:	10-Aug-2009
Approved by:	H O'Callaghan	Date:	10-Aug-2009
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Name: _ArcView\Mapping\Rochdale_SWF_Map.mxd			
Drawing Number:	Status:	Scale:	
Map 1.4 M (Rochdale)	FINAL	1:10,000	



- 1 Source of Flooding
- 2 Sources of Flooding
- 3 Sources of Flooding

This map has been produced in addition to the requirements in PPS25: Development and Flood Risk and its Practice Guide for a Level 2 SFRA.

The map shows areas that could be at risk from multiple sources of flooding (river, surface water and canals) and highlights those areas that are at risk from all three, two or just one source.

This map should be used to assess flood risk within Bury Rochdale and Oldham as part of the Sequential Test sieving process.



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for
**Bury, Rochdale & Oldham
Strategic Flood Risk Assessment**

Rochdale: Flooding from Multiple Sources

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Approved by:	H O'Callaghan	Date:	10-Oct-2009	
File Name:				
Drawing Number:	Status:		Scale:	
Map 7.2 M (Rochdale)	FINAL		1:10,000	
Original (A)				

Appendix G ReFH2 Runoff Rates

DOCUMENT VERIFICATION RECORD	
Project:	Manchester Road, Rochdale
Client:	Redrow Homes Limited
Report Title:	Flood Risk Assessment & Drainage Strategy
Date:	11/12/20

DOCUMENT REVIEW & APPROVAL	
Author:	Anthony Jones BSc (Hons) MSc
Checker:	Aled Williams BSc (Hons) MCIWEM
Approver:	Victoria Griffin BSc (Hons) MSc MEnvSc CEnv

ReFH2 RUNOFF RATES*	
Return Period (Years)	As-rural Peak Flow (l/s)
1	117.4133
2	134.0218
5	193.1417
10	240.0107
30	328.363
50	379.028
75	425.5102
100	462.4702
200	566.4304
1000	891.1384

*Runoff Rates printed from the ReFH Flood Modelling software package

Appendix H MicroDrainage Storage Volumes

Waterco Ltd				Page 1																																																																																																																																																																																												
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<u>Summary of Results for 30 year Return Period</u> <table><tr><th>Storm Event</th><th>Max Level (m)</th><th>Max Depth (m)</th><th>Max Control (l/s)</th><th>Max Volume (m³)</th><th>Status</th></tr><tr><td>15 min Summer</td><td>100.239</td><td>0.239</td><td>56.4</td><td>4622.2</td><td>O K</td></tr><tr><td>30 min Summer</td><td>100.324</td><td>0.324</td><td>89.1</td><td>6259.2</td><td>O K</td></tr><tr><td>60 min Summer</td><td>100.420</td><td>0.420</td><td>112.4</td><td>8114.8</td><td>O K</td></tr><tr><td>120 min Summer</td><td>100.502</td><td>0.502</td><td>115.1</td><td>9681.6</td><td>O K</td></tr><tr><td>180 min Summer</td><td>100.554</td><td>0.554</td><td>116.2</td><td>10689.5</td><td>O K</td></tr><tr><td>240 min Summer</td><td>100.593</td><td>0.593</td><td>116.7</td><td>11436.6</td><td>O K</td></tr><tr><td>360 min Summer</td><td>100.648</td><td>0.648</td><td>117.1</td><td>12509.9</td><td>O K</td></tr><tr><td>480 min Summer</td><td>100.687</td><td>0.687</td><td>117.2</td><td>13260.0</td><td>O K</td></tr><tr><td>600 min Summer</td><td>100.715</td><td>0.715</td><td>117.2</td><td>13808.8</td><td>O K</td></tr><tr><td>720 min Summer</td><td>100.737</td><td>0.737</td><td>117.2</td><td>14219.1</td><td>O K</td></tr><tr><td>960 min Summer</td><td>100.765</td><td>0.765</td><td>117.2</td><td>14763.6</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>100.801</td><td>0.801</td><td>117.2</td><td>15468.3</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>100.832</td><td>0.832</td><td>117.2</td><td>16064.7</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>100.845</td><td>0.845</td><td>117.2</td><td>16306.0</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>100.838</td><td>0.838</td><td>117.2</td><td>16180.4</td><td>O K</td></tr><tr><td>5760 min Summer</td><td>100.813</td><td>0.813</td><td>117.2</td><td>15699.3</td><td>O K</td></tr></table> <table><tr><th>Storm Event</th><th>Rain (mm/hr)</th><th>Flooded Volume (m³)</th><th>Discharge Volume (m³)</th><th>Time-Peak (mins)</th></tr><tr><td>15 min Summer</td><td>69.703</td><td>0.0</td><td>2543.1</td><td>54</td></tr><tr><td>30 min Summer</td><td>47.605</td><td>0.0</td><td>3846.4</td><td>67</td></tr><tr><td>60 min Summer</td><td>31.250</td><td>0.0</td><td>6773.5</td><td>94</td></tr><tr><td>120 min Summer</td><td>18.971</td><td>0.0</td><td>8403.1</td><td>150</td></tr><tr><td>180 min Summer</td><td>14.188</td><td>0.0</td><td>9503.9</td><td>208</td></tr><tr><td>240 min Summer</td><td>11.557</td><td>0.0</td><td>10358.1</td><td>264</td></tr><tr><td>360 min Summer</td><td>8.673</td><td>0.0</td><td>11666.5</td><td>378</td></tr><tr><td>480 min Summer</td><td>7.086</td><td>0.0</td><td>12659.7</td><td>494</td></tr><tr><td>600 min Summer</td><td>6.062</td><td>0.0</td><td>13447.2</td><td>608</td></tr><tr><td>720 min Summer</td><td>5.338</td><td>0.0</td><td>14083.5</td><td>724</td></tr><tr><td>960 min Summer</td><td>4.370</td><td>0.0</td><td>15001.9</td><td>908</td></tr><tr><td>1440 min Summer</td><td>3.299</td><td>0.0</td><td>15700.1</td><td>1154</td></tr><tr><td>2160 min Summer</td><td>2.500</td><td>0.0</td><td>22526.3</td><td>1556</td></tr><tr><td>2880 min Summer</td><td>2.057</td><td>0.0</td><td>24446.9</td><td>1976</td></tr><tr><td>4320 min Summer</td><td>1.561</td><td>0.0</td><td>26691.6</td><td>2804</td></tr><tr><td>5760 min Summer</td><td>1.286</td><td>0.0</td><td>32499.8</td><td>3632</td></tr></table>						Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status	15 min Summer	100.239	0.239	56.4	4622.2	O K	30 min Summer	100.324	0.324	89.1	6259.2	O K	60 min Summer	100.420	0.420	112.4	8114.8	O K	120 min Summer	100.502	0.502	115.1	9681.6	O K	180 min Summer	100.554	0.554	116.2	10689.5	O K	240 min Summer	100.593	0.593	116.7	11436.6	O K	360 min Summer	100.648	0.648	117.1	12509.9	O K	480 min Summer	100.687	0.687	117.2	13260.0	O K	600 min Summer	100.715	0.715	117.2	13808.8	O K	720 min Summer	100.737	0.737	117.2	14219.1	O K	960 min Summer	100.765	0.765	117.2	14763.6	O K	1440 min Summer	100.801	0.801	117.2	15468.3	O K	2160 min Summer	100.832	0.832	117.2	16064.7	O K	2880 min Summer	100.845	0.845	117.2	16306.0	O K	4320 min Summer	100.838	0.838	117.2	16180.4	O K	5760 min Summer	100.813	0.813	117.2	15699.3	O K	Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)	15 min Summer	69.703	0.0	2543.1	54	30 min Summer	47.605	0.0	3846.4	67	60 min Summer	31.250	0.0	6773.5	94	120 min Summer	18.971	0.0	8403.1	150	180 min Summer	14.188	0.0	9503.9	208	240 min Summer	11.557	0.0	10358.1	264	360 min Summer	8.673	0.0	11666.5	378	480 min Summer	7.086	0.0	12659.7	494	600 min Summer	6.062	0.0	13447.2	608	720 min Summer	5.338	0.0	14083.5	724	960 min Summer	4.370	0.0	15001.9	908	1440 min Summer	3.299	0.0	15700.1	1154	2160 min Summer	2.500	0.0	22526.3	1556	2880 min Summer	2.057	0.0	24446.9	1976	4320 min Summer	1.561	0.0	26691.6	2804	5760 min Summer	1.286	0.0	32499.8	3632
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180 min Summer	14.188	0.0	9503.9	208																																																																																																																																																																																												
240 min Summer	11.557	0.0	10358.1	264																																																																																																																																																																																												
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XP Solutions		Source Control 2019.1

Model Details

Storage is Online Cover Level (m) 102.000

Tank or Pond Structure

Invert Level (m) 100.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	19300.0	2.000	19300.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0410-1174-2000-1174
Design Head (m)	2.000
Design Flow (l/s)	117.4
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	410
Invert Level (m)	99.995
Minimum Outlet Pipe Diameter (mm)	450
Suggested Manhole Diameter (mm) Site Specific Design (Contact Hydro International)	

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	117.4
Flush-Flo™	0.698	117.2
Kick-Flo®	1.439	100.0
Mean Flow over Head Range	-	98.6

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

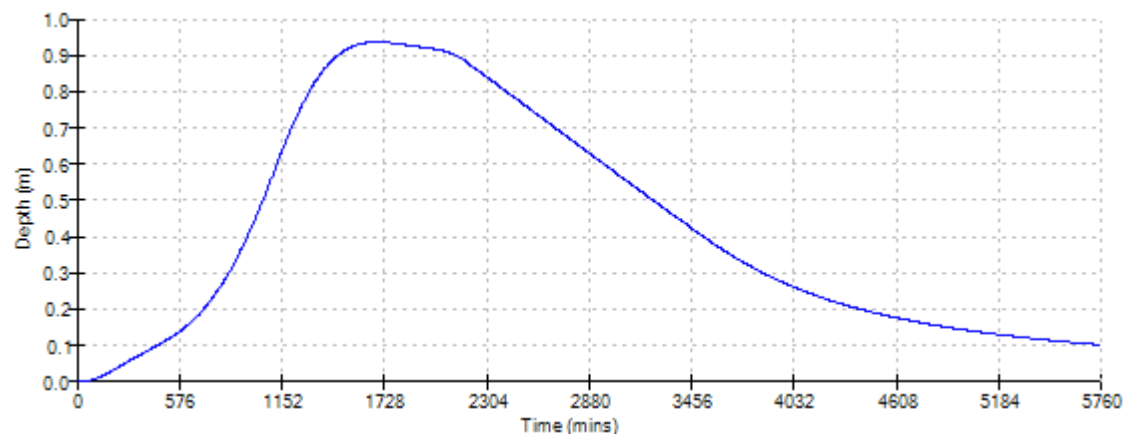
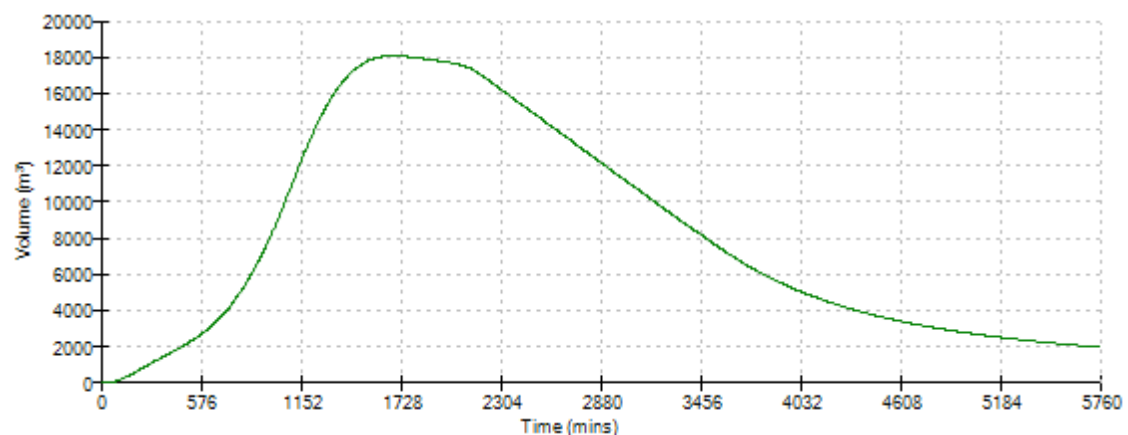
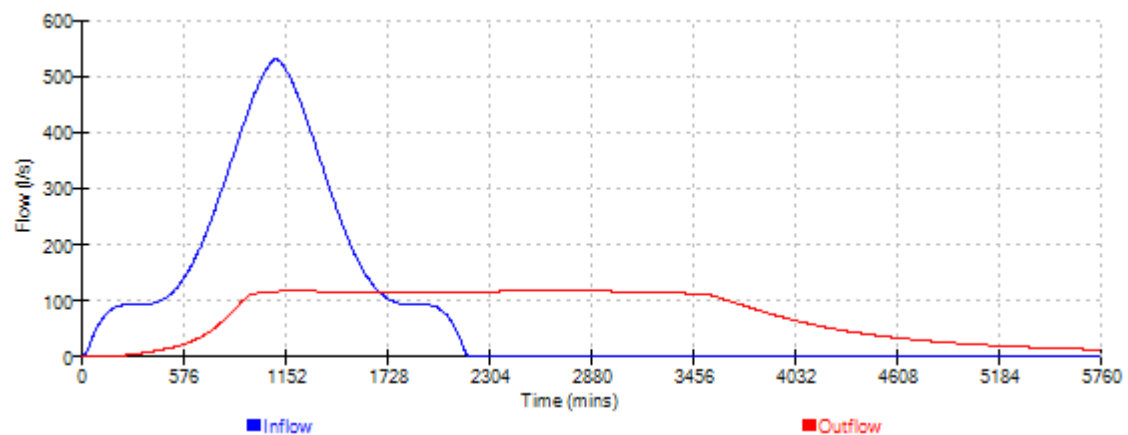
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	11.2	0.600	116.8	1.600	105.3	2.600	133.4
0.200	40.1	0.800	116.9	1.800	111.5	3.000	143.0
0.300	77.9	1.000	114.7	2.000	117.4	3.500	154.2
0.400	111.3	1.200	111.0	2.200	122.9	4.000	164.5
0.500	115.0	1.400	102.7	2.400	128.3	4.500	174.3

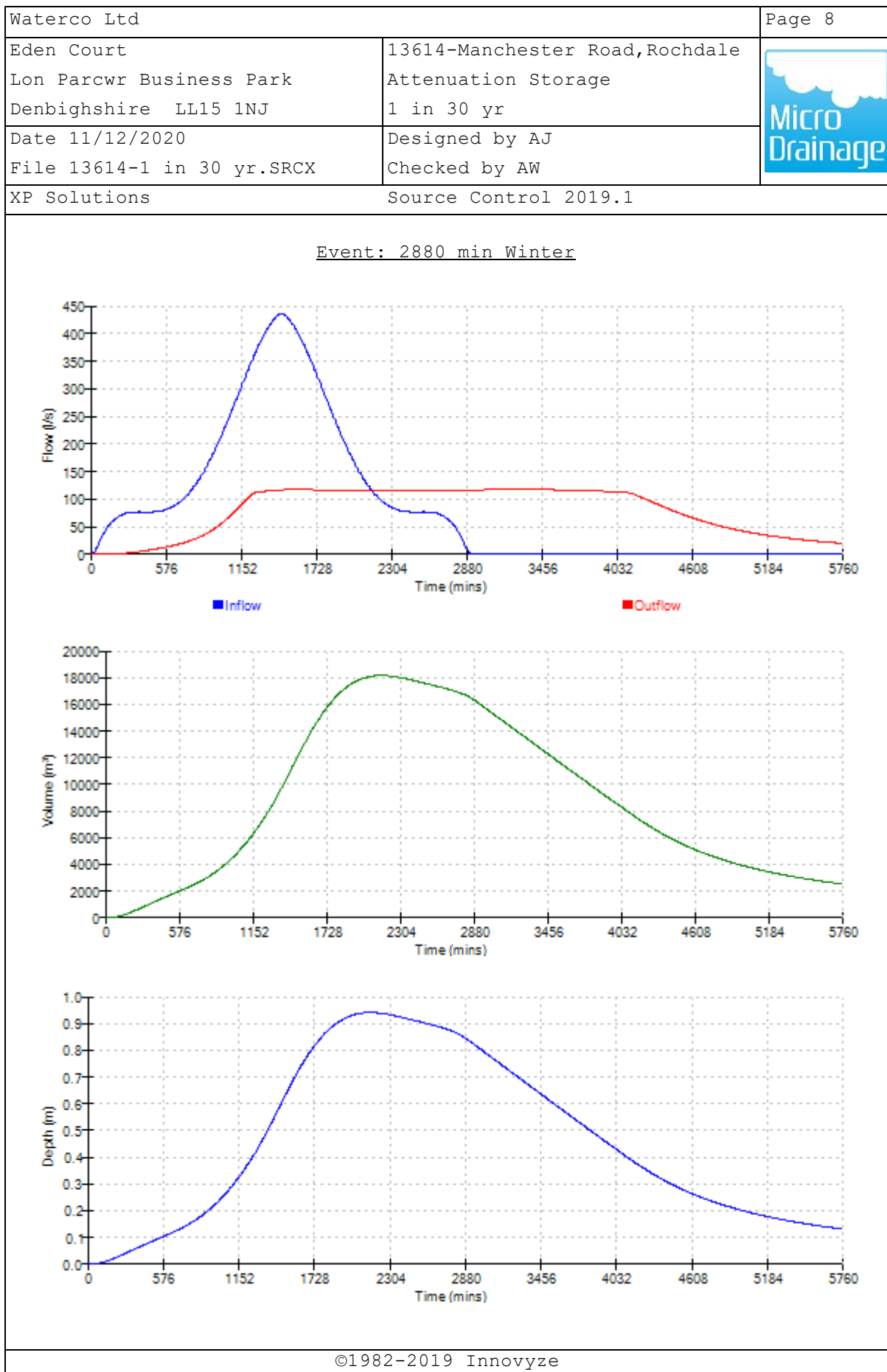
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Waterco Ltd		Page 6																																
Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	13614-Manchester Road,Rochdale Attenuation Storage 1 in 30 yr																																	
Date 11/12/2020 File 13614-1 in 30 yr.SRCX	Designed by AJ Checked by AW																																	
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<u>Hydro-Brake® Optimum Outflow Control</u> <table><thead><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>5.000</td><td>183.5</td><td>6.500</td><td>208.7</td><td>8.000</td><td>231.0</td><td>9.500</td><td>251.3</td></tr><tr><td>5.500</td><td>192.3</td><td>7.000</td><td>216.4</td><td>8.500</td><td>238.0</td><td></td><td></td></tr><tr><td>6.000</td><td>200.6</td><td>7.500</td><td>223.8</td><td>9.000</td><td>244.8</td><td></td><td></td></tr></tbody></table>			Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	5.000	183.5	6.500	208.7	8.000	231.0	9.500	251.3	5.500	192.3	7.000	216.4	8.500	238.0			6.000	200.6	7.500	223.8	9.000	244.8		
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Date 11/12/2020 File 13614-1 in 30 yr.SRCX	Designed by AJ Checked by AW	
XP Solutions		Source Control 2019.1

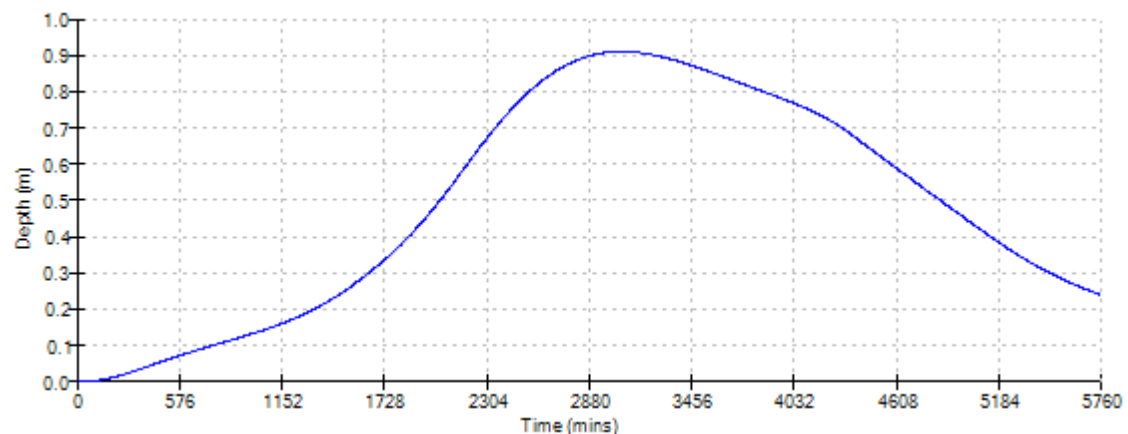
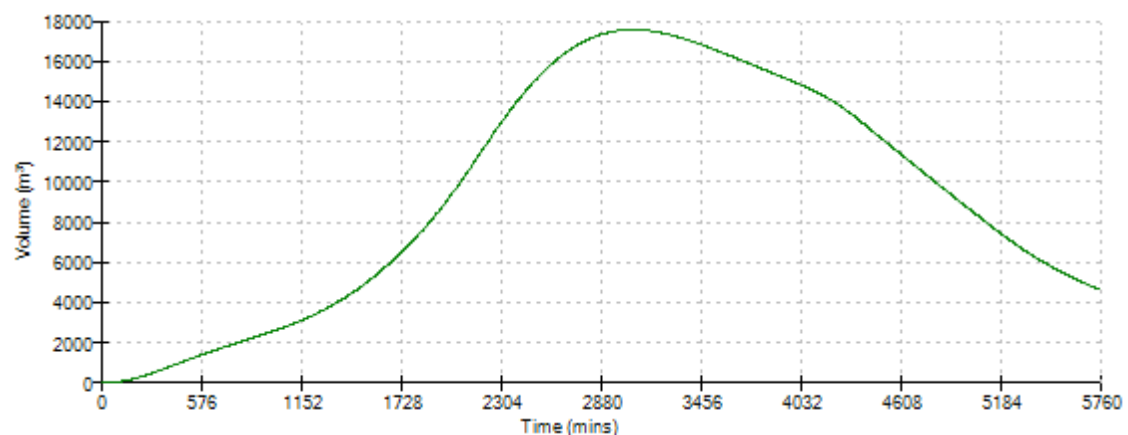
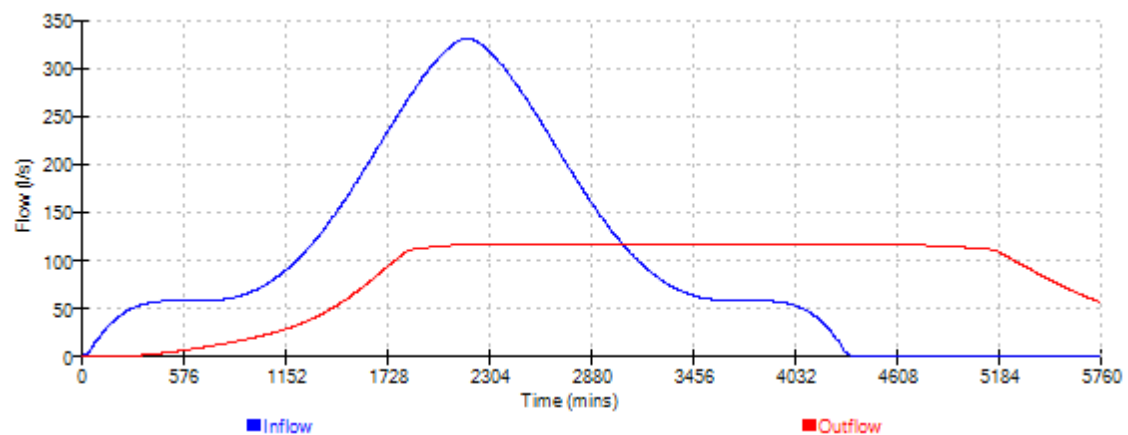
Event: 2160 min Winter





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Eden Court Lon Parcwr Business Park Denbighshire LL15 1NJ	13614-Manchester Road, Rochdale Attenuation Storage 1 in 30 yr	
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XP Solutions		Source Control 2019.1

Event: 4320 min Winter



Waterco Ltd					Page 1																																																																																																																																																																																												
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Summer</td><td>101.341</td><td>1.341</td><td>117.2</td><td>25871.9</td><td>O K</td></tr><tr><td>600 min Summer</td><td>101.405</td><td>1.405</td><td>117.2</td><td>27123.2</td><td>O K</td></tr><tr><td>720 min Summer</td><td>101.458</td><td>1.458</td><td>117.2</td><td>28134.9</td><td>O K</td></tr><tr><td>960 min Summer</td><td>101.533</td><td>1.533</td><td>117.2</td><td>29589.8</td><td>O K</td></tr><tr><td>1440 min Summer</td><td>101.628</td><td>1.628</td><td>117.2</td><td>31415.3</td><td>O K</td></tr><tr><td>2160 min Summer</td><td>101.679</td><td>1.679</td><td>117.2</td><td>32413.9</td><td>O K</td></tr><tr><td>2880 min Summer</td><td>101.694</td><td>1.694</td><td>117.2</td><td>32699.6</td><td>O K</td></tr><tr><td>4320 min Summer</td><td>101.700</td><td>1.700</td><td>117.2</td><td>32814.3</td><td>Flood Risk</td></tr><tr><td>5760 min Summer</td><td>101.686</td><td>1.686</td><td>117.2</td><td>32530.3</td><td>O K</td></tr></tbody></table> <table><thead><tr><th>Storm Event</th><th>Rain 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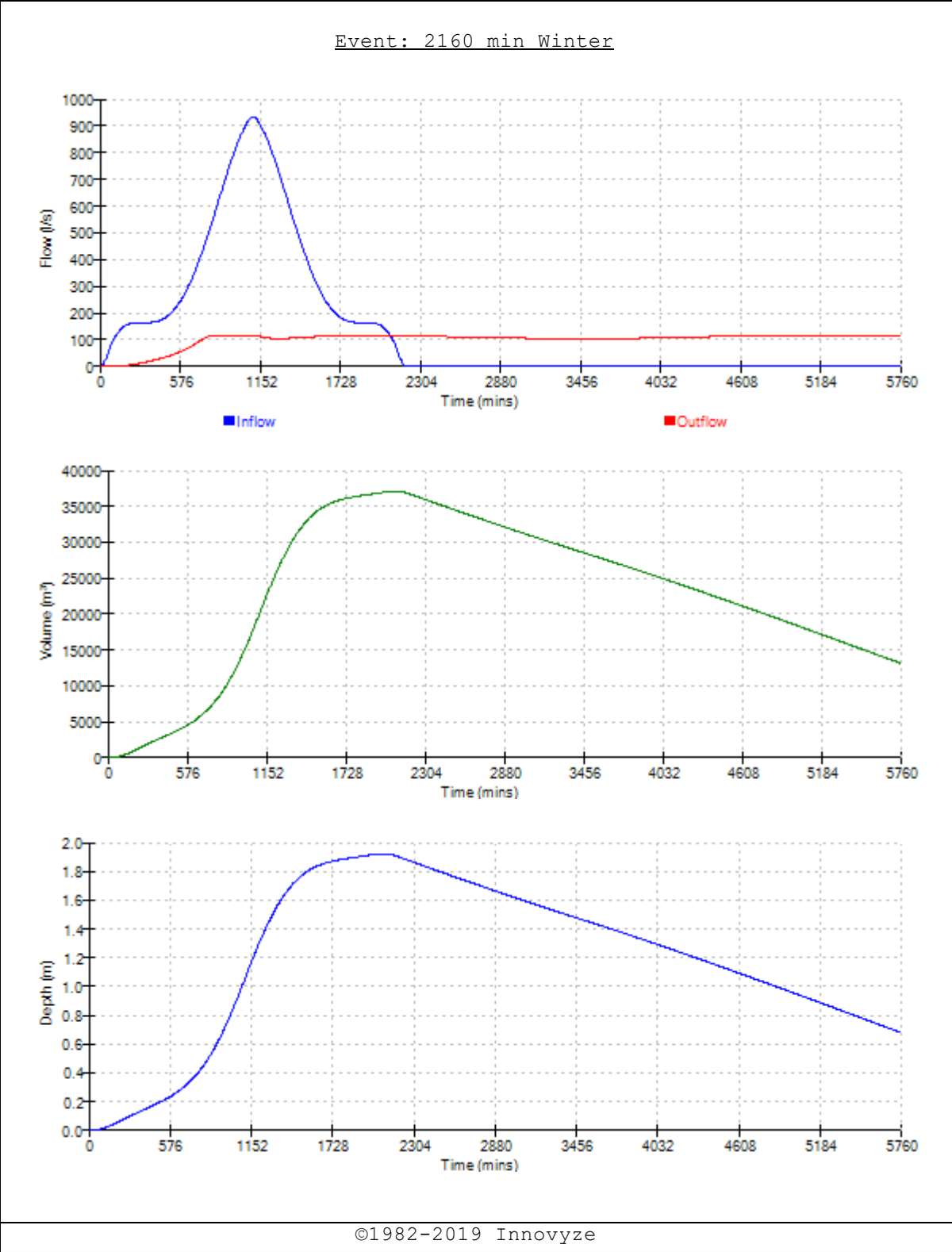
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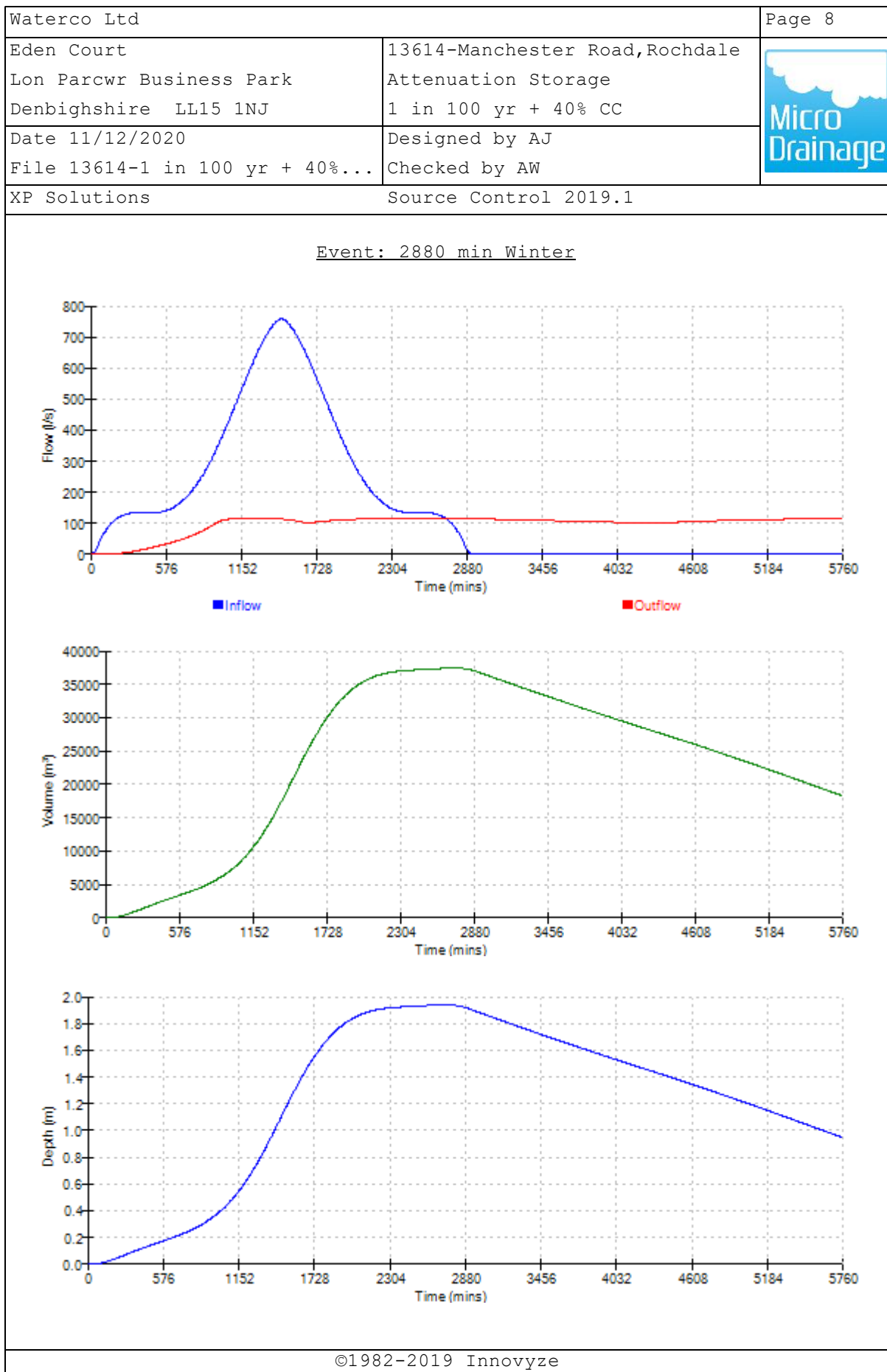
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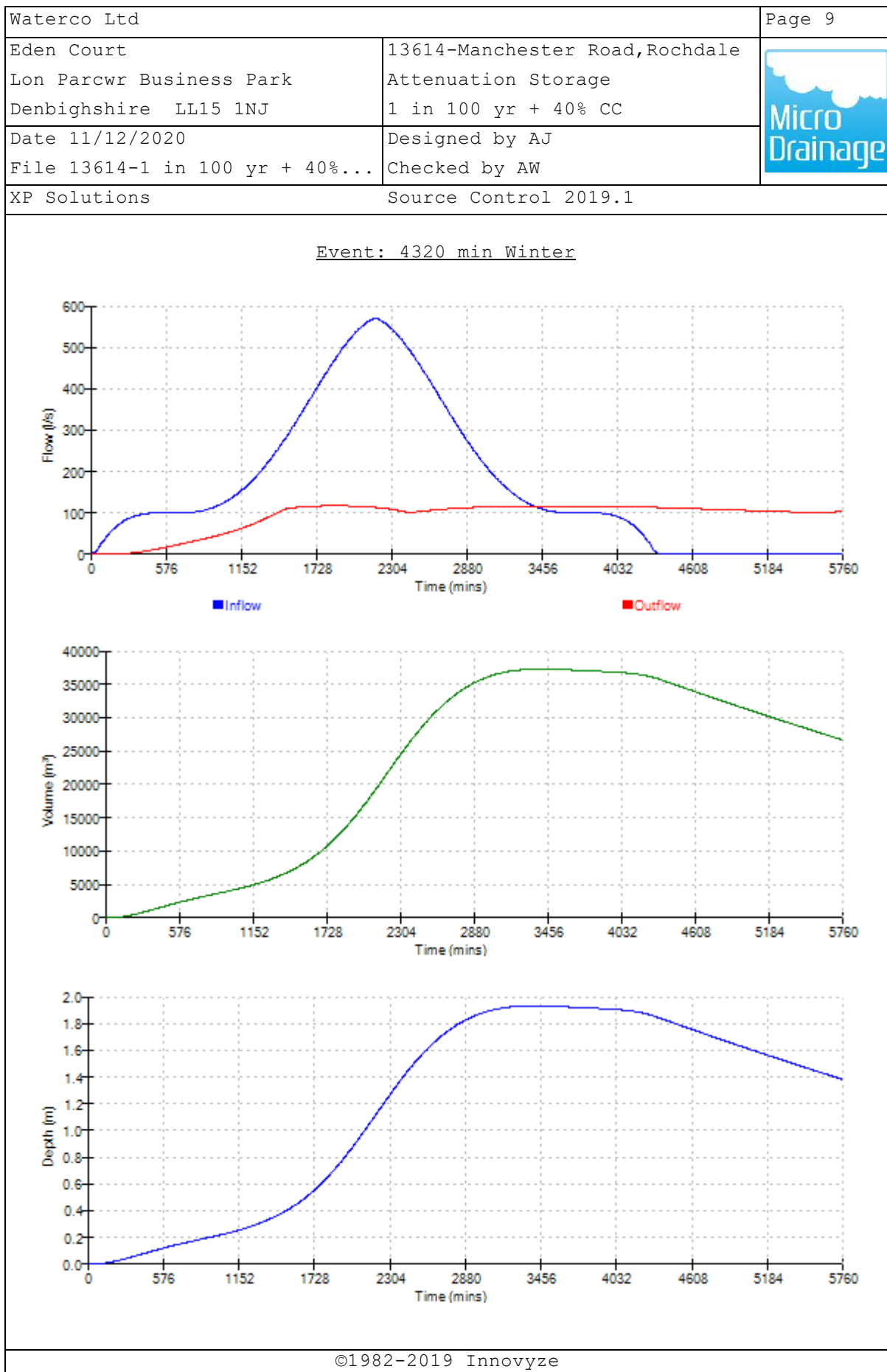
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<u>Hydro-Brake® Optimum Outflow Control</u> <table><thead><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>5.000</td><td>183.5</td><td>6.500</td><td>208.7</td><td>8.000</td><td>231.0</td><td>9.500</td><td>251.3</td></tr><tr><td>5.500</td><td>192.3</td><td>7.000</td><td>216.4</td><td>8.500</td><td>238.0</td><td></td><td></td></tr><tr><td>6.000</td><td>200.6</td><td>7.500</td><td>223.8</td><td>9.000</td><td>244.8</td><td></td><td></td></tr></tbody></table>					Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	5.000	183.5	6.500	208.7	8.000	231.0	9.500	251.3	5.500	192.3	7.000	216.4	8.500	238.0			6.000	200.6	7.500	223.8	9.000	244.8		
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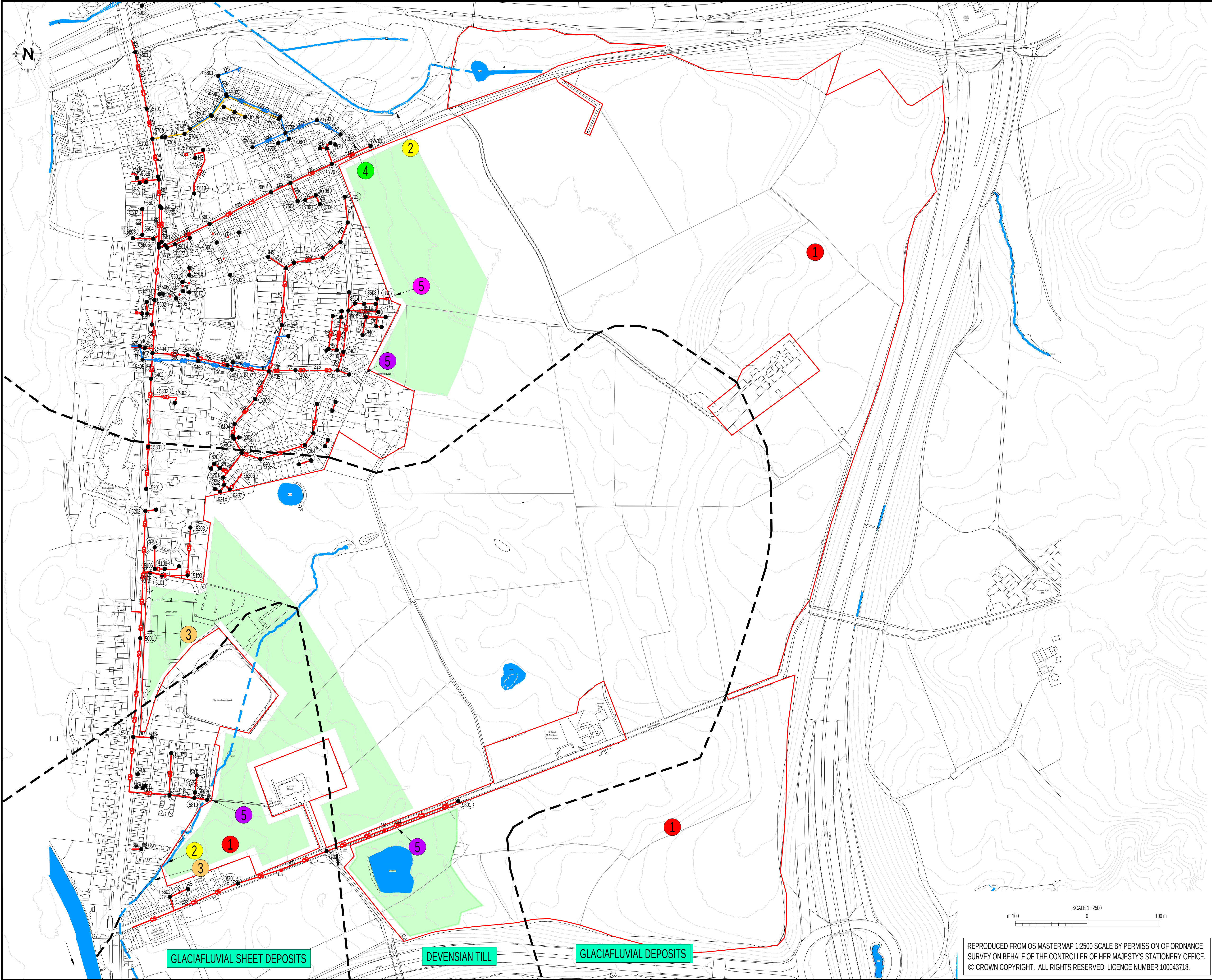
Waterco Ltd		Page 7
Eden Court	13614-Manchester Road, Rochdale	
Lon Parcwr Business Park	Attenuation Storage	
Denbighshire LL15 1NJ	1 in 100 yr + 40% CC	
Date 11/12/2020	Designed by AJ	
File 13614-1 in 100 yr + 40%...	Checked by AW	
XP Solutions	Source Control 2019.1	







Appendix I Drainage Optioneering Sketch



NOTES

- ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS SHOWN OTHERWISE.
- THIS DESIGN IS PROPOSED ON THE BASIS OF CLIENT BRIEF, SPECIFICATIONS, BEST PRACTICE AND RISK REDUCTION/ELIMINATION. THE DESIGNER MUST BE CONSULTED ON ANY PROPOSED CHANGES, BEFORE THEY ARE CONSIDERED FOR IMPLEMENTATION.
- THE POSITION AND LEVEL INFORMATION OF UNITED UTILITIES APPARATUS IS AS PER SEWER RECORDS RECEIVED. NO WARRANTY IS GIVEN AS TO THE ACCURACY OR COMPLETENESS OF THIS INFORMATION. THE CONTRACTOR SHALL CHECK AND CONFIRM THE POSITION OF ALL SERVICES PRIOR TO EXCAVATION.

KEY

- SITE BOUNDARY
- CS CS PUBLIC COMBINED SEWERS
- SW SW PUBLIC SURFACE WATER SEWERS
- PUBLIC FOUL SEWERS
- APPROX. GLACIOFLUVIAL EXTENT
- ASSUMED CULVERT ROUTE

SURFACE WATER DISCHARGE OPTIONS

- MANHOLE CHAMBER
- SOAKAWAY
- WATERCOURSE AND / OR LAND DRAIN
- ROCHDALE CANAL
- PUBLIC SURFACE WATER SEWER
- PUBLIC COMBINED AND / OR FOUL SEWER
- OPTIMAL SURFACE WATER ATTENUATION LOCATION
- WATER FEATURES

SITE LOCATION

GRID REFERENCE: 389111, 409288
SITE ADDRESS: THORNHAM LANE, TRUB, ROCHDALE, M24 2SH

P00	DD-MM-YY	FIRST ISSUE	TF	JW	JR
REV.	DATE	DESCRIPTION	DSGND	CHK'D	APP'D

CLIENT

REDROW

PRINCIPAL DESIGNER

Waterco

Waterco Ltd., Eden Court, Lon Parcwr Business Park, Ruthin LL15 1NJ tel (+44) 1824 702220 www.waterco.co.uk

SCHEME

MANCHESTER ROAD, ROCHDALE

TITLE

DRAINAGE OPTIONEERING SKETCH

STATUS

PRELIMINARY

DESIGNED	CHECKED	APPROVED	SCALE / SHEET SIZE
TF	JW	JR	1 : 2500 / A1

DRAWING NO.	REV
w10926-2001	P00

REPRODUCED FROM OS MASTERMAP 1:2500 SCALE BY PERMISSION OF ORDNANCE SURVEY ON BEHALF OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. ALL RIGHTS RESERVED. LICENCE NUMBER 100043718.

Appendix J Maintenance Schedules

Operation and Maintenance Requirements for Soakaways

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor inspection tube or chamber and inside of concrete manhole rings.	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs.	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Ref. Table 13.1, 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 :

Operation and Maintenance Requirements for Detention Basins

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass-for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring - before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc. for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebays	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed- areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years. or as required
	Remove sediment from inlets, outlets, forebays and main basin when required	Every 5 years. or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Ref. Table 22.1 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 :

Operation and Maintenance Requirements for Ponds and Wetlands

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season), or as required
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage, and / or physical damage.	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options.	Half yearly
	Check any mechanical devices e.g. penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Remove sediment from any forebay	Every 1 – 5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, e.g. 25-50 years
Remedial actions	Repair erosion or other damage	As required
	Replant where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitate of Inlets, outlets and overflows	As required

Ref. Table 23.1 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 :

Operation and Maintenance Requirements for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and move contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level or the paving	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and / or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Ref. Table 20.15, 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 :

Operation and Maintenance Requirements for Swale

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as Required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swales treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseed	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oil or petrol residues using safe standard practices	As required

Ref. Table 17.1 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 :

Operation and Maintenance Requirements for Attenuation Storage Tanks

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

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

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

Name :

Position :

Date :

Signed on behalf of the site owner :

Appendix K Concept Designers Risk Assessment

Project: Manchester Road, Rochdale
Client: Redrow Homes Limited
Report Reference: 13614-FRA and Drainage Strategy-03

Project No: 13614

Prepared by: Anthony Jones
Checked by: Aled Williams
Reviewed by: Victoria Griffin

Date: 11/12/2020
Date: 14/12/2020
Date: 15/12/2020

Requirement:

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

DRA Summary

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

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

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

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

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Yes	BGS mapping and desk study shows artificial ground in the northern extent of the site
2	Hazardous Environment	Unknown	Artificial ground can give rise to ground gas accumulation
3	Existing Working Environment	Unknown	
4	Existing Services	Unknown	Garden centre in the west
5	Proximity to Other Structure(s)	Unknown	Possible culverts on site
6	Near Waterbody / flood risk	Yes	Ponds and land drains have been identified on site. Associated flood risk is low
7	Proximity to Other Activities	Yes	Near highways and local roads
8	Sequence of Construction	Unknown	
9	Access	Unknown	
10	Interfaces	Unknown	
11	Confined Space Working	Unknown	
12	Maintenance Considerations	Unknown	
13	Working at Height	Unknown	
14	Steep Slopes	Unknown	
15	Demolition / Refurbishment / Repair	Unknown	
16	Welfare	Unknown	
17	Occupational Health	Unknown	
18	Environmental Issues	Unknown	
19	Other Significant Hazards not Identified Above	Unknown	
20	Residual Risk to Future Users	Unknown	