



Russells South Heywood (Commercial) Ltd

SOUTH HEYWOOD PLOT 3 OUTLINE APPLICATION

FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY





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WSP

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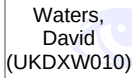
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CONTENTS

	EXECUTIVE SUMMARY	1
1	INTRODUCTION	3
2	CONTEXT & SETTING	4
3	FLOOD RISK	7
4	PLOT 3 SITE DRAINAGE STRATEGY	12
5	FOUL WATER DRAINAGE STRATEGY	16
6	MITIGATION / MANAGEMENT OF FLOOD RISK	18
7	CONCLUSIONS	19

APPENDICES

APPENDIX A

SITE LOCATION PLAN

APPENDIX B

CAMPBELLREITH DRAINAGE STRATEGY EXTRACTS

APPENDIX C

TOPOGRAPHICAL SURVEY

APPENDIX D

FOUL SEWER S104 LAYOUT

APPENDIX E

GREENFIELD RUNOFF RATE ASSESSMENT

APPENDIX F



DRAINAGE STRATEGY OVERVIEW

APPENDIX G

ATTENUATION VOLUME CALCULATIONS

APPENDIX H

OVERLAND FLOOD ROUTEING PLAN

EXECUTIVE SUMMARY

This Flood Risk Assessment and Drainage Strategy report has been prepared by WSP on behalf of Russells South Heywood (Commercial) Ltd for Plot 3 of the South Heywood development to support an application for outline planning permission to construct a B8 warehouse.

The Plot 3 development site covers an area of approximately 8.8 hectares (ha) and for the purposes of this strategy has been classified as a greenfield site. A location plan for the site is included in **Appendix A**.

The Plot 3 development proposals consist of the following:

- A total site area of 8.8Ha
- Overall total 40,000sq.m Gross Internal Area (GIA) of building extent.

The Plot 3 Outline Application site fits within the extent of an already approved Hybrid Planning Application (ref: 16/01399/HYBR). As such the principles and parameters set out in this report have already been accepted by the Local Authority.

FLOOD RISK

The site is located in Flood Zone 1 and is low risk of flooding from rivers or the sea.

There are two watercourses (both main river) within the site extents (Brightley Brook and an unnamed watercourse). These are considered to be minor in nature and are unlikely to experience out of bank flooding.

Surface water flood risk is present in low lying areas adjacent to the two watercourses, although this is unlikely to affect the development.

Based on the Level 1 SFRA, it is considered that the risk of groundwater flooding of the site is low. However, ground investigations are being undertaken to support detailed design and part of these works will be to assess groundwater levels relative to proposed development platform level.

Overland flow routes as a result of failure or blockages in the proposed drainage system are considered to head north or south to the watercourses and can be managed to ensure no impact on buildings.

SURFACE WATER DRAINAGE

The available ground investigation data indicates that the ground conditions across the site are unlikely to be suitable for discharge of surface water by means of infiltration into the ground. Further investigations will be undertaken at the detailed design (reserved Matters) stage to confirm this.

The proposed surface water drainage will reflect the existing drainage regime. It is therefore proposed that surface water flows from the development will drain to the Brightley Brook (Main River) located along the northern boundary of the Plot 3 site boundary.

Peak flows leaving the Plot 3 development will be restricted to variable greenfield run-off rates by means of a series of SUDS features. These features, which may include filter drains, attenuation basins, and geocellular storage, will be used to treat, convey and store surface water runoff from



impermeable areas for storm events up to and including a 1 in 100-year event plus 40% climate change.

The SUDS features will be privately maintained by an appointed management company.

FOUL WATER DRAINAGE

The Plot 3 development foul flows will discharge into an existing United Utilities combined sewer in Pilsworth Road via an as-yet undefined route. Options include either a direct connection to the public sewer, or an indirect connection to the adoptable foul pumping station which is to be constructed at the southern extent of the spine road serving the wider South Heywood development.

The below ground foul water drainage network within the Plot 3 site boundary will remain in private ownership and will be operated and maintained privately.

1 INTRODUCTION

1.1 APPOINTMENT AND BRIEF

- 1.1.1. WSP UK Ltd has been commissioned by Russells (Commercial) South Heywood Ltd to provide a flood risk assessment and drainage strategy for Plot 3 of the South Heywood development. This will support an outline planning application for a B8 warehouse of up to 40,000sq.m.
- 1.1.2. A site location plan is included in **Appendix A**.

1.2 PROPOSED DEVELOPMENT

- 1.2.1. External features of the South Heywood Plot 3 development are as follows:
 - A total site area of 8.8Ha
 - Overall total 40,000sq.m Gross Internal Area (GIA) of building extent.

1.3 STUDY OBJECTIVES

- 1.3.1. The objective of this study is to provide information and present proposals relating to the following:
 - An assessment of flood risk to the site, demonstrating the proposed development will be safe for its lifetime, considering the effects of climate change.
 - Flood risk mitigation measures to be included within the development proposals.
 - Proposed surface water drainage strategy, with due consideration to the drainage hierarchy and the provision of Sustainable Drainage Systems (SuDS).
 - Arrangements for the discharge of foul water from the development.

1.4 2020 HYBRID PLANNING PERMISSION

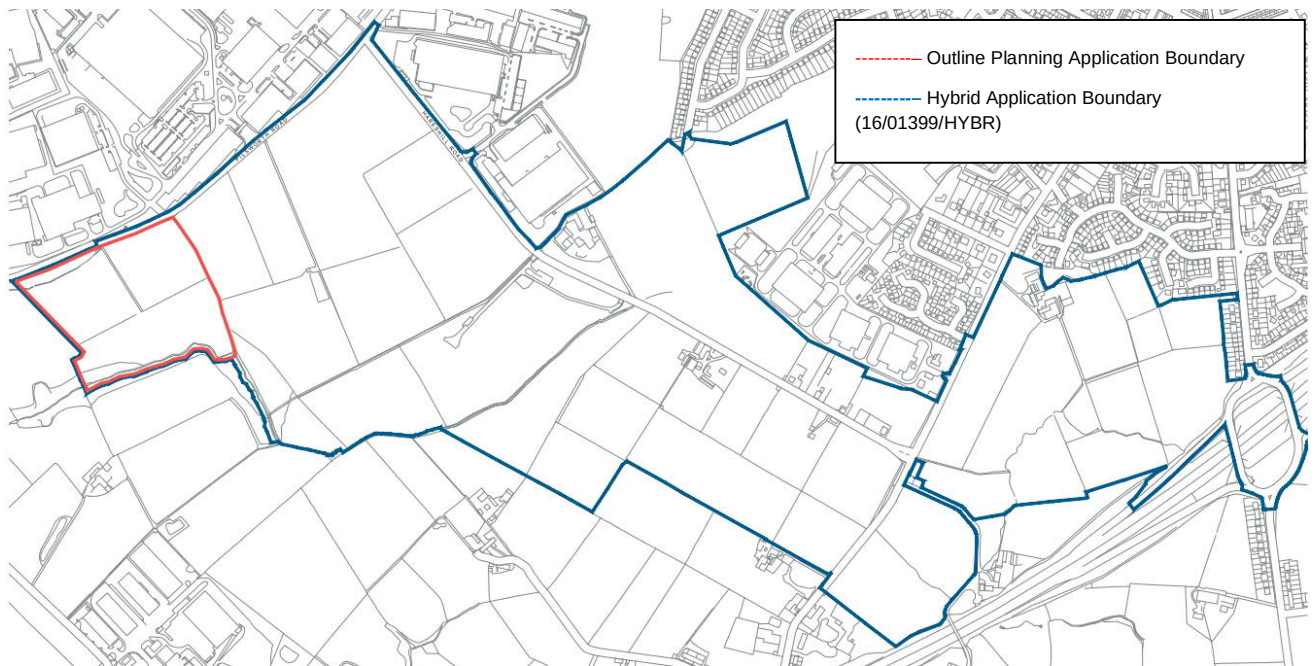
- 1.4.1. Hybrid Planning Permission (part outline, part detailed) for the wider South Heywood development was granted in March 2020 (planning ref: 16/01399/HYBR). This included the land of the current Plot 3 development. The Hybrid Planning Application was accompanied by an Environmental Statement (ES) prepared as part of an Environmental Impact Assessment (EIA). The ES included a chapter on Drainage and Flood Risk and was supported by a Flood Risk Assessment, prepared by CampbellReith in November 2016.
- 1.4.2. The current Plot 3 development was included within Area 4 in the CampbellReith FRA. Many of the studies and conclusions within the CampbellReith FRA are relevant to the Plot 3 development and extracts of the CampbellReith FRA are provided in **Appendix B** for reference.
- 1.4.3. This report draws on the findings of the CampbellReith FRA, highlighting any variation brought by the Plot 3 proposals and providing further detail where appropriate.

2 CONTEXT & SETTING

2.1 SITE LOCATION

- 2.1.1. The application site is in South Heywood, Rochdale, approximately 2km northwest of Junction 19 of the M62 motorway. The nearest postcode is OL10 2TB and the OS grid reference for the centre of the application site is 384066, 409158.
- 2.1.2. The site location and red line boundary is shown in Figure 2-1 below and included in **Appendix A**.

Figure 2-1 - Site Location



2.2 SITE DESCRIPTION

2.2.1. The table below describes the general site characteristics.

Table 2-1 – Characteristics of the Site

Characteristic	Description
Area	Overall site area within the red line 8.8Ha
Existing Use	Greenfield, currently used for agriculture
Boundaries	North: Pilsworth Road East: South Heywood Plot 1 South: Agricultural land Under Option by Applicant West: Agricultural land in 3 rd party ownership
Topography	Topographic levels across the application site are generally falling away from a high point located on the western boundary and approximately 75m to the north of the southern boundary of the site. Levels range from 117.05m AOD to 110.37m AOD.
Access	The application site is accessed via a new junction to be constructed on Pilsworth Road.

2.2.2. The application site lies within Rochdale Borough Council.

2.3 TOPOGRAPHY

2.3.1. A Topographic Survey was undertaken by Survey Ops in September 2020.

2.3.2. The survey indicates a high point on the western boundary of the Plot 3 site at 117.665m AOD. From this high point, the site falls away to the north, east and west, with the lowest point of 110.37 in the north western corner.

2.3.3. A copy of the topographical survey is included as **Appendix C**.

2.4 GEOLOGY AND HYDROGEOLOGY

2.4.1. British Geological Survey (BGS) maps describe the site as being underlain by Pennine Lower Coal Measures Formation comprising Mudstone, Siltstone and Sandstone.

2.4.2. Defra MAGIC Mapping indicates that the bedrock beneath the Plot 3 development site is designated as a Secondary A Aquifer. The application site is not located within a designated Source Protection Zone.

2.5 HYDROLOGY

2.5.1. The survey identifies the presence of an existing watercourse located within northeast boundary of the Plot 3 site that flows from east to west, adjacent to Pilsworth Road. Over a length of approximately 150m from the northeast boundary of the Plot 3 site, the watercourse is culverted and

designated as an ordinary watercourse. Downstream of this point the watercourse is designated as Main River (Brightley Brook) up to the western boundary of the Plot 3 site.

- 2.5.2. There is a watercourse that runs along the southern site boundary of the Plot 3 site that flows from east to west. The watercourse is designated as Main River and is an un-named tributary to the Brightley Brook.

2.6 SEWER INFRASTRUCTURE

- 2.6.1. United Utilities public sewer records indicate that the closest public sewers to the site are located within Pilsworth Road approximately 500m to the east of Plot 3.
- 2.6.2. A Section 104 application is currently in progress, comprising the construction of a new 300mm diameter foul sewer within Hareshill Road that discharges into the existing United Utilities manhole MH01 in Pilsworth Road.
- 2.6.3. The Section 104 application includes the provision of a 300mm diameter spur into the spine road serving the wider South Heywood development. This will serve as the preferred point of discharge for foul water arising from the Plot 3 development.
- 2.6.4. A copy of the Section 104 application general arrangement drawings is included in **Appendix D**.

3 FLOOD RISK

- 3.1.1. The potential risk of flooding to the site from all current and future sources of flooding has been assessed in accordance with the National Planning Policy Framework. A detailed assessment the flood risk and associated flood risk ratings are presented in Sections 5.2 to 5.6.
- 3.1.2. Table 3-1 below summarises the findings of the assessment. It should be noted that the designation of risk outlined in Table 3-1 is prior to the inclusion of any mitigation measures, which may subsequently act to reduce the risk.

Table 3-1 - Degree of Risk from Each Source of Flooding

Source		Risk
Fluvial		Low
Surface Water		Very Low to High
Sewer		Low
Groundwater		Low
Tidal		Not at risk
Artificial Sources	Reservoir	Not at risk
	Canal	Not at risk

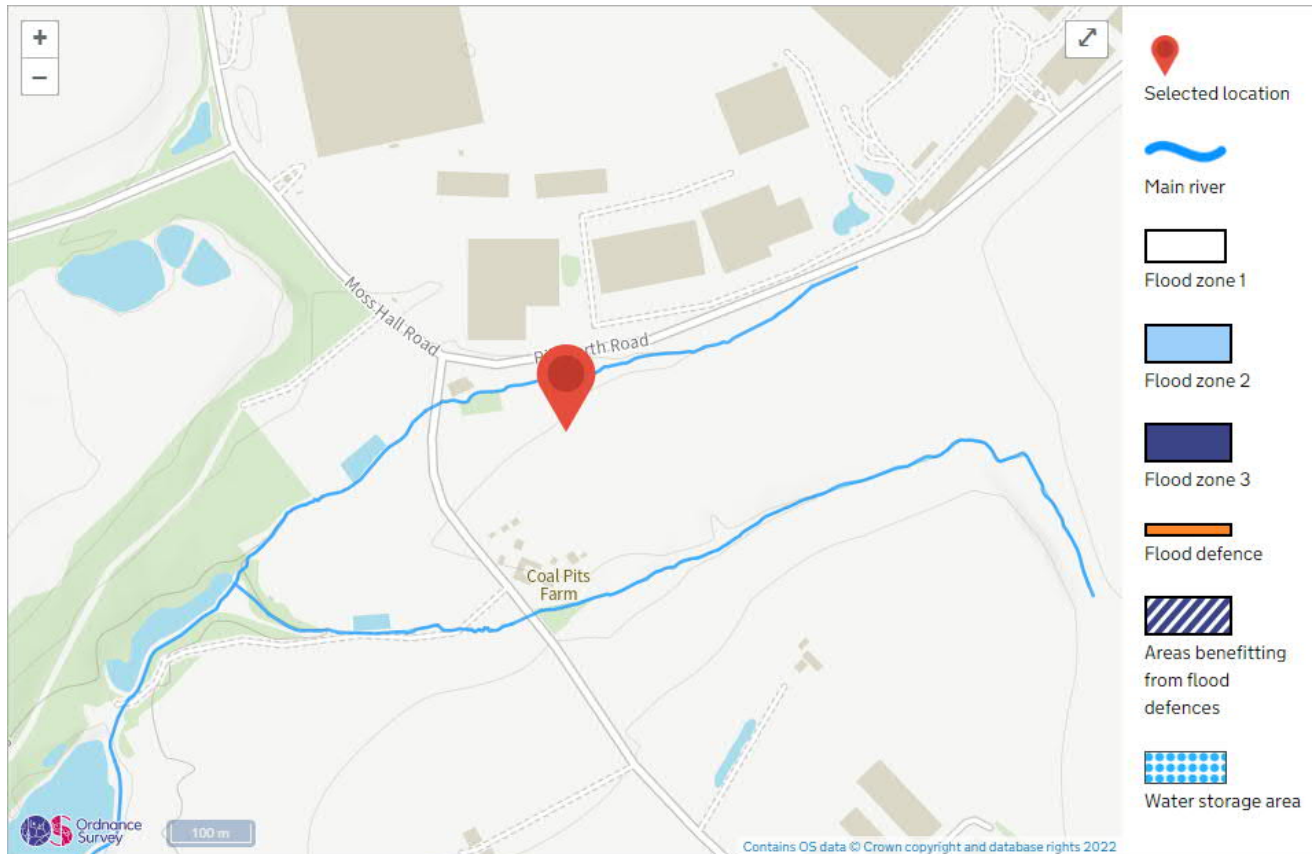
3.2 FLUVIAL FLOOD RISK

FLOOD MAPS

- 3.2.1. The National Planning Policy Framework (NPPF) categorises flood risk as follows:
- Zone 1 (low probability) – Land assessed as having less than a 1 in 1,000 annual probability of river or sea flooding (<0.1%);
 - Zone 2 (medium probability) – Land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year; and
 - Zone 3a (high probability) - Land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
 - Zone 3b The Functional Floodplain - This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map).

- 3.2.2. The EA Flood Map for Planning shows that the Plot 3 development site is located within Flood Zone 1, with less than 1 in 1,000 annual probability of flooding from the rivers of the sea (<0.1% Annual Exceedance Probability (AEP)). This classifies the area at a low risk of flooding from fluvial and tidal sources.

Figure 3-1 - Flood Map for Planning



- 3.2.3. The Flood Map for Planning indicates the two watercourses (both Brightley Brook) as described in Section 2.5.
- 3.2.4. The watercourses are not shown to have floodplains associated with them, suggesting that 1 in 1000 year flows are contained within bank. The CampbellReith FRA states the following in relation to the Brightley Brook.
- “An existing ditch runs along the northern site boundary... which flows in a southern direction, conveying overland flows from the Site to Brightley Brook which flows from the south-west corner of the Site. The existing ditch flows from the Pilsworth Road / Hareshill Road junction (to the north of the Site) to Brightley Brook in the south-west corner of the Site. Brightley Brook also appears to receive flows from a number of balancing ponds located to the north of Pilsworth Road, within the Heywood Distribution Park.”*
- 3.2.5. Based on the above, the risk to the development from fluvial flooding is considered to be low.

3.3 SURFACE WATER FLOODING

3.3.1. The EA descriptions for the High, Medium and Low risk scenarios for surface water flooding are as follows:

- **High risk** means that each year this area has a chance of flooding of greater than 3.3%.
- **Medium risk** means that each year this area has a chance of flooding of between 1% and 3.3%.
- **Low risk** means that each year this area has a chance of flooding of between 0.1% and 1%.
- **Very Low risk** means that each year this area has a chance of flooding of less than 0.1%.

3.3.2. It should be noted that flooding from surface water is difficult to predict as rainfall location and volumes are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding. The modelling used to predict this flooding is coarse and does not accurately take into consideration the public drainage network, highway drainage and other drainage features and is likely to be overestimating the predicted flood extent.

3.3.3. The Environment Agency Map of long-term flood risk from surface water (Figure 3-2 below) indicates that the risk of surface water flooding is generally very low within the site. Areas of higher surface water flooding risk (up to High) are present following the line of the two watercourses (both Brightley Brook). The areas of highest surface water flood risk are shown within the watercourse channels, as expected. There are limited areas of low to high surface water flood risk shown in low lying areas immediately adjacent to the watercourses. An isolated area of high surface water flood risk is shown within the western portion of Plot 3 and is consistent with a low spot in the topography.

Figure 3-2 - EA Surface Water Flood Map



3.4 SEWER FLOODING

- 3.4.1. There are no public sewers currently within the site area and hence sewer flooding is not anticipated to affect the site. The risk of sewer flooding is therefore considered to be low.

3.5 GROUNDWATER FLOODING

- 3.5.1. Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.
- 3.5.2. The Level 1 SFRA notes that there are relatively few reported incidents of groundwater flooding in Rochdale and furthermore that the risk posed by groundwater flooding is likely to remain remote within the region.
- 3.5.3. Based on the Level 1 SFRA, it is therefore considered that the risk of groundwater flooding of the site is low. However, ground investigations are being undertaken to support detailed design and part of these works will be to assess groundwater levels relative to proposed development platform level.

3.6 TIDAL / COASTAL FLOOD RISK

The site is remote from tidal influences and is therefore not at risk of tidal or coastal flooding.

3.7 ARTIFICIAL SOURCES FLOODING

Non-natural or artificial sources of flooding can include canals, reservoirs, lakes, etc. The potential effects of flood risk management infrastructure and other structures need to be considered.

CANAL / RIVER INTERACTION

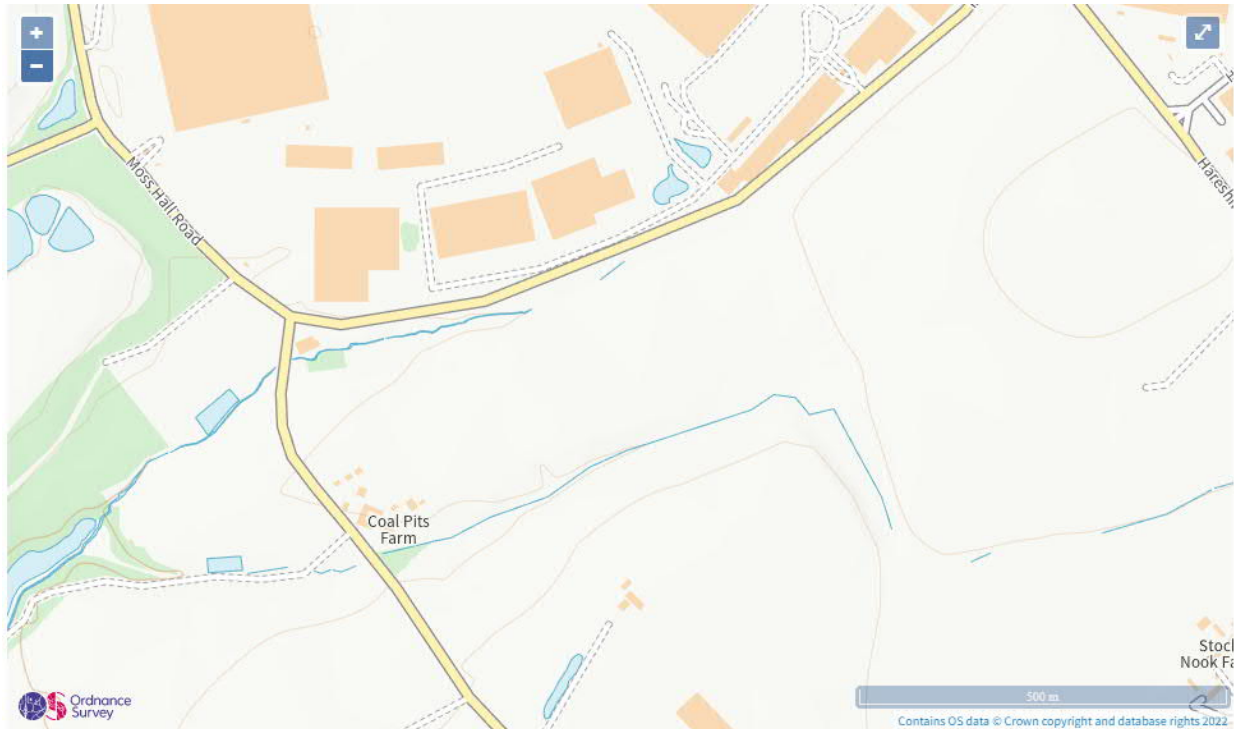
The closest canal to the site is the Rochdale Canal, located approximately 4.3km to the east.

The site is not considered to be at risk of flooding from canals.

RESERVOIRS

Figure 2-3 below shows an extract from the EA Reservoir Flood Map which indicates that the site is not within an area that could be affected by flooding from reservoirs in the event of a reservoir failure.

Figure 3-3 - EA Reservoir Flood Map Extract



3.7.1. Based on the above, it is considered that the site is not at risk of flooding from reservoir failure.

4 PLOT 3 SITE DRAINAGE STRATEGY

4.1 SURFACE WATER MANAGEMENT REQUIREMENTS

- 4.1.1. The proposed surface water infrastructure will be designed to discharge surface water from the Plot 3 development at restricted rates for the 1:1, 1:30 and 1:100 year return periods. The 1:100 year discharge rate will include an allowance of 40% for the potential effects of climate change.
- 4.1.2. The surface water drainage strategy will comply with the drainage hierarchy within the Building Regulations (H3), which states that the priority for discharging surface water runoff shall be as follows:
- Infiltration into the ground.
 - Discharge into a watercourse.
 - Discharge into a sewer.

4.2 DRAINAGE HIERARCHY

DISCHARGE BY INFILTRATION

- 4.2.1. The geotechnical investigations indicate the potential for groundwater at shallow depths beneath the Plot 3 site. The underlying geology comprises superficial deposits of Glacial Till, overlying a solid geology of Coal Measures.
- 4.2.2. The ground conditions are therefore considered unlikely to be suitable for infiltration due to the impact on groundwater and the unsuitability of the underlying media.
- 4.2.3. Further investigations will be undertaken at detailed design stage to establish whether discharge of surface water by means of infiltration into the ground is feasible. However, for the purposes of this outline planning application, it is assumed that surface water will be disposed of by other means.

DISCHARGE TO WATERCOURSE

- 4.2.4. It is proposed to discharge surface water run-off generated by the Plot 3 development to the watercourse located to the north of the site. The outfall will be made by means of a new headwall which will be located immediately to the east of the culverted public right of way in the north west corner of the plot.
- 4.2.5. It is proposed that discharge rates from the Plot 3 site will be restricted to match existing greenfield runoff rates for the 1:1, 1:30 and 1:100+cc return periods. This is in accordance with the approved Flood Risk Assessment and Surface Water Management Strategy report prepared by Campbell Reith in November 2016 to support the Hybrid Planning Application for the wider development.

DISCHARGE TO SEWER

- 4.2.6. Discharge of surface water to a sewer has not been considered for the Plot 3 development as there is scope to discharge to a watercourse which has higher priority in the drainage hierarchy.

4.3 CONTROLLED DISCHARGE RATES

- 4.3.1. The Flood Risk Assessment and Surface Water Drainage Strategy prepared by Campbell Reith covers the full extent of the South Heywood development site and was submitted as Appendix 12.1 to the Environmental Statement as part of planning application ref 16/01399/HYBR.

- 4.3.2. The proposed development site is undeveloped and is therefore classed as a greenfield site.
- 4.3.3. Drawing 12441-CRH-Z1-XX-SK-C-4009 within the Campbell Reith report identifies the development site as falling within sub-catchment 8 (parcel EP3 and EP4), which forms part of Area 4.
- 4.3.4. Runoff rates for the 1:1, 1:30 and 1:100 year event for sub-catchment 8 are defined within the Campbell Reith report based on 16.2Ha of gross development area. A copy of the Campbell Reith greenfield runoff assessment is included within **Appendix E**.
- 4.3.5. The greenfield runoff rates per hectare of development are summarised in Table 4-1 below.

Table 4-1 - Greenfield Runoff Rates (taken from Campbell Reith report)

Return Period	Greenfield Runoff Rate (l/s/Ha)
1	6.8
30	13.3
100	16.2

- 4.3.6. The post development catchment area for the Plot 3 development is 8.8Ha. Peak discharge rates for the Plot 3 development are summarised in Table 4-2 below.

Table 4-2 - Peak Discharge Rates

Return Period	Plot 3 Discharge Rate (l/s)
1	59.8
30	117.0
100	142.6

- 4.3.7. An allowance of 40% will be applied to the 1:100 year discharge rate to allow for the future effects of climate change.

4.4 PROPOSED SURFACE WATER DRAINAGE

- 4.4.1. The restricted flows from the Plot 3 will discharge by gravity to a chamber in the north west corner of the Plot 3 site as indicated on drawing SHOW-WSP-SHP3-XX-DR-D-0501, included in **Appendix F**. The final connection to the watercourse will be made via a headwall connection with appropriate measures to prevent erosion of the banks.
- 4.4.2. Filter drains will be provided at the toe of earthworks to collect runoff from the embankments. These will discharge at an unrestricted rate into the watercourse.
- 4.4.3. The total discharge rate from the Plot 3 site will not exceed the greenfield runoff rates given in Table 4-2 above.

4.5 ATTENUATION REQUIREMENTS

- 4.5.1. The SuDS appraisal method defined in the SuDS Manual C753 will be used to incorporate appropriate methods of providing a sustainable surface water attenuation and conveyance within the constraints of the Plot 3 site masterplan.
- 4.5.2. A quick storage estimate for the Plot 3 development has been undertaken using the Microdrainage Source Control software package. For an assumed impermeable area of 80% of the total site area of the Plot 3 development, a volume of attenuation of between 3283m³ and 5,148m³ is likely to be required.
- 4.5.3. A copy of the calculations is included in **Appendix G**.

4.6 MANAGEMENT OF RESIDUAL RISK

- 4.6.1. The surface water drainage system has been designed to ensure flooding does not occur:
 - On any part of the site for a 1 in 30-year rainfall event
 - During a 1 in 100+40% rainfall event in any part of a building (including a basement) or utility plant susceptible to water (e.g. electricity sub-station)
 - On neighbouring sites during a 1 in 100+40% rainfall event.

4.7 EXTREME STORM EVENT

- 4.7.1. There is a risk associated with the exceedance of the capacity of the drainage system during an extreme event in excess for which the drainage system was designed (i.e. the 1 in 100 year + climate change event).
- 4.7.2. The risk associated with extreme events can be reduced by engineering site levels to ensure flow is directed away from buildings and towards less vulnerable receptors. For example, CIRIA C635 Designing for Exceedance in Urban Drainage states that car parks and road areas should be designed to occupy lower areas of a site where water may collect, as this reduces the likelihood of water ingress into buildings. With the exception of docking bays (which will be self-containing), exceedance flows within the service yards of the Plot 3 site will be directed away from the building and towards the site perimeter.

4.8 DRAINAGE SYSTEM MAINTENANCE

- 4.8.1. There is a risk associated with blockage or operational failure of the drainage system which could cause flooding. This could include blockage of pipes, and obstruction of flow control devices and outfalls.
- 4.8.2. This risk can be reduced through ensuring that the drainage system and SuDS measures are adequately maintained to ensure the drainage system remains serviceable.
- 4.8.3. The drainage infrastructure serving the Plot 3 development will be maintained by an appointed Management Company. A detailed maintenance strategy will be prepared as part of the detailed design Reserved Matters Application.

4.9 OFF-SITE IMPACTS

- 4.9.1. Surface water runoff from the scheme has the potential to increase flood risk to other areas however, as the surface water management scheme will provide on-site storage for the 1 in 100 year plus climate change event (40%), the risk to off-site locations is considered low. The Plot 3 development will not increase the risk of flooding from fluvial sources or to the public sewer network in downstream areas.

5 FOUL WATER DRAINAGE STRATEGY

- 5.1.1. A foul water strategy has been developed for the site to establish discharge rates, points of connection to the network and to identify any significant constraints.
- 5.1.2. The foul drainage will consist of the offices for the building. In addition the foul drainage design will consider the requirements of a transport hub, gatehouse, and sprinkler pump house as applicable within the site masterplan.
- 5.1.3. As noted in Section 2.6, a new foul sewer within Hareshill Road is in the process of being approved by United Utilities as part of a Section 104 Agreement. This sewer will collect foul flows from the South Heywood development and discharges into an existing United Utilities manhole in Pilsworth Road.
- 5.1.4. The proposed point of discharge for foul water is the 300mm diameter pipe at the junction between Hareshill Road and the spine road for the wider South Heywood development.
- 5.1.5. Further investigations will be undertaken at detailed design to establish whether a direct connection to the foul sewer in Hareshill Road is achievable for the proposed Plot 3 masterplan once this has been developed.
- 5.1.6. For the purposes of this outline planning application, it has been assumed that foul water will be discharged to the proposed pumping station located at the southern extent of the spine road serving the remainder of the South Heywood development phases. The rising main from this pumping station will discharge to a new foul sewer that is currently under construction in Hareshill Road. The foul pumping station and rising main will be adopted by United Utilities under a Section 104 Agreement.
- 5.1.7. A packaged foul pumping station may be required to convey foul water arising from within the Plot 3 site to the proposed point of discharge. This will be further assessed at detailed design once a site masterplan is available. Should a packaged foul pumping station be required, this will remain in private ownership, with future maintenance responsibilities to be confirmed in due course.
- 5.1.8. An indicative layout for the foul drainage is shown on drawing SHOW-WSP-SHP3-XX-DR-D-0501, included in **Appendix F**, with further investigations to be undertaken at detailed design to establish whether a direct connection to the adoptable sewer in Hareshill Road can be achieved.

5.2 DISCHARGE RATE

- 5.2.1. The expected loadings for the Plot 3 development have been calculated using the table of loadings for foul flows in the Sewerage Sector Guidance Appendix C – Design and Construction Guidance.
- 5.2.2. Foul flows have been calculated for a developable area of 8.8Ha, at an assumed rate of 1.3l/s/ha, comprising 0.6l/s/ha domestic flow and 0.7l/s/ha for industrial flows where the proportion of wet industry is unknown. The anticipated flows are outlined in Table 5-1 below.

Table 5-1 - Expected Daily Peak Flow

Development	Developable Area (Ha)	Expected flow (daily peak) l/s
Plot 3	8.8	11.4
Total	8.8	11.4

5.3 MAINTENANCE AND ADOPTION

- 5.3.1. The foul water sewers proposed within the site boundary will be constructed in line with the Design and Construction Guidance to uphold a minimum construction standard. The new system will be maintained by a private maintenance contractor to the point of connection in the public network.

6 MITIGATION / MANAGEMENT OF FLOOD RISK

6.1 FINISHED FLOOR LEVELS & ACCESS AND EGRESS

- 6.1.1. The site is at low risk from fluvial flooding and is unlikely to experience widespread flooding requiring special consideration off safe access and egress routes.
- 6.1.2. Finished floor levels are unconstrained by flood risk matters. Design of external levels to fall away from buildings is proposed and new drainage systems will reduce the likelihood and impact of any surface water flooding.

6.2 DRAINAGE AND EXCEEDANCE FLOW ROUTES

- 6.2.1. The proposed surface water drainage system will be designed in accordance with the drainage strategy set out in section 4 of this report.
- 6.2.2. Reference should be made to the WSP Exceedance - Overland Flow Routes drawing appended to this report (**Appendix H**) and which shows the likely route of exceedance flows in the event of failure or design exceedance of the proposed drainage systems. This will be updated at detailed design once a masterplan is available and external levels have been established.
- 6.2.3. Based on existing site topography, flows are likely to head north or south towards the existing watercourses within the site extent. The design of external levels can be conducted to ensure that such flows do not impact on buildings.

6.3 FLOOD RISK POST MITIGATION

- 6.3.1. Table 6-1 below, summarises the risk of all sources of flooding post mitigation.

Table 6-1 - Degree of Risk from Each Source of Flooding Post Mitigation

Source		Risk
Fluvial		Low
Surface Water		Very Low to High
Groundwater		Low
Sewer		Low
Tidal		Not at risk
Artificial Sources	Reservoir	Not at risk
	Canal	Not at risk

This Flood Risk Assessment and Drainage Strategy has concluded that the development is appropriate and can be occupied safely subject to implementation of the flood risk mitigation being carried out.

7 CONCLUSIONS

- 7.1.1. This Drainage Strategy has been prepared to support an outline planning application for South Heywood Plot 3.
- 7.1.2. The Plot 3 development site covers an area of approximately 8.8Ha and is currently used for agriculture. The site has been classified as a greenfield site and assessed on this basis.
- 7.1.3. The Plot 3 development proposals consist of the following:
 - Overall total 40,000sq.m Class B8 building.
- 7.1.4. According to the Environment Agency's flood map for planning, the Plot 3 development is located within Flood Zone 1.

7.2 FLOOD RISK

- 7.2.1. This FRA has concluded that the site is at low risk of flooding from fluvial sources and not at risk of flooding from tidal sources.
- 7.2.2. Surface water flooding is possible close to the two watercourses that are located within the site, although this is not expected to impact on development or development users.
- 7.2.3. The Level 1 SFRA notes that there are relatively few reported incidents of groundwater flooding in Rochdale and furthermore that the risk posed by groundwater flooding is likely to remain remote within the region. It is therefore considered that the risk of groundwater flooding of the site is low. However, ground investigations are being undertaken to support detailed design and part of these works will be to assess groundwater levels relative to proposed development platform level.
- 7.2.4. Overland flow routes from drainage exceedance or failure can be managed through external levels design to ensure no impact on buildings.

7.3 SURFACE WATER DRAINAGE – PLOT 3

- 7.3.1. The available ground investigation data indicates that infiltration as a means of surface water disposal is unlikely to be viable. Further investigations will be undertaken at detailed design to confirm this.
- 7.3.2. The proposed surface water drainage will reflect the existing drainage regime. It is proposed that surface water flows from the Plot 3 development will drain to the existing watercourse located at the north west corner of the Plot 3 site.
- 7.3.3. Peak flows leaving the Plot 3 development site will be restricted to the existing greenfield run-off rate by means of a series of SuDS features. These features, which may include filter drains, attenuation basins, or other suitable treatments will be used to treat, convey and store surface water runoff from impermeable areas for storm events up to and including a 1 in 100-year event plus 40% climate change.

7.4 FOUL WATER DRAINAGE

- 7.4.1. The Plot 3 development foul flows will discharge to the United Utilities combined sewer in Pilsworth Road via a length of sewer installed within Hareshill Road as part of a previous package of enabling

works. This may be either a direct connection or via the adoptable foul pumping station located at the southern end of the spine road serving the wider development.

- 7.4.2. It is not currently known whether a packaged foul pumping station will be required to convey foul runoff to the point of discharge. If a packaged foul pumping station is required, this will remain in private ownership.
- 7.4.3. The below ground foul water drainage network within the Plot 3 site boundary will remain in private ownership and will be operated and maintained privately.

Appendix A

SITE LOCATION PLAN





REDLINE AREA 88,273sqm/ 21.812 Acres

REV	DATE	DESCRIPTION	DRAWN BY	CHECKED BY
REVISIONS				

PROJECT TITLE				
SOUTH HEYWOOD				
DRAWING TITLE				
PLOT 3 LOCATION PLAN				
RIBA STAGE		STATUS		DRAWN BY
N/A		PLANNING		DH
SHEET		SCALE	DATE	SUITABILITY
A1		1 : 1250	27/07/2022	REVISION
				P0
DRAWING NO.				
2212 - ASA - ZZ - SI - D - A - 3014 _ (S0 - P0)				

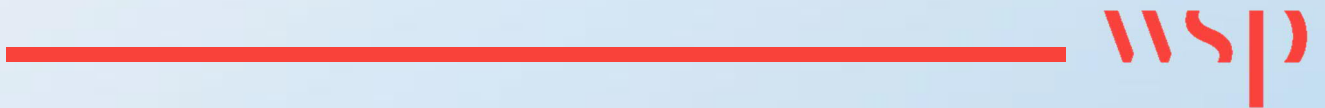
CLIENT	 AshtonSmith Beyond Design
	Ashton Smith, Belvedere House, 2 Victoria Avenue, Harringate, North Yorkshire, HG1 1EL Tel: 01423 522882 Fax: 01423 565356 www.ashtonsmith.co.uk

22112

JOB NO.

Appendix B

CAMPBELLREITH DRAINAGE STRATEGY EXTRACTS



Confidential

South Heywood Development Opportunity

FLOOD RISK ASSESSMENT & SURFACE WATER MANGEMENT STRATEGY

For

Russell Homes

Project Number:

12441

November 2016

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Contents

1.0	Introduction	4
1.1.	Background	4
1.2.	Limitations	5
2.0	Site context	6
2.1.	Site Location	6
3.0	Planning Policy	13
3.1.	National Planning Policy	13
3.2.	Local Planning Policy	16
4.0	Flood hazard.....	23
5.0	Area 1 – Collop Gate Farm & Saxon Farm.....	28
5.1.	Existing Drainage Regime	28
5.2.	Proposed Surface Water Management Strategy	34
6.0	Area 2 – South of Hareshill Road	43
6.1.	Existing Drainage Regime	43
6.2.	Proposed Surface Water Management Strategy	45
7.0	Area 3 – South of Hareshill Road	48
7.1.	Existing Drainage Regime	48
7.2.	Proposed Surface Water Management Strategy	50
8.0	Area 4 – Hareshill Road / Pilsworth Road.....	54
8.1.	Existing Drainage Regime	54
8.2.	Proposed Water Management Strategy	57

Appendices

Appendix A: Site Observation Notes & Photomontages
Appendix B: Extracts From 'Bury Rochdale And Oldham Strategic Flood Risk Assessment Volume Iii – Level 2 Sfrra'
Appendix C: United Utilities Sewer Record Information
Appendix D: SW Management Strategy For Area 1
Appendix E: SW Management Strategy For Area 2 Appendix F: SW Management Strategy For Area 3
Appendix G: SW Management Strategy For Area 4
Appendix H: Proposed Masterplans
Appendix I: Topographical Survey
Appendix J: Previous Reports

Tables

Table 1: Categories of Flood Mechanisms (From Box 2.3 CIRIA C624)	23
Table 2: Flood Hazard Identification	24
Table 3: Potential sources of Flooding	25
Table 4: Site 1 Summary of Greenfield Run-off Rates	32
Table 5: PPS 25, Annex B, Table B.2	32
Table 6: Sub-Catchments – Summary of Development Areas / Impermeable Areas	35
Table 7: Capability of Different SUDS Techniques (from Table 1.7 CIRIA C697)	37
Table 8: Qualitative Assessment of SUDS Options for Catchment 1-10 (excluding Catchment 2).....	38
Table 9: Estimated Storage Volumes for Site 1	39
Table 10: Site 2 – Summary of Greenfield Run-Off Rates	44
Table 11: Site 2 – Summary of Development Areas / Impermeable Areas	46
Table 12: Qualitative Assessment of SUDS Options for Site 2	47
Table 13: Site 3 – Summary of Greenfield Run-Off Rates	49

Table 14: Site 3 – Summary of Development Areas / Impermeable Areas	50
Table 15: Qualitative Assessment of SUDS Options for Site 3	51
Table 16: Estimated Storage Volumes for Sub-Catchments	52
Table 17: Site 4 – Summary of Greenfield Run-Off Rates	56
Table 18: Site 4 – Summary of Development Areas / Impermeable Areas	57
Table 19: Qualitative Assessment of SUDS Options for Site 4	58
Table 20: Estimated Storage Volumes for Site 4	59
Table 21: Estimated Storage Volumes for Site 4 Sub-Catchments	60

Figures

Figure 1: Site Locations (not to scale).....	7
Figure 2: Aerial Image (not to scale)	8
Figure 3: Land Use and Parameters (not to scale) See in detail in Appendix H; Masterplans.....	12
Figure 4: Susceptibility to Surface Water Flooding – Area 1 (not to scale)	19
Figure 5: Susceptibility to Surface Water Flooding – Area 1 (not to scale)	20
Figure 6: Susceptibility to Surface Water Flooding – Area 3 (not to scale)	20
Figure 7: Susceptibility to Surface Water Flooding – Area 4 (not to scale)	21
Figure 8: Outfall at Head of Whittle Brook (UU node 2110)	29
Figure 9: Minor watercourse flowing from the south-east corner of Area 1.....	29
Figure 10: Whittle Brook spilling on to Track (upstream side of Track).....	33
Figure 11: Whittle Brook 'culvert' beneath Track (downstream side of Track).....	34
Figure 12: SW outfall into ditch south of Hareshill Road & Site 2 (UU node 0102).....	43
Figure 13: SW outfall into ditch south of Hareshill Road & Area 3	48
Figure 14: SW ditch adjacent to Area 4 Northern Site Boundary & Pilsworth Road	55
Figure 15: Brightley Brook towards South-West corner of Area 4.....	55
Figure 16: Hydraulic Structure crossing Existing Ditch.....	57

1.0 INTRODUCTION

1.1. Background

1.1.1. Russell Homes (hereafter referred to as 'the Applicant') is seeking to obtain planning permission for a new link road and mixed used development on land at South Heywood, Rochdale. It is anticipated that the following uses will be sought as part of the planning application:

- New link road- between Junction 19 of the M62 and Pilsworth Road
- Employment Uses B2/B8 (split 30/70)
- Residential Uses (Use class C3);
- Local retail ancillary retail (Use Class A1, A2, A3 and A5) and primary school (Use Class D1);
- Public open space, drainage, SUDs and landscaping; and
- Associated infrastructure.

1.1.2. A hybrid planning application for the development will be submitted to Rochdale Metropolitan Borough Council (RMBC).

1.1.3. The hybrid planning application will seek detailed approval for:

- Means of Access; and
- New link road comprising:
- Construction of a 1km link road between the M62 Junction 19 and Manchester Road;
- Creation of a new signal controlled junction where the link road crosses Manchester Road;
- Construction of a new section of road located to the north of Hareshill Road which joins into the existing Hareshill Road alignment further west;
- The closure of the existing Hareshill Road to form a cul-de-sac;
- The signalisation of, and improvements to, the Hareshill Road / Pilsworth Road junction; and
- Road widening and improvements to Pilsworth Road.

1.1.4. And outline approval for:

- Up to 1,000 residential dwellings;
- 1. 458 million square foot of employment uses;
- Local retail and community uses

1.1.5. A level of evidence is required to support the Planning Application and to assess the feasibility of developing the Site and identify any potential constraints to development and how these constraints might be overcome if the Site was to be brought forward for development.

1.1.6. The majority of the proposed development Site is Greenfield and Campbell Reith Hill LLP (CampbellReith) were therefore appointed by Russell Homes to assess what impacts the

potential redevelopment of the Site may have on the local hydrology and surface water drainage regimes.

1.2. **Limitations**

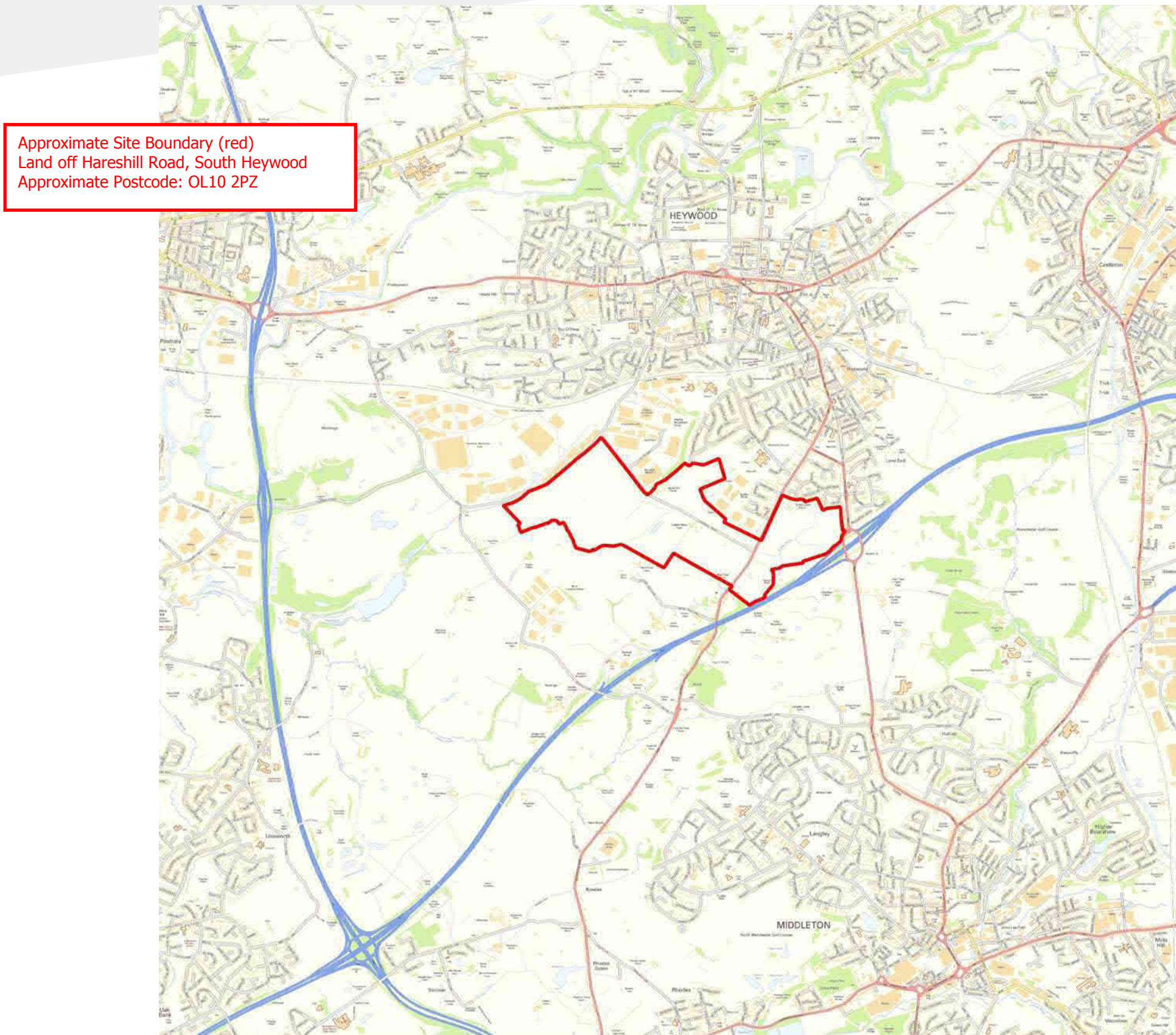
- 1.2.1. This report has been prepared for exclusive use by Russell Homes for the purpose of assisting them in evaluating the development potential of the Sites off Hareshill Road and Manchester Road in South Heywood. CampbellReith accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the Client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole.
- 1.2.2. CampbellReith has endeavoured to assess all information provided to them during the production of this report. The report summarises information from a number of external sources and CampbellReith do not therefore offer any guarantees or warranties for the completeness or accuracy of information relied upon.
- 1.2.3. A number of assumptions have been made throughout this Report which will need to be verified during later stages of design and once the exact quantum of development and development types are known. Much of this Appraisal is therefore qualitative in nature and no guarantee is given or implied as to the accuracy of the information contained herein. Further consultation with the Regulatory Authorities will be required to determine the acceptability of the proposed strategies put forward in this Report.

2.0 SITE CONTEXT

2.1. Site Location

- 2.1.1. The Site under consideration is generally located south-west of Heywood in Lancashire, along the Hareshill Road / Manchester Road corridor between J19 of the M62 and the Heywood Distribution Park, approx. 10km south-west of Rochdale and approx. 2.5km south-west of Heywood Town Centre, ref Figures 1 and 2.
- 2.1.2. The area is bounded by the M62 to the south, Middleton Road (A6046) to the east and Manchester Road (A6045) to the west. The proposed link road connects M62 Junction 19, dropping in level from the south-westerly elevation, continuing parallel to the M62 connecting the existing highway network at the Manchester Road and Hareshill Road junction. To the west of the site along Hareshill Road is the Hareshill Business Park and Heywood Distribution Park (on Pilsworth Road).
- 2.1.3. The proposed link road has been subject to preliminary design as part of the Full Detailed Planning Application. As part of the link road Application a Drainage Design, Flood Risk Assessment, Phase I Geo-Environmental Site Assessment and Site Investigation have already been carried out. Copies of these reports are included in Appendix J.

Figure 1: Site Locations (not to scale)



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Figure 2: Aerial Image (not to scale)



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- 2.1.4. The development opportunities along the Hareshill Road / Manchester Road corridor comprise 3 individual Areas. Brief details of each Area / land parcel are provided below and should be referenced to Figure 3.
- 2.1.5. The red line on Figure 3 indicates the approximate route of a proposed link road through from Pilsworth Road to Junction 19 of the M62, linking Heywood Distribution Park and the proposed development Sites with the M62 motorway. This link road is proposed as part of the overall development of the identified Site and is likely to include road improvements / widening along Hareshill Road/Pilsworth Road and the provision of a new highway from Manchester Road to J19. Surface water run-off from this new link road has been assessed as part of this Report and attenuation provided within Sub Catchment 6. This report deals primarily with the development Areas themselves.

Area 1 – Collop Gate Farm & Saxon Farm

- 2.1.6. Collop Gate Farm lies to the north of the proposed J19 Link Road and is to be re-developed. Saxon Farm lies to the south of the proposed J19 Link Road and is to remain. High quality housing is proposed in the area, with some ancillary uses which could include a small district type centre containing local shops and possible food / drink or a mini express store. The need for a landscaped buffer zone / noise mitigation between the Site and the potential J19 Link Road will also need to be considered. Both sites to be accessed via Manchester Road

Area 2 – North of Hareshill Road

- 2.1.7. This site is proposed for high quality houses.

Area 3 – South of Hareshill Road

- 2.1.8. The site is currently predominantly greenfield, with Siddal Moor Farm to the north-west of the site and New Gap Farm adjacent to the south-east boundary.
- 2.1.9. It is proposed that the area south of the J19 Link Road will become predominantly housing with a small section to be sports pitches. There is also a proposed primary school.
- 2.1.10. There is to be a 'green corridor' that follows the route of a high pressured gas main that crosses the site. This will increase the amount of landscaped area/SUDs and create a scenic pathway through the housing to break up the urbanisation of this greenfield land. Certain works will be restricted within the gas easement (6.1m either side of the gas main, measured from the centre of the gas main). The applicant maintains a close liaison with National Grid.

Area 4 – Hareshill Road / Pilsworth Road

- 2.1.11. This site has planning permission for B2 & B8 employment uses. No housing is proposed on this Site. The Site is bounded by Hareshill Road to the north, Pilsworth Road to the west and Brightley Brook to the east and south.

2.2. Existing Vegetation / Land-Use

Area 1 – Collop Gate Farm & Saxon Farm

A Site visit was undertaken on 6 July 2016. At the time of the visit, Area 1 was Greenfield, open agricultural land, comprising large areas of grassland and areas of dense vegetation, particularly adjacent to Whittle Brook – a small watercourse which runs through the Area in a

north-east to south-west direction. Towards the south of the area there are large areas of grassland and a small area of marsh land at the low point in the Area near Saxon Farm. The Area would appear to have land drainage as a silt trap manhole was found. A number of photos were taken during the Site visit which can be made available if required. A number of the photos, taken on a previous visit in June 2010, have been combined to produce panoramic photomontages of the various Areas and these are included in Appendix A along with 3 drawings showing the photo locations and other observations made during the Site visit. Drawing no. GIS001 and photomontages 1 – 7 inc. provide an overview of Area 1.

Area 2 – North of Hareshill Road

- 2.2.1. Area 2 was also Greenfield, open agricultural land, which at the time of the visit was partly being utilised for livestock grazing. Drawing no. GIS002 and photomontage 8 provide an overview of Area 2.

Area 3 – South of Hareshill Road

- 2.2.2. The areas to be developed are entirely grassland, open agricultural land on Area 3 which at the time of the visit was being utilised for livestock grazing towards the southern boundary. There are two areas of ponding which have over grown vegetation towards the south of Area 3. A pond, intended for use as a competitive fishing facility had previously been constructed towards the north-west corner of the site. Drawing no. GIS003 provides an overview of Area 3.

Area 4 – Hareshill Road / Pilsworth Road

- 2.2.3. The majority of Area 4 is greenfield, open agricultural and scrub land. Drawing no. GIS003 and photomontages 9 – 12 inc. provide an overview of Area 4.

Site Topography

Area 1 – Collop Gate Farm & Saxon Farm

- 2.2.4. A topographical survey was undertaken in June 2016 and relevant extracts attached in Appendix I.
- 2.2.5. As expected, the topography of Area 1 generally falls towards Whittle Brook, which runs through the centre of Area 1. The Area generally falls in level from north to south and there are a number of natural ridges and valleys within the Site, noted on drawing GIS001, attached in Appendix A. The Area has been sub-divided into various catchments for ease of assessment.

Area 2 – North of Hareshill Road

- 2.2.6. Area 2 varies in level from approx. 132m AOD in the north-west corner to approx. 123m AOD at the low point / natural valley indicated on drawing no. GIS002.
- 2.2.7. Area 2 generally falls from the northern boundary towards Hareshill Road.

Area 3 – South of Hareshill Road

- 2.2.8. Area 3 generally falls from the northern boundary away from Hareshill Road. It also falls into the centre of the Area towards a confluence of Whittle Brook.

Area 4 – Hareshill Road / Pilsworth Road

- 2.2.9. Area 4 has a ridge towards the centre of the Area and falls either way from the northern boundary towards Pilsworth Road, which has a confluence of Brightley Brook adjacent on one side and Brightley Brook towards the east & south.

Legend:

- Application boundary**
- Employment zone (see class 2/3/4/5/6/7/8/9/10/11/12/13/14/15/16/17/18/19/20/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000/1001/1002/1003/1004/1005/1006/1007/1008/1009/1010/1011**

3.0 PLANNING POLICY

3.1. National Planning Policy

- 3.1.1. The National Planning Policy Framework (NPPF)¹ and its associated Planning Practice Guidance (PPG)² were introduced in March 2012 and set out the Government's national policies on land-use Planning in England and how land-use Planning should be applied in relation to flood risk. The NPPF clearly identify flood risk as a specific material consideration in the Planning Process and in the allocation and release of sites for development or re- development.
- 3.1.2. The Framework seeks to strengthen the co-ordination between land-use planning and development planning and the operational delivery of flood and coastal defence strategy. Through the Framework Local Planning Authorities will continue to use their existing powers to guide, regulate and control development in relation to flooding and flood risk. The NPPF places a presumption in favour of sustainable development whilst meeting the challenge of climate change, flooding and coastal change. In accordance with Tables 1, 2, and 3 of the Planning Practice Guidance, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk through application of the Sequential Test.
- 3.1.3. The NPPF and Planning Practice Guidance revoke the previous Planning guidance document, PPS 25 'Development and Flood Risk', although the technical criteria for Flood Risk Assessments remained largely unchanged. The Practice Guidance sets out the vulnerability classification of development in relation to flooding and encourages development to be located in areas of lower flood risk where possible.
- 3.1.4. The Practice Guidance also states that sources of flooding, other than fluvial flooding, should be considered, including Groundwater, sewers, reservoirs etc. and reinforces the importance of ensuring that new development does not result in an increased flood risk either to the site itself or to the wider catchment.
- 3.1.5. Tables D.1, D.2, D.3, B.1, and B.2 from PPS 25, covering flood zone definition, flood risk vulnerability, and climate change have been directly reproduced in the NPPF, and the Environment Agency's 'Standing Advice' still applies.
- 3.1.6. Local Plans will continue to be supported by Strategic Flood Risk Assessments (SFRA) and should follow a sequential approach in the allocation of development sites. The Exception Test, when applicable, no longer includes a requirement for development to be located on previously developed, brownfield land, and now contains only two objectives relating to sustainability and the safety of a development and its users [para. 102 NPPF].
- 3.1.7. In addition, the Flood and Water Management Act (2010)³ Schedule 3, Paragraph 7 requires developments 'with drainage implications' to have a drainage system which has been approved by an approving body – a SuDS Approving Body (SAB) – and designed in accordance with the new National SuDS Standards, prior to construction.

¹ National Planning Policy Framework, DCLG, March 2012

² <http://planningguidance.planningportal.gov.uk>

³ <http://www.defra.gov.uk/Flood> and Water Management Act 2010 received Royal Assent 8 April 2010

- 3.1.8. The intention is that where Planning Permission is required, SAB approval of any drainage system must also be obtained, either by applying separately to the SAB or by combining the SAB application with the application for Planning Permission. The SAB is to be appointed by the Secretary of State, although presently there is no secondary legislation to support the Act and facilitate formation of the SAB's.
- 3.1.9. The National SuDS Standards went out for consultation some time ago and received considerable comment. Because of this, along with various other factors, DEFRA has advised that the implementation of the SUDS Approval Body has been put back indefinitely⁴.
- 3.1.10. However, on 18 Dec 2014 the Department for Communities and Local Government (DCLG) issued a written statement (HCWS161)⁵ confirming that:

"As part of the Government's continuing commitment to protect people and property from flood risk, the DCLG and the Department for Environment, Food and Rural Affairs (DEFRA) recently consulted on a proposal to make better use of the planning system to secure sustainable drainage systems. Today we are publishing our response to the consultation explaining how we will be strengthening existing planning policy. This will make clear that the Government's expectation is that sustainable drainage systems will be provided in new developments wherever this is appropriate. To this effect, we expect local planning policies and decisions on planning applications relating to major development - developments of 10 dwellings or more; or equivalent non- residential or mixed development (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010) - to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.

Under these arrangements, in considering planning applications, local planning authorities should consult the relevant lead local flood authority on the management of surface water; satisfy themselves that the proposed minimum standards of operation are appropriate and ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The sustainable drainage system should be designed to ensure that the maintenance and operation requirements are economically proportionate.

To protect the public whilst avoiding excessive burdens on business, this policy will apply to all developments of 10 homes or more and to major commercial development. The Government will keep this under review, and consider the need to make adjustments where necessary. The current requirement in national policy that all new developments in areas at risk of flooding should give priority to the use of sustainable drainage systems will continue to apply. These changes will take effect from 6 April 2015. For avoidance of doubt this statement should be read in conjunction with the policies in the National Planning Policy Framework.

This statement should be taken into account in the preparation of local and neighbourhood plans, and may be a material consideration in planning decisions."

- 3.1.11. Therefore, all Planning Applications for 'major development' (development carried out on a site having an area of 1 hectare or more) submitted after 6 April 2015 will need to consider the use

⁴ http://www.sustainabledrainagecentre.co.uk/suds-approval-body-sab_c1299.aspx

⁵ <http://planningguidance.planningportal.gov.uk/>

of Sustainable Drainage Systems. An Application will need to provide an assessment of which types of SuDS are considered appropriate for use on the proposed development site or conversely, provide evidence / justification to demonstrate that their use is not appropriate. The use of SuDS within major development is now a material Planning consideration.

- 3.1.12. The use of SuDS has been considered in formulating an overall Surface Water Drainage Strategy for the Site, outlined in Table 7 of this Report.

National Planning Policy

Flood Zone 1 is defined in the NPPF as "Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%). The NPPF states that "A site-specific flood risk assessment is required for proposals of 1hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding"

- 3.1.13. The National Planning Policy Framework (NPPF) considers 'water-compatible' development to be appropriate in all Flood Zones. ⁶National Planning Policy Framework, DCLG, 2012 – Para 103. Environment Agency Guidance / Standing Advice Paragraph 032 of the Planning Practice Guidance 'Flood Risk and Coastal Change' document⁷ notes that "To assist the developer, the local planning authority should set out and agree the scope of the flood risk assessment, using the Environment Agency Standing Advice on flood risk". Flood risk is an issue that needs to be considered at the early stages of planning a new development (whether a home extension or something bigger, or even a change of use). The Local Planning Authority will make a decision on whether a development is suitable and the Environment Agency helps in this process by providing advice, either on a case by case basis, or for lower risk developments, via a series of standard comments known as 'Standing Advice'. The EA provide 'Standing Advice'⁸ as a tool to help Local Planning Authorities establish the level of environmental risk associated with Planning Applications and to deal with low risk Applications without the need to consult the EA directly. Proposed developments that are classed as high risk by the Standing Advice will continue to be dealt with by the EA but on a case-by-case basis.
- 3.1.14. The NPPF requires that the EA's Standing Advice must be observed if the proposed development falls into one of the following categories:

"a minor extension (household extensions or non-domestic extensions less than 250 square metres) in Flood zone 2 or 3; 'more vulnerable' development and up to 1 hectare (ha) in flood zone 2 (except for landfill or waste facility sites, caravan or camping sites); · 'less vulnerable' development and up to 1ha in flood zone 2 (except for agriculture and forestry, waste treatment, and water and sewage treatment); · 'water compatible' development and up to 1ha in flood zone 2; This includes developments involving a change of use into one of these vulnerable categories or into the water compatible category." Development categories are defined in Table 2 [para. 068] in the Planning Practice Guidance 'Flood Risk and Coastal

⁶ National Planning Policy Framework, DCLG, 2012 – Para 2013

⁷ <http://planningguidance.planning.gov.uk/blog/guidance/flood-risk-and-costal-change/>

⁸ <https://www.gov.uk/flood-risk-assessment-standing-advice>

Change' document⁹. Water-based development of the type proposed on the Site is classified as 'Water Compatible development'."

The Site extends to approximately 130 hectares and thus exceeds the Standing Advice threshold. The EA have advised that EA Standing Advice does not therefore apply. The EA and the Lead Local Flood Authority (LLFA) – Rochdale Borough Council have both been consulted for guidance informing the scope of this Flood Risk Assessment.

Building Regulations 2000 – Part H Drainage and Waste Disposal

3.1.15. Approved document H of The Building Regulations 2000 'Drainage and Waste Disposal'¹⁰ establishes a hierarchy of options for the disposal of surface water run-off:

- "Surface water drainage should discharge to a soakaway or other infiltration system where practicable"; or where this is not possible:
- "Discharge to a watercourse may require a consent from the Environment Agency who may limit the rate of discharge"; or where this is not possible:
- "Where other forms of outlet are not practicable, discharge should be made to a sewer".

3.1.16. Approved document H of The Building Regulations 2000 therefore indicates that natural infiltration systems should be used in preference over discharges to sewers.

3.2. Local Planning Policy

Rochdale Core Strategy

3.2.1. The Core Strategy is a key document in the Local Plan, which provides the strategic planning framework for the Borough's future development needs up to 2028. A range of policies sets out how these needs can be met while at the same time achieving social and environmental objectives.

3.2.2. The Core Strategy policies replace a large number of Unitary Development Plan (UDP) policies, against which current planning applications are determined.

3.2.3. The Rochdale Core Strategy contains 1 Policies relevant to surface water run-off and flooding – Policy G8 'Managing Water Resources & Flood Risk'.

3.2.4. Policy G8 'Managing Water Resources & Flood Risk' states "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.

⁹ <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/flood-zone-and-flood-risk-tables/table-2-flood-risk-vulnerability-classification/>

¹⁰ Approved document H of the Building Regulations 2000 'Drainage and Waste Disposal', published by ODPM, 2002

- 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.

Strategic Flood Risk Assessment (SFRA)

- 3.2.5. Local Planning Authorities are required to produce Local Development Frameworks, which are a portfolio of Local Development Documents that collectively deliver the spatial planning strategy for the Authority area. The LDD's undergo a Sustainability Appraisal which assists Planning Authorities in ensuring their policies fulfill the principles of sustainability. Strategic Flood Risk Assessments are one of the documents to be used as the evidence base for planning decisions and are a component of the Sustainability Appraisal process. Therefore, SFRA's should be used in the review or production of LDD's.
- 3.2.6. To assist Local Planning Authorities in their strategic land-use planning, SFRA's should present sufficient information to enable Local Authorities to apply the Sequential Test to their proposed development sites: "Decision-makers should use the SFRA to inform their knowledge of flooding, refine the information on the Flood Map and determine the variations in flood risk from all sources of flooding across and from their area. These should form the basis for preparing appropriate policies for flood risk management for these areas."¹¹
- 3.2.7. The 'Bury Rochdale and Oldham Strategic Flood Risk Assessment Volume III – Level 2 SFRA' was published in November 2009 and covers the member areas of Bury, Rochdale and Oldham (BRO) and the Beal catchment within Oldham and their individual key urban areas; Ramsbottom, Bury, Radcliffe, Littleborough, Rochdale and Shaw. The SFRA is available on the

¹¹ PPS 25, para E5

Rochdale Council website¹², although the detailed maps can only be purchased. A copy of the SFRA was purchased and reviewed as part of this Appraisal.

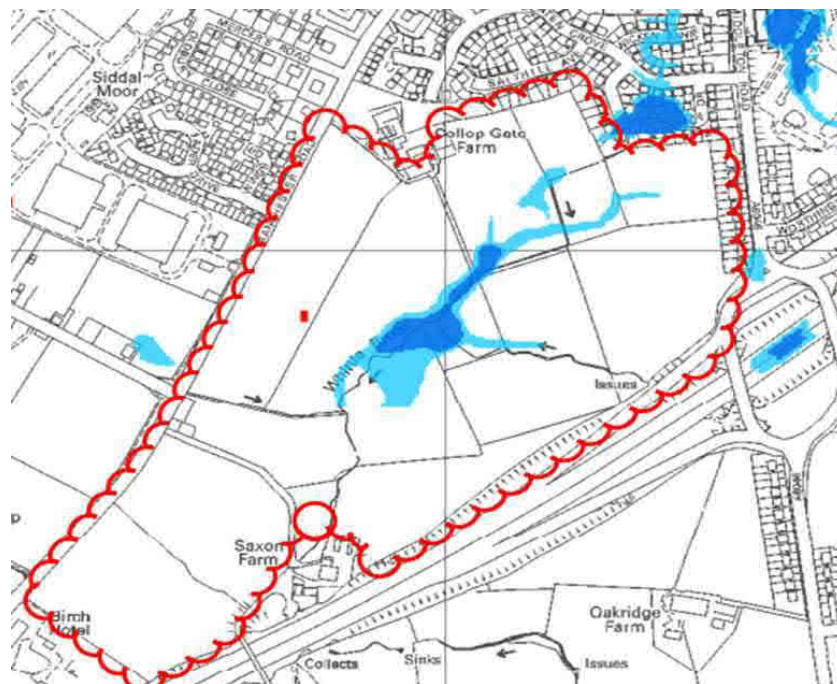
- 3.2.8. The SFRA notes that "In addition to Main River flooding, local surface water runoff from surrounding rural/greenfield and urban areas can become trapped behind defences, pooling in low lying areas, or as a result of pumping station failure can produce additional sources of flooding. The BRO Level 1 SFRA identified a number of Critical Drainage Areas (CDA's) in Bury, Rochdale and Oldham including; Littleborough, Heywood, Ramsbottom, Radcliffe, Derker and Sholver" [Section 1.3].
- 3.2.9. Littleborough, Heywood, Ramsbottom, Radcliffe, Sholver and Derker were put forward as CDA's for more detailed analysis as part of the Level 2 SFRA, including detailed surface water modelling to further define the risk of surface water flooding. The SFRA concluded that "There is also a significant risk of surface water flooding in Heywood and Radcliffe. In both cases there are known capacity problems in the sewer network, which may cause sewers to surcharge more frequently and increase the incidence of surface water and sewer flooding.
- The disused Manchester, Bury and Bolton Canal in Radcliffe acts as a conduit for surface water flows and helps to reduce flood risk as it conveys surface water away from more built up areas. In Heywood surface water flooding is associated with the valley of the Millers Brook and Pilsworth Road. The analysis shows that surface water flood risk will increase significantly in the future in Littleborough, Heywood, Ramsbottom and Radcliffe." [Section 5.2].
- 3.2.10. The SFRA includes recommendations for surface water management in each of the Critical Drainage Areas [Table 5-1]. For Heywood, the SFRA recommends that "A SWMP should be undertaken that will look in detail at drainage assets and local flood risk and assess feasible options for reducing risk. This may include a drainage strategy for the collection of development Areas to identify areas suitable for SUDS and where surface water flow paths could be opened up in new development."
- 3.2.11. The SFRA includes Map 1.2 (attached in Appendix B) which identifies those areas susceptible to surface water flooding and the degree of susceptibility. The map indicates areas within all of the potential development Areas which are susceptible to surface water flooding:

¹² http://www.rochdale.gov.uk/enviroment_and_planning/planning/local_development_framework/main_ldf_policy_documents/ldf_-_evidence_base.aspx

Area 1 - Collop Gate Farm & Saxon Farm:

- Area of 'low susceptibility' (light blue) generally along the alignment of Whittle Brook;
- Area of 'medium susceptibility' (dark blue) around the confluence of Whittle Brook and the minor watercourse flowing from the south-east;

Figure 4: Susceptibility to Surface Water Flooding – Area 1 (not to scale)



Extract from Map 1.2 (Heywood): Bury
Rochdale Oldham Vol. III, Level 2 SFRA

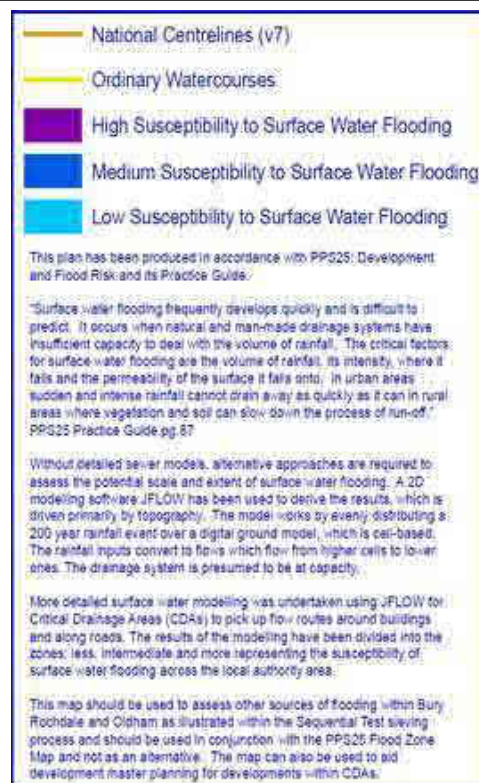
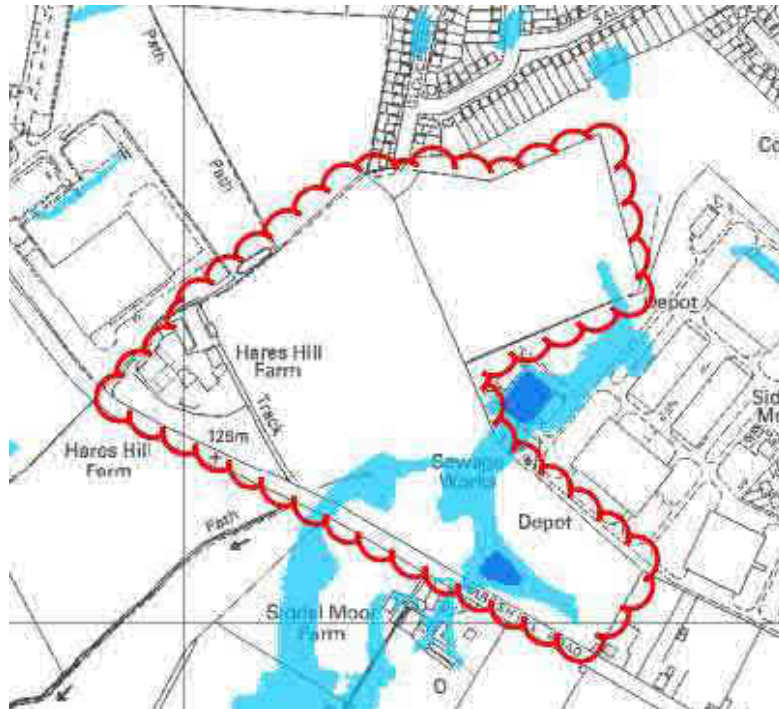


Figure 5: Susceptibility to Surface Water Flooding – Area 1 (not to scale)

Area 2 – South of Hareshill Road:

- Area of 'low susceptibility' (light blue) generally along the alignment of Whittle Brook;
- Area of 'medium susceptibility' towards the south east of the Area;

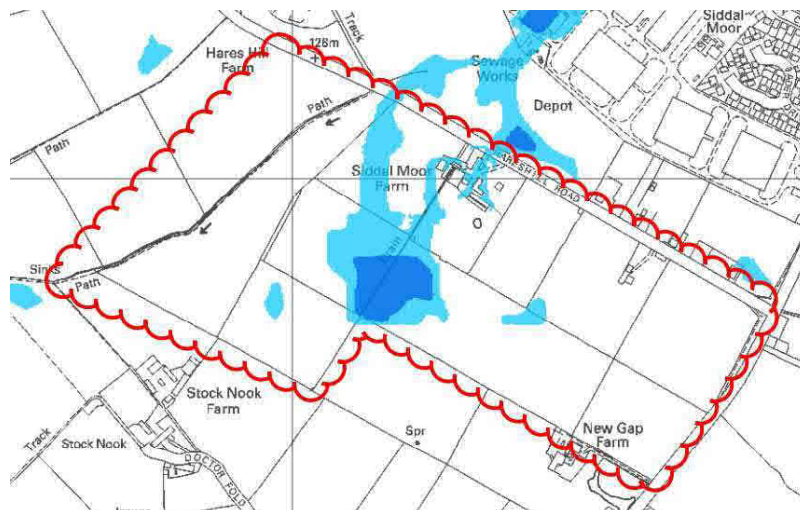
Figure 5: Susceptibility to Surface Water – Area 2 (not to scale)



Area 3 – South of Hareshill Road:

- Area of 'low susceptibility' (light blue) generally along the alignment of Whittle Brook;
- Area of 'medium susceptibility' (dark blue) as Whittle Brook enters culvert;

Figure 6: Susceptibility to Surface Water Flooding – Area 3 (not to scale)



Area 4 – Hareshill Road / Pilsworth Road:

- Area of 'low susceptibility' and 'medium susceptibility' generally along Pilsworth Road, immediately north west of the Area;
- Area of 'low susceptibility' and 'medium susceptibility' along Brightley Brook, towards the south western boundary of the Area; Figure 6: Susceptibility to Surface Water Flooding – Area 4 (not to scale)

3.2.12. The SFRA therefore concludes that there are a number of key surface water flow paths that have been identified which could pose a risk to properties within the Heywood area. Developing sites in a piecemeal manner without a wider and strategic approach to development in these areas would be likely to affect flow paths, alter the pattern of flooding and make flooding worse for some of the existing communities. An integrated and engineered solution for the whole Site would be most sustainable and would help to deliver reductions in flood risk to both new and current developments.

DEFRA Guidance

- BDcb12441-161116-FRASW MAN Strategy ReportD4.doc

- 'Flood Risk Assessment Guidance for New Development' – DEFRA / EA, October 2005;
- 'Preliminary Rainfall Run-off Management for New Developments' – DEFRA / EA, June 2007;
- 'Surface Water Management Plan Technical Guidance' – DEFRA, March 2010;

CIRIA Guidance

- 3.3.2. The Construction Industry Research and Information Association (CIRIA) publication 'C624 Development and Flood Risk – Guidance for the Construction Industry', 2004 also contains useful information relating to the management of surface water run-off.

4.0 FLOOD HAZARD

4.1. Potential Flood Hazards

- 4.1.1. Prior to undertaking an FRA, the different types of flooding mechanisms which may affect the Site need to be identified and then assessed to determine whether the development Site is located within an area which is at risk of flooding from one or more of the applicable mechanisms. CIRIA Report C624 describes the various flood mechanisms:

Category	Flood Mechanism
Fluvial Flooding	Exceedence of the flow capacity of the channel of a river, stream or other natural watercourse, typically associated with heavy rainfall events. Excess water spills onto the flood plain
Coastal & Tidal Flooding	High tides, storm surges and wave action, often in combination
Estuarial flooding and watercourses affected by tidelocking	Often involving high tidal levels and high fluvial flows in combination
Groundwater Flooding	Raised groundwater levels, typically following prolonged rain (may be slow to recede). High groundwater levels may result in increased overland flow flooding
Flooding from overland flow	Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water.
Flooding from artificial drainage systems	Blockage or overloading of pipes, sewers, canals, and drainage channels or failure of pumping systems. Typically following heavy rain or as a result of high water levels in a receiving watercourse
Flooding from infrastructure failure	Structural, hydraulic or geotechnical failure of infrastructure that retains, transmits or controls the flow of water

Table 1: Categories of Flood Mechanisms (From Box 2.3 CIRIA C624)

- 4.1.2. CIRIA Report C624, Table 1, lists a number of key factors that should be considered during a Level 1 FRA. This table can be used to summarise the findings of a Level 1 FRA study and to identify those flood hazards which may be applicable to the Site in question.
- 4.1.3. Those boxes shaded grey indicate those sources of flooding which are unlikely to be identified for each question. If sufficient information is not available to identify the specific source of flooding, then all possible sources should be ticked. If a tick is placed below any flood hazard then a Level 2 FRA will be required to assess flood risk issues relating to that hazard in more detail. Table 2 below identifies the flood hazards applicable to the Site:

Question	Fluvial	Sea	Estuaries	Groundwater	Overland flow	Artificial drainage systems	Infrastructure failure
Is the development site next to the sea or any watercourse shown on Ordnance Survey maps?	✓	x	x				
Is the development site, or part of the development site, identified as being at risk of flooding within available documentation?	x	x	x	x	x	x	x
If a strategic flood risk assessment is available, is the development site, or part of the development site, identified as being at risk of flooding?	x	x	x	x	x	x	x
If a flood zone map is available, is the development site, or part of the development site, within a High Risk zone?	x	x	x				
If a flood zone map is available, is the development site, or part of the development site, within a Low to Medium Risk zone?	x	x	x				
If a flood zone map is not available, is the development site, or part of the development site, situated on alluvium based on consideration of geological maps of the area?	x	x	x				
If there is an existing property on, or next to the site at the same level, is the property within a flood warning area?	x	x	x	x			
Are the LPA / FDA aware of any existing, historical or potential flooding problems that may affect the site?	x	x	x	x	x	x	x
Do the physical characteristics of the site suggest that it may be prone to flooding?	x	x	x	x	x	x	x
If a flood zone map is not available, is the development site, or part of the development site below 10m AOD AND does the FDA consider the development to be at risk of tidal flooding?		x	x				
Is the development located within a natural or artificial hollow, or at the base of a valley or at the bottom of a hill slope?				x	x		
Does examination of historical maps indicate any likelihood of flood risk at the site?	x	x	x	x	x		
Do the names of surrounding roads, areas or houses suggest the possibility of seasonal or historical flooding?	x	x	x	x	x		
Is the site likely to involve excavation / construction below existing ground levels (excluding foundations)?				x			
Is the land use upslope of the site such that the generation of overland flow may be encouraged, and can water from this area flow onto the site?					✓		
Are there any artificial drainage systems on or next to the site, at the same level, or upslope of, the site?						✓	x
Is the development site protected by an existing flood defence?	x	x	x			x	x
Is the development site protected by a flood control structure (e.g. flap valve, sluice gate, tidal barrier etc?)	x	x	x			x	x
Is the development site located upstream of a culvert which may be prone to blockage?	x		x	x	x	x	x
Are water levels in a watercourse located in or next to a development site controlled by a pumping station?	x	x	x	x	x	x	x
Is the development site next to or downstream / down slope of a canal?						x	x
Is the development site downstream / down slope of a reservoir or other significant water body?						x	x
FURTHER COMMENT ON FLOOD RISK WITHIN THIS FRA?	✓	x	x	x	✓	✓	x

Table 2: Flood Hazard Identification

4.2. Summary of Site Specific Assessments

- 4.2.1. Based on the CIRIA Report C624, Table 1 assessment, 3 potential flood mechanisms are considered to apply to the Site:

Flood Hazard	Flood Mechanism
Fluvial Flooding	Brightley Brook and Whittle Brook are located on the Site. Discounted on the basis of Flood Zone Classification -The EA Flood Maps show the Site to be in Flood Zone 1 with less than 0.1% probability of flooding from a water course. Fluvial Flood risk is therefore considered to be low.
Coastal and Tidal flooding	Discounted on the basis of Site location – not in close proximity to any coast or tidal feature.
Estuarial flooding and watercourses affected by tidelocking	Discounted on the basis of Site location – not in close proximity to any estuary.
Groundwater Flooding	Discounted on the basis of Site location. – The SFRA indicates that the Site is not in an area at risk of flooding.
Flooding from Overland Flow	In times of heavy rainfall, the Site is likely to become heavily saturated allowing little or no rainfall to be absorbed, resulting in a substantial proportion of the rainfall contributing towards the overland flow.
Flooding from Artificial Drainage systems	Potential for overflow from combined sewer system into Whittle Brook
Flooding from Infrastructure Failure	Discounted on the basis of Site Location – not in close proximity to any infrastructure feature.

Table 3: Potential sources of Flooding

4.3. Flooding from Overland Flow

- 4.3.1. CIRIA Report C624 defines '*Flooding from Overland Flow*' as flooding caused by "*Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water.*"
- 4.3.2. Rain falling on the Site will contribute towards the Greenfield run-off and will generate overland flows which will either be absorbed by the underlying ground or flow downhill over the surface and towards Whittle Brook and the minor watercourse. In times of heavy rainfall, the Site is likely to become heavily saturated allowing little or no rainfall to be absorbed, resulting in a substantial proportion of the rainfall contributing towards the overland flow.
- 4.3.3. SW flooding as indicated on the SFRA Map 1.2 (attached in Appendix B) is unlikely to reoccur following redevelopment of the Site as the overland flows which previously contributed towards the flooding, would now be managed through the redevelopment of the Site and collected in the piped drainage systems installed within the Site. All of these flows would then be discharged to the detention basin.

- 4.3.4. The residual risk of flooding from Overland Flow is therefore considered to be negligible.

4.4. **Flooding from Artificial Drainage**

- 4.4.1. Artificial drainage systems designed to manage runoff can pose a flood risk if the system is overwhelmed.
- 4.4.2. There is a combined sewer overflow system (CSO) that flows into Whittle Brook (on site). However Whittle Brook will be unaffected following development as flows within the Site will be restricted to Greenfield runoff rates.
- 4.4.3. The FW on Site will also be dealt with separately within the Site using a combination of gravity and pump systems. Therefore, the foul water flows generated on Site will not be exacerbating any pressures on the existing CSO.
- 4.4.4. A predevelopment enquiry is currently awaiting a response from United Utilities.
- 4.4.5. The residual risk of flooding from Artificial Drainage is therefore considered to be low.

4.5. **New Link Road Flood Risk Assessment Conclusions**

- 4.5.1 Relevant extracts from the report are listed below in italics. A full copy of the report is in Appendix J.
- 4.5.2 *"A review of the EA Flood Risk Maps for Planning show that the site lies within Flood Zone 1, in an area with a low probability of flooding from rivers or the sea. The proposed M62 J19 Link Road is classed as 'Essential Infrastructure' under NPPF, as such the development is appropriate for this site. Flooding from Main Rivers does not pose a significant risk to the proposed M62 J19 Link Road.*
- 4.5.3 *The EA Risk of Flooding from Surface Water map identifies the majority of the proposed M62 J19 Link Road as being at 'very low' risk of surface water flooding. Isolated areas exist within the development site where a greater risk of surface water flooding has been identified, predominantly situated along Pilsworth Road, Manchester Road or associated with land drainage features and Ordinary Watercourses (such as Whittle Brook, Brightley Brook and associated tributaries).*
- 4.5.4 *One isolated area identified as high risk of surface water flooding lies at the mid- point of the proposed red line boundary immediately to the north of Hareshill Road, with a predicted flooding depth of between 300-900mm. As such the proposed M62 J19 Link Road is identified as being susceptible to surface water flooding in isolated areas. The overall flood risk from surface water runoff from land is assessed as being very low.*
- 4.5.5 *The proposed M62 J19 Link Road will result in an increase in the impermeable area compared to the existing site and in turn will lead to an increase in the surface water runoff from the site post-development. Section 6.2 outlines the mitigation measures to be incorporated into the design of the proposed M62 J19 Link Road in order to mitigate against possible surface water flooding on the road or elsewhere in the future. This includes the use of SuDS features, which can also provide water quality improvements and environmental enhancements. Please refer to the Drainage Strategy document produced to sit alongside this FRA for details of the proposed drainage design for this development.*

- 4.5.6 *There are a number of surface water sewers running along the existing road network within the red line boundary. Historical evidence of sewer flooding and capacity issues exists in the Heywood area, including some reported incidents on Pilsworth Road. However, the flood risk to the site from surface water sewers is assessed as being low due to the distance between historical sites of surface water sewer flooding and the site itself. It is recommended that further consultations are undertaken with United Utilities (UU) and RBC (the LLFA) as the SWMP highlighted the future work to be carried out as part of the AMP6 period (2015 – 2020) in terms of improving the sewer infrastructure in the Heywood area.*
- 4.5.7 *The proposed M62 J19 Link Road is in an area designated as a both a 'Secondary (undifferentiated) Aquifer' and a 'Secondary A Aquifer' according to superficial deposits and bedrock, respectively. Consequently parts of the site are either within (or adjacent to) a number of the EA's Minor Aquifer High Groundwater Vulnerability Zones. The published material reviewed for this study did not reveal any historical groundwater flooding issues in the vicinity of the site, and as such it is considered that groundwater does not pose a significant flood risk to the proposed M62 J19 Link Road.*
- 4.5.8 *The development site is not located within an area at risk from reservoir flooding. The nearest maximum extent of reservoir flooding to the site lies over 1km away. As such the site is assessed as being at low risk of flooding from reservoirs. The nearest navigable watercourse is the Rochdale Canal, which also lies some distance away from the site (approximately 1.8km). As such it is considered that given the distance between the site and the Rochdale Canal, along with the absence of supporting evidence of historical canal flooding in the area, the risk of flooding from the Rochdale Canal is low. There are no other artificial flood risk sources in the proposed M62 J19 Link Road location".*

8.0 AREA 4 – HARESHILL ROAD / PILSWORTH ROAD

8.1. Existing Drainage Regime

- 8.1.1. Plans showing the locations of the existing Foul Water (FW), Surface Water (SW) and Combined sewers in the area have been obtained from United Utilities (UU) and are attached in Appendix C for information.
- 8.1.2. The Area south-east of Pilsworth Road is greenfield and extends to approx. 38.96 ha (96.3 acres) in area. The UU sewer record plans do not show any Adopted sewers in the immediate vicinity of the Area. There is pumping station to the south-west of the site which could be utilised dependant on capacity.
- 8.1.3. Area 4 broadly comprises 4 sub-catchments, with the area bounded by Hareshill Rd to the north, with Pilsworth Road & Brightley Brook on either side. All catchments fall from the centre of the northern boundary of the site outwards in either direction towards the ditch next to Pilsworth Road to the north-west and Brightley Brook to the south-east. Drawing GIS004 attached in Appendix A shows the approximate locations of the natural valleys and ridges observed during the Site visit and the positions where the various photomontages were taken (ref. Appendix A).
- 8.1.4. An existing ditch runs along the northern site boundary, ref. Figures 14 and 15, which flows in a southern direction, conveying overland flows from the Site to Brightley Brook which flows from the south-west corner of the Site. The existing ditch flows from the Pilsworth Road / Hareshill Road junction (to the north of the Site) to Brightley Brook in the south-west corner of the Site. Brightly Brook also appears to receive flows from a number of balancing ponds located to the north of Pilsworth Road, within the Heywood Distribution Park.
- 8.1.5. Rain falling on the Site will contribute towards the Greenfield run-off and will generate overland flows which will either be absorbed by the underlying ground or flow downhill over the surface and towards the ditch which runs along the northern site boundary and eventually into Brightley Brook at the southern end of the Site. In times of heavy rainfall, the Site is likely to become heavily saturated allowing little or no rainfall to be absorbed, resulting in a substantial proportion of the rainfall contributing towards the overland flow.

Figure 14: SW ditch adjacent to Area 4 Northern Site Boundary & Pilsworth Road



Figure 15: Brightley Brook towards South-West corner of Area 4



- 8.1.6. The 'Bury Rochdale and Oldham Strategic Flood Risk Assessment Volume III – Level 2 SFRA' identified that parts of Area 4 are susceptible to Surface Water (SW) flooding. The predicted extents of surface water flooding are shown on Map 1.2 of the SFRA, attached in Appendix B. These extents have been overlaid on the Ordnance Survey data for the Site to define the areas in relation to the Site boundary and the proposed areas of development, see drawing no. 12441-CRH-XX-SK-4009 attached in Appendix G. The areas shaded light blue denote those with a low susceptibility to surface water flooding and those shaded dark blue denote those areas with a medium susceptibility.
- 8.1.7. Greenfield run-off rates for the 4 sub-catchments have been calculated for the 1 in 100 year storm events, ref. Table 17.

Table 17: Area 4 – Summary of Greenfield Run-Off Rates

SUB-CATCHMENT AREAS	GREENFIELD RUN OFF RATE
	1 in 100 Yr
7	219.5
8	271.4
9	63.7
10	78.8

- 8.1.8. The land within the Site boundary will therefore generate up to a maximum of 633 l/sec. during the 1 in 100 year storm event. This run-off is assumed to flow over-land and discharge into Brightley Brook to the east and into the ditch running adjacent to the northern Site boundary and Pilsworth Road, eventually discharging into Brightley Brook to the south. As would be expected, the areas susceptible to SW flooding largely follow the northern ditch, with a large area around the entrance to Heywood Distribution Park indicated as being of medium susceptibility. A number of areas along the ditch, indicated as medium susceptibility, are likely to be associated with hydraulic structures of limited capacity, ref. Figure 16, where the reduced capacity of the structure forces SW flows out of the ditch channel and onto the surrounding land. Brightley Brook to the south also shows areas indicated as medium susceptibility, this is mainly due to the channel narrowing slightly and possibly due to large overland flows entering in this area. There are also random areas within the sites but they do not seem to tie into the topographical level so have been discounted.

Figure 16: Hydraulic Structure crossing Existing Ditch



8.2. Proposed Water Management Strategy

8.2.1. A copy of the proposed Masterplan is attached in Appendix H. Area 4 is proposed to be redeveloped primarily for warehousing / distribution land-uses, including at this stage:

- Warehousing / distribution (38.96 ha);

8.2.2. As before, an average 75% impermeability has been assumed for the Site:

Table 18: Site 4 – Summary of Development Areas / Impermeable Areas

SUB-CATCHMENT AREAS	SIZE (Ha)	% Imp. Area	Drained area (Ha)
7	13.48	75%	10.11
8	16.67	75%	12.50
9	3.94	75%	2.95
10	4.87	75%	3.65

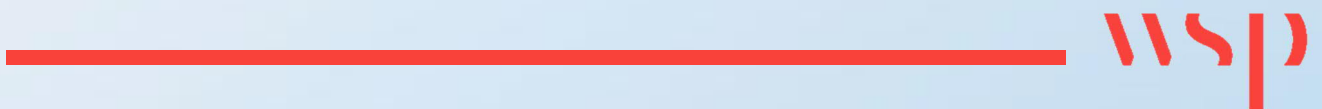
Appendix C

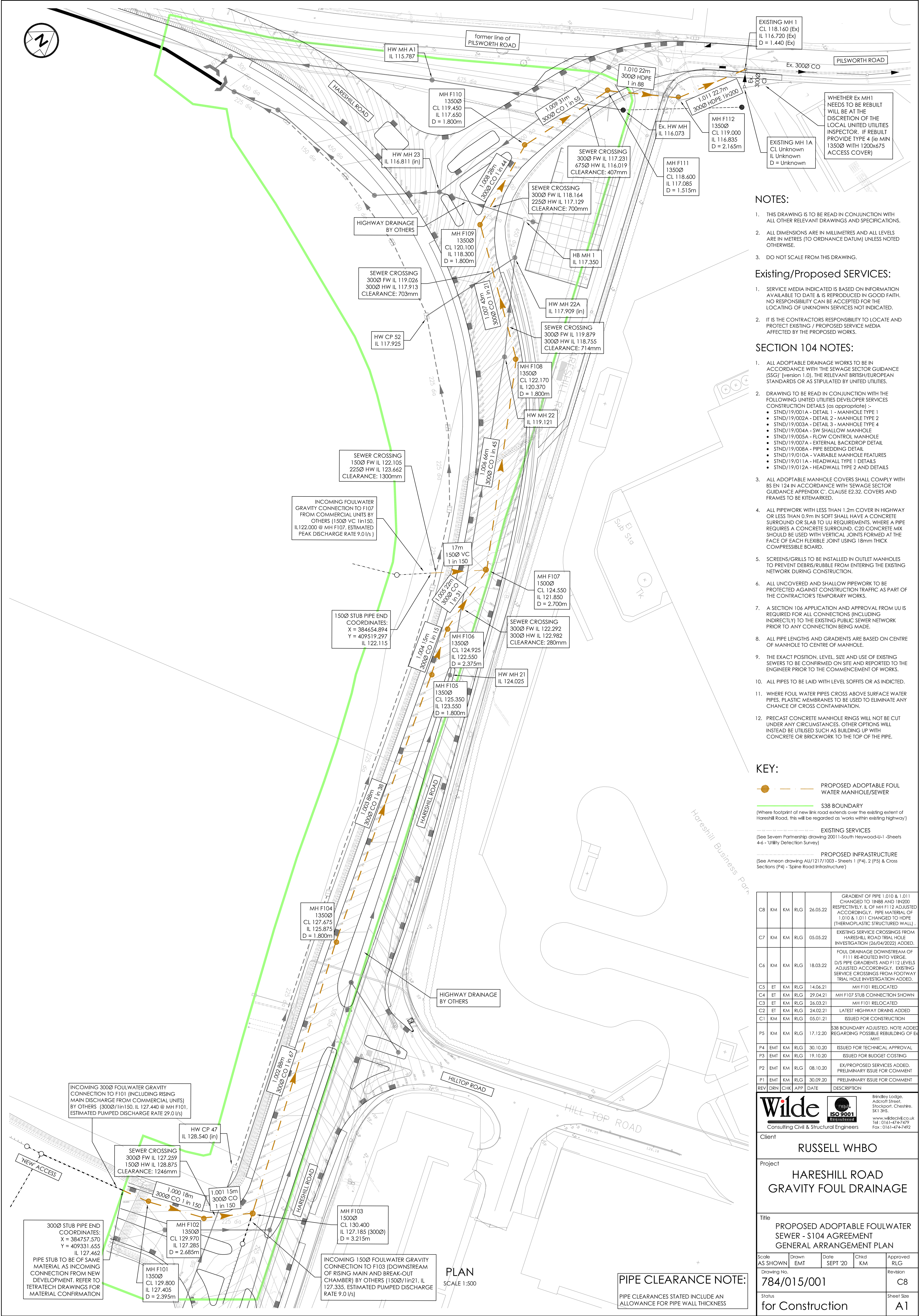
TOPOGRAPHICAL SURVEY



Appendix D

FOUL SEWER S104 LAYOUT





EXISTING MH 1
CL 118.160 (Ex)
IL 116.720 (Ex)
D = 1.440 (Ex)

WHETHER Ex MH1
NEEDS TO BE REBUILT
WILL BE AT THE
DISCRETION OF THE
LOCAL UNITED UTILITIES
INSPECTOR. IF REBUILT
PROVIDE TYPE 4 (ie MIN
1350Ø WITH 1200x675
ACCESS COVER)

EXISTING MH 1A
CL Unknown
IL Unknown
D = Unknown

- NOTES:
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS AND SPECIFICATIONS.
 - ALL DIMENSIONS ARE IN MILLIMETRES AND ALL LEVELS ARE IN METRES (TO ORDNANCE DATUM) UNLESS NOTED OTHERWISE.
 - DO NOT SCALE FROM THIS DRAWING.

- Existing/Proposed SERVICES:
- SERVICE MEDIA INDICATED IS BASED ON INFORMATION AVAILABLE TO DATE & IS REPRODUCED IN GOOD FAITH. NO RESPONSIBILITY CAN BE ACCEPTED FOR THE LOCATING OF UNKNOWN SERVICES NOT INDICATED.
 - IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE AND PROTECT EXISTING / PROPOSED SERVICE MEDIA AFFECTED BY THE PROPOSED WORKS.

- SECTION 104 NOTES:
- ALL ADOPTABLE DRAINAGE WORKS TO BE IN ACCORDANCE WITH 'THE SEWAGE SECTOR GUIDANCE (SSG)' [version 1.0]. THE RELEVANT BRITISH/EUROPEAN STANDARDS OR AS STIPULATED BY UNITED UTILITIES.
 - DRAWING TO BE READ IN CONJUNCTION WITH THE FOLLOWING UNITED UTILITIES DEVELOPER SERVICES CONSTRUCTION DETAILS (as appropriate) :-
 - STND/19/001A - DETAIL 1 - MANHOLE TYPE 1
 - STND/19/002A - DETAIL 2 - MANHOLE TYPE 2
 - STND/19/003A - DETAIL 3 - MANHOLE TYPE 4
 - STND/19/004A - SW SHALLOW MANHOLE
 - STND/19/005A - FLOW CONTROL MANHOLE
 - STND/19/007A - EXTERNAL BACKDROP DETAIL
 - STND/19/008A - PIPE BEDDING DETAIL
 - STND/19/010A - VARIABLE MANHOLE FEATURES
 - STND/19/011A - HEADWALL TYPE 1 DETAILS
 - STND/19/012A - HEADWALL TYPE 2 AND DETAILS
 - ALL ADOPTABLE MANHOLE COVERS SHALL COMPLY WITH BS EN 124 IN ACCORDANCE WITH 'SEWAGE SECTOR GUIDANCE APPENDIX C', CLAUSE E2.32. COVERS AND FRAMES TO BE KITEMARKED.
 - ALL PIPEWORK WITH LESS THAN 1.2m COVER IN HIGHWAY OR LESS THAN 0.9m IN SOFT SHALL HAVE A CONCRETE SURROUND OR SLAB TO UU REQUIREMENTS. WHERE A PIPE REQUIRES A CONCRETE SURROUND, C20 CONCRETE MIX SHOULD BE USED WITH VERTICAL JOINTS FORMED AT THE FACE OF EACH FLEXIBLE JOINT USING 18mm THICK COMPRESSIBLE BOARD.
 - SCREENS/GRILLS TO BE INSTALLED IN OUTLET MANHOLES TO PREVENT DEBRIS/RUBBLE FROM ENTERING THE EXISTING NETWORK DURING CONSTRUCTION.
 - ALL UNCOVERED AND SHALLOW PIPEWORK TO BE PROTECTED AGAINST CONSTRUCTION TRAFFIC AS PART OF THE CONTRACTOR'S TEMPORARY WORKS.
 - A SECTION 104 APPLICATION AND APPROVAL FROM UU IS REQUIRED FOR ALL CONNECTIONS (INCLUDING INDIRECTLY) TO THE EXISTING PUBLIC SEWER NETWORK PRIOR TO ANY CONNECTION BEING MADE.
 - ALL PIPE LENGTHS AND GRADIENTS ARE BASED ON CENTRE OF MANHOLE TO CENTRE OF MANHOLE.
 - THE EXACT POSITION, LEVEL, SIZE AND USE OF EXISTING SEWERS TO BE CONFIRMED ON SITE AND REPORTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORKS.
 - ALL PIPES TO BE LAID WITH LEVEL SOFFITS OR AS INDICATED.
 - WHERE FOUL WATER PIPES CROSS ABOVE SURFACE WATER PIPES, PLASTIC MEMBRANES TO BE USED TO ELIMINATE ANY CHANCE OF CROSS CONTAMINATION.
 - PRECAST CONCRETE MANHOLE RINGS WILL NOT BE CUT UNDER ANY CIRCUMSTANCES. OTHER OPTIONS WILL BE USED TO ELIMINATE ANY CHANCE OF CROSS CONTAMINATION.

- KEY:
- PROPOSED ADOPTABLE FOUL WATER MANHOLE/SEWER
 - S38 BOUNDARY
(Where footprint of new link road extends over the existing extent of Hareshill Road, this will be regarded as 'works within existing highway')
 - EXISTING SERVICES
(See Severn Partnership drawing 20011-South Heywood-U-1 - Sheets 4-6 - 'Utility Detection Survey')
 - PROPOSED INFRASTRUCTURE
(See Ameson drawing AU/1217/1003 - Sheets 1 (P4), 2 (P5) & Cross Sections (P4) - 'Spine Road Infrastructure')

C8	KM	KM	RLG	26.05.22	GRADIENT OF PIPE 1.010 & 1.011 CHANGED TO 1IN88 AND 1IN200 RESPECTIVELY. IL OF MH F112 ADJUSTED ACCORDINGLY. PIPE MATERIAL OF 1.010 & 1.011 CHANGED TO HDPE (THERMOPLASTIC STRUCTURED WALL) .
C7	KM	KM	RLG	05.05.22	EXISTING SERVICE CROSSINGS FROM HARESHELL ROAD TRIAL HOLE INVESTIGATION (26/04/2022) ADDED.
C6	KM	KM	RLG	18.03.22	FOUL DRAINAGE DOWNSTREAM OF F111 REROUTED INTO VERGE. D/S PIPE GRADIENTS AND F112 LEVELS ADJUSTED ACCORDINGLY. EXISTING SERVICE CROSSINGS FROM FOOTWAY TRIAL HOLE INVESTIGATION ADDED.
C5	ET	KM	RLG	14.06.21	MH F101 RELOCATED
C4	ET	KM	RLG	29.04.21	MH F107 STUB CONNECTION SHOWN
C3	ET	KM	RLG	26.03.21	MH F101 RELOCATED
C2	ET	KM	RLG	24.02.21	LATEST HIGHWAY DRAINS ADDED
C1	KM	KM	RLG	05.01.21	ISSUED FOR CONSTRUCTION
P5	KM	KM	RLG	17.12.20	S38 BOUNDARY ADJUSTED. NOTE ADDED REGARDING POSSIBLE REBUILDING OF Ex MH1
P4	EMT	KM	RLG	30.10.20	ISSUED FOR TECHNICAL APPROVAL
P3	EMT	KM	RLG	19.10.20	ISSUED FOR BUDGET COSTING
P2	EMT	KM	RLG	08.10.20	EX/PROPOSED SERVICES ADDED. PRELIMINARY ISSUE FOR COMMENT
P1	EMT	KM	RLG	30.09.20	PRELIMINARY ISSUE FOR COMMENT
REV	DRN	CHK	APP	DATE	DESCRIPTION



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Fax: 0161-474-7492

Client	RUSSELL WHBO			
Project	HARESHELL ROAD GRAVITY FOUL DRAINAGE			
Title	PROPOSED ADOPTABLE FOULWATER SEWER - S104 AGREEMENT GENERAL ARRANGEMENT PLAN			
Scale	AS SHOWN	Drawn	EMT	Approved
Date	SEPT '20	Chkd	KM	RLG
Drawing No.	784/015/001			Revision
Status	for Construction			Sheet Size
				A1

PIPE CLEARANCE NOTE:
PIPE CLEARANCES STATED INCLUDE AN ALLOWANCE FOR PIPE WALL THICKNESS

PLAN
SCALE 1:500

Appendix E

GREENFIELD RUNOFF RATE ASSESSMENT



Site name: South Heywood
Site location: CATCHMENT 8

Site coordinates
Latitude: 53.58128° N
Longitude: 2.23514° W

Reference: gcw2v4hmt6wc / 16.67
Date: 9 Sep 2016

This is an estimation of 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", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Site characteristics

Total site area	16.67	ha
Significant public open space	0	ha
Area positively drained	16.67	ha

Methodology

Greenfield runoff method	IH124
Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type
SOIL type	4
HOST class	N/A
SPR	0.47

Hydrological characteristics

	Default	Edited	
SAAR	1058	1058	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	0.9	0.9	
Hydrological region	10	10	
Growth curve factor: 1 year	0.87	0.87	
Growth curve factor: 10 year	1.38	1.38	
Growth curve factor: 30 year	1.7	1.7	
Growth curve factor: 100 year	2.08	2.08	

Greenfield runoff rates

	Default	Edited	
Qbar	130.49	130.49	l/s
1 in 1 year	113.53	113.53	l/s
1 in 30 years	221.83	221.83	l/s
1 in 100 years	271.42	271.42	l/s

Please note that a minimum flow of 5 l/s applies to any site

Appendix F

DRAINAGE STRATEGY OVERVIEW



Appendix G

ATTENUATION VOLUME CALCULATIONS



Quick Storage Estimate

Micro Drainage

Variables

FSR Rainfall

Return Period (years) 100

Region England and Wales

Map M5-60 (mm) 20.000

Ratio R 0.300

Cv (Summer) 0.750

Cv (Winter) 0.840

Impermeable Area (ha) 7.040

Maximum Allowable Discharge (l/s) 142.6

Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Micro Drainage

Results

Global Variables require approximate storage of between 3283 m³ and 5148 m³.

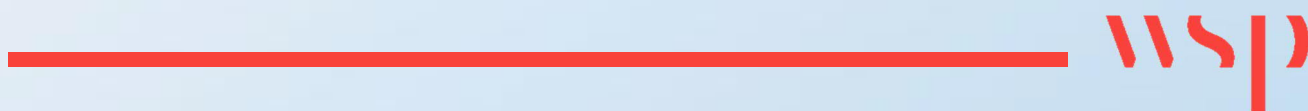
These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Appendix H

OVERLAND FLOOD ROUTEING PLAN





8 First Street
Manchester
M15 4RP

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