M61C4: West of Gibfield, Atherton

Statement of Flood Risk

Peel Holdings

March 2019

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
A	25.02.2019	Updated for 2019 submission	Y	Joanne Somerton	Principal Flood Risk Consultant

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1. Introduction

1.1 Report Background

AECOM Infrastructure & Environment UK Limited (AECOM) have been commissioned by Peel Investments (North) Ltd. (the 'Client') to undertake a Statement of Flood Risk in support of the change of land allocation application for land located to the West of Gibfield, (an area known as Gibfield Park) on the outskirts of Atherton, in Wigan, as shown in Appendix A.

This report contains a high level review of the potential flood risk at the Site, highlights major constraints to development and determines whether the Sites are suitable for housing and commercial uses in principle.

1.2 Existing Reports / Information Referred To

The following sources of information have been reviewed as part of this assessment:

- Environment Agency Flood Map for Planning (Online, Accessed 25.02.2019);[1]
- British Geological Survey "Geoindex Onshore Geology of Britain Viewer" (Online, Accessed 25.02.2019)[2];
- Wigan Borough Hybrid SFRA (Volume I: SFRA Report) (JBA Consulting, 2011);
- Wigan Council Preliminary Flood Risk Assessment (PFRA) (JBA Consulting, 2011);
- Greater Manchester Surface Water Management Plan (SWMP) (JBA,2012);
- United Utilities (UU) DG5 Dataset;
- CIRIA Report C723 - Water Sensitive Urban Design in the UK (CIRIA, 2013); and
- The Building Regulations 2000; Part H; Drainage and Waste Disposal (HM Government, 2015).
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2019);
- Rainfall Runoff Management for Developments Report – W5-074/A/TR1/1 Revision E (Environment Agency, 2007);
- Institute of Hydrology Report 124 (IH124) "Flood estimation for small catchments" (Marshall, D C W & Bayliss, A C, 1994);
- Sewers for Adoption 7th Edition – A Design and Construction Guide for the Developer (Water Research Centre, 2012);
- Sustainable drainage systems: non-statutory technical standards (Department for Environment, Food and Rural Affairs, 2015); and
- The SuDS Manual, Report C735 (CIRIA, 2015).

1.3 Site Information

The Proposed Development comprises approximately 77.1 hectares (ha) of predominantly Greenfield land and is located to the western edge of Atherton, Wigan. The developer is proposing only 29.3ha of the Site is developed with the remaining Site area (approximately 43.8ha) left as green space (refer to Appendix A).

The Site is bound to the west by the B5235 (Schofield Lane); the south by the A557 (Wigan Road); the north by the Manchester-Wigan railway line and; east by North Road. At present the Site is predominantly undeveloped comprising open fields, with a few small ponds, thought to be used for grazing and arable farming.

According to the Environment Agency (EA) online flood maps[1] the Site is located entirely within Flood Zone 1 (with a low risk of flooding from tidal and fluvial sources).

[1] Available at: https://flood-map-for-planning.service.gov.uk
[2] Available at: http://mapapps2.bgs.ac.uk/geoindex/home.html

1.4 Proposed Development

The Client is currently considering disposal of the Site as a mixed development plot with the Proposed Development comprising 750 residential units and 45,500 square metres (sqm) of employment floor space. An outline masterplan, included as Appendix A to this report, has been drafted for the Site.

The National Planning Policy Framework[3] (NPPF) considers the vulnerability of different forms of development to flooding and classifies proposed uses accordingly. Residential properties are considered 'More Vulnerable' to flooding whilst commercial/ employment uses are considered 'Less Vulnerable.

Section 7, Paragraph 066 of the Planning Policy Guidance[4] (PPG) illustrates a matrix which identifies which vulnerability classifications are appropriate within each flood zone. This can be seen below in Table 1.

Table 1. Flood Risk Vulnerability and Flood Zone Compatibility

Flood risk Vulnerability classification	*Essential Infrastructure*	*Water Compatible*	*Highly Vulnerable*	*More Vulnerable*	*Less Vulnerable*
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	✓	Exception test required	✓	✓
Zone 3a	Exception test required	✓	×	Exception test required	✓
Zone 3b 'Functional Flood plain'	Exception test required	✓	×	×	×

Key
✓ Development is appropriate.
× Development should not be permitted

Based on the classification shown in Table 1, the Proposed Development use (residential and employment) is considered appropriate in Flood Zone 1. The Site is considered to pass the Sequential Test and therefore an Exception Test is not required.

2. Flood Risk Overview

2.1 Fluvial and Tidal Flood Risk

The EA online flood maps[1] indicate Hall Lee Brook, an EA Main River, flows southwards by the B5235 to the west of the Site (approximately 250m from the Site). An un-named EA Main River, a tributary to Collier Brook/ Atherton Brook is located immediately to the east of North Road to the east of the Site. A drain flows from the north of the Site (from underneath the Manchester-Wigan railway line near Langley Hall Farm) adjacent to and parallel with the western Site boundary, it is culverted at Colliery Lane and it is not clear if it joins Hall Lee Brook or Small Brook. Further investigation would need to be carried out at the site to understand which watercourse this drain flows to.

There are three other drains in the southern half of the Site; one flows from near the western end of Colliery Lane southwards, the second flows from the eastern end of Colliery Lane westwards and the third flows from near Poultry House westwards. The second drain is culverted and appears to join the first drain (but further investigation would be required to confirm this), the first and third drain joins Small Brook at the south western corner of the Site. Small Brook continues to flow out of the Site in a south easterly direction towards Smallbrook Lane (A577).

According to the EA Risk of Flooding for Planning maps[1] the Site is located predominantly within land classed as Flood Zone 1 (i.e. a low probability of fluvial and tidal flooding). A small section of Colliery Lane on the western side of the Site is within the Flood Zone 2 and 3 extents associated with Hall Lee Brook.

[3] Ministry of Housing, Communities and Local Government (2019) National Planning Policy Framework
[4] https://www.gov.uk/guidance/flood-risk-and-coastal-change

Land in Flood Zone 1 (low risk) has a less than 1 in 1000 annual probability (<0.1% AEP) of flooding in any given year. Land in Flood Zone 2 (medium risk) has between a 1 in a 100 (1.0% AEP) and 1 in a 1,000 annual probability of river flooding whilst land located in Flood Zone 3 (high risk) has an annual probability of greater than 1 in 100 (>1.0%AEP) of flooding from rivers. As such the Site is considered to be overall at low risk of flooding from this source.

The Site is not located in a coastal region so tidal flooding has not been considered further as part of this assessment.

2.2 Surface Water Flood Risk

The Site is not located within a strategic surface water flooding hotspot in the SWMP[5] and there is no evidence of historical surface water flood events noted within this parcel of land.

Based on the EA Risk of Flooding from Surface Water (RoFSW) maps[6] the majority of the Site is considered to be at 'very low' risk of flooding from surface water. The EA define 'very low risk' as "*an area that has a less than a 1 in 1000 (0.1%) probability of flooding in any given year*". Areas within the Site considered to be at medium risk and high risk of surface water are associated predominantly with the un-named drain that flows adjacent to the western Site boundary and its associated drainage ditches located within the Site. The extent of surface water flooding in these areas are generally limited to the immediate watercourse corridor and flow routes follow the path of the watercourses or drainage features. Medium risk is considered to be areas with a risk of flooding between a 1 in 30 (33.3%) and 1 in 100 (1%) probability of flooding in any given year whilst high risk is associated with areas with a risk of a greater than 1 in 30 (3.3%) probability of flooding in any given year. An additional area shown to be at high risk of surface water flooding is identified to the east of the Site where water pools against the adjacent works located off North Road.

A further surface water flow route in to the Site is present to the south where surface water enters the Site from Wigan Road via the local residential area associated with Durban Street.

Based on the above information, the risk of surface water to the majority of the Site is considered to be at very low risk of flooding whilst areas in close proximity to the watercourses/ drains, to the east in the location of the works, and to the south flood risk is considered to be high. Any residual risk will be mitigated through the implementation of a surface water management strategy. Potential options for mitigation to ensure that flood risk from this source is not increased as a result of the development, including the use of Sustainable Drainage Systems (SuDS) are discussed in the Surface Water Management section.

2.3 Flooding from Artificial Sources

The EA's map of Flood Risk from Reservoirs[6] shows that the Site is not located in an area at residual risk of flooding from a large reservoir in the event of a structural failure or breach. There is a small reservoir and covered reservoir located around 500m from the east of the Site, but these are not represented on the EA's map of Flood Risk from Reservoirs, presumably due to their small size. The Wigan Borough Hybrid SFRA states that there is little historic evidence of reservoir flooding in Wigan and shows the Site to be outside of the potential breach vulnerability area.

There are four ponds located within the Site boundary. The waterbodies are small and appear to be formed from depressions in the topography. The location of the majority of the ponds appears not to coincide with surface water flooding.

Only two of the ponds are located within the areas which have currently been assigned for development at present. The ponds are small and there could be potential to remove these ponds but further investigation would be required with regards to ecology as to whether this would be permitted. If these ponds remain then residential and commercial areas would have to be set back from these water features. Any residual risk of flooding could be mitigated through the implementation of an appropriate surface water drainage strategy.

Provided that the ponds are either removed or built development are set back from these waterbodies then the risk of flooding could be considered to be low.

[5] JBA Consulting Ltd (2012) Greater Manchester Surface Water Management Plan
[6] https://flood-warning-information.service.gov.uk/long-term-flood-risk/#x=357683&y=355134&scale=2 Accessed: 25.02.2019

2.4 Flooding from Groundwater

The BGS 'Onshore Geology of Britain Viewer'[7] provides information on the bedrock and superficial geology for the Site. The bedrock consists of bands of: Pennine Lower Coal Measures Formations (Carboniferous Mudstone, Siltstone and Sandstone); Pennine Lower Coal Measures Formation (Mudstone, Siltstone and Sandstone); and Trencherbone Rock (Sandstone). Superficial deposits are predominantly Till (Devensian Diamicton).

The EA groundwater map indicates that the bedrock underlying the Site is classed as a Secondary A Aquifer which is characterised by permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forms an important source of base flow to rivers. The superficial deposits are predominantly classed as Secondary Undifferentiated Aquifer which is 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 'Areas Susceptible to Groundwater Flooding' maps[8] provided by the EA to inform the SFRA and PFRA indicates that the Site is located in an area with >50% - <75% to >75% potential for groundwater flooding to occur. None of the flood risk documentation reviewed indicates instances of historic groundwater flooding reported at the Site.

The Site is predominantly Greenfield with natural levels of infiltration and only localised areas of hardstanding ground. As such the likelihood of localised groundwater reaching the surface and causing flooding has not been altered to date.

The BGS 'Onshore Geology of Britain Viewer' shows that there are 6 inferred coal seams which intersect the Site parallel to the A557 (Wigan Road). Further investigation will be required to understand if open cast mining has taken place at the site as it could have an effect on recovering groundwater levels.

The depth of groundwater below the Site will also have a bearing on any attenuation measures recommended as part of the surface water management strategy and so must be confirmed to enable development of an appropriate management plan.

Based on the adoption of appropriate mitigation strategies, the Site is considered to be at medium risk of groundwater flooding. Due to the large scale historic mining and uncertainties associated with groundwater recharge, the risk is increased to high should basements be proposed in the residential/ commercial development.

2.5 Flooding from Sewers and Drainage Infrastructure

There is not believed to be an extensive drainage network within the Site (refer to Appendix B), although it is likely that there are field drains across parts of the agricultural land. The full extent of these is not known as limited records are available. United Utilities (UU) have drainage infrastructure within the surrounding road network.

The Wigan Borough Hybrid SFRA has collated information from the UU DG5 Flood Register for the area, which records historic internal and external sewer flooding events. Mapping of the DG5 postcode areas, undertaken as part of the SFRA, indicates that the Proposed Development is located in an area where there have been no recorded incidents of flooding from the UU network.

Based on the available information the risk of flooding from this source is considered low.

2.5.1 Surface Water Management

The Greenfield runoff rate for the Site, based on the approximate development areas (29.3 ha), has been calculated using MicroDrainage software. The remaining site area (43.8 ha) will remain as Greenfield land and will continue to drain via natural processes as the existing scenario. The runoff rates are considered to be the Greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments"[9], and the CIRIA SUDS Manual[10]. The Greenfield runoff rate (based on The Institute of Hydrology Report 124 (IH124) "Flood estimation for small

[7] British Geological Society Geology of Britain Onshore Geology Viewer [Online] Accessed: 25.02.2019
[8] Environment Agency Groundwater Maps [Online] Accessed: 25.02.2019
[9] Environment Agency (2007) Rainfall Runoff Management for Developments. Report – W5-074/A/TR1/1 Revision E
[10] CIRIA (2015) The SuDS Manual, Report C735

catchments[11]") for the QBAR storm event (equivalent to a 1 in 1 year return period) for the development area is approximately 187.9 litres/ second (l/s).

2.5.1.1 Restricted Surface Water Runoff Rate

The NPPF requires that the new development should not increase flood risk both on the Site and in the area surrounding it. Surface water runoff should therefore not exceed the volumes already generated by the existing Site and betterment should be provided where possible.

The Greenfield runoff rate for the 29.3 ha development area indicates the maximum discharge for which the drainage strategy should be limited to the QBAR rate of 187.9 l/s. Runoff volumes in excess of this will need to be attenuated.

In addition, the surface water drainage design should follow the principles listed in the Approved Document Part H of the Building Regulations[12] and Sewers for Adoption 7th Edition[13], and will encourage an approach which incorporates SuDS (based on the Buildings Regulations hierarchy).

An increase of 40% in rainfall intensity to account for the effects of climate change (based on the latest EA climate change guidance[14]) over the lifespan of a commercial development shall be taken into account. Finally, the surface water attenuation will be designed to store the critical 100 year return period storm event including an allowance for climate change.

2.5.1.2 Surface Water Attenuation Volumes

Given the lack of a masterplan for the Proposed Development it is to be assumed that 60% of the Proposed Development area will become impermeable post development. The remaining 40% will be made up of greenspace and, the infiltration capacity of the soils has been assumed to be 0%, as a worst case scenario, as the infiltration coefficient for the site is not known.

Assuming that post development 60% of the proposed 29.3 ha development area (approximately 17.6 ha) will become impermeable, the restricted runoff rate of 187.9 l/s has been used in WinDes MicroDrainage modelling software to calculate an indicative storage volume that would be required to store surface water for rainfall events up to the 1% AEP storm event plus climate change (40%). The results of this indicative calculation show that a storage volume of between 9,485m^3 and 14,082m^3 would be required (Appendix C) based on the 100 year 6 hour rainfall event.

3. Residual Risks

Failure, blockage and exceedance of design events for the drainage system are a potential risk to the Site and the surrounding area. Regular maintenance of the drainage system should be undertaken to ensure that the system continues to perform as designed.

There also remains the risk of surface water flooding in the event of a storm in excess of the 'design storm'. To manage the risk from exceedance flows, the drainage design will follow appropriate guidance (i.e. CIRIA C635) to provide flow paths such that any overland flow is directed away from impacting any surrounding development.

The combined risk of flooding from the sources listed above can be considered as low to medium. Based on the Vulnerability Classification of the Proposed Development, as outlined in NPPF, the Site considered appropriate for housing development in principle.

3.1 Recommended Work to De-risk Site

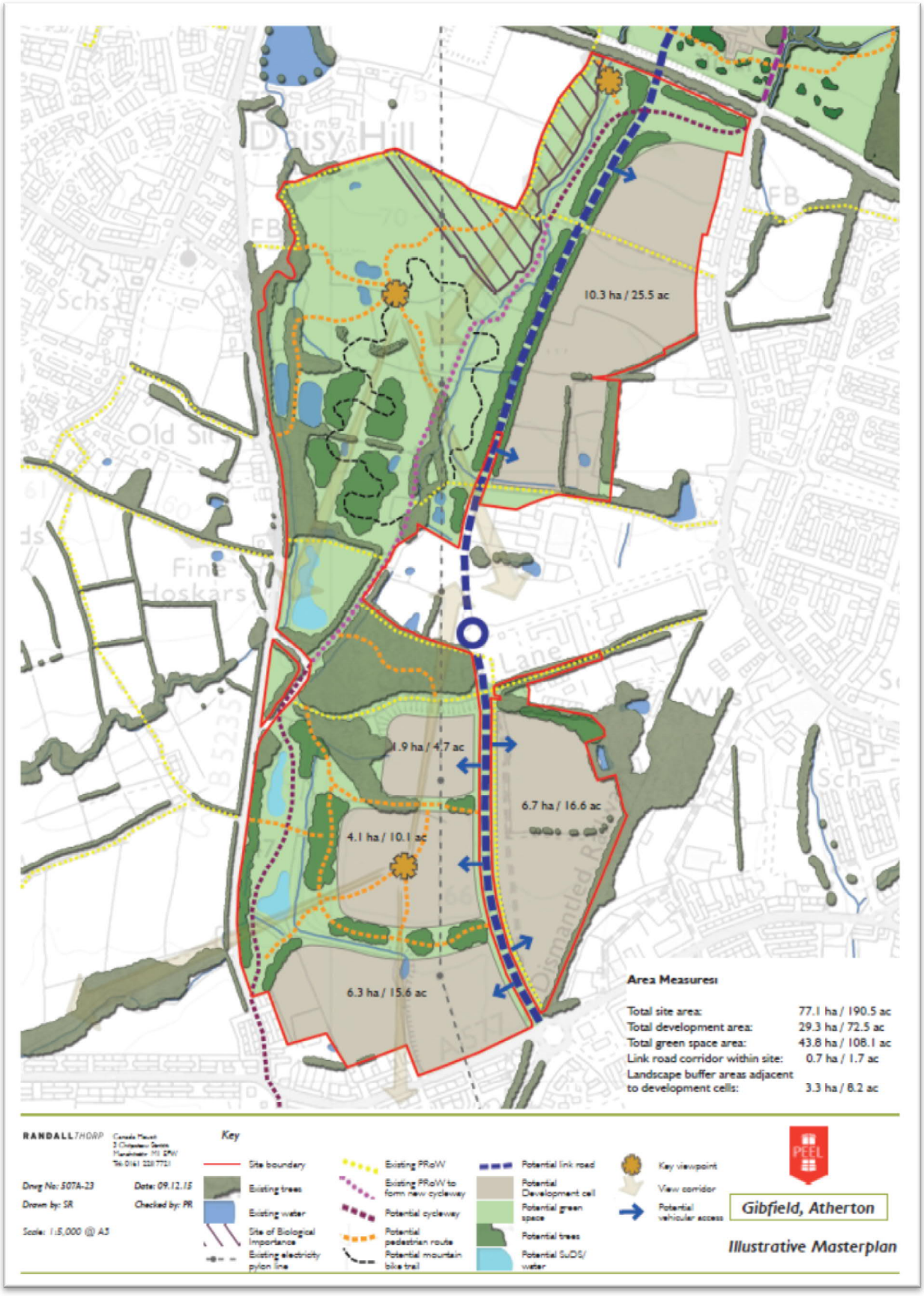
As the proposed Site is greater than 1 ha, the undertaking of a detailed site specific Flood Risk Assessment (FRA) is recommended to ensure compliancy with the NPPF. A more detailed review of the surface water and groundwater flood risk at the Site is recommended to see if the current risk can be mitigated so that it can be demonstrated that the development will remain safe for the lifetime of the development and not increase flood risk elsewhere. The FRA should take into consideration: the latest proposed site layout, UU DG5 records, specific

[11] Marshall, D C W & Bayliss, A C (1994) Institute of Hydrology Report 124 (IH124) "Flood estimation for small catchments"
[12] HM Government (2015) The Building Regulations 2000; Part H; Drainage and Waste Disposal
[13] Water Research Centre (2012) Sewers for Adoption 7th Edition – A Design and Construction Guide for the Developer
[14] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

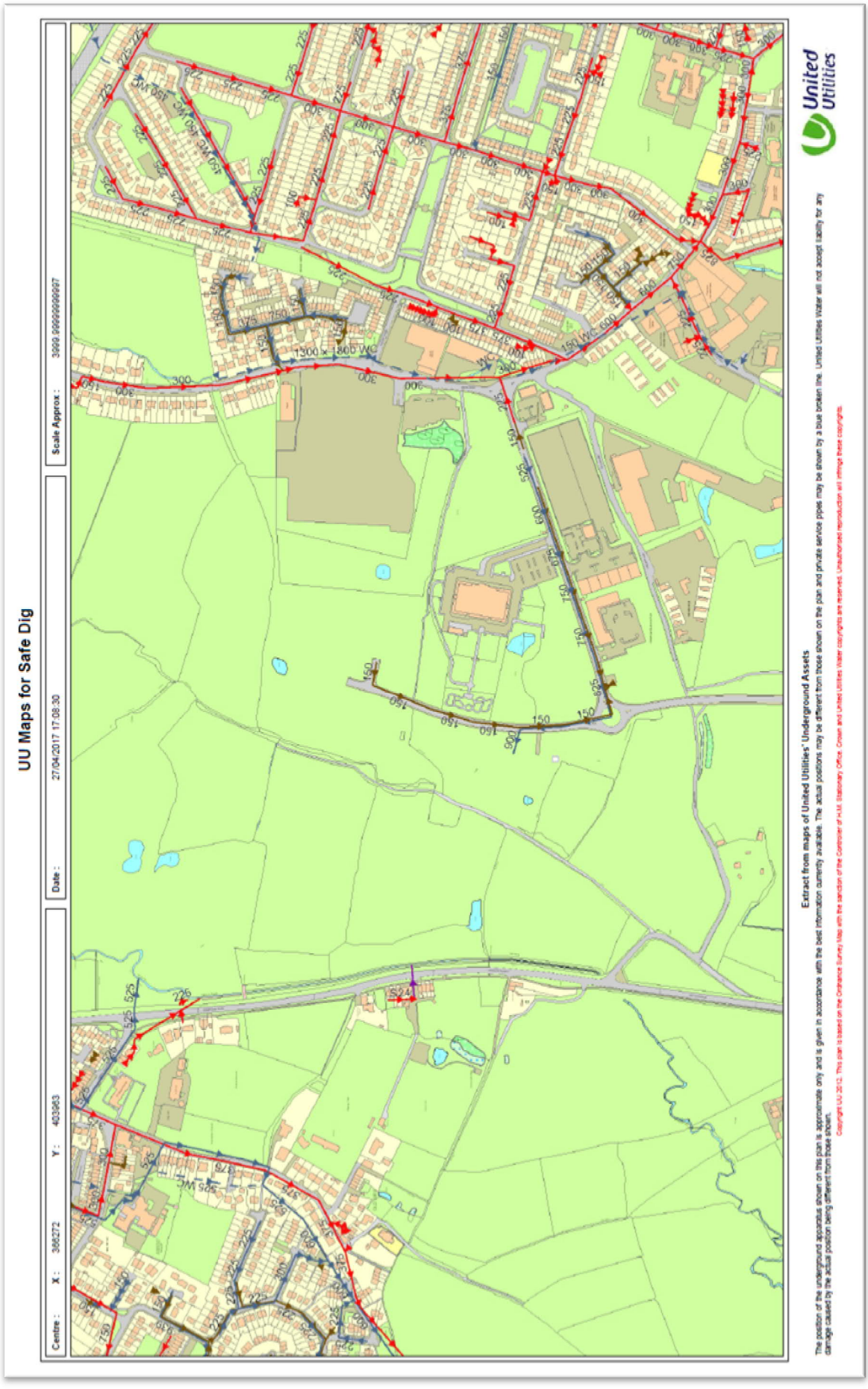
flood mitigation measures which will be implemented as part of the design and consultation with the EA, Wigan Borough Council and UU.

Further ground investigations are likely to be required as part of more detailed assessments for the Site to understand if there is a risk of groundwater emergence due to the history of open cast mining in the vicinity of the Site. If further investigations indicate that there is a risk of groundwater emergence on the Site, a comprehensive groundwater mitigation strategy should be considered at the detailed design stage, particularly if basements are proposed. It is suggested that these risks can be mitigated through the use of raised finished floor levels, flood resilient and resistant construction, appropriate flood routing through the site and installation of appropriate drainage.

Appendix A Outline Masterplan



Appendix B Existing Sewer Network


UU Maps for Safe Dig
Centre : X : 368272 Y : 403963
Date : 27/04/2017 17:08:30
Scale Approx : 3999.999999997
United Utilities
Extract from maps of United Utilities' Underground Assets
The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.
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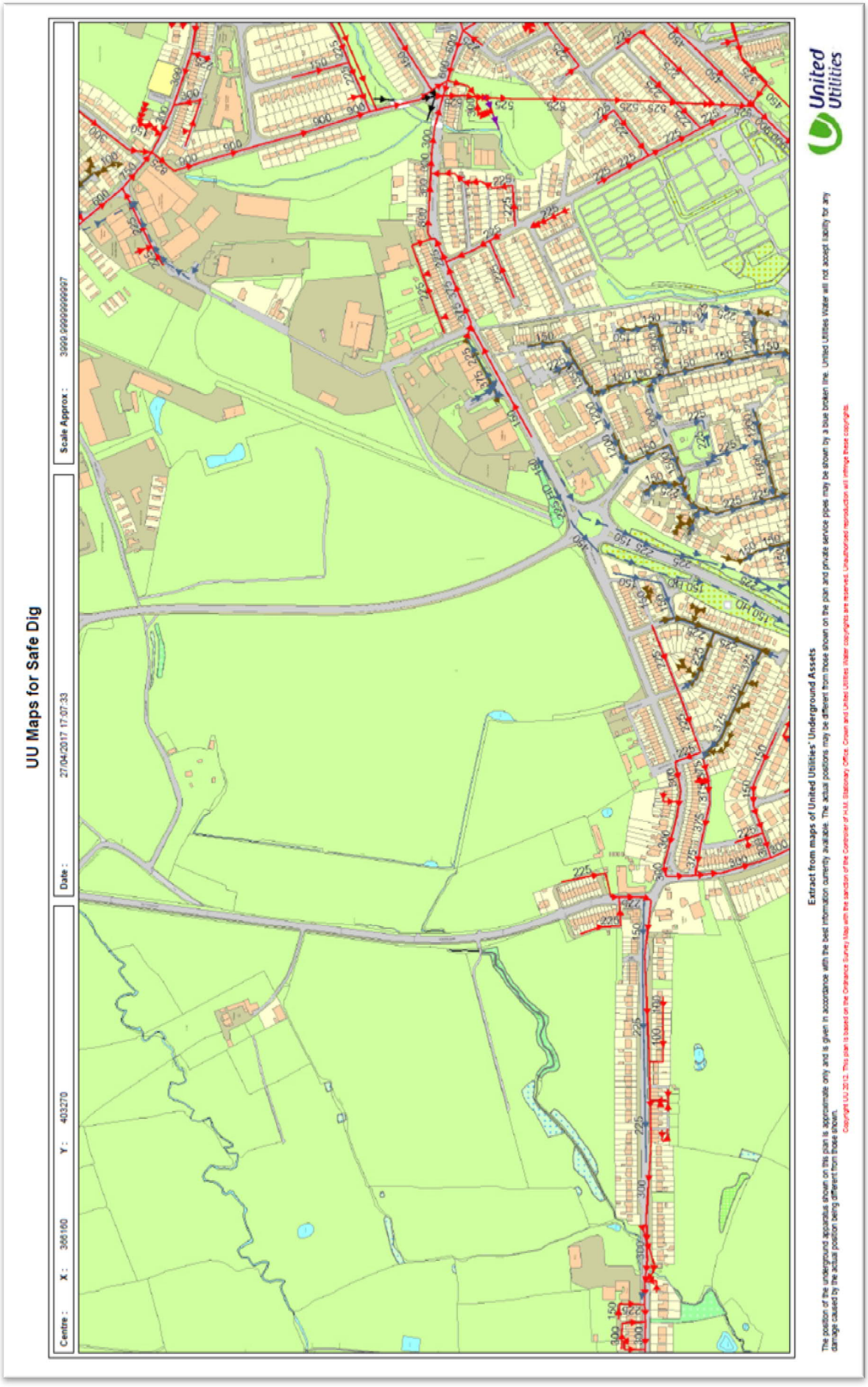
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United Utilities
Extract from maps of United Utilities' Underground Assets
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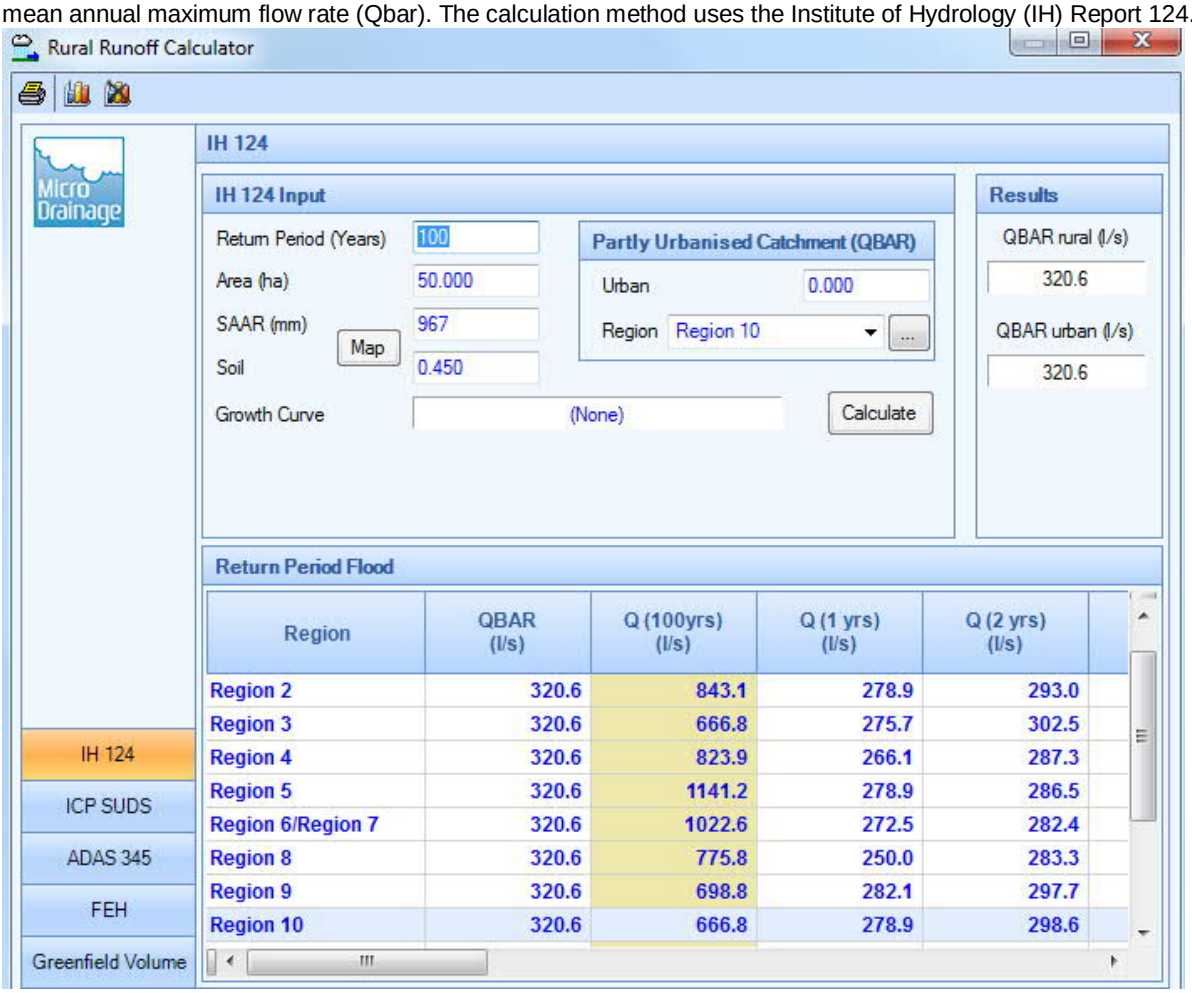
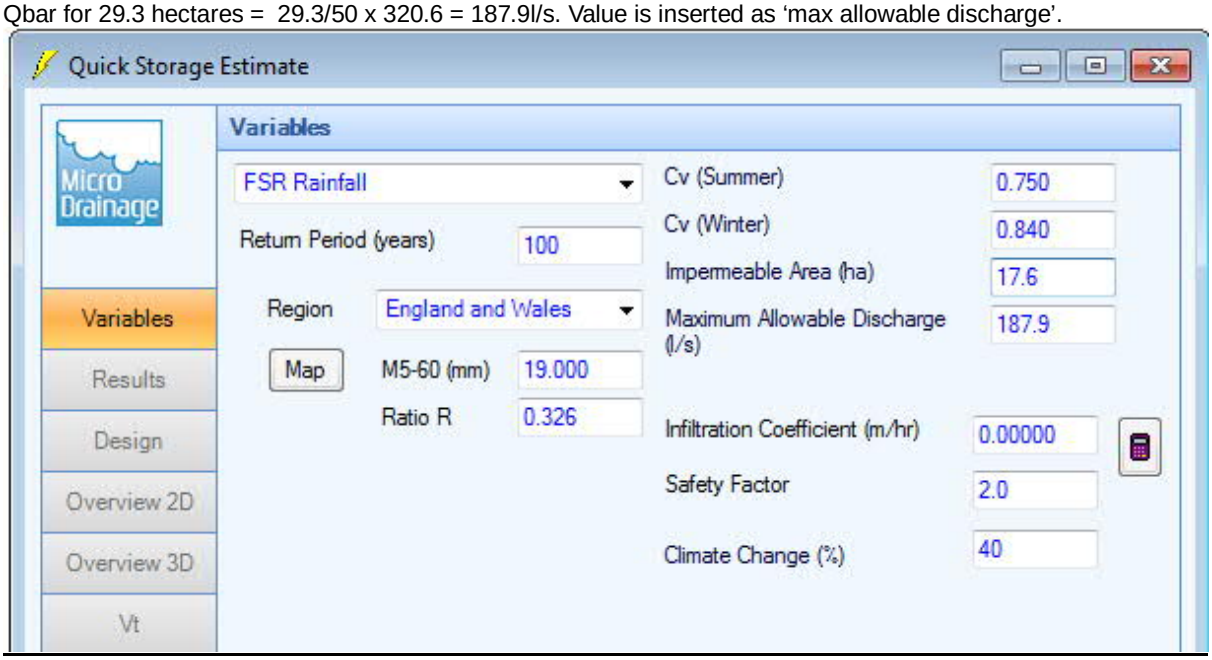
Appendix C Drainage Calculations

Greenfield Runoff Calculation: The screenshot below shows that the *MicroDrainage*® program calculates the mean annual maximum flow rate (Qbar). The calculation method uses the Institute of Hydrology (IH) Report 124.

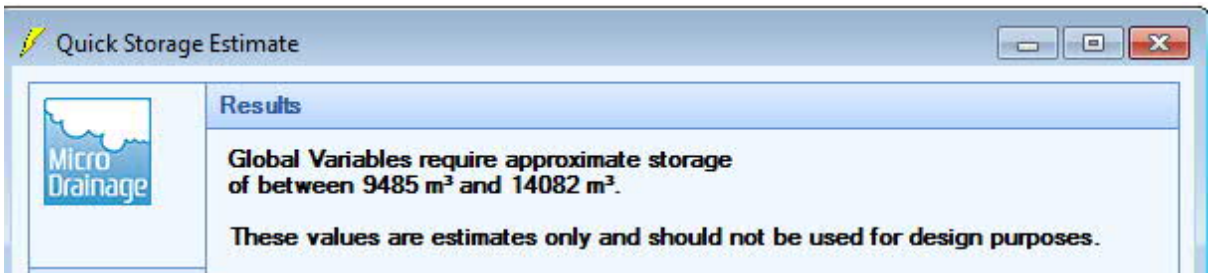


Area for development is estimated as 29.3 hectares. The rest of the site area (43.8 ha) is green space to be developed only for recreational paths & bike trails and, perhaps, runoff ponds.

Qbar for 29.3 hectares = 29.3/50 x 320.6 = 187.9l/s. Value is inserted as 'max allowable discharge'.



Assumptions: Impermeable area = 60% of the 29.3 hectares = 17.6 hectares



Results: The estimated site storage pond/ lagoon to restrict the runoff from the developed site to that of existing greenfield runoff will be between 9,485m^3 and 14,082m^3.
Assuming a mid range volume value (11,784m^3) with an average depth of 1m, the total footprint of the storage lagoon(s) would be equivalent to 1 ½ football pitches. (A typical football pitch measures 105m x 70m).
The average rainfall runoff storage requirement per hectare of developed land will be **402m^3**.
The total storage volume requirement can be reduced by incorporating Sustainable urban Drainage Systems in the design e.g. Swales, permeable driveways and soakaways.