Marston & Grundy LLP
Consulting Engineers

FLOOD RISK ASSESSMENT & OUTLINE DRAINAGE STRATEGY

at

PROPOSED RESIDENTIAL DEVELOPMENT ON LAND WEST OF NEW STREET, LITTLEBOROUGH, ROCHDALE

For

Russell Homes

Marston & Grundy LLP
Consulting Engineers

Quality Management

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Contents

1. Executive Summary 1
2. Introduction 2
3. Development Description and Location 3
3.1 Site Location 3
3.2 Existing Site Description 3
3.3 Topography 4
3.4 Hydrology 4
3.5 Development Proposals 4
4. Planning Policy and Consultation 5
4.1 Planning Policy Framework 5
4.2 Strategic Flood Risk Assessment (SFRA) 5
4.3 Statutory Authority Correspondence 6
4.4 Local Planning Policy 6
5. Definition of Flood Hazard 8
5.1 Generally 8
5.2 Sources of Information 8
5.3 Flooding from Rivers (Fluvial) and Estuaries (Tidal) 8
5.4 Flooding from Land (Overland Flow) 9
5.5 Flooding from Sewers and Private Drainage 11
5.6 Flooding from Groundwater 11
5.7 Flooding from Artificial Sources 11
5.8 Summary 12
6.0 Outline Drainage Strategy 13
6.1 External Consultation 13
6.1.1 United Utilities 13
6.1.2 Environment Agency 13
6.2 Existing Runoff 13
6.3 Geology 13
6.4 Hydrological Assessment 13
6.5 Sustainable Drainage Systems (SuDS) Assessment 14
6.5.1 SuDS Objectives 14
6.5.2 SuDS Design Themes 14
6.5.3 SuDS Site Constraints 14
6.5.4 SuDS Methods 15
6.5.5 SuDS Hierarchal Approach 17
6.5.6 SuDS Design Philosophy 18
6.6 Outline Surface Water Drainage Strategy 18
6.7 Maintenance 19
7.0 Management Measures, Off Site Impacts & Residual Risk 24
7.1 Flood Risk Management Measures 24
7.2 Offsite Impacts 24
7.3 Residual Risk 24

Appendix A – Architects Drawings ..... A
Appendix B – Topographical Survey ..... B
Appendix C – United Utilities Correspondance C
Appendix D – United Utilities Sewer Records ..... D
Appendix E – Marston & Grundy Drawings ..... E
Appendix F – Hydrualic Calculations ..... F
Appendix G – Environment Agency Flood Data ..... G

List of Figures

Figure 1 Site Referencing Information 3
Figure 2 Site Location 4
Figure 3 Sources of information used in the identification of flood risk 8
Figure 4 The EA's Indicative 100-year Flood Plain Map 9
Figure 5 The EA's Indicative Surface Water Flood Map 10
Figure 6 Flood Risk Summary 12
Figure 7 Existing Greenfield Runoff Rate 13
Figure 8 Surface SuDS Methods 16
Figure 9 Sub-Surface SuDS Methods 17
Figure 10 SuDS Hierarchal Approach 17
Figure 11 Extract from The SuDS Manual Table 32.1: Typical key SuDS components operation and maintenance activities 20
Figure 12 Operation and Maintenance Requirements of Piped Networks and Inspection Chambers 21
Figure 13 Operation and Maintenance Requirements for Attenuation Basins 22
Figure 14 Operation and Maintenance Requirements for Flow Controls 23

1. Executive Summary

1.1 The proposal is for the construction of a new residential development on a greenfield site known as Land West of New Street, Littleborough. The development consists of sixty-two dwellings including access and associated works. The overall site is approximately 3.5Ha in plan footprint. Thus, to address the requirements of the new National Planning Policy Framework (NPPF) a Flood Risk Assessment is appropriate.

1.2 According to the Environment Agency (EA) Indicative flood maps, the development site holds a Flood Zone 1 classification, i.e. land assessed as having less than a 1 in 1000 annual probability of fluvial flooding (<0.1%). However, as the site is on the periphery of Flood Zone 2/3, further detailed flood modelling data was requested from the EA. This data has confirmed that the site is wholly within Fluvial Flood Zone 1 (Low Risk).

1.3 The development target has been assessed against the NPPF 'Sequential Test'. Taking into consideration that the application is for a residential development in Flood Zone 1, Tables 1, 2 & 3 of the NPPF have been appraised to confirm that the development is appropriate, and an Exception Test would not be required.

1.4 The Flood Risk Assessment has considered all other forms of flooding and overall, has found that the site is at low risk of flooding from all other sources apart from surface water flooding. Mitigation measures relating to this are detailed in Section 5.4.

1.5 There is no residual flood risk from the development site to the surrounding district as storm water flow rates discharging into the River Roch are restricted to greenfield runoff rates. The development does not therefore increase the risk of surface water flooding to other adjacent neighbourhoods.

1.6 Sustainable Drainage Systems (SuDS) in the form of Prevention, Source Control and Site Control methods will be incorporated where feasible. An outline surface water drainage strategy assessment forms part of this report.

1.7 Foul water generated by the development will be discharged to the adjacent combined water public sewers. The foul discharge does not present an increased flood risk to the surrounding district.

2. Introduction

2.1 Marston and Grundy LLP (M&G) have been appointed by Russell Homes to prepare this Flood Risk Assessment (FRA) and outline drainage strategy to support a full planning submission for a proposed residential development on a greenfield site known as Land West of New Street, Littleborough, Rochdale, OL15 8HZ.

2.2 The assessment has been undertaken in line with Section 10 of the 'National Planning Policy Framework' plus the accompanying Technical Guidance on Flood Risk.

2.3 This FRA has been commissioned by Russell Homes and is specific to their interests in the development proposals as described by the Architectural plan in Appendix A. This report may not be assigned.

2.4 The report has been prepared to identify any flood related issues associated with the proposed development and any likely constraints that could be imposed, along with considering the drainage strategy for it. The following issues have been suggested by the Environment Agency (EA), Rochdale Council as Lead Local Flood Authority (LLFA) and United Utilities (UU), and subsequently addressed within this report.

- Identify available data relating to flood risk at the site.
- Determine whether the site is at risk from flooding from all sources, including from breach or overtopping of any existing flood defences, surface water flooding and/or ground water flooding.
- Consider the flood risk from all other sources.
- Determine the current surface water drainage regime and assess any potential increase in surface water runoff as a result of the proposed development.
- Discuss Sustainable Drainage Systems (SuDS) as an option for reducing surface water flood risk.
- Devise an appropriate outline surface water drainage strategy (including calculations where appropriate) to deal with any potential increase in surface water runoff and include for climate change.
- Consider the recommendations of the Rochdale MBC Strategic Flood Risk Assessment (SFRA).
- Assess mitigation measures and off-site impacts and define any residual risks.

3. Development Description and Location

3.1 Site Location

1.1.1 The site is referenced in Figure 1, and a site plan is provided in Appendix A.

Item	Brief Description
Project name	Land West of New Street, Littleborough
Site address and location	New Street, Littleborough, Rochdale, OL15 8HZ.
Council Area	Rochdale Borough Council
Approximate Grid Reference	OS: 392580,13169
General Locality	The site is located in the Littleborough area of Rochdale, some 2km to the northeast of Rochdale Town Centre.

Figure 1 Site Referencing Information

3.2 Existing Site Description

3.2.1 The development site (Red Line Boundary) is irregular in plan shape and is predominantly undeveloped. The site therefore holds a greenfield classification.

3.2.2 Residential properties and gardens abut both the northern boundaries, with further residential properties beyond New Street on the eastern boundary. Stubley Mill Road abuts the southern boundary with the River Roch beyond. In the southeast corner of the development there are agricultural buildings and a green used for leisure activities.

3.2.3 Figure 2 overleaf identifies the overall site location details. Further details of the existing layout can be seen on the site plan in Appendix A and the topographical survey in Appendix B.

Figure 2 Site Location

3.3 Topography

3.3.1 A review of the topographical survey would indicate that the western part of the site is relatively flat at 137.00mAOD with a steep slope leading up to the northern boundary at circa 142.00mAOD. The eastern area is quite undulating with a low area in the centre. A topographical survey is provided in Appendix B.

3.4 Hydrology

3.4.1 The closest identified main watercourse is the River Roch, located approximately 75m to the south of the site and flowing generally in a westerly direction.

3.4.2 There is a small un-named drainage channel passing through the north eastern corner of the site that flows in a south easterly direction towards the River Roch. It is a mix of open ditch and a piped system. It is understood however that a culverted section beneath New Street is blocked/collapsed.

3.4.3 There is also the Rochdale Canal, located some 1km to the south of the site beyond the River Roch.

3.5 Development Proposals

3.5.1 As discussed in the earlier sections, the report is prepared to support a planning application for the construction of sixty-two new residential dwellings, new highways infrastructure and associated works.

3.5.2 The outline Site Master Plan as indicated in Appendix A provides details of the proposed development intent. Access into the site would be off an existing access road constructed as part of an earlier Phase to the east.

4. Planning Policy and Consultation

4.1 Planning Policy Framework

4.1.1 The flood maps provided by the Environment Agency (EA) locate the site in low-risk flood zone 1, i.e. land defined as having an annual probability of fluvial flooding of less than 1 in 1000 in any year (<0.1%). As a requirement of the new NPPF (2021), Annex D, the proposed development should satisfy the requirements of the Sequential Test and where applicable the Exception Test.

4.1.2 Sequential Test:

Under the NPPF (2021), Zone 1 is defined as low probability flood risk. The proposal is for a residential development, which in line with Table 2 is classified as 'More Vulnerable'.

Placing both these criteria into Table 3 (Flood Risk Vulnerability and Flood Zone 'Compatibility'), More Vulnerable development in Flood Zone 1 determines that the development is appropriate, and the sequential test is passed.

4.1.3 Exception Test:

As the Sequential test is passed, the Exception test is therefore not required.

4.2 Strategic Flood Risk Assessment (SFRA)

4.2.1 SFRA's assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The NPPF states that regional planning bodies (RPB's) or local planning authorities should prepare SFRA's in consultation with the EA.

4.2.2 Rochdale BC in partnership with Consultants Capita have produced in 2013 the Level 2 Strategic Flood Risk Assessment (SFRA) for the area in accordance with NPPF criteria. The purpose of the SFRA is to assess and map all known sources of flood risk including fluvial, surface water, sewer, groundwater and all impounded water bodies, considering future climate change predictions.

4.2.3 A summary of the main elements from the SFRA associated with the development sites are detailed below. The full report can be obtained from the Rochdale BC website.

- SFRA provides a detailed understanding of flood risks across the borough of Rochdale from all sources.
- Flood maps indicate that the site is at low risk of flooding.
- Sequential and Exception tests to be undertaken where required.
- Current Surface Water flood maps indicate that part of the site to be at medium to high risk from surface water flooding. This information is taken from a number of sources

- Control policies to reduce surface water discharges from new development will help to reduce localised flooding but wider catchment studies (Surface water management plans) are an essential tool in reducing the overall flood risk.
- No recorded groundwater flood incidences.
- Site is located in a Critical drainage Area (CDA) and should aim for a 50% reduction in surface water runoff rates, with an aim of reducing runoff to Greenfield rates up to a 1 in 100-year storm event, considering climate change.
- Development should be designed so that there is no flooding to the development in a 1 in 30-year event and so that there is no property flooding in a 1 in 100 year plus climate change event. Where possible SUDS should be implemented.

4.3 Statutory Authority Correspondence

4.3.1 M&G have consulted with the UU as part of a pre-development enquiry to obtain their comments on both foul and surface water discharge locations and rates. Correspondence can be found in Section 6.1.1 and Appendix C.

4.3.2 Further detailed EA flood modelling information was requested and provided by the EA. This confirmed the site is located in low-risk Flood Zone 1. Full details can be found in Appendix G.

4.4 Local Planning Policy

Rochdale Borough's Strategy for Flood Risk Management 2014 – 2024

4.4.1 The Environment Agency has designated parts of Littleborough and central Rochdale as a flash flooding area where water levels can rise quickly in heavy rainfall. The River Roch is a priority catchment for the Environment Agency who are currently undertaking a study of flood risk and opportunities for enhanced flood defences and flood storage in Littleborough.

4.4.2 Rochdale Council is currently developing proposals for reducing flood risk along Calder Brook in Littleborough, one of the main upstream tributaries for the River Roch. The Council is working with the EA to develop a catchment-based approach to flood risk management including de-culverting measures in Rochdale town centre and supporting a package of measures for the River Roch in Littleborough and downstream towards Rochdale based on the results of the EA's flood study.

Rochdale Core Strategy

4.4.3 Rochdale's Core Strategy was adopted in October 2016, and it set out the strategies and policies within which development within the Borough would take place. Policy G8 relates to managing water resources and flood risk. The full report can be obtained from the Rochdale BC website with a summary of the main items below.

4.4.4 Policy G8 (Managing Water Resources and Flood risk) states that:

- There is a requirement for new developments to show compliance with a 'sequential approach', directing development away from areas of high risk.
- Development proposals must demonstrate compliance with EA Advice and the objectives set out in the Local Flood Risk Management Strategy.
- Developments must include approximate 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'.
- Development proposals must demonstrate compliance with Surface Water Management Plan or drainage strategies produced, such as for the identified critical drainage areas of Littleborough and Heywood.
- Culverting of watercourses should be avoided and opening up of existing culverts is encouraged.
- Developments should ensure that there is no direct or indirect pollution of water resources such as watercourses and groundwater or the reduction of the quantity of groundwater as a result of the development.
- Developments should incorporate measures to improve water quality and the habitat value of watercourses. As well as providing rainwater collection measures.

5. Definition of Flood Hazard

5.1 Generally

Flood risk to the proposed development site is considered from all sources of flooding, as defined by the NPPF (2021).

5.2 Sources of Information

5.2.1 The NPPF (2021) requires the developer to consider the impact of runoff generated by the proposed development onto the downstream catchment, and to assess the risk of runoff from the surrounding district impacting on the development's footprint. Further, the report is to consider flood risk from all other sources. The following section defines the flood risk receptors and anticipated flood risk. Section 5.8 then tabulates the probability of flooding and the likely impacts.

5.2.2 Figure 3 summarises the main sources of information used in the identification of flood risk.

Source of Information	**Details**
Environment Agency Flood Map	From EA website and Product 4 Flood Data
United Utility Sewer Records	Various Maps
Historic Maps	From various websites
Rochdale MBC SFRA	Report & Various Maps

Figure 3 Sources of information used in the identification of flood risk

5.3 Flooding from Rivers (Fluvial) and Estuaries (Tidal)

5.3.1 As mentioned in earlier sections, there is a drainage channel passing through the northern part of the site. When functioning correctly this feeds into the larger River Roch located approximately 75m to the south.

5.3.2 Figure 4 overleaf locates the site on the Environment Agency's indicative floodplain map. It is clear from this that the red line boundary sits outside of a fluvial generator of flood water from any identified water body or river. Detailed flood modelling data was requested from the EA to confirm this. Therefore, it is considered that the site lays outside of the active 100-year and extreme event floodplains, thus lying within 'Flood Zone 1 Classification' in accordance with NPPF Guidance, i.e. probability of annual fluvial flooding significantly less than 1 in 1000 in any one year (<0.1%). The risk from fluvial flood water is diminished to acceptable levels, removing the requirement for further investigation and assessment of the fluvial flood regime.

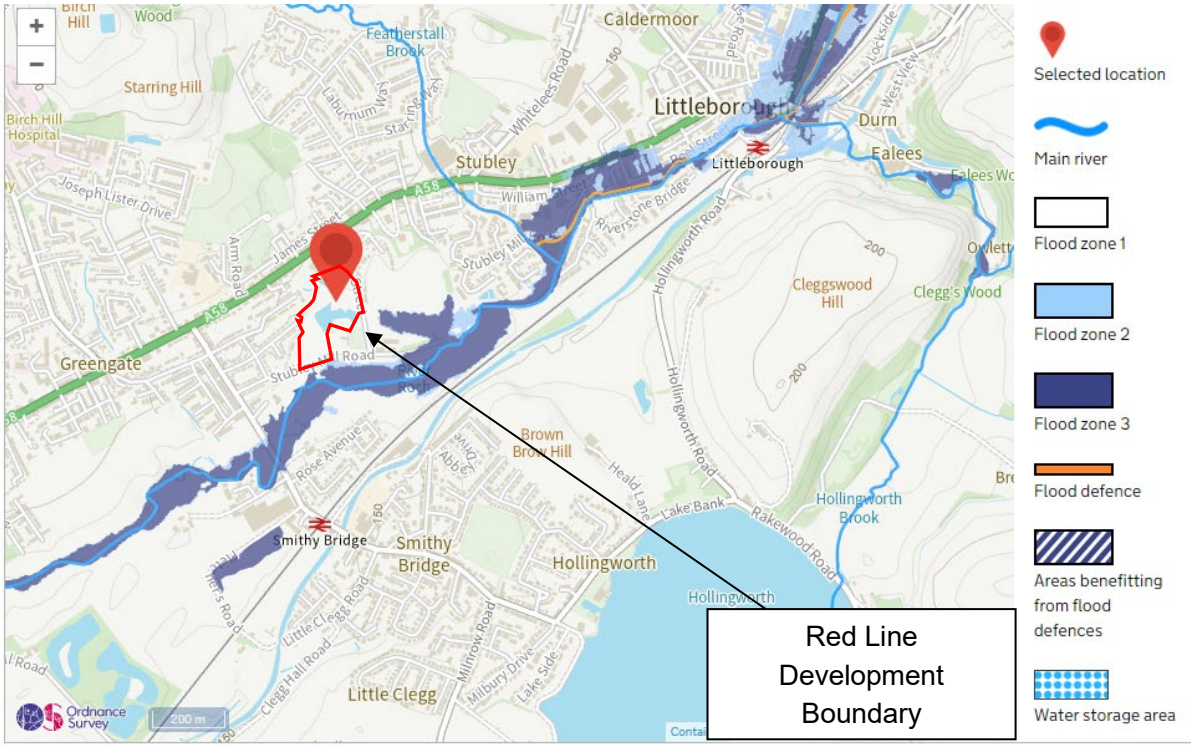


Figure 4 The EA's Indicative 100-year Flood Plain Map

5.4 Flooding from Land (Overland Flow)

5.4.1 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

5.4.2 The majority of the site is at very low and low risk of surface water flooding. The existing site and the surrounding land generally falls to the south, as such there is a low risk of surface water runoff from the lower land to the south impacting the development. Any surface water runoff from the east will be intercepted by existing highway drainage within New Street and conveyed away from the site. Residential properties border the site to the north and west that will have existing infrastructure to pick up any surface water flows and convey them away from the site.

5.4.3 According to the EA's Indicative Surface Water Floodplain map (Figure 5 below) there is an area in the central/eastern portion of the site classified as at high risk of surface water flooding. This area corresponds to the low point on the site which has been identified to hold water and confirms that the site is currently subject to localised surface water flooding as a result of the topography. In addition, and as noted earlier investigations carried out at the site have confirmed that this water is holding due to a blocked/collapsed culverted drainage channel passing beneath New Street. This surface water risk is based on runoff generated predominantly by the site, based against data taken from digital terrain modelling and therefore as long as it is controlled by raising and removing these areas as part of the development layout then they pose no future risk.

5.4.4 There is a potential small flow route through the site from north to south shown on the EA mapping, where the water is holding within the low-lying area identified above. According to EA data this route has a potential depth of <300mm.

5.4.5 As a first source of mitigation, the block culvert that is restricting the flows in the drainage channel will be replaced/repaired as required. This will reduce the risk of offsite flows passing into the proposed development and direct the water into an open ditch to the east of the site that outflows to the River Roch. In additional the route of the overland flows should they pass over the ditch will follow the route of the new spine road, such that the water will naturally pass south towards the River Roch. The new houses will be raised above road levels to reduce any flood risk to them.

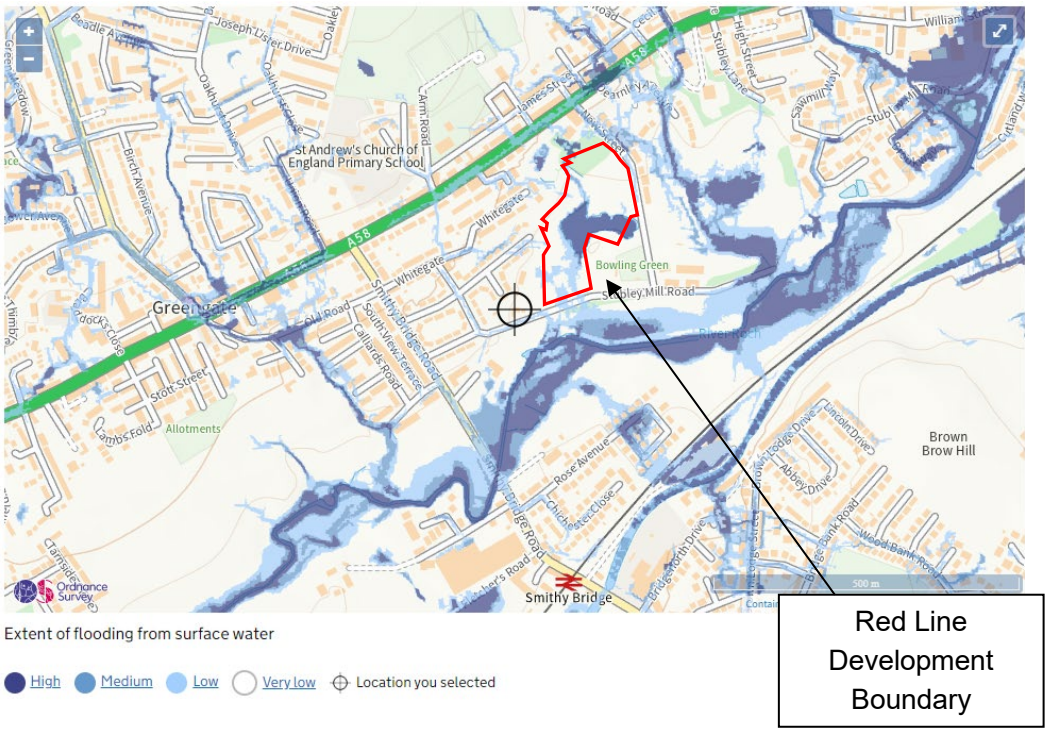


Figure 5 The EA's Indicative Surface Water Flood Map

5.5 Flooding from Sewers and Private Drainage

5.5.1 United Utilities (UU) sewer records have been reviewed and confirm that there is a 225mm diameter combined sewer flowing north to south through the centre of the development site. This sewer is to be retained and the required UU development easements adhered to. Full details of the sewer plans can be found in Appendix D.

5.5.2 The extensive UU adopted drainage network serving the surrounding urban district ensures that the development footprint is protected from the impact of both upstream and downstream runoff. It would be anticipated that complete protection may well exist beyond a storm event equivalent to the 30-year statistical event. Beyond this projection, there may be a small degree of peripheral 'Exceedance' flooding within the highway areas above the sewers. However, this is expected to be localised and restricted to the location of specific manhole covers with the properties raised above road levels. Thus, flood risk to the site from sewers is diminished to acceptable levels.

5.6 Flooding from Groundwater

5.6.1 In general terms, groundwater flooding can occur from three main sources, raised water tables, seepage and percolation, and groundwater recovery or rebound. If groundwater levels are naturally close to the surface, then this can present a flood risk during intense rainfall.

5.6.2 At the time of writing no specific intrusive phase 2 site investigation has been carried out at the site. The Phase 1 Geo-Environmental desk study indicates that the site is considered to have limited potential for groundwater flooding to occur.

5.6.3 The Rochdale BC Level 2 Strategic Flood Risk Assessment (SFRA) would indicate that no groundwater flooding has been experienced in the Borough.

5.6.4 According to the EA's Aquifer Designation Map, the underlying bedrock deposits are classified as a Secondary A Aquifer which are permeable layers capable of supporting water supplies at a local rather than strategic scale and in some cases forming an important source of base flow to rivers. The development site is not within a groundwater source protection zone.

5.6.5 Notwithstanding, an intrusive investigation should be undertaken in advance of detailed design stage to establish exact ground water levels and how they fluctuate seasonally. If required, measures would need to be introduced into the drainage scheme to deal with high groundwater to ensure that flooding to property does not occur.

5.6.6 It is considered that any groundwater issues can be mitigated as required, subject to further investigation, at the detailed design stage. The risk to the site from groundwater flooding is therefore considered to be low.

5.7 Flooding from Artificial Sources

5.7.1 Reservoir flooding is extremely unlikely to happen and there has been no loss of life in the UK from reservoir flooding since 1925. The Environment Agency is the

enforcement authority and ensures that reservoirs are inspected regularly, and essential safety work is carried out.

5.7.2 The Long-Term Flood Risk Assessment (Flood Risk from Reservoirs) map shows that the site is at very low risk of Reservoir flooding.

5.8 Summary

5.8.1 Below is a summary of the flood risks associated with the development site.

Source	Flood Risk	Likely Impacts	Remarks
Tidal	Low	Low	Site not affected by Tidal Flood water.
Fluvial (Watercourse)	Low	Low	Site located in Low-Risk Flood Zone 1 from Fluvial Flooding.
Surface (Overland Flood Flow)	Medium/High	Low	Site currently at risk of surface water ponding as a result of the undulating topography in the eastern sections that has the potential to hold water at times of rainfall. EA indicative mapping shows a potential low risk flow route through the site. Mitigation measures are detailed in section 5.4.
Sewers	Low	Low	Public sewer runs through the centre of the site, all required UU development easements are adhered to.
Groundwater	Low	Low	No indication through SFRA that site at risk of groundwater flooding or indication in the site investigation.
Artificial Sources	Low	Low	No Artificial sources in close proximity.

Figure 6 Flood Risk Summary

6.0 Outline Drainage Strategy

6.1 External Consultation

6.1.1 *United Utilities*

As discussed in Section 5, the UU sewer records have been reviewed and confirm that a combined water sewer flows north to south through the development site.

A response to a pre-development enquiry has confirmed that surface water discharge should follow the SuDS management train.

Foul water can discharge unrestricted into the public combined water system. The preferred point of discharge would be to the combined sewer within the proposed development site.

6.1.2 *Environment Agency*

The Environment Agency (EA) has been contacted for detailed flood modelling data and this confirmed that the site is located in low-risk Flood Zone 1.

6.2 Existing Runoff

6.2.1 The existing site is comprised of undeveloped land and is considered to be greenfield. Figure 7 below defines the existing Greenfield runoff rate.

Existing Permeable Area (ha)	**Greenfield Rates**
3.5	**Q_1 25.1 l/s** **Q_{30} 48.9 l/s** **Q_{100} 60.0 l/s**

Figure 7 Existing Greenfield Runoff Rate

6.3 Geology

6.3.1 According to the British Geological Survey (BGS) data the site is underlain by Glacial Till, comprised of clays, sands, silts and gravels. There is a band of Alluvium running through the centre of the site comprised of clay, silt, sand and gravel. The Bedrock geology of the site is the Pennine Lower Coal Measures Formation comprised of mudstone, siltstone and sandstone. Therefore, based on the cohesive underlying geology, infiltration is not viable for the site.

6.4 Hydrological Assessment

6.4.1 As discussed in previous sections, the River Roch is approximately 75m to the south of the proposed development.

6.5 Sustainable Drainage Systems (SuDS) Assessment

6.5.1 *SuDS Objectives*

Sustainable drainage, developed in line with the ideals of sustainable development, is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed both to manage the environmental risks resulting from the urban runoff and to contribute wherever possible to environmental enhancement. SuDS objectives are therefore to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).

6.5.2 *SuDS Design Themes*

The 'Management Train Approach' should be central to the surface water drainage strategy of the proposed site. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:

i. **Prevention** – The use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse / harvesting.

ii. **Source Controls** – Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).

iii. **Site Control** – Management of water in a local area and can include below ground storage / attenuation, detention basins, large infiltration devices.

iv. **Regional Control** – Management of water from a site or various sites and can include wetlands and balancing ponds.

6.5.3 *SuDS Site Constraints*

SuDS techniques are suitable for all sites; therefore, an assessment of the existing site is required so that SuDS limitations can be determined.

- *Land Use Characteristics:* The size and type of development enables the potential range of source control and site control SuDS devices to be considered below ground only.
- *Site Characteristics:* Cohesive underlying geology means infiltration is not a viable means of surface water discharge.
- *Catchment Characteristics:* The site is currently classed as 'Greenfield' and the discharge rate from the site will need to be no greater than the existing Greenfield runoff rates.
- *Environmental and Amenity Performance:* The inclusion of SuDS within the overall development is a key driver in providing both amenity and habitat creation. All types of SUDs including where possible Ponds, swales and both wet and dry basins will be considered and blended into the landscaping zone, if possible. Safety to all future users is paramount and so best practice guidance will be incorporated so that these devices blend into the surrounding

without the need for significant safety precautions. Maintenance plans will be prepared for all SuDS devices that are included.

6.5.4 *SuDS Methods*

Figure 8 and 9 on the following pages provide an assessment of various above and below ground SuDS methods that can provide water quality treatment and management of flows to reduce runoff rates and volumes and whether they can be suitably incorporated at this development site. The purpose of this assessment is to set out options to be considered at the planning stage with consideration to time constraints, viability and lifetime maintenance of the commercial development.

Method	Comment	Suitability for Development
Green Roofs	• Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	*Not suitable*: • Architectural proposals for the residential units with pitched roofs that are not viable.
Water Butts	• Plastic tanks placed at the base of rainwater down pipes to collect rainwater runoff from the roof areas.	*Not Suitable*: • to be left with the property owners to incorporate.
Rainwater Harvesting	• Rainwater harvesting reduces the total runoff volume from the developed site and reduces treated water consumption.	*Not Suitable*: • Additional costs of installation would have severe effect on viability of the development. • Running and maintenance costs would not be acceptable to our client and future occupiers. • The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs.
Infiltration Options	• Reduces total run off volume from the development.	*Not Suitable*: • Subject to the completed Site Investigation, the cohesive underlying geology precludes the use of infiltration.
Permeable Surfacing (Infiltration)	• Reduces total run off volume from the development. • Can be used to enhance water quality.	*Not Suitable*: • Subject to the completed Site Investigation, the cohesive underlying geology precludes the use of infiltration.

Permeable Surfacing (Standard)	• Can be used to enhance quality of runoff water. • Sub-base provides 'source' storage and reduces the volume of storage downstream. • The storage can be created with selection of the stone fill or use of plastic box stems. • Impermeable membrane at base of construction to prevent impact on pavement stability.	*Not suitable:* • Long term maintenance required and risk of reduction in permeability. • Specialist maintenance required to maintain porous surfaces. • No services to run beneath areas of permeable surface (due to presence of base impermeable barrier which is very difficult to excavate through and reinstate if required), spatial constraints of site do not allow alternative routes for services along plot frontages. • Difficult to install small areas of tanked systems that require very small flow controls which can lead to maintenance issues.
Swales, basins and ponds	• Provide areas for above ground surface runoff storage. • Swales also allow filtering of particulate matter, improving water quality	*Suitable:* • An attenuation pond can be incorporated into the development layout.
Bio-Retention	• Collect and retain run-off to help improve water quality, prior to discharge in piped system on infiltration.	*Not suitable:* • Space constraints on site do not permit large above ground areas for flood storage. • No scope to reduce development area due to site viability.

Figure 8 Surface SuDS Methods

Method	Comment	Suitability for Development
Geocellular Storage	• Suitable for sites with insufficient space for basins etc. • Suitable for sites where topography prevents the use of open basins etc. • Can be very effective infiltration devices subject to ground conditions.	*Suitable:* • Subject to detailed design and drainage layout.
Large Diameter Pipes, Culverts or Tanks	• Suitable for sites with insufficient space for basins etc. • Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. • Generally, be suitable for adoption by the statutory water company (e.g. United Utilities).	*Suitable*: • Would suit the development intent of having adopted oversized pipes in the new highway.

Figure 9 Sub-Surface SuDS Methods

6.5.5 *SuDS Hierarchal Approach*

Based on the SuDS assessment in Figure 8 and 9, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in greater detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	Cohesive underlying geology precludes the use of infiltration.
Connection to Watercourse	Yes	River Roch located approximately 75m to the south.
Connection to Surface Water Sewer	No	No surface water sewers in close proximity.
Connection to a Combined Sewer	No	Higher options to be considered.

Figure 10 SuDS Hierarchal Approach

6.5.6 *SuDS Design Philosophy*

SuDS assessment and hierarchal approach discussed in Figure 8, 9 and 10 above has defined the overall SuDS strategy. Thus, the SuDS philosophy for the development site is the promotion of Prevention and Site Control techniques with discharge rates to the River Roch at greenfield runoff rates, up to and including the 100 year runoff rate.

The following design philosophy is proposed:

- Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance to the existing drainage infrastructure.
- Restrict new development runoff peak flow rates to greenfield run off rates.
- Site control in the form of an attenuation pond.
- Aim to limit where possible the impermeable fraction of development.

6.6 Outline Surface Water Drainage Strategy

6.6.1 The general principal of the surface water drainage strategy is to collect the runoff from the roof and external areas of the new residential units & highways, and direct it to a new below ground adopted surface water drainage network that will be constructed in the new highways and ultimately outfall to the River Roch via an attenuation pond at controlled rates.

6.6.2 The proposed drainage layout for the new development site has been designed in accordance with Design and Construction Guidance (DCG), BS EN 752: 2008 and Building Regulations Part H guidance. This is to indicate no surcharge for the 2-year storm event and no flooding for up to the 30-year storm event.

6.6.3 Flooding can occur on a local scale beyond the 30-year criterion due to runoff exceeding the capacity of the minor system during extreme events and it can only be addressed on a site-specific basis. DCG states that developments should be protected against flooding from extreme events (1 in 30 year) and that flood pathways are identified when the drainage system is exceeded.

6.6.4 All development flows into the River Roch will be restricted to the respective greenfield runoff rates detailed in Figure 7, up to and including the 1 in 100 year rate, through the use of a complex flow control.

6.6.5 Site control SuDS in the form of an attenuation pond will act as the storage measure upstream of the flow restricting device.

5.8.4 A hydraulic network has been modelled and simulated in the Microdrainage design software to define the outline pipes size and pond volume size. This outline surface water network can be found on the drainage strategy drawing in Appendix E which should be read in conjunction with the hydraulic calculations in Appendix F. It is noted that these rates and volumes are preliminary for this outline assessment and are likely to alter at detailed design stage when more site-specific information is made available.

6.6.6 Any future drainage calculations carried out as part of a site wide drainage strategy or for the development layouts themselves must include the appropriate increase in rainfall to satisfy the future Climate change allowances. In the case of this development, this would be 40%.

6.7 Maintenance

6.7.1 This section is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details. Where proprietary products are specified, the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints. The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

6.7.2 Where sewers and SuDS features are offered for adoption, the adopting authority will have their own maintenance strategy in place.

6.7.3 There are three types of maintenance activities associated with surface water drainage systems. The SuDS Manual, CIRIA C753, defines these as:

- Regular Maintenance – '*basic tasks undertaken on a frequent and predictable schedule' including vegetation management, litter and debris removal, and inspections*.'
- Occasional Maintenance – *'tasks that are likely to be required periodically, but on a much less frequent and predictable basis than the routine tasks (sediment removal is an example.'*
- Remedial Maintenance – *'intermittent tasks that may be required to rectify faults associated with the system, although the likelihood of faults can be minimised by good design. Where remedial work is found to be necessary, it is likely to be due to site-specific characteristics or unforeseen events, and as such timings are difficult to predict.*'

6.7.4 Specific maintenance needs should be monitored and maintenance schedules adjusted to suit the location and condition of the drainage feature in question.

Operation and Maintenance Activity	SuDS Component		
	Piped Network / Inspection Chambers	Attenuation Basins	Swale / Ditch
Regular Maintenance			
Inspection	■	■	■
Litter and debris removal	■	■	■
Grass cutting		■	■
Weed and invasive plant control		□	
Shrub management (including pruning)		□	□
Shoreline vegetation management		□	
Aquatic vegetation management		□	
Occasional Maintenance			
Sediment management[1]	■	■	■
Vegetation replacement		□	□
Remedial Maintenance			
Structure rehabilitation / repair	□	□	□
Infiltration surface reconditioning			

■ Will be required □ May be required
[1] Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

Figure 11 Extract from The SuDS Manual Table 32.1: Typical key SuDS components operation and maintenance activities

6.7.5 Piped Networks, Inspection, Manhole and Catchpit Chambers

The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Maintenance Manager prior to any access.

Pipes are proprietary products and the materials can vary across the site and as such where used the manufacture's recommendations should be followed.

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers and manholes.

Regular inspection and maintenance is important to identify areas which may have been obstructed / clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required, take remedial action	Monthly for three months, then six monthly
	Debris removal from catchment surface / gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair / rehabilitation of gratings, inlets and outlets	As required
Monitoring	Inspect / check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed	Annually and after large storm events
Structure Rehabilitation / Repair	Regular Maintenance and Monitoring to identify if repair and / or replacement of features or pipework is required.	As required

Figure 12 Operation and Maintenance Requirements of Piped Networks and Inspection Chambers

6.7.6 Attenuation Basins

Attenuation basins are landscaped depressions that are normally dry except during and immediately following rainfall and storm events. They can be on-line components where surface water runoff from regular events is routed the basin and when flows rise, because the outlet is restricted, the basin fills and provides storage of runoff and flow attenuation. They can also be off-line components into which runoff is diverted once flows reach a specific threshold.

Detention basins can be vegetated depressions (that provide treatment when designed to manage regular flows) or hard landscaped storage areas (that will tend not to provide any treatment and are normally designed as off-line components).

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

Figure 13 Operation and Maintenance Requirements for Attenuation Basins

6.7.7 Flow Control Units

The flow control units are intended for flood control and flow restriction.

The flow control is specified as Hydro-brake and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.

Access for maintenance has been provided by locating within manhole chambers.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre- treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

Figure 14 Operation and Maintenance Requirements for Flow Controls

6.7.8 Foul Water Drainage

6.7.5 Foul drainage generated from the new development will discharge to the existing combined public sewer that flows through the development site.

6.7.6 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance.

6.7.7 An indicative foul water drainage layout can be found on the drawing in Appendix E.

7.0 Management Measures, Off Site Impacts & Residual Risk

7.1 Flood Risk Management Measures

7.1.1 The surface water drainage strategy for the new development site will be to limit the surface water runoff to greenfield runoff rates prior to discharge into the River Roch. Therefore, the development proposals do not increase flood risk to surrounding areas.

7.1.2 Attenuation measures will be incorporated in the form of oversized pipes and an attenuation pond.

7.1.3 The new private surface water networks will be designed in line with current British Standard guidance up to the 100-year storm return period including an allowance for climate change. Beyond the 30yr criterion, any potential out of chamber flooding that may occur with flood water directed away from the residential units to the highways where it will then be directed back into the drainage network as the pipe water levels recede.

7.1.4 The use of SUDS in the form of Prevention and Site Control measures will help to minimise the flood risk impact to the surrounding watercourses.

7.1.5 Should any flooding occur from the new sewers and drains it will be directed away from the new residential units to the external highways and soft landscaping areas.

7.1.6 Proposed properties will be raised above the highway levels to reduce the flood risk from overland flows.

7.2 Offsite Impacts

7.2.1 The development of the site does not impair the hydraulic continuity of any watercourse and the current ‘‘local hydraulics’’ of distributing watercourses / outfalls.

7.2.2 The Development footprint does not cross or cover any existing or declared future catchment flood defences. Consequently, the Applicant does not propose to augment or compromise the current catchment defences.

7.2.3 By mimicking the pre-development peak runoff at its point of discharge into the River Roch by the inclusion of SuDS, this will reduce surface water flooding impact onto the downstream catchment.

7.2.4 As there is no flood displacement or increased rate of runoff as part of this proposal into the adjacent sewers, the proposed development will therefore not increase flood risk onto its locality.

7.3 Residual Risk

7.3.1 With careful design of the drainage elements as described above there will be no residual flood-related risks that will remain after the development has been completed.

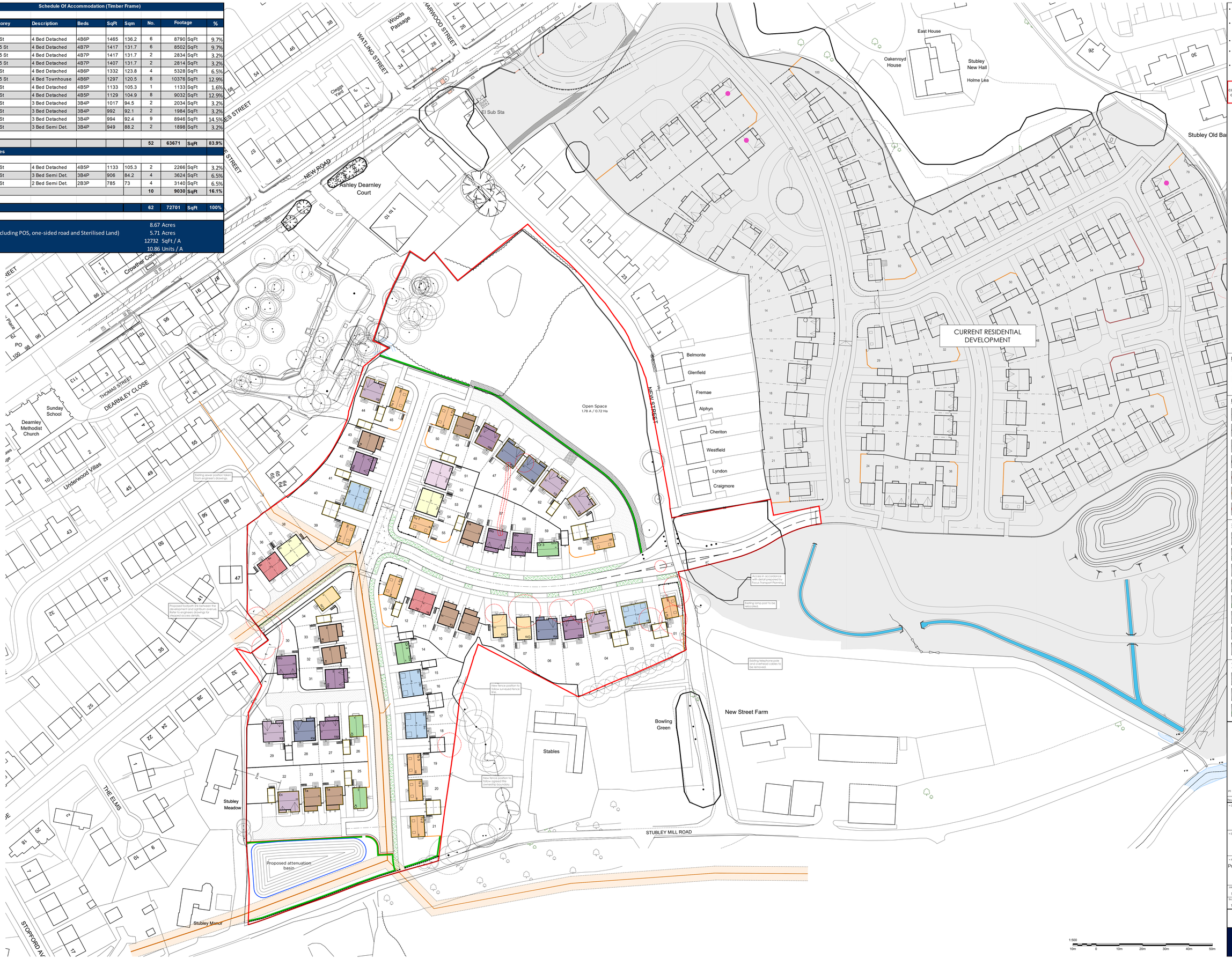
Appendix A – Architects Drawings

New Street, Littleborough

Schedule Of Accommodation (Timber Frame)

Name	Storey	Description	Beds	SqFt	Sqm	No.	Footage		%
Eccleston	2 St	4 Bed Detached	4B6P	1465	136.2	6	8790	SqFt	9.7%
Turner 1	2.5 St	4 Bed Detached	4B7P	1417	131.7	6	8502	SqFt	9.7%
Turner 2	2.5 St	4 Bed Detached	4B7P	1417	131.7	2	2834	SqFt	3.2%
Turner 3	2.5 St	4 Bed Detached	4B7P	1407	131.7	2	2814	SqFt	3.2%
Kenyon	2 St	4 Bed Detached	4B6P	1332	123.8	4	5328	SqFt	6.5%
Bower	2.5 St	4 Bed Townhouse	4B6P	1297	120.5	8	10376	SqFt	12.9%
Cromwell	2 St	4 Bed Detached	4B5P	1133	105.3	1	1133	SqFt	1.6%
Worrall	2 St	4 Bed Detached	4B5P	1129	104.9	8	9032	SqFt	12.9%
Orrell	2 St	3 Bed Detached	3B4P	1017	94.5	2	2034	SqFt	3.2%
Orrell 3	2 St	3 Bed Detached	3B4P	992	92.1	2	1984	SqFt	3.2%
Talbot	2 St	3 Bed Detached	3B4P	994	92.4	9	8946	SqFt	14.5%
Scott	2 St	3 Bed Semi Det.	3B4P	949	88.2	2	1898	SqFt	3.2%
Total						**52**	**63671**	**SqFt**	**83.9%**
Affordable Properties									
Cromwell	2 St	4 Bed Detached	4B5P	1133	105.3	2	2266	SqFt	3.2%
Phillips	2 St	3 Bed Semi Det.	3B4P	906	84.2	4	3624	SqFt	6.5%
Buckley	2 St	2 Bed Semi Det.	2B3P	785	73	4	3140	SqFt	6.5%
Total						**10**	**9030**	**SqFt**	**16.1%**
Total						**62**	**72701**	**SqFt**	**100%**

Gross Site Area	8.67 Acres
Nett Site Area (Excluding POS, one-sided road and Sterilised Land)	5.71 Acres
Nett Footage	12732 SqFt / A
Nett Density	10.86 Units / A



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- Only scale for 'Town and Country Planning Act 1990' services. For construction purposes, work to figured dimensions only. All dimensions to be checked with MPSL and on site prior to the execution of any work.
- For the avoidance of doubt all dimensions are measured to wall structure and not the finishes unless otherwise stated.
- Where any discrepancy is found to exist within or between drawings and/or documents it should be reported to the Architect immediately.
- MPSL Planning & Design Ltd. shall not be liable for any use of drawings and documents for any purpose other than for which the same were prepared by or on behalf of MPSL Planning & Design Ltd.

NOTE: Drawing should be read in conjunction with the boundary treatment details, landscape layout and engineers drawings.

MATERIALS

- Denotes properties to be built in red brick.
- Denotes properties to be built in reconstituted stone.

Refer to the materials layout for further details.

BOUNDARY TREATMENTS

- Denotes 0.6m high knee rail - Hedge planting behind where indicated.
- Denotes 0.6m high reconstituted stone wall, to match development facings, with hedge planting behind.
- Denotes 1.8m high plot divisional timber fence. Colour: Natural
- Denotes 1.8m high close boarded fence with gates where shown. Colour: Natural
- Denotes 1.8m high brick wall, to match development facings.
- Denotes 1.8m high reconstituted stone wall, to match development facings.
- Denotes vehicle restraint barrier. Details to be agreed with the LA.

SURFACE FINISH

- Denotes raised speed tables to be finished with red chippings.
- Denotes speed ramps.
- Denotes shared access drives.
- Denotes tree lined grass verge.
- Denotes hoggin style footpath adjacent to public open space.
- Denotes grasscrete link to allow emergency vehicle access.
- Denotes demountable bollards to emergency access.
- Denotes hard standing for bin storage.

TREES / HEDGES

- Denotes existing trees to be retained - Refer to Tree Survey.
- Denotes trees to be removed - Refer to Tree Survey.
- Denotes proposed hedge planting - Refer to landscape layout for details.

Rev	Date	Revision	Initial
P1	06.07.22	Revised access arrangement incorporated and plots 1 - 9 & 56 - 60 adjusted accordingly.	sir

* Client

Russell Homes

* Drawing Title

PROPOSED SITE LAYOUT

* Project

Proposed Residential Development, New Street, Littleborough

Job No	Drg No	Drawn	Rev
19060	01	ac / sir	P1
Scale	Date	Stage	
1:500 @ A0	JUNE 2022	FOR PLANNING	

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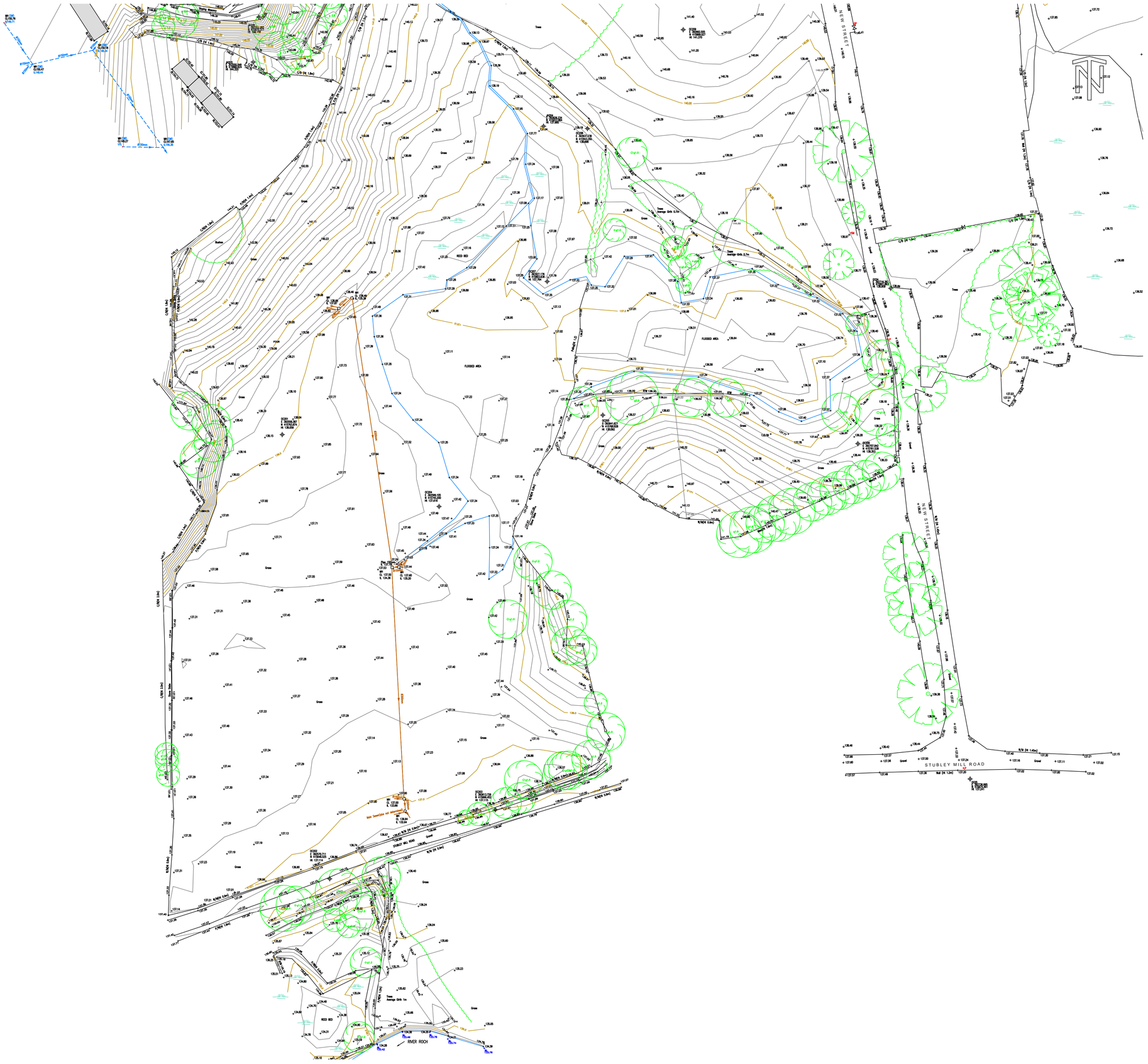
mpsl planning&design

Appendix B – Topographical Survey



Notes

KEY

Grid & Datum - Local Plane Grid related to OS National Grid & Datum
By GNSS RTK Observations

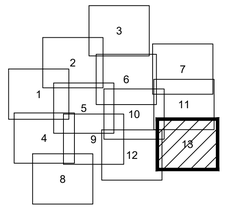
STANDARD ABBREVIATIONS

A/C	-	AIR CONDITIONING	GM	-	GAS METER	PP	-	PETROL PUMP
AE	-	AERIAL	GB	-	GREASE BOX	P/R	-	POST & RAIL
AL	-	ALARM	G	-	GIRTH	P/W	-	POST & WIRE
AV	-	AIR VALVE	GP	-	GATE POST	RH	-	RIDGE HEIGHT
BA	-	BUOYANCY AID	GU	-	GULLY	RP	-	REFLECTOR POST
BB	-	BELISHA BEACON	GV	-	GAS VALVE	RS	-	ROAD SIGN
BD	-	BUILDING DIVIDE	H/R	-	HANDRAIL	RTW	-	RETAINING WALL
BE	-	BED LEVEL	HT	-	HEIGHT	RWP	-	RAINWATER PIPE
BH	-	BOREHOLE	Hyd	-	HYDRANT	SA	-	STANCHION
BL	-	BASEMENT LIGHT	I/R	-	IRON RAILING	SB	-	SOFT BED LEVEL
BO	-	BOLLARD	IC	-	INSPECTION COVER	SC	-	SPEED CAMERA
BP	-	BOUNDARY POST	IL	-	INVERT LEVEL	SD	-	SATELITTE DISH
BR	-	BOULDER	IT	-	TRAFFIC COVER	S/F	-	SAFETY FENCE
BS	-	BUS STOP	JB	-	JUNCTION BOX	SG	-	SIGNAL
BU	-	BUSH	KO	-	KERB OFFLET	SI	-	SIGN
B/W	-	BARBED WIRE	LA	-	LADDER	SL	-	SOFFIT LEVEL
CA	-	CABLE	LB	-	LITTER BIN	SMP	-	SERVICE MARKER POST
CB	-	CONTROL BOX	LC	-	LIGHTING COLUMN	SS	-	SECURITY SENSOR
C/B	-	CLOSE BOARDED	LI	-	LIGHT	ST	-	STOP TAP
CC	-	CLOSE CIRCUIT TV	LP	-	LAMP POST	STN	-	STATION
C/I	-	CORRUGATED IRON	MBO	-	MOORING BOLLARD	SU	-	STUMP
C/B	-	CIGARETTE BIN	MA	-	MAST	SV	-	STOP VALVE
CL	-	COVER LEVEL	MH	-	MANHOLE	SW	-	SWITCHGEAR
Col	-	COLUMN	MO	-	MONUMENT	SY	-	STAY
CP	-	CATHODIC TEST POINT	MP	-	MILE POST	TA	-	TAP
C/P	-	CONCRETE PANEL	MR	-	MOORING RING	TBM	-	TEMPORARY BENCH MARK
CT	-	CLOSE CIRCUIT TV POLE	MW	-	MONITORING WELL	TCB	-	TELEPHONE CALL BOX
Cul	-	CULVERT	NP	-	NAME PLATE	TE	-	TELEPHONE
DP	-	DOWN PIPE	NYX	-	NYNEX	Tel	-	TELECOM
DR	-	DRAIN	OC	-	OLIVER CONTROL	TH	-	THRESHOLD
Dr.Ch	-	DRAINAGE CHANNEL	O/H	-	OVERHEAD	Tk	-	TANK
DU	-	DUCT	OSBM		ORDNANCE SURVEY BENCH MARK	TM	-	TICKET MACHINE
EH	-	EAVE HEIGHT				TS	-	TRAFFIC SIGNAL
EL	-	ELECTRIC	PA	-	PLAY APPARATUS	TP	-	TELEGRAPH POLE
EP	-	ELECTRICITY POLE	Pal	-	PALISADE	UTL	-	UNABLE TO LIFT
ER	-	EARTH ROD	PB	-	PILLAR BOX	VDP	-	VEHICLE DETECTOR PAD
FA	-	FENDOR ANCHOR	P/C	-	POST & CHAIN	VP	-	VENT PIPE
FB	-	FOOTBRIDGE	PC	-	PEDESTRIAN CROSSING	WB	-	WHISTLE BLOW
F/B	-	FLOWER BED	PH	-	PUBLIC HOUSE	WD	-	WELD
FH	-	FIRE HYDRANT	PI	-	PIPE	W/M	-	WIRE MESH
FL	-	FLOODLIGHT	PL	-	PLANT	WL	-	WATER LEVEL
FP	-	FOOTPATH	PM	-	PARKING METER	WM	-	WATER METER
FS	-	FLAG STAFF	PN	-	PLANTER	WO	-	WASH OUT
GA	-	GAS	PO	-	POST	WP	-	WASTE PIPE

SYMBOLS

HEDGE
GATE
BUILDING
TREE CANOPY
CONTROL STATION
TACTILE PAVING
TREE
MARSH

SHEET LAYOUT



Rev	Date	Drawn	Description	Ch'k'd	App'd
E	02.11.21	BW	Topo Area Added	AM	NDO
D	23.08.18	BW	Topo Area Added	AM	NDO

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Client

RUSSELL HOMES
13 WESTPOINT ENTEPRISE PARK
CLARENCE AVENUE
TRAFFORD PARK
MANCHESTER, M17 1QS

Title

NEW LANE
LITTLEBOROUGH

TOPOGRAPHICAL SURVEY

PHASE III

Surveyed	JW		Drawn	BW	
Dwg.Chk.	AM		Approved	NDO	
Scale 1:500 @ A1		Project 8476			Status REV
		CAD file !NDO-SBS\Projects\8476\DRAWING\SB8476_001D.DWG			
Drawing No 8476 / 001E / 14					Rev E

Appendix C – United Utilities Correspondence

Andy James

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 25 April 2022 16:30
To: Andy James
Cc: Wastewater Developer Services
Subject: PDE 4200048808 Land off New Street Littlebrough Rochdale OL15 8HZ

Good afternoon Andy,

Pre Development Enquiry for: Land off New Street Littlebrough Rochdale OL15 8HZ UU Reference Number : 4200048808

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

https://www.unitedutilities.com/builders-developers/working-near-our-assets/

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 225mm or 1950mm diameter public combined sewer within your proposed development site boundary at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

https://www.gov.uk/government/publications/groundwater-protection-position-statements

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the main river located south of the proposed site.

We would encourage you to identify and engage with any third party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/

A free copy of the new Design & Construction Guidance can be downloaded via the link below**:**

https://www.water.org.uk/sewerage-sector-guidance-approved-documents/

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please note that we would not permit the attenuation pond to be built over (even partially) the existing on site public sewers and all necessary easements should be met.

It is also important that you accurately locate the sewers on site as our records are only indicative.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Shoaib.

United Utilities
Water for the North West

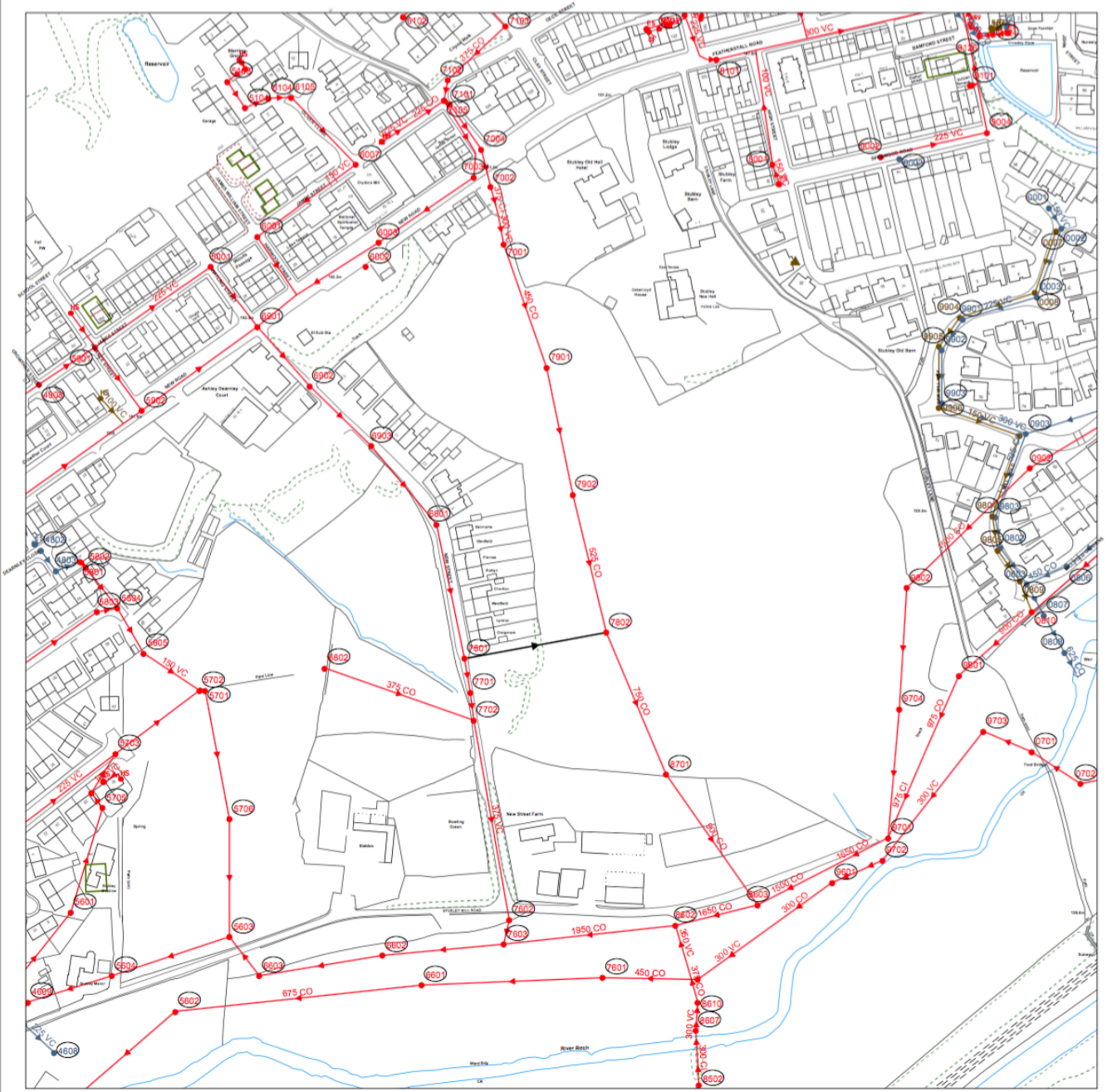
Shoaib Tauqeer
Developer Engineer
Developer Services & Metering
M: 07876745601
unitedutilities.com

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at developerserviceswater@uuplc.co.uk

-

Appendix D – United Utilities Sewer Records



Refno	Cover	Func	Invert	Size x Size y	Shape	Matl	Length	Grad
4603	142.8	SW						
4604	142.72	CO						
4605	142.64	SW						
4606	142.87	CO						
4607	140.28	SW						
4608	138.49	SW						
4609	141.28	CO						
4701	150.44	SW	149.1	150	CI	VC	15.81	35
4702	145.58	CO						
4801	152.77	CO						
4802	150.79	SW	149.75	150	CI	VC	13.6	49
4803	150.47	SW						
4804	149.93	CO						
4903	155.58	CO						
5601	141.36	CO	139.35	225	CI	VC	58.52	
5602	135.5	CO	132.87	675	CI	CO	68.77	382
5603	136.96	CO	132.67	1650	CI	CO	66.41	604
5604	137.23	CO						
5701	136.53	CO	135.44	225	CI	VC	70.21	72
5702	138.73	CO	137.98	225	CI	VC	9	13
5703	141.04	CO	139.47	225	CI	VC	56.4	51
5704		CO	0	225	CI	VC	24.7	
5706		CO						
5708	139.79	CO						
5801	150.39	CO	148.5	100	CI	VC	4.24	30
5802	149.18	CO						
5803	148.26	CO	146.85	150	CI	VC	11.18	25
5804	147.88	CO						
5805		CO						
5901	154.63	CO	152.9	225	CI	VC	75.45	43
5902	151.41	CO						
6601	135.49	CO	133.41	675	CI	CO	132.74	271
6602	136.96	CO						
6603	136.41	CO						
6801	141.08	CO	138.47	375	CI	VC	73.56	51
6802		CO	0	375	CI	CO	84.76	
6901	150.46	CO						
6902	144.73	CO						
6903	142.38	CO						
7601	136.1	CO	133.6	675	CI	CO	97.08	303
7602	137.18	CO	136.1	375	CI	VC	13.34	21
7603	136.66	CO						
7701	136.55	CO	136.71	375	CI	VC	15.13	378
7702	138.46	CO						
7801	139.07	CO						
7802	137.96	CO	135.83	750	CI	CO	82.46	434
7901	149.68	CO						
7902	147.09	CO						
8602	137.66	CO						
8601	137.55	CO	135.49	450	CI	CO	51.01	33
8602	136.8	CO	133.12	1950	CI	CO	92.54	617
8603	137.15	CO	133.4	1650	CI	CO	45.35	302
8607	137.12	CO						
8610	136.55	CO	135.56	375	CI	CO	21.84	25
8701	137.72	CO						
8801	138.68	CO	134.89	300	CI	CO	44.41	
9701	138.88	CO	133.43	1650	CI	CO	39.36	3936
9702	138.57	CO	134.99	300	CI	VC	14.32	239
9703		CO	0	300	CI	VC	67.62	
9704	137.41	CO	133.78	1500	CI	CO	69.28	247
9801	137.24	CO	135.59	675	CI	CO	47.01	80
9802	138.94	CO	133.74	1500	CI	CO	65.12	
9803	138.59	SW						
9804	138.59	FO						
9805	138.41	FO						
9901	143.95	SW						
9902	143.12	SW						
9903	140.86	SW						
9904	143.95	FO						
9905	143.16	FO						
9906	140.84	FO						
9001	153.07	CO						
5102		CO						
5103		CO						
5104		CO						
6001	151.93	CO	149.85	225	CI	VC	37.44	
6002	150.25	CO						
6003	150.18	CO	147.86	375	CI	VC	79.17	144
6007		CO	0	150	CI	VC	65.41	
6102	156.46	CO	156.88	150	CI	VC	36.8	59
6104		CO						
6105		CO						
7001	146.18	CO	143.79	450	CI	CO	69.89	13
7002	151.25	CO	148.76	375	CI	CO	15.52	11
7003	150.87	CO	148.35	375	CI	VC	61.85	126
7004	151.36	CO	148.65	375	CI	CO	20.62	12
7101	152.98	CO						
7102	154.03	CO	151.31	375	CI	CO	11.18	58
7103	155.94	CO	153.29	375	CI	CO	42.45	22
7105	153.25	CO	151.03	375	CI	CO	3.81	20
8001	148.19	CO	146.83	100	CI	VC	61.88	
8101	148.88	CO						
8102	150.81	CO	149.26	225	CI	VC	27.88	
9002	147.59	CO	145.33	225	CI	VC	58.48	84
9003	147.44	SW						
9004	146.74	CO						
9101	146.43	CO	145.66	100	CI	VC	4.12	
9121		CO						
9124		CO						
9125		CO						
6701	136.98	CO	135.42	300	CI	VC	28.23	
6702	137.52	CO	135.55	300	CI	VC	31.06	444
6801	141.25	CO						
6802	136.43	SW						
6803	138.49	SW						
6804	140.88	SW						
6805	140.69	SW						
6806	139.24	SW						
6807	138.34	SW						
6808	137.39	SW						
6809	136.49	FO						
6810	136.32	CO	135.67	900	CI	CO	51.7	739
6902	137.94	CO	133.9	1500	CI	CO	92.05	614
6903	139.28	SW						
6904	140.27	SW						
6905	139.32	FO						
0001	144.47	SW	143	150	CI	VC	12.96	19
0002	143.71	SW						
0003	143.67	SW						
0004	141.69	SW						
0007	143.73	FO	142.1	150	CI	VC	35	140
0008	143.68	FO						
4609		SW						
5707		CO						
5903		FO						
5905		CO	0	225	CI	VC	22.2	
8604		CO						
8605		CO						
8606		CO						
8608		CO	0	300	CI	CI	12.14	
9602		CO						
9603		CO						
9705		CO						
5101		CO	0	150	CI	VC	5.71	
6101		CO						
7036		CO						
8105		CO						
8106		CO						
8107		CO						
8109		CO						
8116		CO						
8117		CO						
9111		FO						
9115		SW						
9122		CO						
0126		SW						
5904		CO						
6005		CO						
6006		CO						
8104		CO						

Refno	Cover	Func	Invert	Size x Size y	Shape	Matl	Length	Grad
8112		CO						
8118		CO						
8119		CO						
8120		CO						
9121		CO						
9122		CO						
0107		CO						
8002		FO						
9126		CO						

WASTE WATER SYMBOLOGY

Foul · Surface · Combined · Overflow

Manhole
Manhole, Side Entry
Mainsewer, Public
Mainsewer, Private
Mainsewer, SS04
Rising Main, Public
Rising Main, Private
Rising Main, SS04
Highway Drain, Private

Foul · Surface · Combined

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

Sludge Main, Public
Sludge Main, Private
Sludge Main, SS04

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

Foul · Surface · Combined · Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

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

SEWER MATERIAL

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

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.
The actual positions may be different from those shown on
the plan and private pipes, sewers or drains may not be recorded.
United Utilities will not accept any liability for any damage caused by the actual positions being different from those shown.

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OS Sheet No:

Scale: 1: 1250 Date: 18/03/2015

159 Nodes

Sheet 1 of 1

United Utilities
helping life flow smoothly

SEWER RECORDS

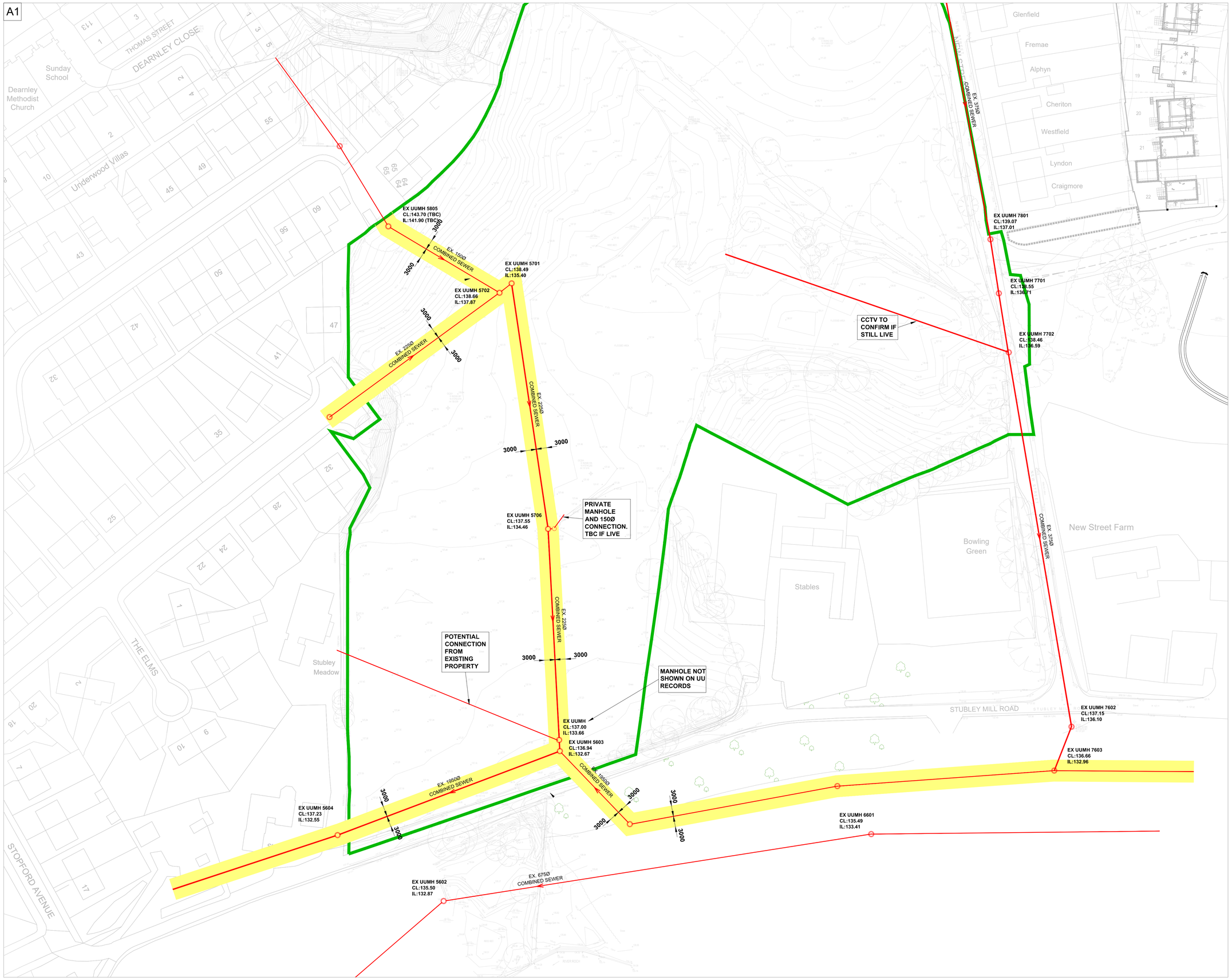
Printed By: Jodie Lloyd

OS Sheet No:

Scale: 1: 1250 Date: 18/03/2015

Appendix E – Marston & Grundy Drawings

A1



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KEY

- EXISTING COMBINED SEWER
- SITE BOUNDARY
- SEWER EASEMENT

CCTV & ALIGNMENT SURVEY REQUIRED

Rev	Description	By	Date	Chk'd
P4	ATTENUATION POND REMOVED	PG	29.04.22	AJ
P3	ATTENUATION POND SIZE AMENDED	PG	25.04.22	AJ
P2	OUTLINE ATTENUATION POND SHOWN	PG	21.04.22	AJ
P1	PRELIMINARY ISSUE	PG	11.04.22	AJ

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Consulting Engineers
Priory House, Ellesmere Ave
Marple, Stockport, Cheshire, SK6 7AN
Telephone: *0161 427 7231*
Email: *mail@marstonandgrundy.com*

Client
RUSSELL HOMES

Project
NEW STREET
LITTLEBOROUGH

Drawing
EXISTING DRAINAGE GA

Purpose of Issue
PRELIMINARY

Scale @ A1	Date	Drawn	Checked
1:500	08.04.22	PG	AJ

Project No.	Drawing No.	Revision
13169	100	P4

A1

SURFACE WATER DRAINAGE STRATEGY

CONSIDERATION HAS BEEN GIVEN TO THE HIERARCHY OF DRAINAGE OPTIONS FOR THE SITE AS FOLLOWS:

1. DISCHARGE INTO GROUND - ANTICIPATED COHESIVE CLAY MATERIAL WOULD NEGATE INFILTRATION AS A VIABLE OPTION.
2. DISCHARGE TO SURFACE WATER BODY - NEW GRAVITY CONNECTION TO BE MADE TO THE RIVER ROCH WATERCOURSE SOUTH OF THE DEVELOPMENT SITE.
3. DISCHARGE TO SURFACE WATER SEWER, HIGHWAY DRAIN OR OTHER DRAINAGE SYSTEM - HIGHER OPTIONS AVAILABLE..

THE PROPOSAL IS TO DISCHARGE SURFACE WATER TO THE ADJACENT RIVER ROCH. FLOWS WILL BE RESTRICTED TO THE RESPECTIVE GREENFELD RATES OF:

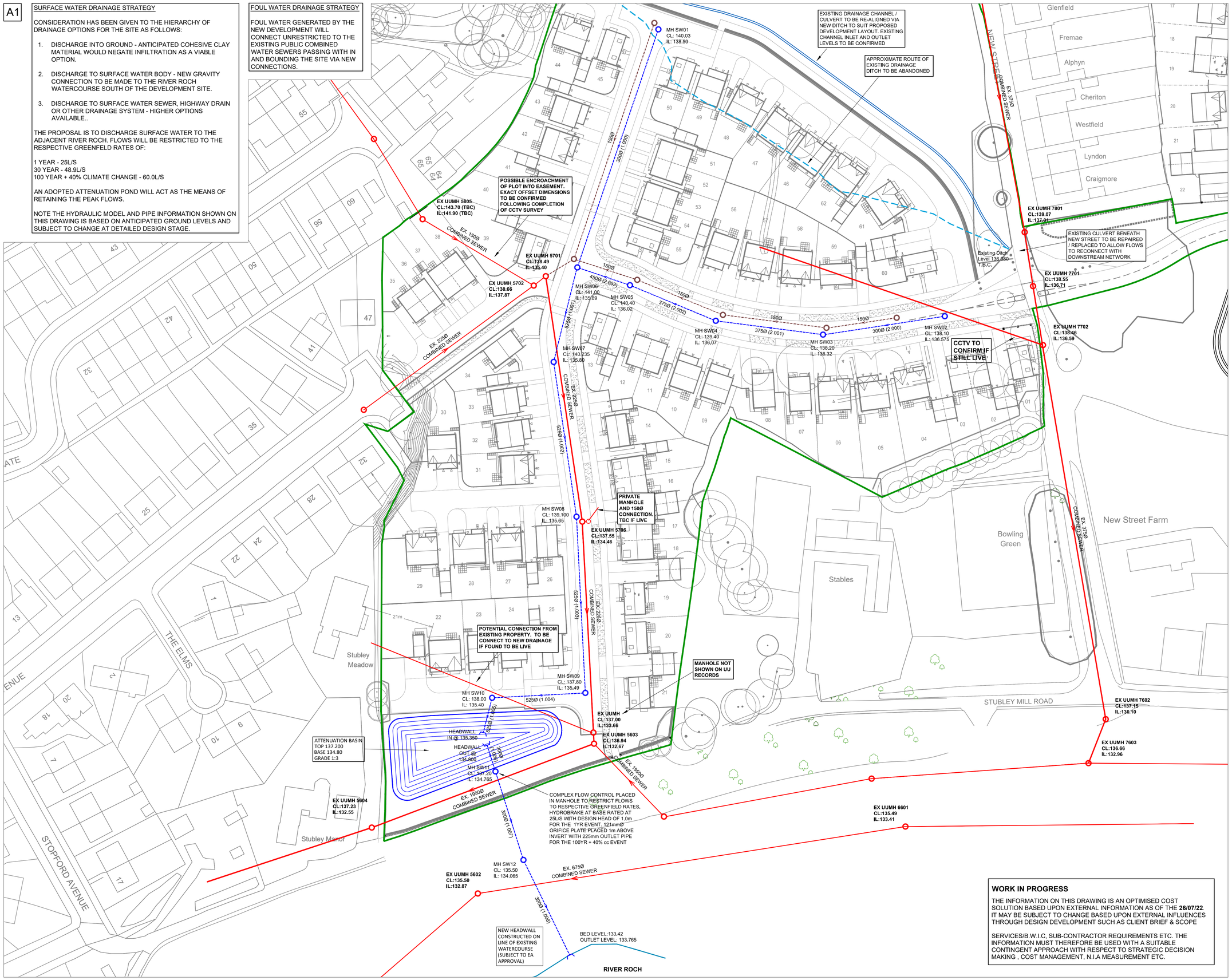
1 YEAR - 25L/S
30 YEAR - 48.9L/S
100 YEAR + 40% CLIMATE CHANGE - 60.0L/S

AN ADOPTED ATTENUATION POND WILL ACT AS THE MEANS OF RETAINING THE PEAK FLOWS.

NOTE THE HYDRAULIC MODEL AND PIPE INFORMATION SHOWN ON THIS DRAWING IS BASED ON ANTICIPATED GROUND LEVELS AND SUBJECT TO CHANGE AT DETAILED DESIGN STAGE.

FOUL WATER DRAINAGE STRATEGY

FOUL WATER GENERATED BY THE NEW DEVELOPMENT WILL CONNECT UNRESTRICTED TO THE EXISTING PUBLIC COMBINED WATER SEWERS PASSING WITH IN AND BOUNDING THE SITE VIA NEW CONNECTIONS.



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KEY

- EXISTING COMBINED SEWER
- EXISTING DRAINAGE DITCH
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- SITE BOUNDARY

WORK IN PROGRESS

THE INFORMATION ON THIS DRAWING IS AN OPTIMISED COST SOLUTION BASED UPON EXTERNAL INFORMATION AS OF THE **26/07/22**. IT MAY BE SUBJECT TO CHANGE BASED UPON EXTERNAL INFLUENCES THROUGH DESIGN DEVELOPMENT SUCH AS CLIENT BRIEF & SCOPE

SERVICES/B.W.I.C, SUB-CONTRACTOR REQUIREMENTS ETC. THE INFORMATION MUST THEREFORE BE USED WITH A SUITABLE CONTINGENT APPROACH WITH RESPECT TO STRATEGIC DECISION MAKING , COST MANAGEMENT, N.I.A MEASUREMENT ETC.

Rev	Description	By	Date	Chk'd
P2	SITE PLAN & INVERT LEVELS UPDATED	PG	26.07.22	AJ
P1	PRELIMINARY ISSUE	PG	29.04.22	AJ

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Email: mail@marstonandgrundy.com

Client
RUSSELL HOMES

Project
NEW STREET
LITTLEBOROUGH

Drawing
DRAINAGE STRATEGY PLAN

Purpose of Issue
PRELIMINARY

Scale @ A1	Date	Drawn	Checked
1:500	29.04.22	PG	AJ

Project No.	Drawing No.	Revision
13169	101	P2

Appendix F – Hydraulic Calculations

	New Street, Littleborough Outline Surface Water Drainage Network V2
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	150	PIMP (%)	100
M5-60 (mm)	19.000	Add Flow / Climate Change (%)	0
Ratio R	0.252	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.431	4-8	1.096	8-12	0.012

Total Area Contributing (ha) = 1.539

Total Pipe Volume (m³) = 55.665

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	72.000	0.360	200.0	0.304	4.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	36.000	0.180	200.0	0.192	4.00	0.0	0.600	o	300	Pipe/Conduit	
2.001	30.000	0.120	250.0	0.130	0.00	0.0	0.600	o	375	Pipe/Conduit	
2.002	26.000	0.104	250.0	0.124	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.08	138.500	0.304	0.0	0.0	0.0	1.11	78.3	41.2
2.000	50.00	4.54	136.575	0.192	0.0	0.0	0.0	1.11	78.3	26.0
2.001	50.00	4.98	136.320	0.322	0.0	0.0	0.0	1.14	126.1	43.6
2.002	50.00	5.36	136.200	0.446	0.0	0.0	0.0	1.14	126.1	60.4

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	New Street, Littleborough Outline Surface Water Drainage Network V2
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
2.003	16.000	0.053	300.0	0.075	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.001	28.000	0.093	300.0	0.200	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.002	44.000	0.147	300.0	0.210	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.003	50.000	0.167	300.0	0.140	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.004	26.000	0.087	300.0	0.100	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.005	12.000	0.060	200.0	0.064	0.00	0.0	0.600	o	525	Pipe/Conduit	
1.006	7.000	0.035	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	28.000	0.700	40.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	31.000	0.300	103.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
2.003	50.00	5.59	136.021	0.521	0.0	0.0	0.0	1.17	185.8	70.5
1.001	50.00	5.95	135.893	1.025	0.0	0.0	0.0	1.29	278.8	138.8
1.002	50.00	6.52	135.799	1.235	0.0	0.0	0.0	1.29	278.8	167.2
1.003	50.00	7.17	135.653	1.375	0.0	0.0	0.0	1.29	278.8	186.2
1.004	50.00	7.50	135.486	1.475	0.0	0.0	0.0	1.29	278.8	199.7
1.005	50.00	7.63	135.399	1.539	0.0	0.0	0.0	1.58	342.1	208.4
1.006	50.00	7.73	134.800	1.539	0.0	0.0	0.0	1.11	78.3«	208.4
1.007	50.00	7.92	134.765	1.539	0.0	0.0	0.0	2.49	176.2«	208.4
1.008	50.00	8.26	134.065	1.539	0.0	0.0	0.0	1.55	109.3«	208.4

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.008	RIVER ROCH	134.800	133.765	133.420	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Simulation Criteria for Storm

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.000	Storm Duration (mins)	30
Ratio R	0.252		

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Online Controls for Storm

Complex Manhole: MH SW11, DS/PN: 1.007, Volume (m³): 5.4

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0219-2500-1000-2500
Design Head (m)	1.000
Design Flow (l/s)	25.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	219
Invert Level (m)	134.765
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1500

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	25.0
Flush-Flo™	0.361	25.0
Kick-Flo®	0.736	21.6
Mean Flow over Head Range	-	20.8

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.4	1.200	27.3	3.000	42.4	7.000	63.9
0.200	21.5	1.400	29.4	3.500	45.6	7.500	66.0
0.300	24.8	1.600	31.3	4.000	48.7	8.000	68.2
0.400	24.9	1.800	33.1	4.500	51.5	8.500	70.2
0.500	24.6	2.000	34.8	5.000	54.2	9.000	72.2
0.600	23.9	2.200	36.5	5.500	56.8	9.500	74.1
0.800	22.5	2.400	38.0	6.000	59.3		
1.000	25.0	2.600	39.5	6.500	61.6		

Orifice

Diameter (m) 0.121 Discharge Coefficient 0.600 Invert Level (m) 135.765

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

Storage Structures for Storm

Tank or Pond Manhole: POND, DS/PN: 1.006

Invert Level (m) 134.800

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	105.0	2.800	0.0	5.600	0.0	8.400	0.0
0.400	190.0	3.200	0.0	6.000	0.0	8.800	0.0
0.800	300.0	3.600	0.0	6.400	0.0	9.200	0.0
1.200	420.0	4.000	0.0	6.800	0.0	9.600	0.0
1.600	550.0	4.400	0.0	7.200	0.0	10.000	0.0
2.000	680.0	4.800	0.0	7.600	0.0		
2.400	830.0	5.200	0.0	8.000	0.0		

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.252
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	MH SW01	15 Winter	1	+0%	30/15 Summer			
2.000	MH SW02	15 Winter	1	+0%	100/15 Summer	100/15 Summer		
2.001	MHSW03	15 Winter	1	+0%	30/15 Summer	100/15 Winter		
2.002	MH SW04	15 Winter	1	+0%	30/15 Summer			
2.003	MH SW05	15 Winter	1	+0%	30/15 Summer			
1.001	MH SW06	15 Winter	1	+0%	30/15 Summer			
1.002	MH SW07	15 Winter	1	+0%	30/15 Summer			
1.003	MH SW08	15 Winter	1	+0%	30/15 Summer			
1.004	MH SW09	15 Winter	1	+0%	30/15 Summer			
1.005	MH SW10	15 Winter	1	+0%	30/15 Summer			
1.006	POND	120 Winter	1	+0%	1/15 Summer			
1.007	MH SW11	120 Winter	1	+0%	1/15 Summer			
1.008	MH SW12	480 Summer	1	+0%				

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	New Street, Littleborough Outline Surface Water Drainage Network V2
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH SW01	138.648	-0.152	0.000	0.49		36.9	OK	
2.000	MH SW02	136.692	-0.183	0.000	0.32		22.8	OK	4
2.001	MHSW03	136.465	-0.230	0.000	0.31		35.0	OK	1
2.002	MH SW04	136.370	-0.205	0.000	0.42		45.6	OK	
2.003	MH SW05	136.209	-0.262	0.000	0.36		52.5	OK	
1.001	MH SW06	136.147	-0.270	0.000	0.45		104.2	OK	
1.002	MH SW07	136.060	-0.264	0.000	0.49		119.7	OK	
1.003	MH SW08	135.922	-0.256	0.000	0.51		127.5	OK	
1.004	MH SW09	135.774	-0.237	0.000	0.58		131.6	OK	
1.005	MH SW10	135.685	-0.239	0.000	0.57		136.0	OK	
1.006	POND	135.393	0.293	0.000	0.47		26.6	SURCHARGED	
1.007	MH SW11	135.379	0.314	0.000	0.16		24.9	SURCHARGED	
1.008	MH SW12	134.166	-0.199	0.000	0.25		25.0	OK	

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by	
Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.252
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	MH SW01	15 Winter	30	+0%	30/15 Summer			
2.000	MH SW02	15 Winter	30	+0%	100/15 Summer	100/15 Summer		
2.001	MHSW03	15 Winter	30	+0%	30/15 Summer	100/15 Winter		
2.002	MH SW04	15 Winter	30	+0%	30/15 Summer			
2.003	MH SW05	15 Winter	30	+0%	30/15 Summer			
1.001	MH SW06	15 Winter	30	+0%	30/15 Summer			
1.002	MH SW07	15 Winter	30	+0%	30/15 Summer			
1.003	MH SW08	15 Winter	30	+0%	30/15 Summer			
1.004	MH SW09	15 Winter	30	+0%	30/15 Summer			
1.005	MH SW10	15 Winter	30	+0%	30/15 Summer			
1.006	POND	180 Winter	30	+0%	1/15 Summer			
1.007	MH SW11	180 Winter	30	+0%	1/15 Summer			
1.008	MH SW12	180 Winter	30	+0%				

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by	
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH SW01	138.905	0.105	0.000	1.12		84.3	SURCHARGED	
2.000	MH SW02	136.853	-0.022	0.000	0.77		55.8	OK	4
2.001	MHSW03	136.790	0.095	0.000	0.75		83.0	SURCHARGED	1
2.002	MH SW04	136.697	0.122	0.000	0.95		104.5	SURCHARGED	
2.003	MH SW05	136.615	0.144	0.000	0.78		112.2	SURCHARGED	
1.001	MH SW06	136.584	0.167	0.000	1.02		236.3	SURCHARGED	
1.002	MH SW07	136.513	0.189	0.000	1.12		275.3	SURCHARGED	
1.003	MH SW08	136.367	0.189	0.000	1.14		283.0	SURCHARGED	
1.004	MH SW09	136.159	0.148	0.000	1.27		289.7	SURCHARGED	
1.005	MH SW10	135.995	0.071	0.000	1.25		297.6	SURCHARGED	
1.006	POND	135.987	0.887	0.000	0.68		38.6	SURCHARGED	
1.007	MH SW11	135.963	0.898	0.000	0.24		38.6	SURCHARGED	
1.008	MH SW12	134.194	-0.171	0.000	0.39		38.6	OK	

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	New Street, Littleborough Outline Surface Water Drainage Network V2	
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Innovyze	Network 2017.1.2	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 1
Number of Online Controls 1 Number of Time/Area Diagrams 0
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.252
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	MH SW01	15 Winter	100	+40%	30/15 Summer			
2.000	MH SW02	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
2.001	MHSW03	15 Winter	100	+40%	30/15 Summer	100/15 Winter		
2.002	MH SW04	15 Winter	100	+40%	30/15 Summer			
2.003	MH SW05	15 Winter	100	+40%	30/15 Summer			
1.001	MH SW06	15 Winter	100	+40%	30/15 Summer			
1.002	MH SW07	15 Winter	100	+40%	30/15 Summer			
1.003	MH SW08	15 Winter	100	+40%	30/15 Summer			
1.004	MH SW09	15 Winter	100	+40%	30/15 Summer			
1.005	MH SW10	240 Winter	100	+40%	30/15 Summer			
1.006	POND	180 Winter	100	+40%	1/15 Summer			
1.007	MH SW11	180 Winter	100	+40%	1/15 Summer			
1.008	MH SW12	180 Winter	100	+40%				

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	New Street, Littleborough Outline Surface Water Drainage Network V2
Date 25/07/2022 File New Street - SW Network...	Designed by paulg Checked by
Innovyze	Network 2017.1.2

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	MH SW01	139.777	0.977	0.000	1.92		144.5	FLOOD RISK	
2.000	MH SW02	138.118	1.243	17.989	1.34		97.1	FLOOD	4
2.001	MHSW03	138.201	1.506	1.483	0.97		108.4	FLOOD	1
2.002	MH SW04	138.215	1.640	0.000	1.17		128.3	SURCHARGED	
2.003	MH SW05	138.167	1.696	0.000	1.06		152.5	SURCHARGED	
1.001	MH SW06	138.118	1.700	0.000	1.56		360.4	SURCHARGED	
1.002	MH SW07	137.881	1.557	0.000	1.79		439.8	SURCHARGED	
1.003	MH SW08	137.384	1.206	0.000	1.91		475.6	SURCHARGED	
1.004	MH SW09	136.764	0.753	0.000	2.21		504.6	SURCHARGED	
1.005	MH SW10	136.621	0.697	0.000	0.79		188.3	SURCHARGED	
1.006	POND	136.585	1.485	0.000	1.04		58.8	SURCHARGED	
1.007	MH SW11	136.544	1.479	0.000	0.37		58.8	SURCHARGED	
1.008	MH SW12	134.231	-0.134	0.000	0.59		58.8	OK	

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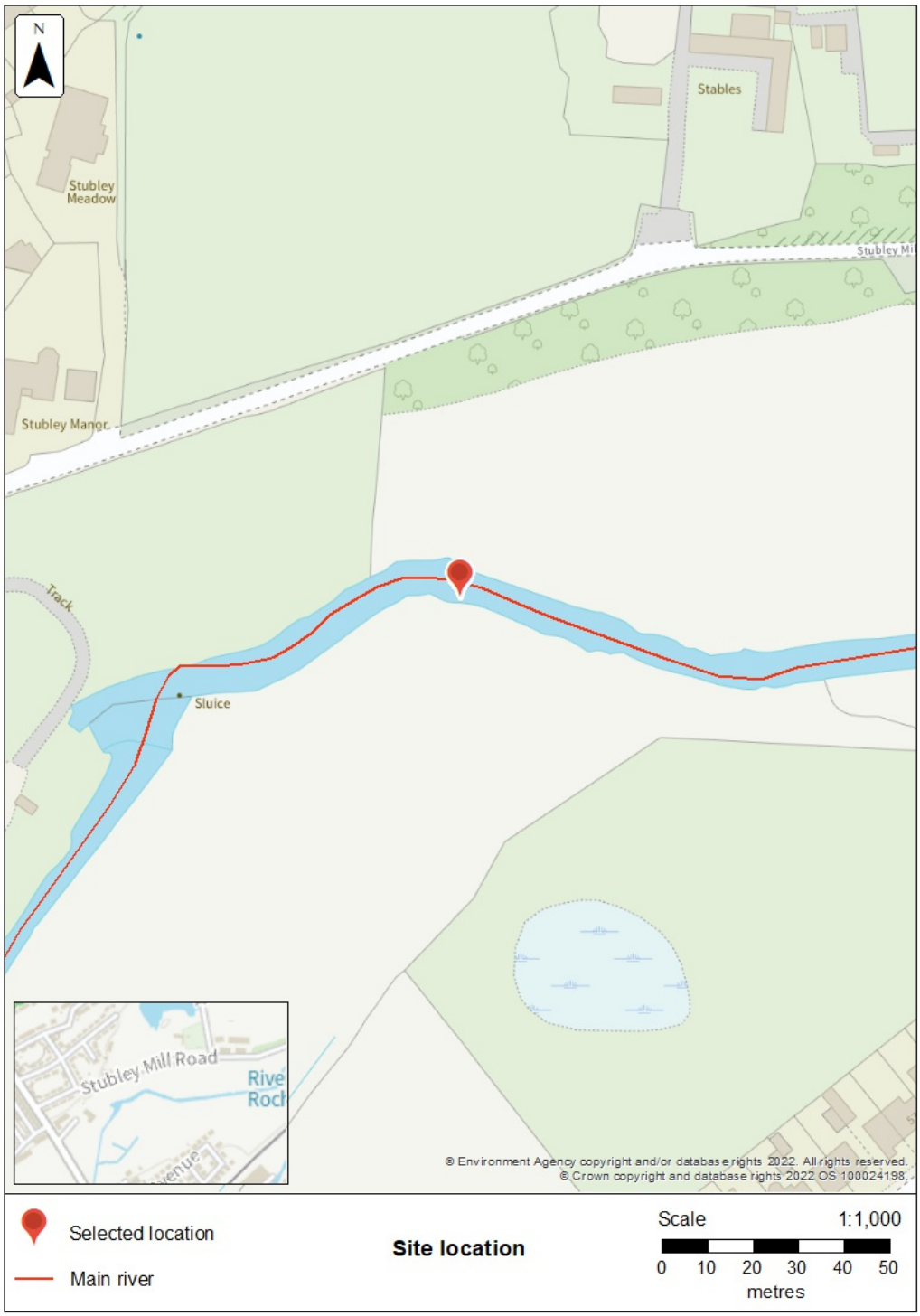
Appendix G – Environment Agency Flood Data

Flood risk assessment data

Location of site: 392603 / 415601 (shown as easting and northing coordinates) **Document created on:** 19 April 2022
This information was previously known as a product 4.
Customer reference number: GMMC257599SW

Map showing the location that flood risk assessment data has been requested for.



How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- information on the models used
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- historic flooding
- flood defences and attributes
- modelled data
- climate change modelled data
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Surface water and other sources of flooding

Use the long term flood risk service to find out about the risk of flooding from:

- surface water
- ordinary watercourses
- reservoirs

For information about sewer flooding, contact the relevant water company for the area.

About the models used

Model name: Rochdale and Littleborough 2013
Scenario(s): Defended fluvial, defences removed fluvial, defended climate change fluvial, defences removed climate change fluvial
Date: 1 June 2013

This model contains the most relevant data for your area of interest.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your development is in flood zone 3.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

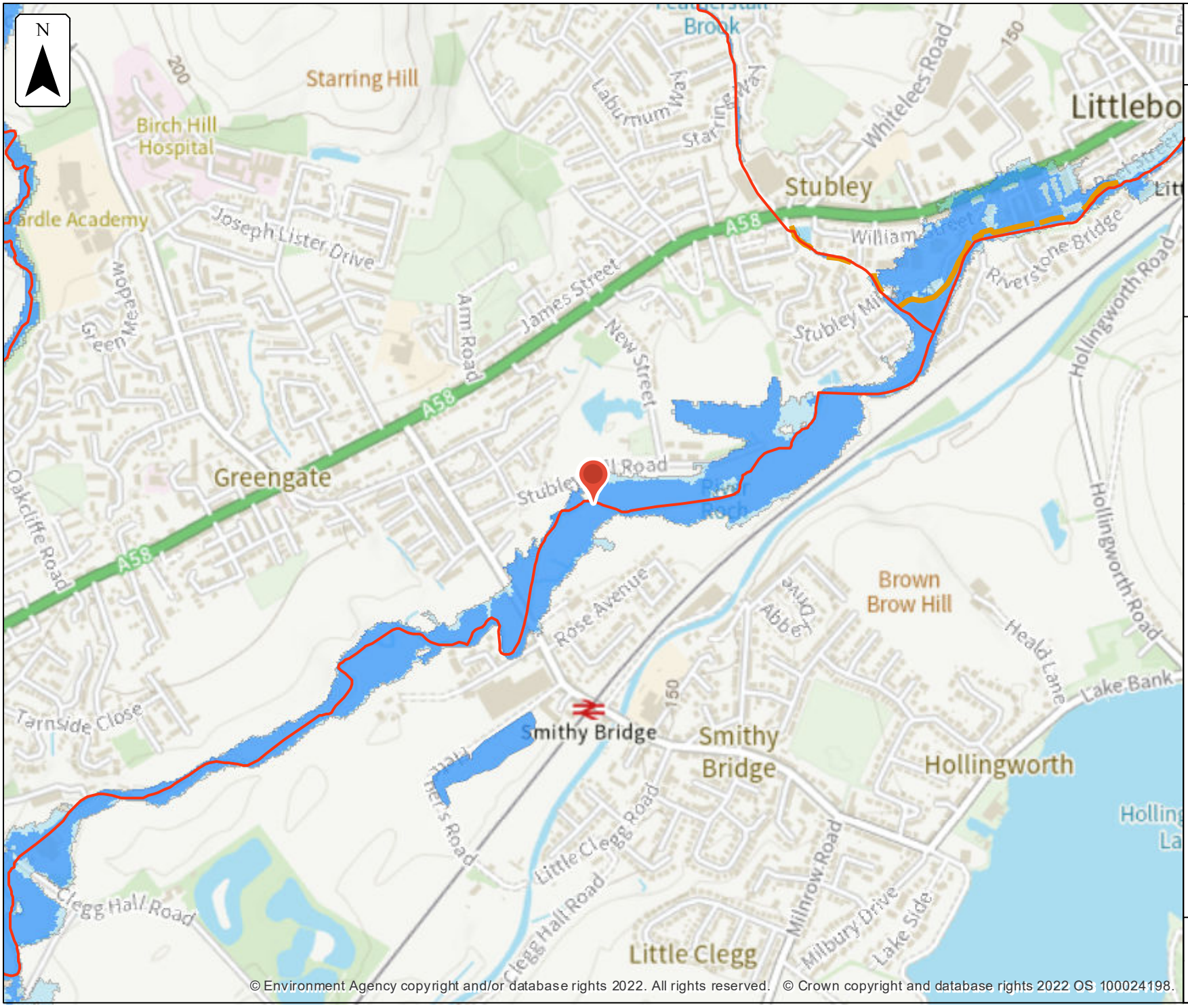
Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change

This data is updated on a quarterly basis as better data becomes available.



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Environment Agency

Flood map for planning

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Selected location

Main river

Flood defence

Flood zone 3

Flood zone 2

0 100 200 300 400 500
metres

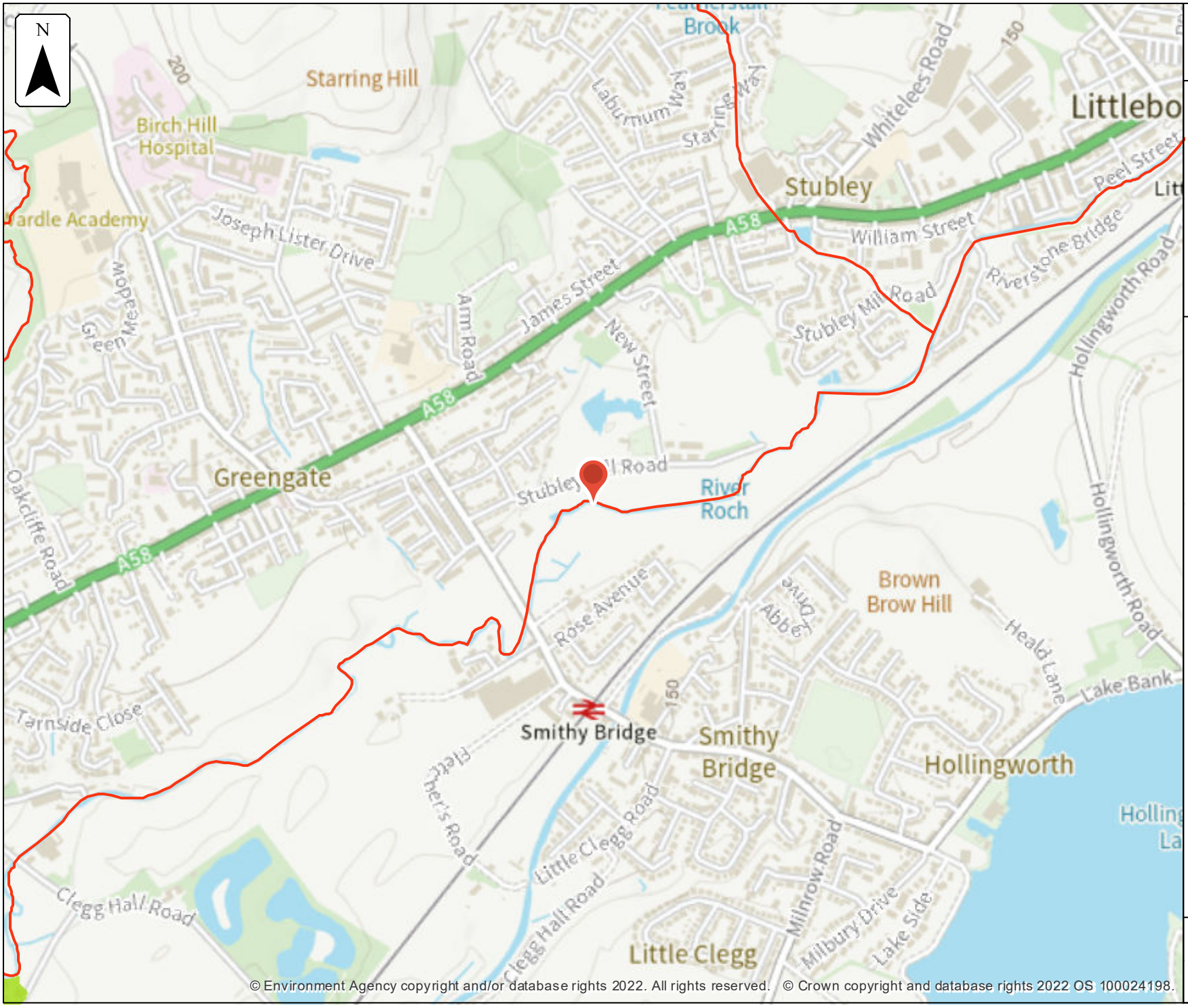
Historic flooding

This map is an indicative outline of areas that have previously flooded. Remember that:

- our records are incomplete, so the information here is based on the best available data
- it is possible not all properties within this area will have flooded
- other flooding may have occurred that we do not have records for
- flooding can come from a range of different sources - we can only supply flood risk data relating to flooding from rivers or the sea

You can also contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

Download recorded flood outlines in GIS format



Environment Agency

Historic flood map

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Selected location

Main river

Date of flood event

December, 2015

0 100 200 300 400 500
metres

Historic flood event data

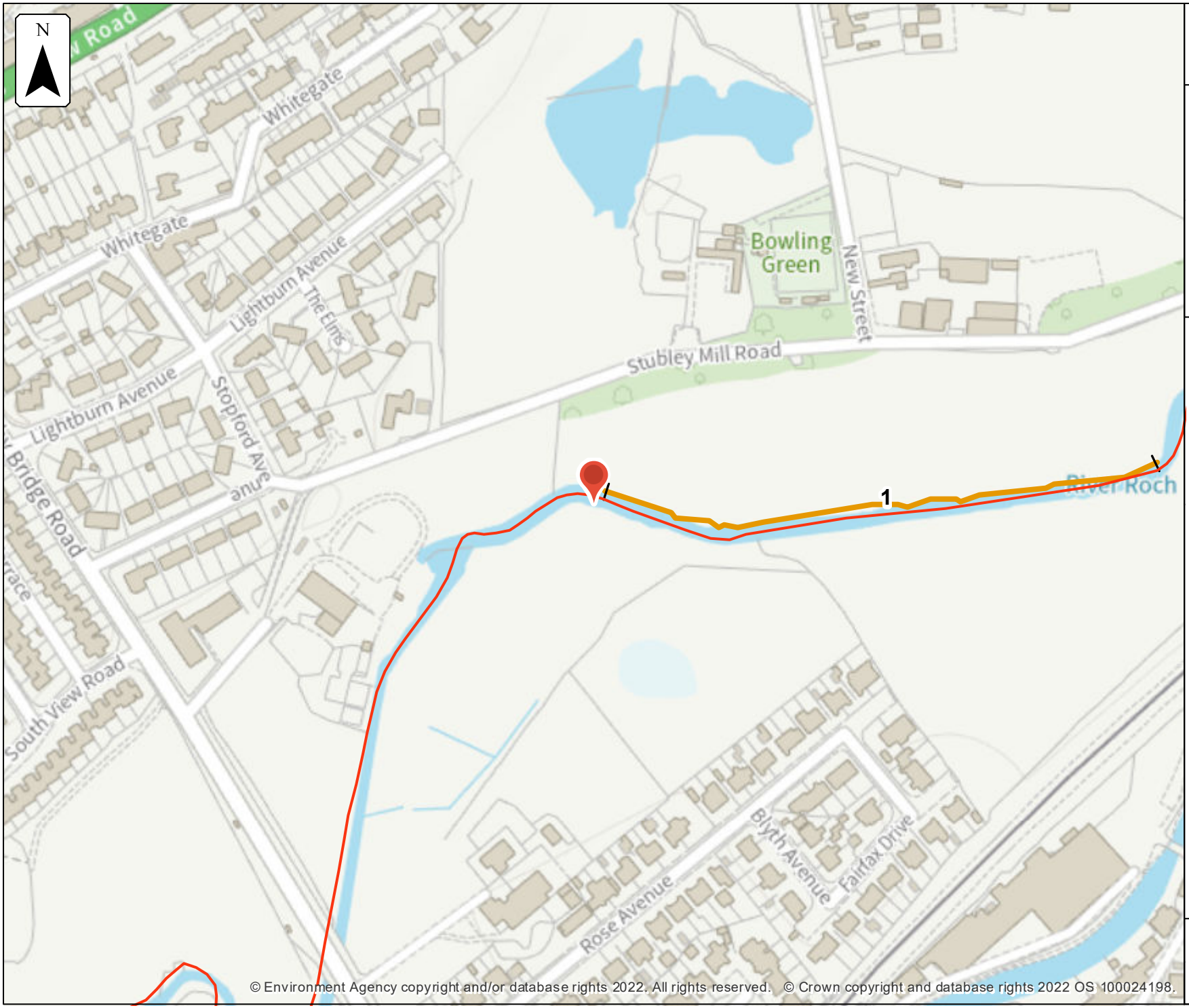
Start date	End date	Source of flood	Cause of flood	Affects location
26 December 2015	26 December 2015	main river	channel capacity exceeded (no raised defences)	No

Flood defences and attributes

The flood defences map shows the location of the flood defences present.

The flood defences data table shows the type of defences, their condition and the standard of protection. It shows the height above sea level of the top of the flood defence (crest level). The height is In mAOD which is the metres above the mean sea level at Newlyn, Cornwall.

It's important to remember that flood defence data may not be updated on a regular basis. The information here is based on the best available data.



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Environment Agency

Flood defences

Location (easting/northing)
392603/415601

Scale
1:2,500

Created
11 Apr 2022

Selected location

Main river

Flood defence

0 25 50 75 100
metres

Flood defences data

Label	Asset ID	Asset Type	Standard of protection (years)	Current condition	Downstream actual crest level (mAOD)	Upstream actual crest level (mAOD)	Effective crest level (mAOD)
1	45831	Embankment			134.50	136.10	

Any blank cells show where a particular value has not been recorded for an asset.

Modelled data

This section provides details of different scenarios we have modelled and includes the following (where available):

- outline maps showing the area at risk from flooding in different modelled scenarios
- modelled node point map(s) showing the points used to get the data to model the scenarios and table(s) providing details of the flood risk for different return periods

Climate change

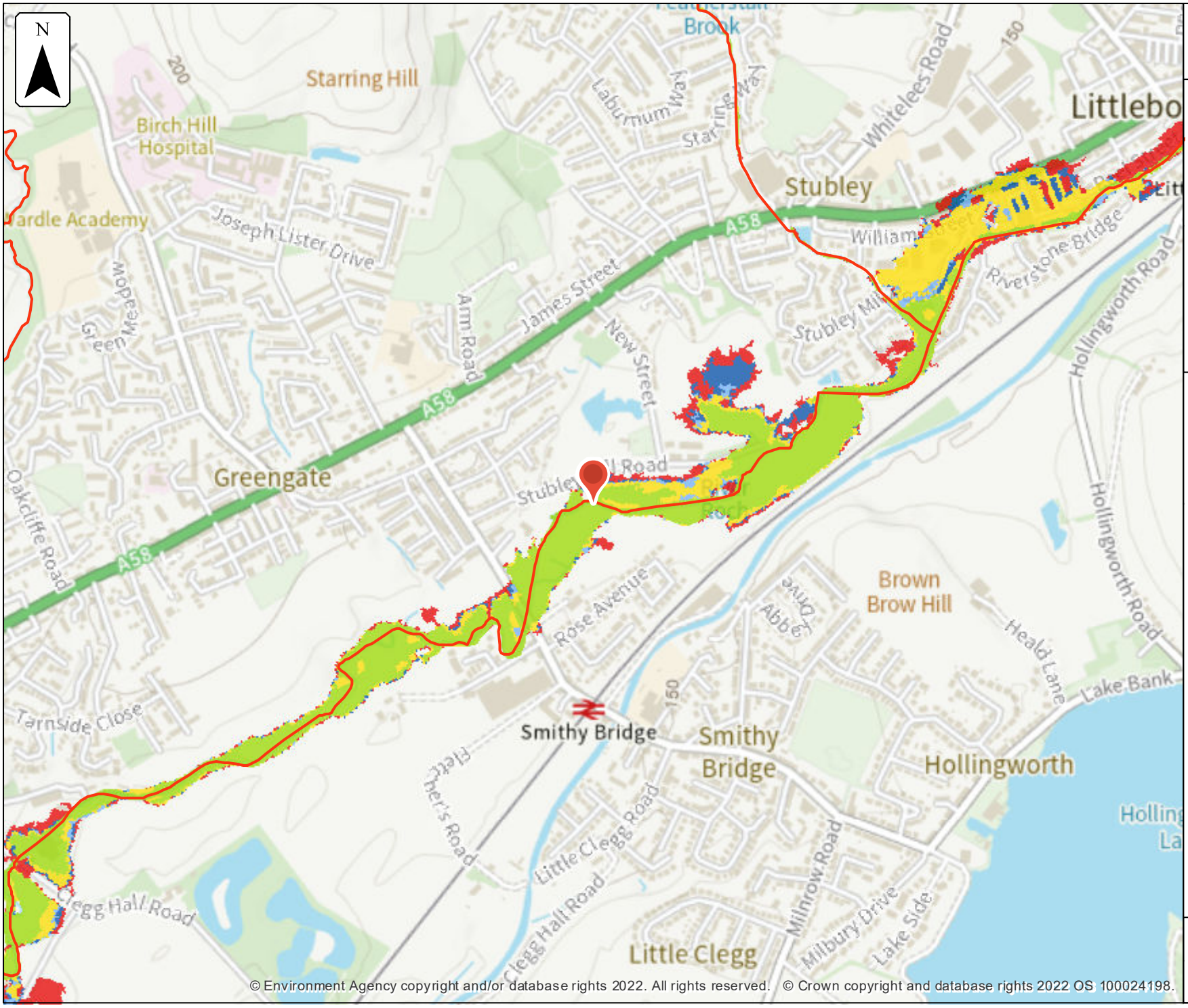
The climate change data included in the models may not include the latest flood risk assessment climate change allowances. Where the new allowances are not available you will need to consider this data and factor in the new allowances to demonstrate the development will be safe from flooding.

The Environment Agency will incorporate the new allowances into future modelling studies. For now, it's your responsibility to demonstrate that new developments will be safe in flood risk terms for their lifetime.

Modelled scenarios

The following scenarios are included:

- Defended modelled fluvial: risk of flooding from rivers where there are flood defences
- Defences removed modelled fluvial: risk of flooding from rivers where flood defences have been removed
- Defended climate change modelled fluvial: risk of flooding from rivers where there are flood defences, including estimated impact of climate change
- Defences removed climate change modelled fluvial: risk of flooding from rivers where flood defences have been removed, including estimated impact of climate change



Environment Agency

Defended modelled fluvial extent

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

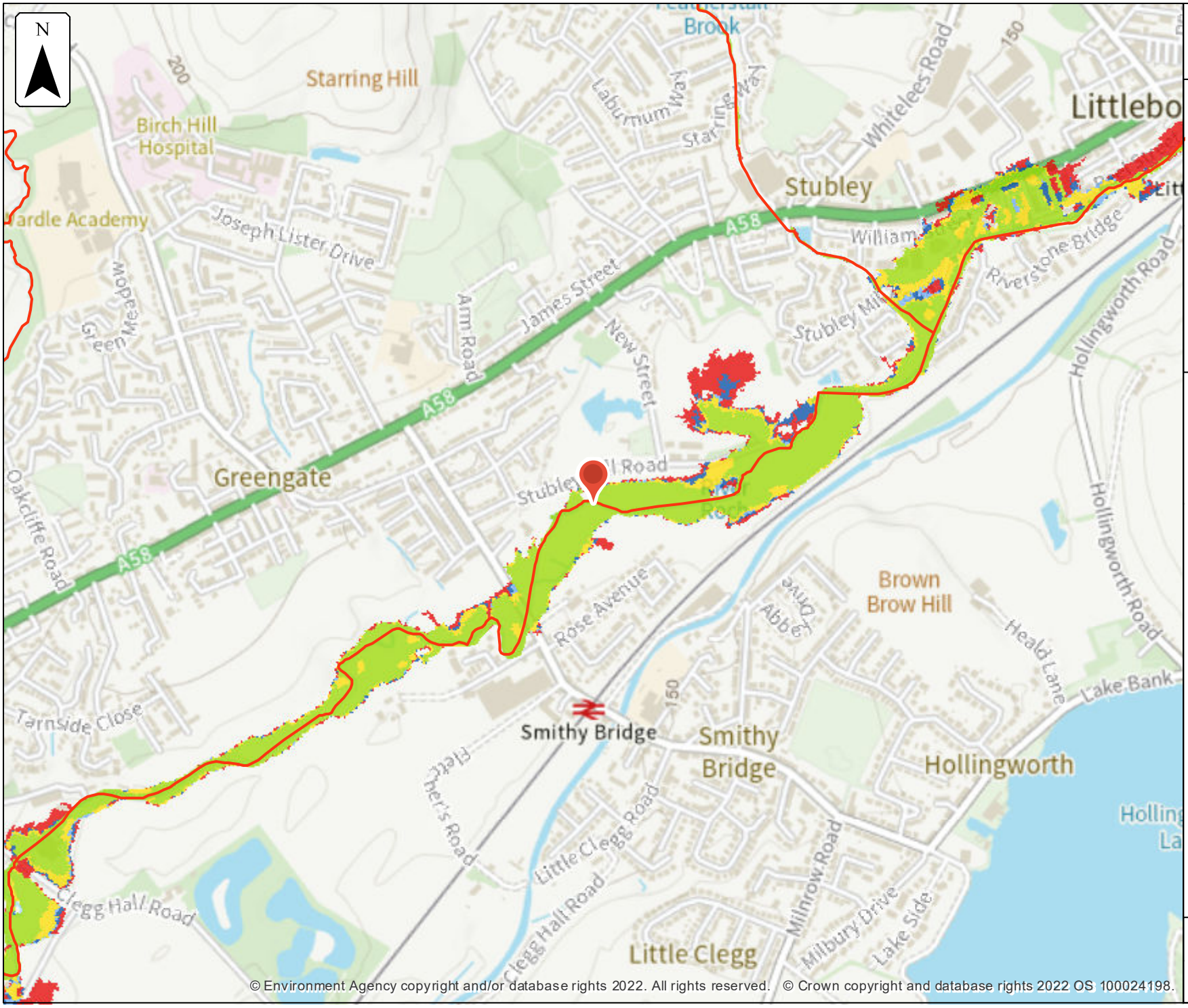
Main river

Modelled flood extent

- 5% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



Environment Agency

Defences removed modelled fluvial extent

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Main river

Modelled flood extent

- 5% AEP
- 1.33% AEP
- 1% AEP
- 0.5% AEP
- 0.1% AEP

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres

Environment Agency

Defended climate change modelled fluvial extent

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+35%)
- 1.0% AEP (+70%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres

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Environment Agency

Defences removed climate change modelled fluvial extent

Location (easting/northing)
392603/415601

Scale
1:10,000

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

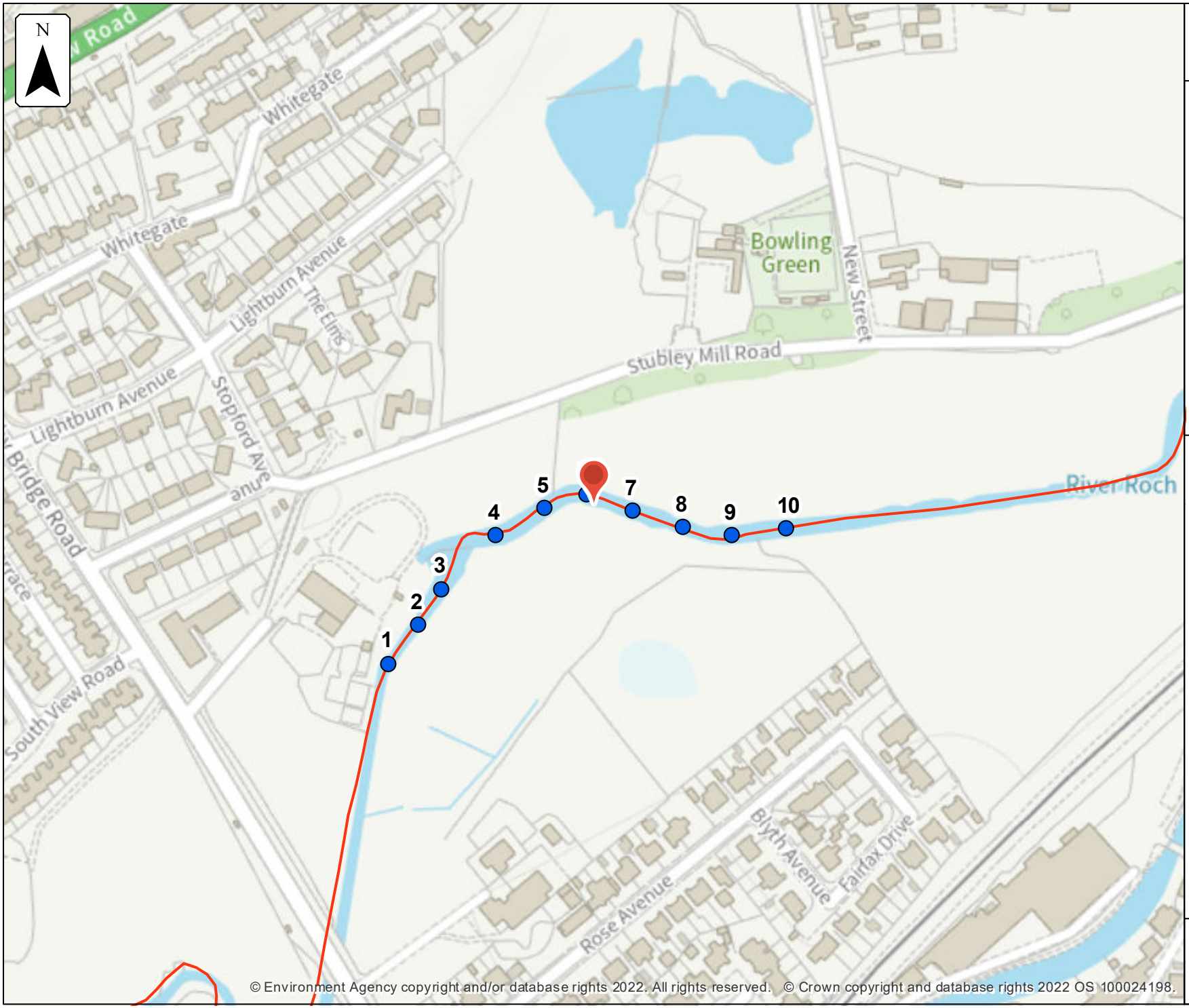
Main river

Modelled flood extent

- 1.0% AEP (+20%)
- 1.0% AEP (+35%)
- 1.0% AEP (+70%)

Flood extents may not be visible where they overlap other return periods

0 100 200 300 400 500
metres



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Environment Agency

Defended modelled fluvial node locations

Location (easting/northing)
392603/415601

Scale
1:2,500

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Modelled location

Main river

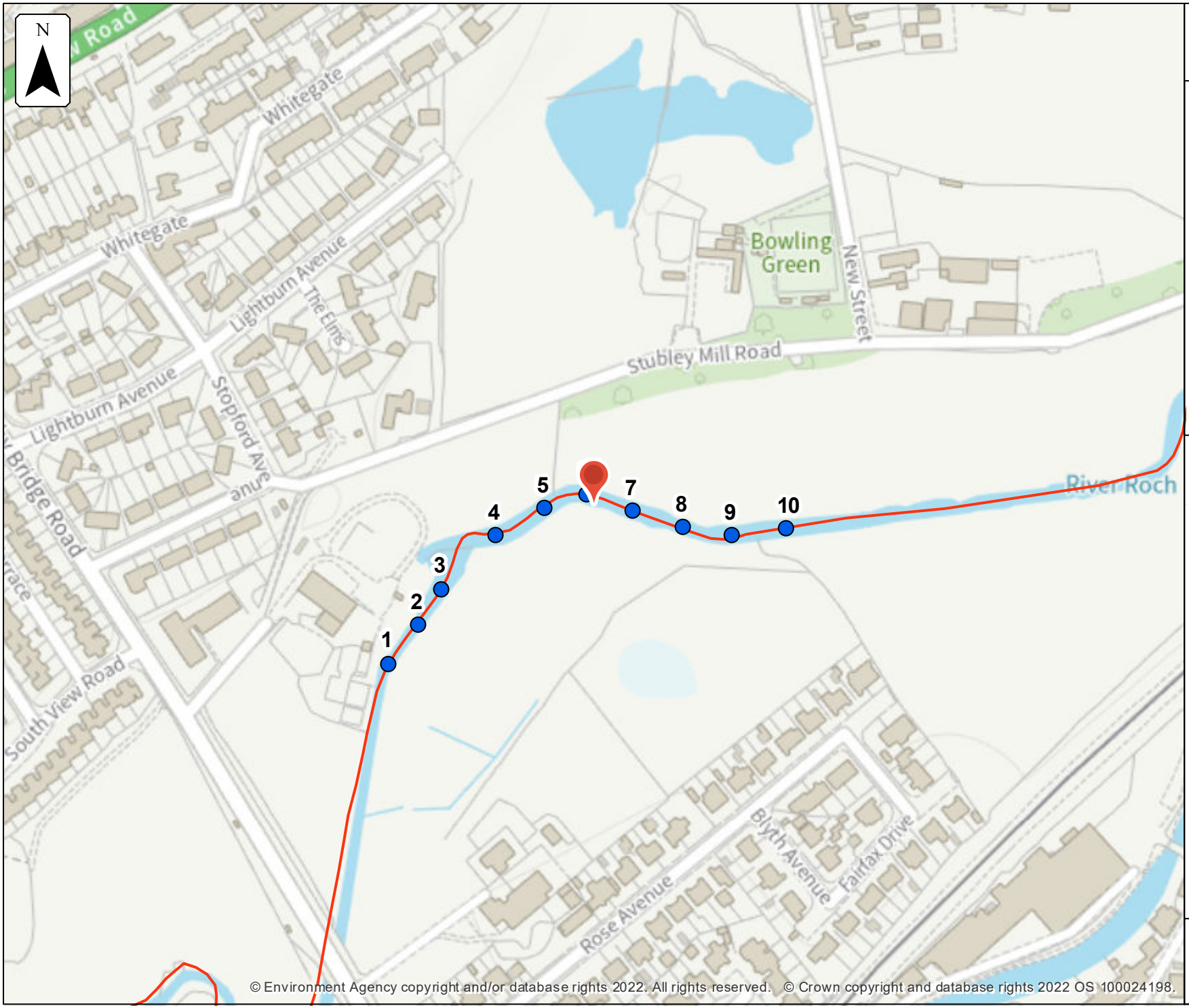
0 25 50 75 100
metres

Modelled node locations data

Defended

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	30359	392502	415522	134.89	18.16			135.09	18.38	135.13	18.43	135.20	18.56	135.35	19.09
2	355235	392517	415541	134.92	19.04			135.12	20.59	135.16	21.04	135.23	21.37	135.38	22.59
3	6646	392528	415559	134.92	19.68			135.12	20.62	135.16	20.97	135.23	21.20	135.38	21.81
4	304615	392555	415585	135.26	19.70			135.30	22.15	135.31	22.76	135.35	23.67	135.45	27.22
5	274417	392579	415598	135.39	19.72			135.44	22.76	135.45	23.45	135.48	24.84	135.56	29.75
6	16977	392599	415605	135.49	21.61			135.53	25.58	135.54	26.49	135.56	28.12	135.65	33.31
7	275208	392622	415597	135.56	23.68			135.66	25.77	135.69	25.85	135.74	26.56	135.85	31.87
8	273301	392646	415589	135.59	27.73			135.61	32.58	135.62	33.54	135.65	35.25	135.77	40.12
9	301412	392670	415585	135.84	27.76			135.96	32.59	135.97	33.46	136.02	34.63	136.18	37.23
10	144063	392696	415588	135.99	26.24			136.11	31.37	136.13	32.26	136.17	33.17	136.33	34.33

Data in this table comes from the Rochdale and Littleborough 2013 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



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Environment Agency

Defences removed modelled fluvial node locations

Location (easting/northing)
392603/415601

Scale
1:2,500

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Modelled location

Main river

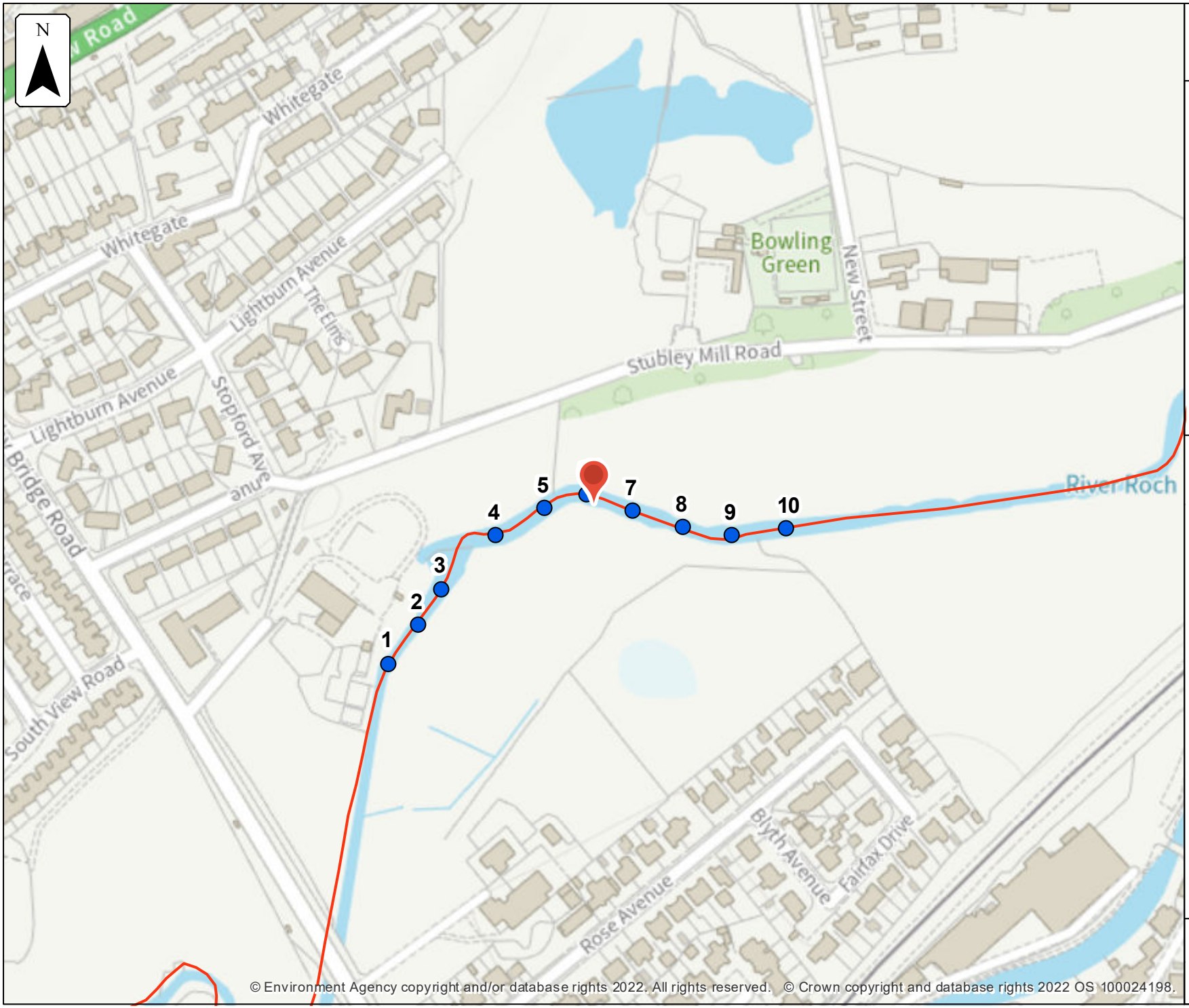
0 25 50 75 100
metres

Modelled node locations data

Defences removed

Label	Modelled location ID	Easting	Northing	5% AEP		2% AEP		1.33% AEP		1% AEP		0.5% AEP		0.1% AEP	
				Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow	Level	Flow
1	30359	392502	415522	134.90	17.92			135.11	18.13	135.14	18.16	135.19	18.22	135.32	18.54
2	355235	392517	415541	134.94	18.41			135.14	20.28	135.16	20.49	135.22	20.76	135.36	21.87
3	6646	392528	415559	134.93	18.92			135.14	20.21	135.16	20.32	135.22	20.36	135.36	21.06
4	304615	392555	415585	135.25	18.93			135.30	21.39	135.31	21.72	135.34	22.66	135.43	25.70
5	274417	392579	415598	135.37	18.87			135.43	21.82	135.44	22.36	135.46	23.80	135.53	28.22
6	16977	392599	415605	135.47	20.42			135.52	24.36	135.53	25.05	135.55	26.81	135.62	31.61
7	275208	392622	415597	135.58	19.59			135.66	23.41	135.67	24.07	135.71	25.80	135.81	30.61
8	273301	392646	415589	135.66	18.89			135.75	22.87	135.77	23.54	135.80	25.29	135.91	30.08
9	301412	392670	415585	135.78	16.92			135.89	20.78	135.91	21.43	135.96	23.14	136.08	27.92
10	144063	392696	415588	135.82	17.74			135.94	21.71	135.96	22.36	136.01	24.06	136.14	28.90

Data in this table comes from the Rochdale and Littleborough 2013 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



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Environment Agency

Defended climate change modelled fluvial node locations

Location (easting/northing)
392603/415601

Scale
1:2,500

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Modelled location

Main river

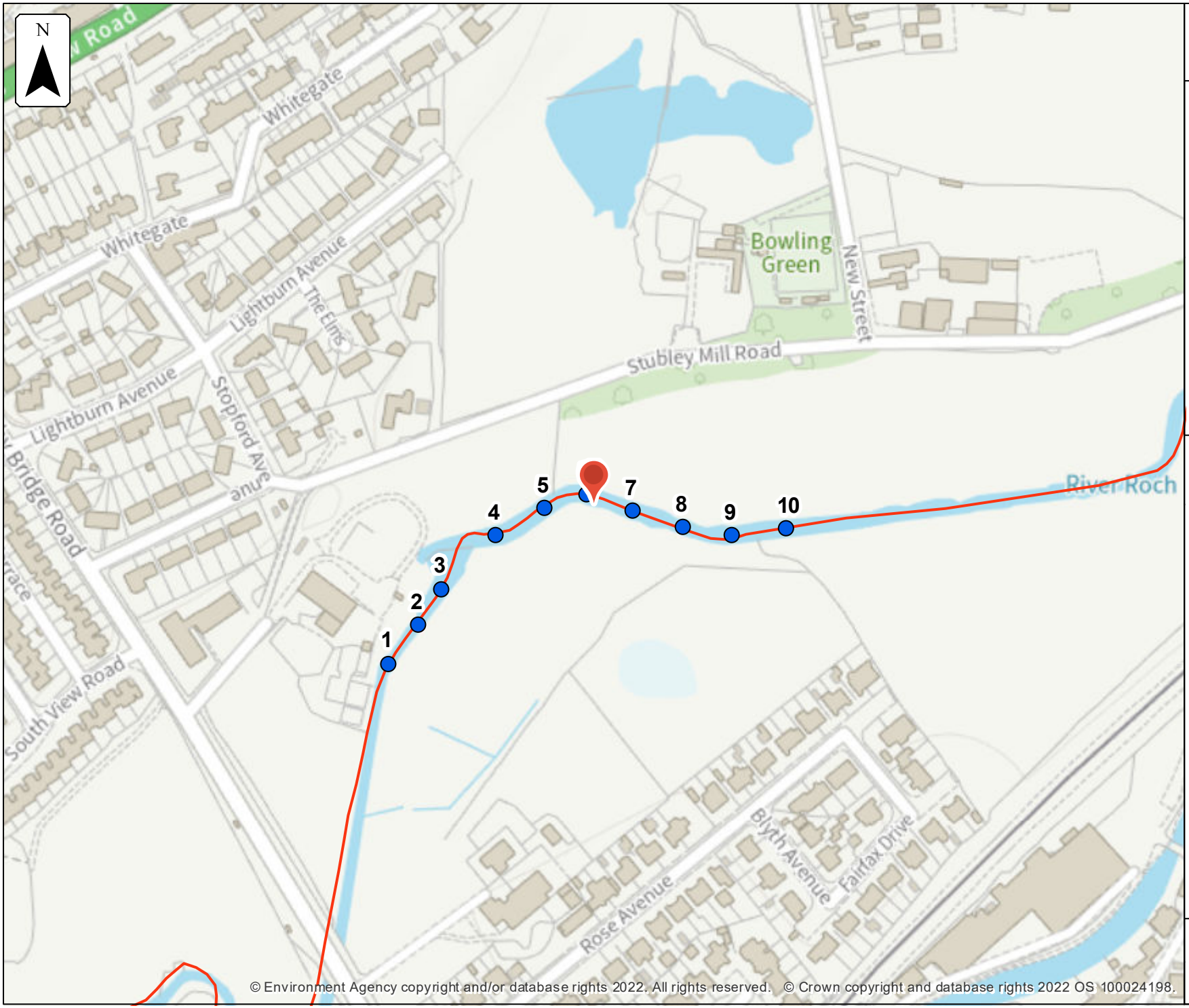
0 25 50 75 100
metres

Modelled node locations data

Defended climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+35%)		1.0% AEP (+70%)	
				Level	Flow	Level	Flow	Level	Flow
1	30359	392502	415522	135.23	18.71	135.32	18.68	135.47	21.44
2	355235	392517	415541	135.26	21.40	135.35	22.12	135.51	25.72
3	6646	392528	415559	135.26	21.17	135.35	21.37	135.51	24.95
4	304615	392555	415585	135.37	24.14	135.42	26.44	135.56	31.36
5	274417	392579	415598	135.49	25.65	135.54	28.84	135.68	34.45
6	16977	392599	415605	135.58	28.97	135.63	32.34	135.73	38.66
7	275208	392622	415597	135.76	27.26	135.83	30.71	135.94	37.95
8	273301	392646	415589	135.67	36.13	135.74	39.14	135.89	44.57
9	301412	392670	415585	136.04	35.11	136.15	36.73	136.33	39.92
10	144063	392696	415588	136.20	33.31	136.30	34.03	136.45	37.55

Data in this table comes from the Rochdale and Littleborough 2013 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.



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Environment Agency

Defences removed climate change modelled fluvial node locations

Location (easting/northing)
392603/415601

Scale
1:2,500

Created
11 Apr 2022

Model name
Rochdale and Littleborough 2013

Selected location

Modelled location

Main river

0 25 50 75 100
metres

Modelled node locations data

Defences removed climate change

Label	Modelled location ID	Easting	Northing	1.0% AEP (+20%)		1.0% AEP (+35%)		1.0% AEP (+70%)	
				Level	Flow	Level	Flow	Level	Flow
1	30359	392502	415522	135.22	18.16	135.29	18.27	135.40	20.35
2	355235	392517	415541	135.25	20.90	135.33	21.39	135.43	23.94
3	6646	392528	415559	135.25	20.43	135.33	20.63	135.44	23.11
4	304615	392555	415585	135.36	23.14	135.41	24.94	135.50	28.48
5	274417	392579	415598	135.47	24.62	135.51	27.21	135.61	31.25
6	16977	392599	415605	135.56	27.70	135.60	30.51	135.68	34.90
7	275208	392622	415597	135.72	26.69	135.78	29.51	135.88	33.98
8	273301	392646	415589	135.82	26.20	135.88	28.97	135.99	33.15
9	301412	392670	415585	135.98	24.04	136.06	26.79	136.17	31.13
10	144063	392696	415588	136.04	24.94	136.11	27.65	136.23	32.01

Data in this table comes from the Rochdale and Littleborough 2013 model.
Level values are shown in mAOD, and flow values are shown in cubic metres per second.
Any blank cells show where a particular scenario has not been modelled for this location.

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the Greater Manchester Merseyside and Cheshire Environment Agency team at inforequests.gmmc@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for