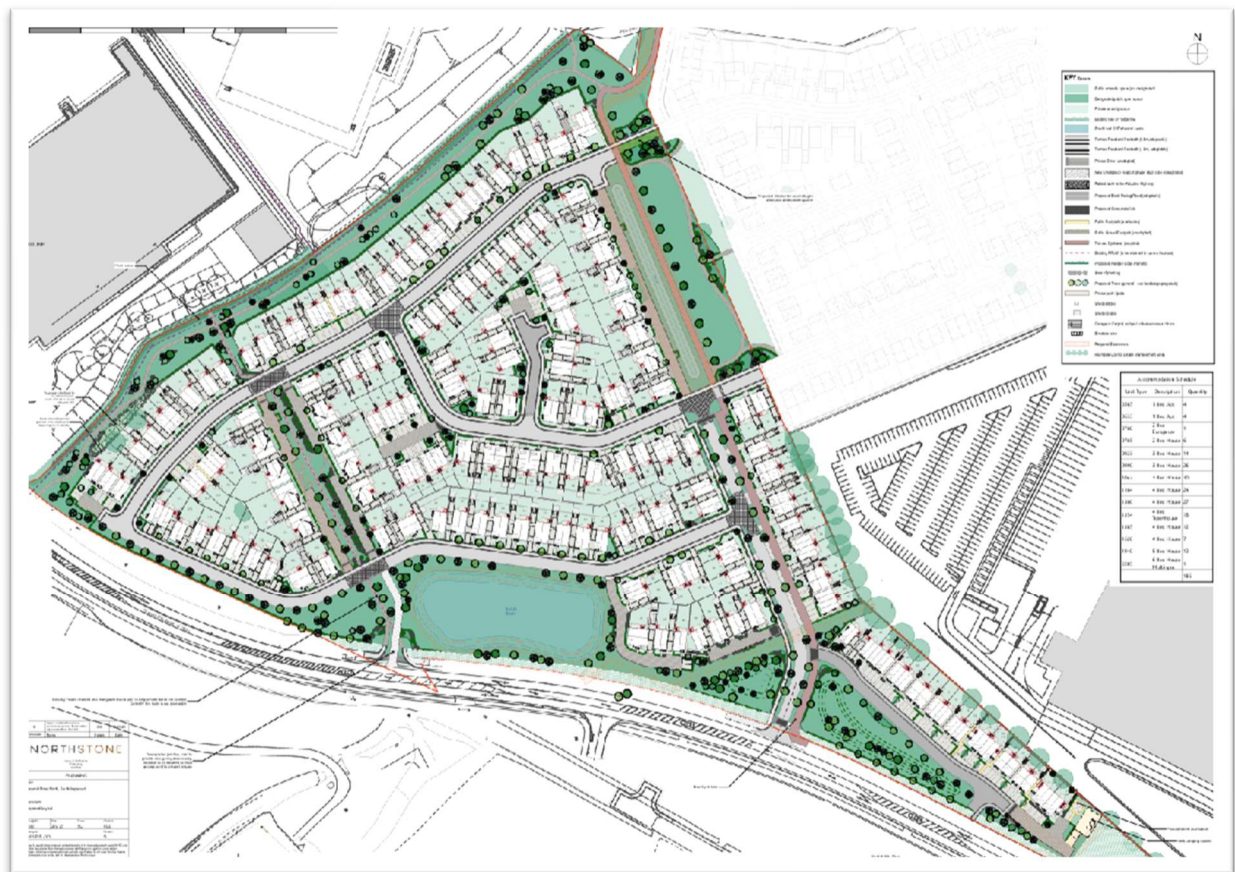




Flood Risk Assessment for a Development at Hareshill Road North, South Heywood, Rochdale, OL10 2TB Rev 2

Contract Ref: FD252

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Quality Assurance Record

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1. INTRODUCTION

1.1 Purpose of this Report

Townsend Water Engineering Ltd. has been appointed by Northstone for a Flood Risk Assessment (FRA) for the development of 186 residential dwellings with associated landscaping and access roads at Hareshill Road North, South Heywood, Rochdale, OL10 2TB (Grid Ref: 385201, 409360). This report has been prepared in support of the planning permission for the aforementioned development. The proposed development has already got outline planning permission (reference number 16/01399/HYBR). The planning permission relates to the development parcel which forms part of the wider South Heywood approved masterplan.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FRA is consistent with the 'Site Specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG):

<https://www.gov.uk/guidance/flood-risk-and-coastal-change#Site-Specific-Flood-Risk-Assessment-checklist-section>

1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing Site Plan drawings and respective topographic plan delivered by Northstone;
- The EA online flood maps;
- <https://flood-map-for-planning.service.gov.uk/>;
- <https://flood-warning-information.service.gov.uk/long-term-flood-risk/>;
- Rochdale Borough Council website;
- [Housing sites proposed in the Allocations Plan - Heywood | Rochdale Borough Council](#);
- Rochdale Borough's Strategy for Flood Risk Management 2014- 2024 (March 2014); and
- Level 1 Strategic Flood Risk Assessment for Greater Manchester - Update Final Report March 2019.

1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

- National policy contained within the National Planning Policy Framework (NPPF) dated December 2024; and
- The Planning Practice Guidance (PPG) dated December 2024.

1.4 Structure of this Report

The Report has been prepared based on the following structure:

- Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and NPPF vulnerability;
- Section 3 presents the assessment of existing flood risk at the site;
- Section 4 presents the proposed development and findings of flooding;
- Section 5 presents the drainage strategy (Undertaken by AJP); and
- Section 6 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

- Appendix A: Topographical Survey;
- Appendix B: EP3 Geo-Environmental Site Assessment;
- Appendix C Layout Plan
- Appendix D Extract from Campbell Reith; and
- Appendix E: AJP Drainage Strategy.

2. SPATIAL PLANNING CONSIDERATION

2.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The site is located at Hareshill Road North, South Heywood, Rochdale, OL10 2TB (Grid Ref: 385201, 409360). (Table 1: Site Details). The site is largely undeveloped and comprises of fields, and hardstanding where previous outbuildings were situated.

The development involves the construction of 186 residential dwellings. The entire development site is approximately 8.29ha and is currently fields. This development is part of a larger development called Land Bound by Manchester Road, Hareshill Road and Pilsworth Road, west of Junction 19 of the M62, Rochdale (planning Reference 16/01399/HYBR).

To the North-West and North-East of the site is an industrial area and to the North is a field and a residential area. To the South of the site is Hareshill Road (link road), followed by fields and a dog boarding kennels. To the West is an industrial unit area.

There is a surface water pipe crossing the site is in the East. The pipe has a 3m easement.

There is a pipe that runs under the link road to the South of the site. The pipe connects to a watercourse to the South of the link road.

Please see Figure 1 and Figure 2 indicating these features.

Table 1: Site Details

Reference	Value
OS X (Eastings)	385201
OS Y (Northings)	409360
Nearest Post Code	OL10 2TB
Nat. Grid	SD 85191 09310

Grid reference details taken from the site Grid Reference Finder

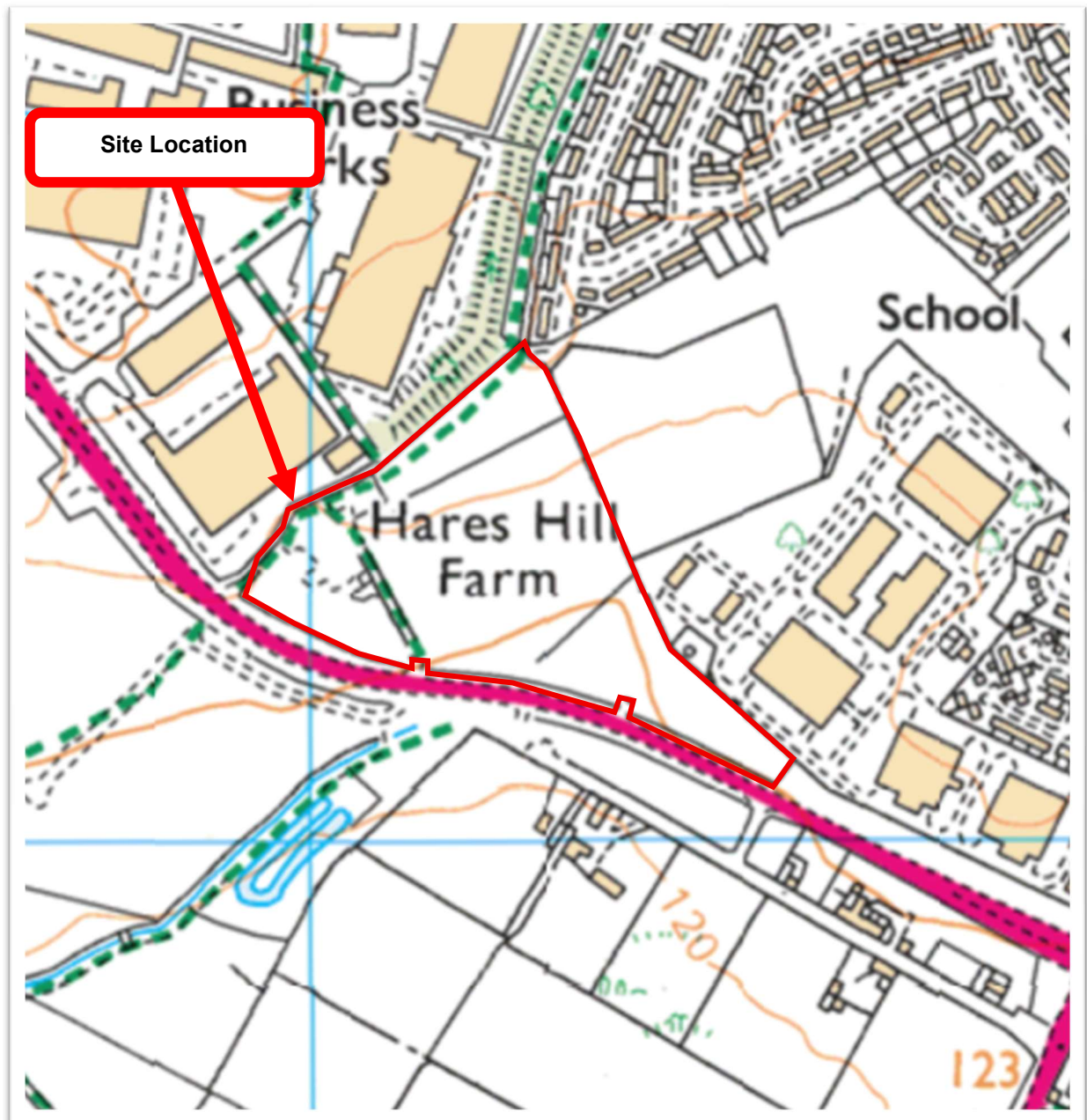


Figure 1: Site Location (Source: Bing Ordinance Survey Map)



Figure 2: Aerial View of the Site (Source: Grid Reference Finder)

2.2 Topography

The existing ground elevations on site is shown in the topographic drawing (Appendix A). It indicates that the ground varies in level from approximately 132mAOD in the North-West corner to approximately 123mAOD at the low point. The site generally falls from the Northern boundary towards Hareshill Road in the South. Please see Figure 3 below.

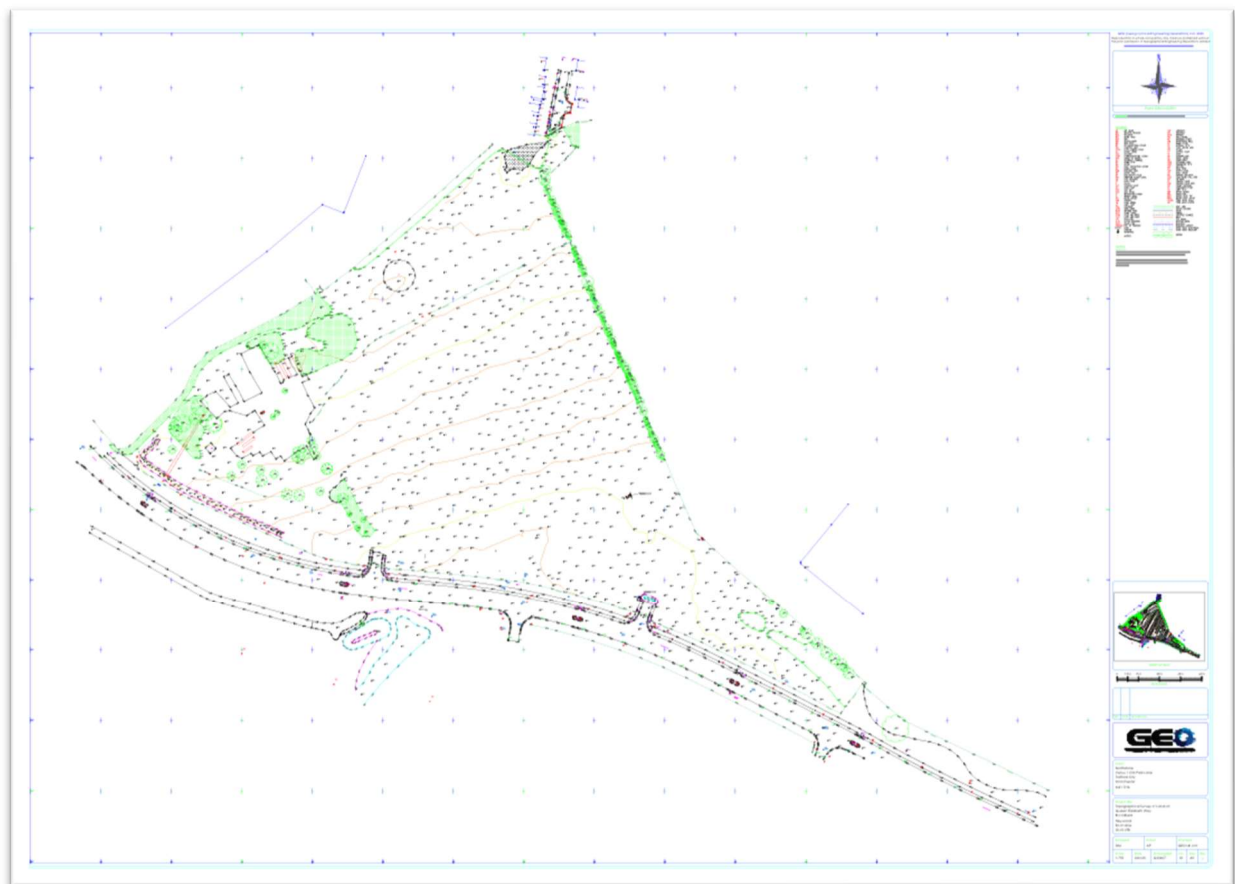


Figure 3: Topographical Survey (Source: Northstone)

2.3 Geology and Soil

The geology at the site has been obtained from the British Geological Survey (BGS) website. The bedrock beneath the site is described as 'Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone.' (Figure 4: Bedrock Underneath the Site (Source: BGS Bedrock Geology Mapping)). The superficial deposits are described as 'Till, Devensian - Diamicton'.

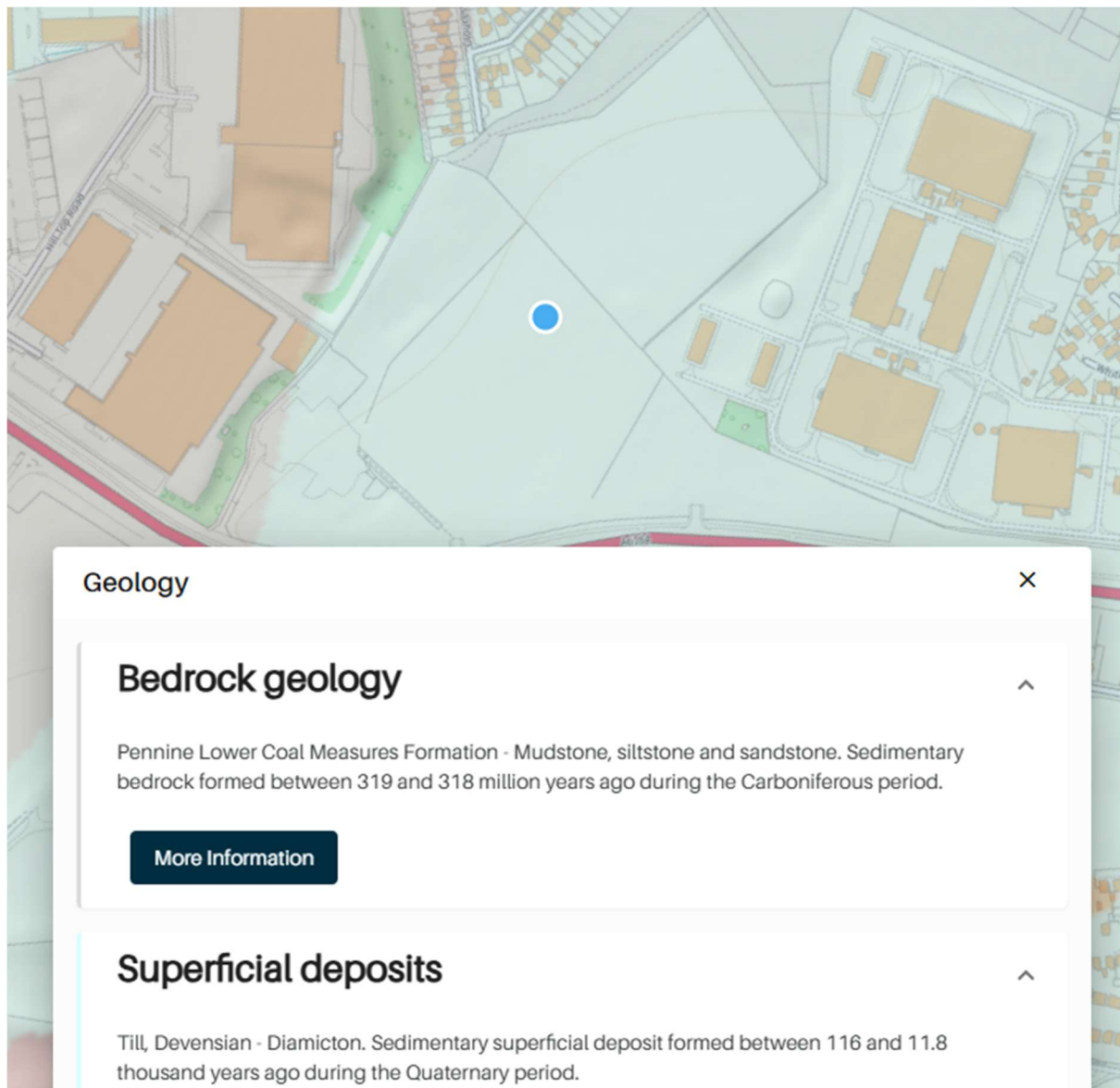


Figure 4: Bedrock Underneath the Site (Source: BGS Bedrock Geology Mapping)

Soils at the site are described on the Cranfield University 'Soilscapes' website mostly as, 'Slowly permeable seasonally wet acid loamy and clayey soils' with impeded drainage (Figure 5). This suggest that the site is likely to be unsuitable for infiltration.

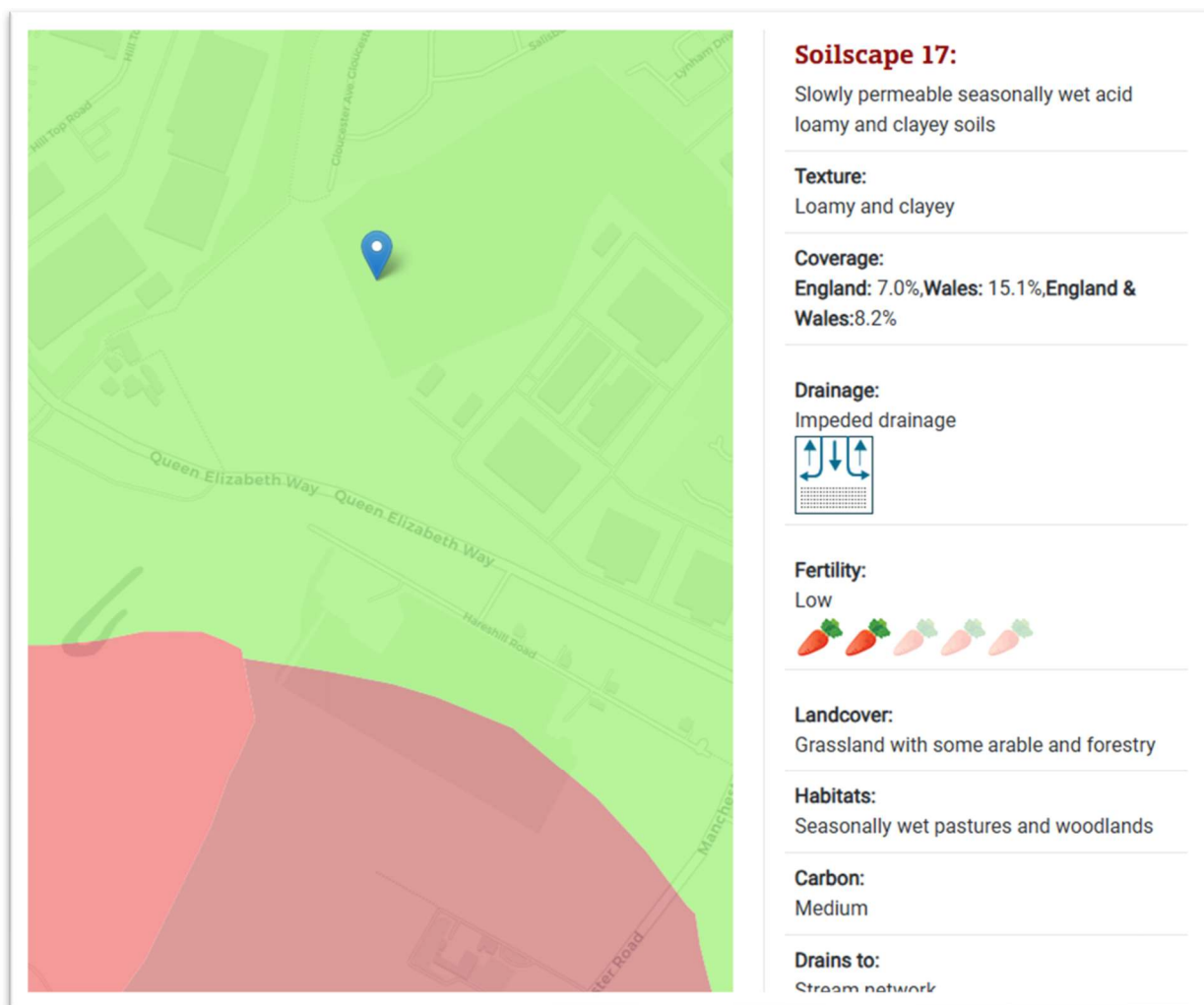


Figure 5: Soil Map of the Site (Source: Cranfield University Soil Mapping)

A geo-environment report has been undertaken by E3P called 'Phase 3-South Heywood Development Area, Phase II Geo-Environmental Assessment July 2019', it says this about infiltration:

'BRE365 infiltration testing suggests that soakaways will not be suitable for the proposed development.'

On the recommendation of the Geo-Environmental Engineers it is not recommended that infiltration is used on the site. Please see an extract of the Geo-Environmental Report in Appendix B.

2.4 Flood Zone

The existing site is within a Flood Zone 1, please see Figure 6 below. Flood Zone 1 is an area with a less than a 0.1% chance of flooding (1 in 1000 year event plus climate change). Therefore, the proposed development is at low risk of fluvial flooding. Please see Figure 6. There is a culverted watercourse crossing the site to the East. The pipe has a 3m easement.

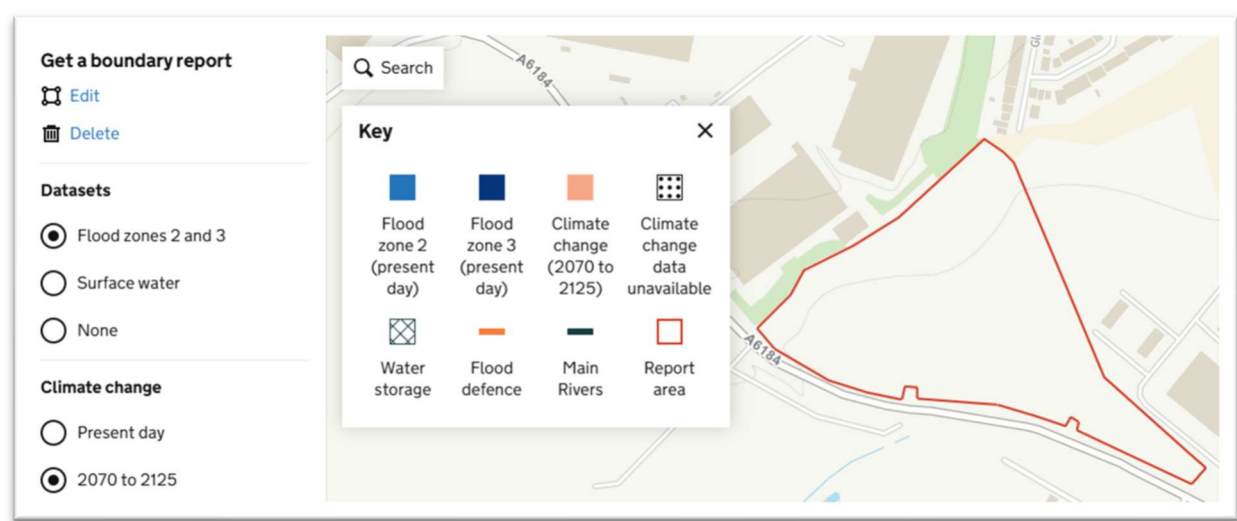


Figure 6: Flood Risk Maps

The existing site is mostly free from surface water flooding but has an area at a risk of surface water flooding in the south near the road. Please see Figure 7 below.

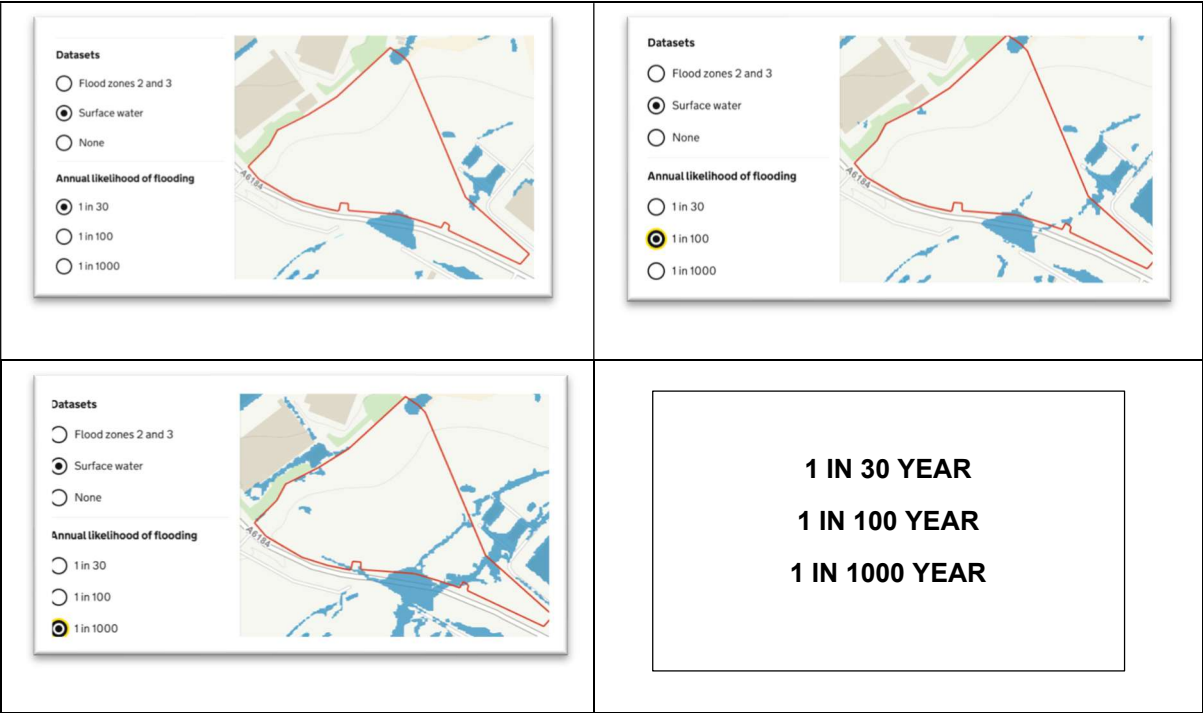


Figure 7: Flood Risk Maps: Surface Water 1 in 30, 1 in 100 and 1 in 1000 Year AEP

To investigate the surface water (SW) flooding further, we obtained the sites surface water flood depths yearly chance of flooding between 2040 and 2060 up to 20cm, up to 30cm and up to 60cm from the EA long term flood risk map. It can be seen that there is some surface water flooding within the site up to 30cm, there is no flooding up to 60cm.

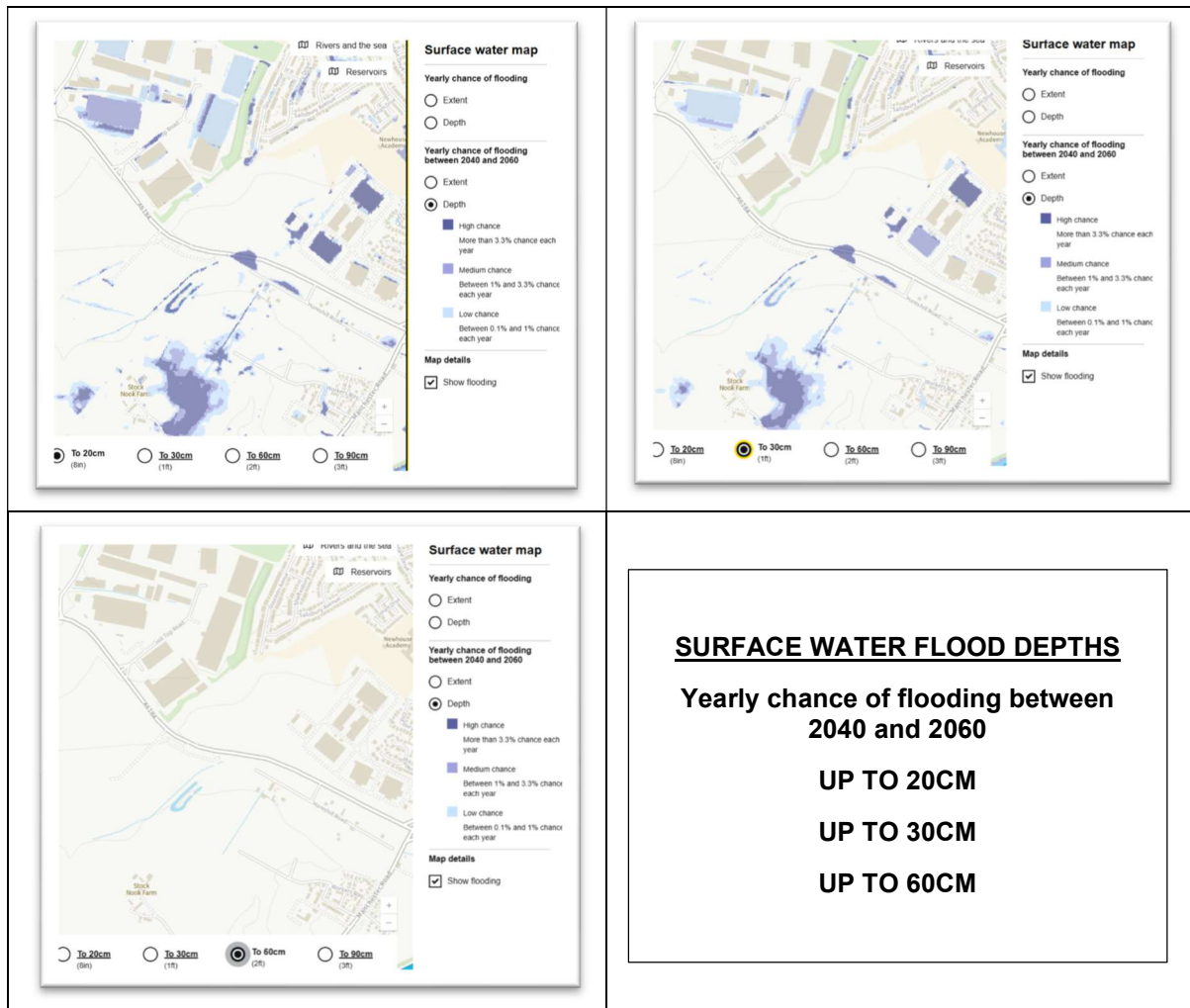


Figure 8: Flood Risk Maps: SURFACE WATER FLOOD DEPTHS Yearly chance of flooding between 2040 and 2060 UP TO 20CM, UP TO 30CM AND UP TO 60CM

The proposed site layout was overlain over the surface water plus climate change flood depths up to 20cm and 30cm to see if any dwellings are placed within surface water flooding areas. It can be seen that no dwelling have be placed in areas at risk of surface water plus climate change flooding up to 20cm or 30cm.

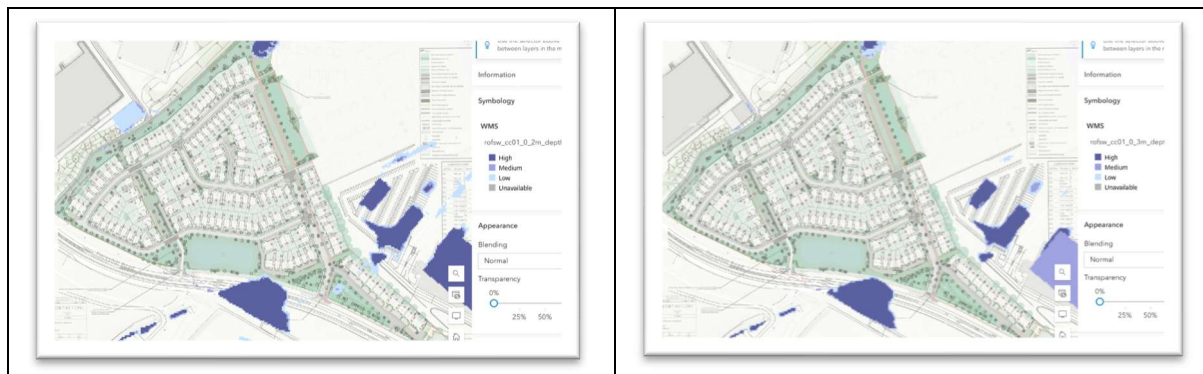


Figure 9: SW Plus Climate Change Depth to 20cm and 30cm Over Site Proposed Layout

An illustration of the surface water hotspots in Rochdale borough based on the Greater Manchester SWMP can be seen in Figure 10. The map shows no surface water flooding hot spots at the site.

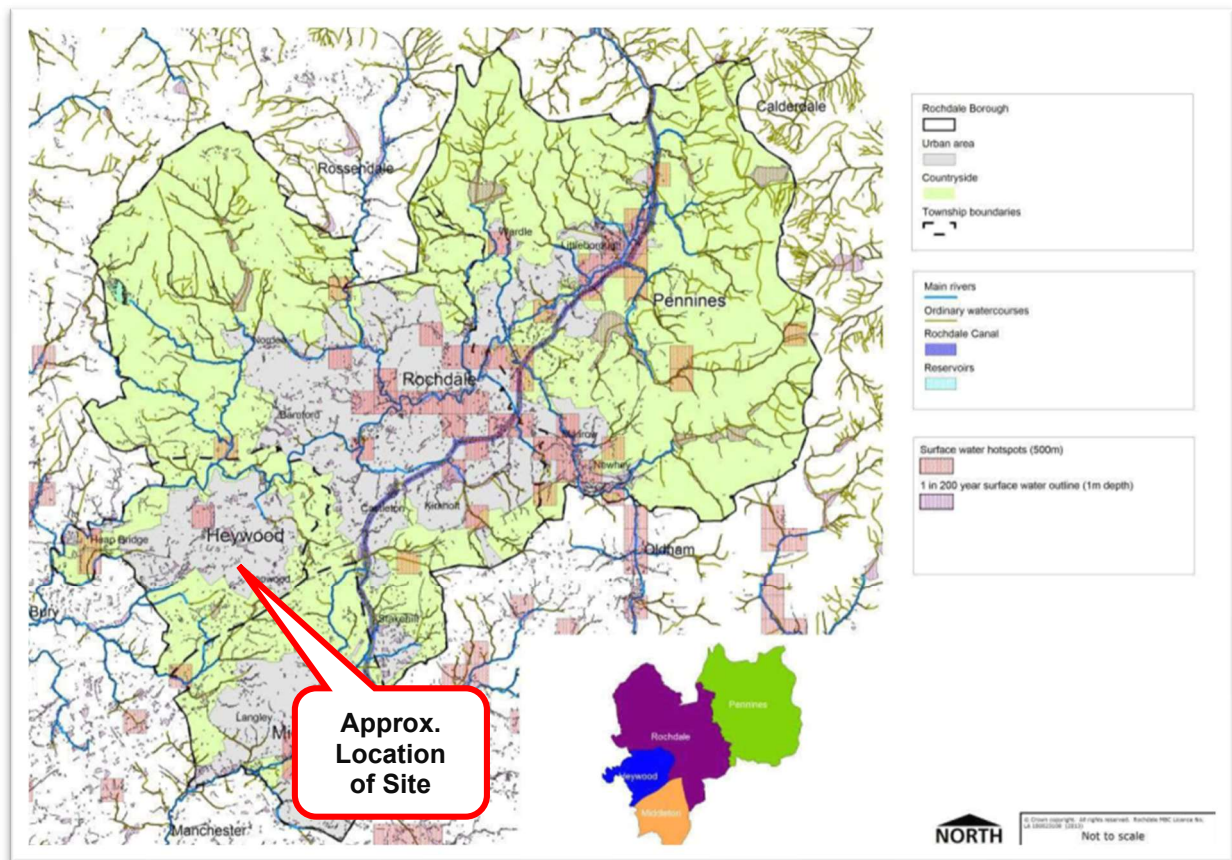


Figure 10: Surface water hotspots of Rochdale borough based on GM SWMP

Figure 11 shows the Level 1 Strategic Flood Risk Assessment for Greater Manchester - Update Final Report March 2019 surface water map. There is an area in the South of the site at high risk of surface water flooding, No dwellings will be placed here.

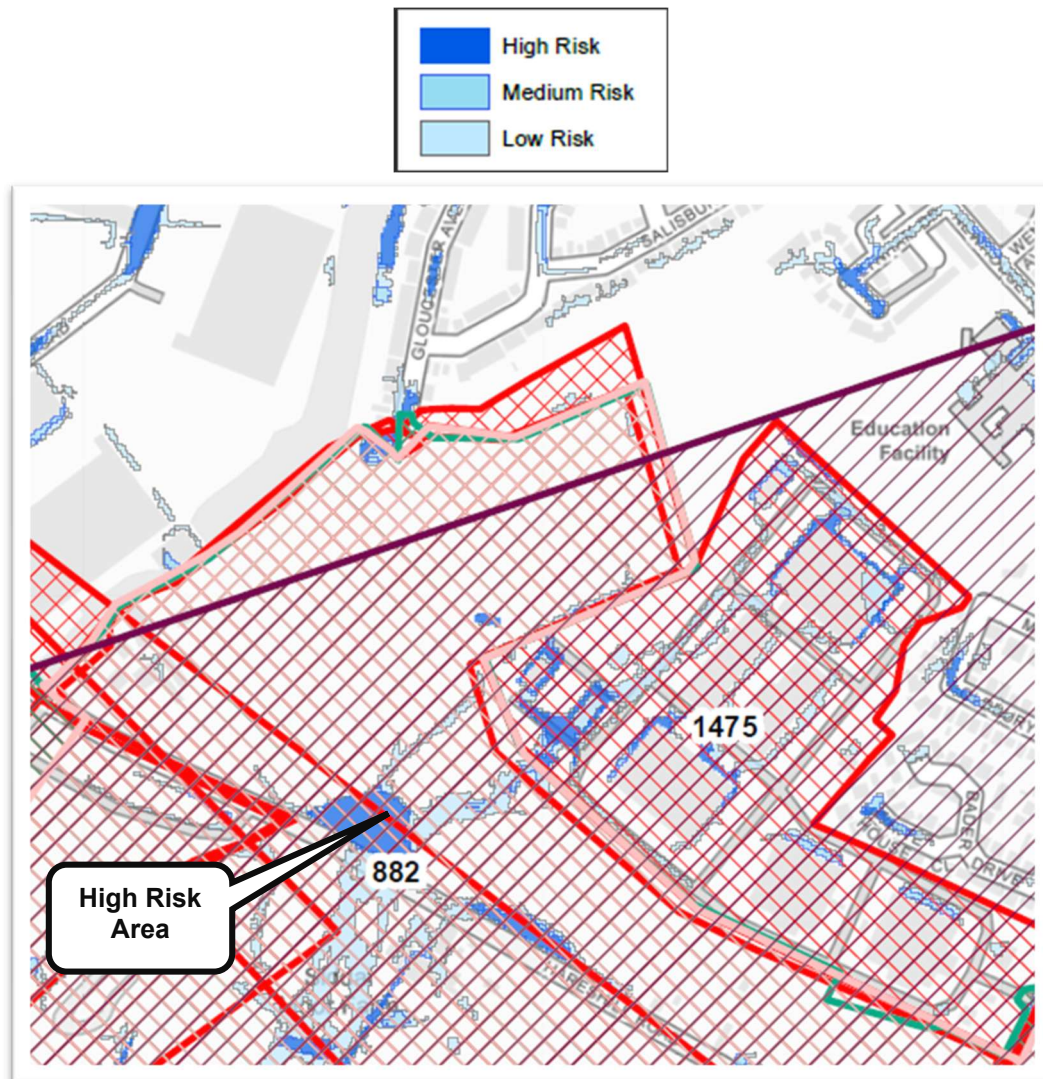


Figure 11: Level 1 Strategic Flood Risk Assessment for Greater Manchester - Update Final Report March 2019

2.5 NPPF Vulnerability

Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Source NPPF Technical Guide). As noted in Section 2.4, the proposed development is within Flood Zone 1, protected according to the EA flood risk map for planning.

Table 2: Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

More vulnerable (MV)
Hospitals, residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels
Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
Non-residential uses for health services, nurseries and educational establishments.
Landfill and sites used for waste management facilities for hazardous waste.
Sites used for holiday or short let caravans and camping, subject to a specific warning and evacuation plan.

Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (Source NPPF Technical Guide)

Flood Zone	Definition	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
1	$T > 1,000$	✓	✓	✓	✓	✓
2	$100 < T_{fluv} < 1,000$ $200 < T_{tidal} < 1,000$	✓	✓	Exc. Test	✓	✓
3a	$T_{fluv} < 100$ $T_{tidal} < 200$	Exc. Test	✓	✗	Exc. Test	✓
3b (functional floodplain)	$T_{fluv} < 20$	Exc. Test	✓	✗	✗	✗

As the development is in a Flood Zone 1, is at low risk of surface water flooding and the site is classed as 'more vulnerable', the site passes the exception test, and the sequential test is not required.

Furthermore, the site has been allocated for possible housing development in the Rochdale Borough Council **Draft** Local Plan - Allocations Plan. Please see Figure 12. ¹

Furthermore, this site has planning permission and therefore the principle of planning has been given by the planning authorities

¹ [Housing sites proposed in the Allocations Plan - Heywood | Rochdale Borough Council](#)

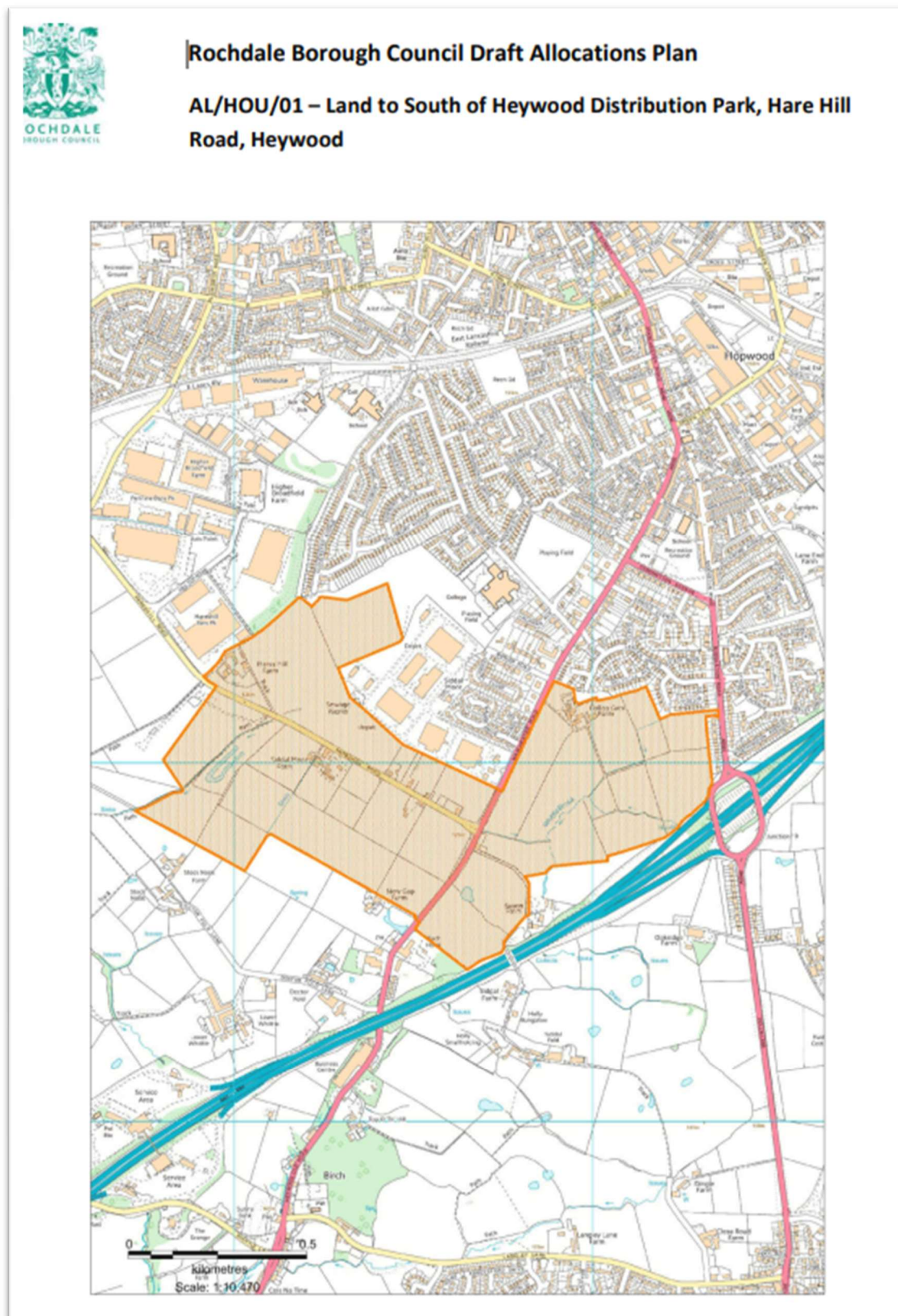


Figure 12: Rochdale Borough Council Draft Allocations Plan

2.6 Climate Change Allowances for Peak Rainfall Intensity

The Environment Agency and NPPF require a consideration of the impacts of climate change in Flood Risk Assessments (FRA). In May 2022, the Environment Agency updated the climate change allowances required in Flood Risk Assessments (Environment Agency, 2022); this advice updates previous climate change allowances to support the NPPF (DCLG, 2021).

Figure 13 shows anticipated changes in small catchments, recommending a progressive increase, reaching **45%** for the 'Upper End' allowance by 2070. This allowance would be recommended for this proposed development, which is classified as '**More Vulnerable**' and has been taken to have a 100-year design life. The **45%** climate change allowance is based on the 90th percentile, meaning that there is a 90% chance that rainfall will not increase by more than the **45%** increment.

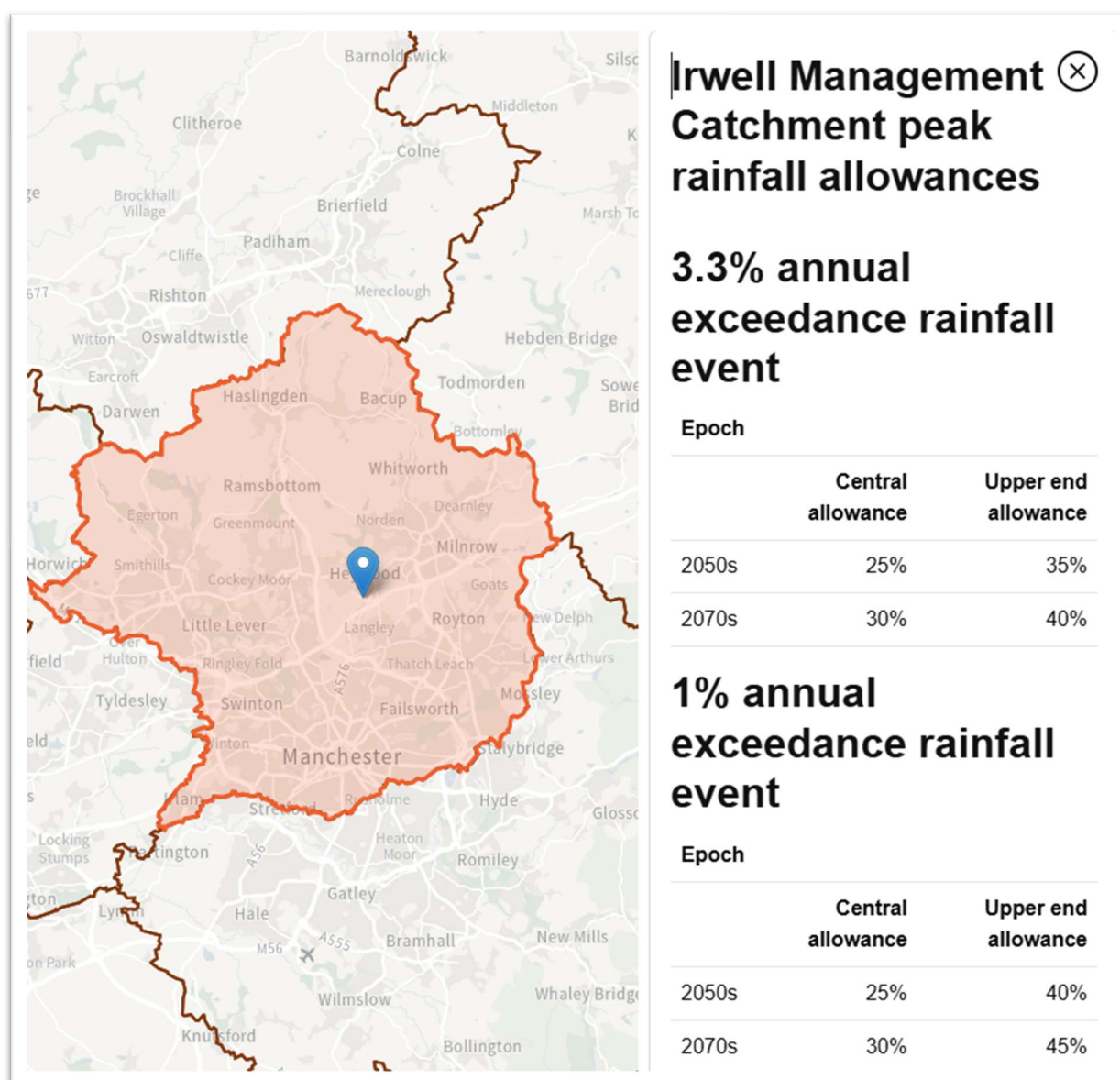


Figure 13: Peak Rainfall Climate Change Allowances

3. FLOOD HAZARD FOR EXISTING SITE

3.1 Source of Flood Risk

Flood sources and their possibilities at the site are further described below.

3.1.1 Flood Risk from Fluvial Sources

The proposed development is within a Flood Zone 1. Therefore, the proposed development is considered to be at low risk of fluvial flooding.

There is a surface water pipe crossing the site to the East. The pipe has a 3m easement. This has been incorporated into the layout.

3.1.2 Surface Water

The existing site is mostly free from surface water flooding but has an area at a risk of surface water flooding in the south near the road. Please see Figure 7.

To investigate the surface water (SW) flooding further, we obtained the site's surface water flood depths yearly chance of flooding between 2040 and 2060 up to 20cm, up to 30cm and up to 60cm from the EA long term flood risk map. It can be seen that there is some surface water flooding within the site up to 30cm, there is no flooding up to 60cm.

We put the proposed site layout over the surface water plus climate change flood depths up to 20cm and 30cm to see if any dwellings are placed within surface water flooding areas. It can be seen that no dwellings have been placed in areas at risk of surface water plus climate change flooding up to 20cm or 30cm.

There will be a decrease in surface water flooding with the planned installation of the drainage infrastructure.

It is recommended that a filter drain is placed on the north border of the site to catch any surface water from the industrial estate to the north. This will be drained to the surface water pipe under the link road.

With the implementation of the new drainage system and filter drain, we believe the site is at low risk of surface water flooding.

3.1.3 Flood Risk from Reservoir /Canals / Other Artificial Sources

The EA Extent of Flooding from Reservoirs map (Figure 14: Extent of Flooding from Reservoirs (Source; EA Flood Warning Information Service)), based only on large reservoirs (over 25,000 m³ of water), shows that the site is not at risk of flooding from reservoirs. Flooding from reservoir is considered to be extremely unlikely and the risk of flooding to the site considered to be low.

There is no flood risk from canals and other artificial sources as there are no canals or other artificial sources within the vicinity of the site.

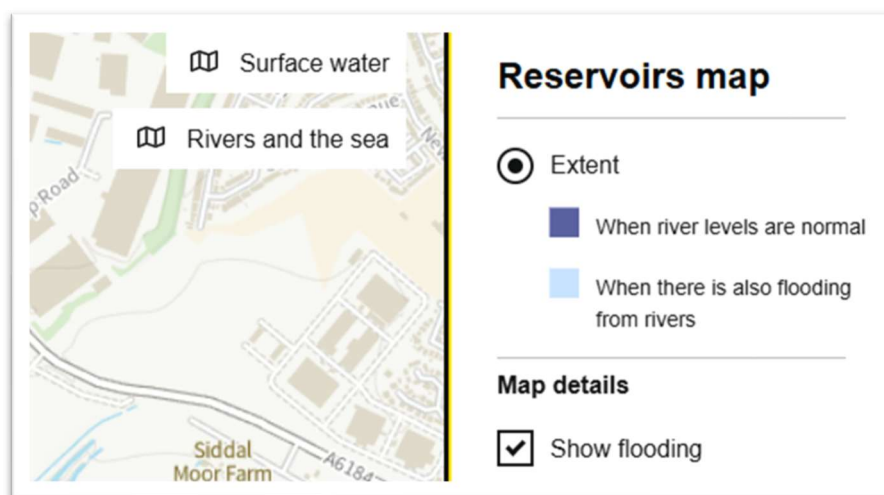


Figure 14:Extent of Flooding from Reservoirs (Source; EA Flood Warning Information Service)

3.1.4 Flood Risk from Groundwater

According to the long term flood risk checker, the site is unlikely to be at risk from groundwater flooding. Please see Figure 15.

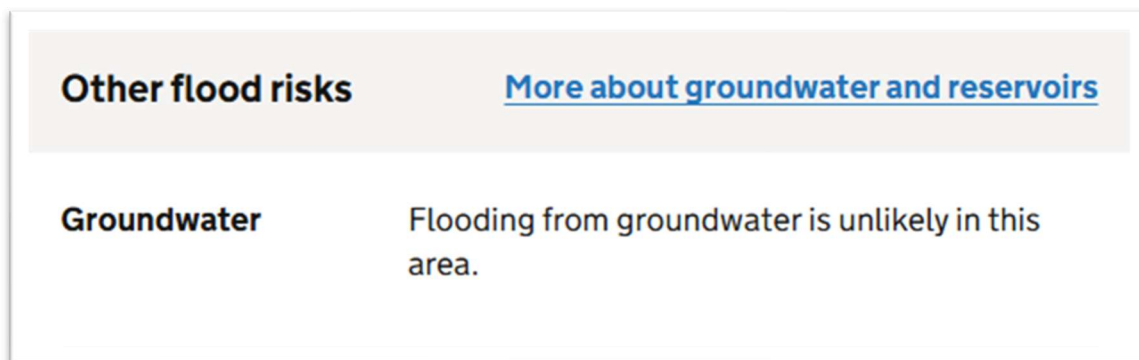


Figure 15: Long Term Flood Risk Check (gov.co.uk)

On the areas susceptible to groundwater flooding in Rochdale borough (Rochdale Borough's Strategy for Flood Risk Management 2014 - 2024) map, the site is at low risk of groundwater flooding. Please see Figure 16.

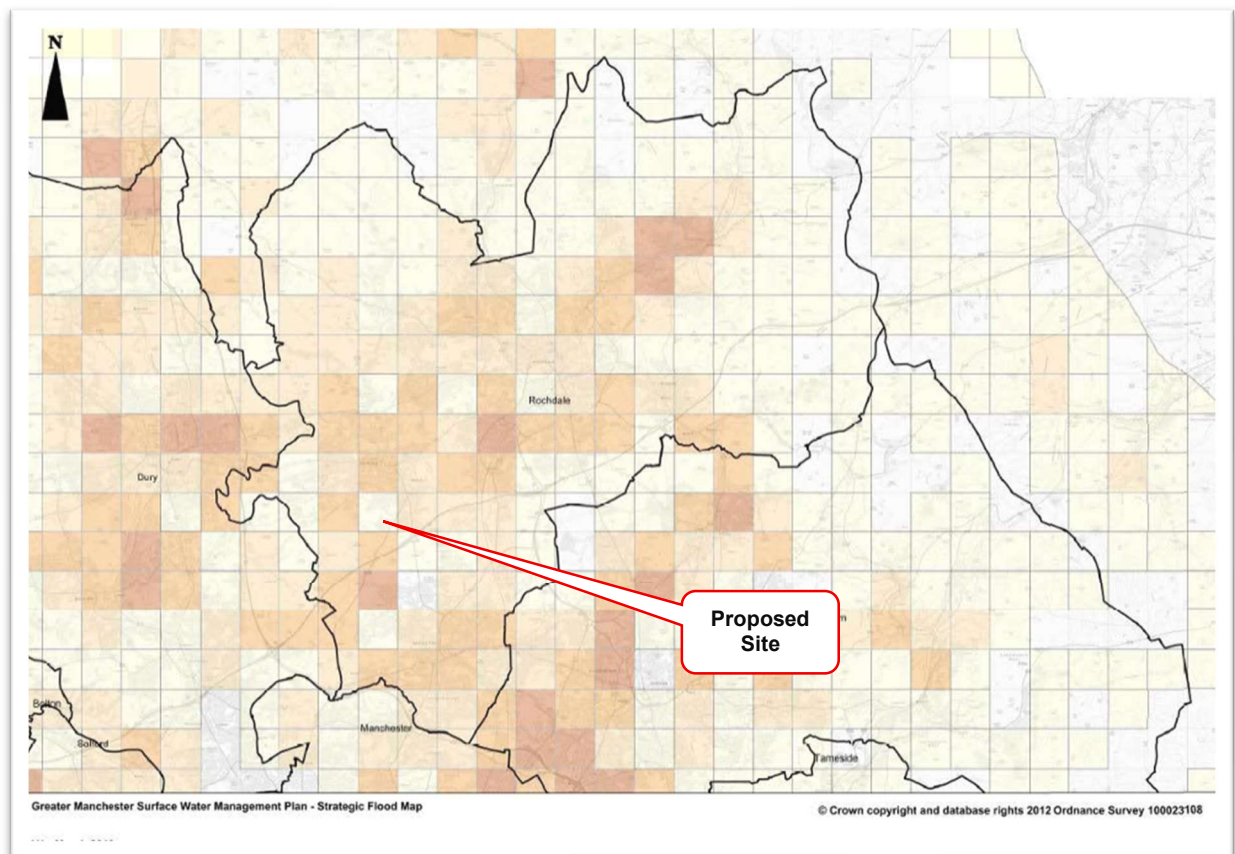


Figure 16: Areas susceptible to groundwater flooding in Rochdale borough (Rochdale Borough's Strategy for Flood Risk Management 2014 - 2024)

Therefore, the risk of groundwater flooding to the site is believed to be low.

3.1.5 Flood Risk from Sewers

There is no flood risk from sewer as the site is a field with no sewers crossing it. Please see the United Utilities (UU) sewer map in Figure 17.

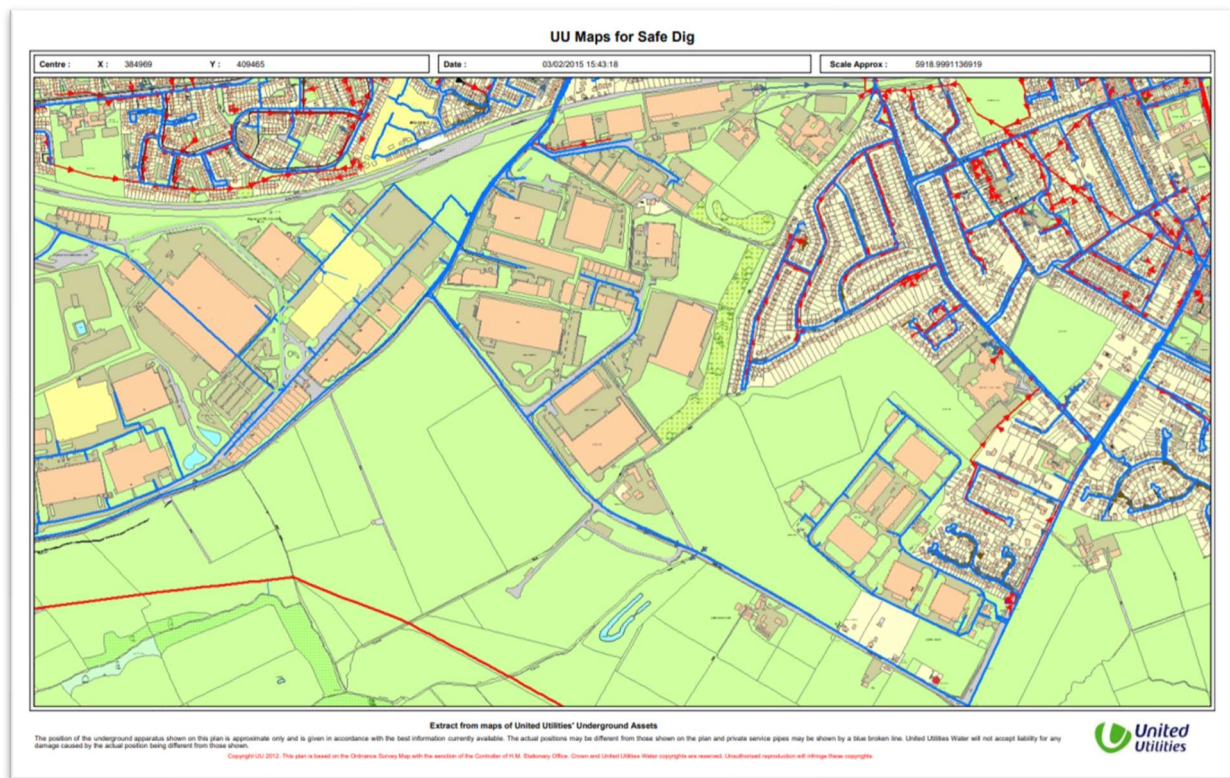


Figure 17: UU Sewer Map

4. ASSESSMENT OF FLOOD RISK FOR PROPOSED DEVELOPMENT

4.1 Development Proposals

It is proposed to build 186 residential dwellings with associated landscaping and access roads at Hareshill Road North, South Heywood, Rochdale, OL10 2TB, as shown on the indicative masterplan Figure 18. Please see Appendix C.

The development area is 8.29ha according to the layout. The impermeable area of the site is 4.97ha (60% impermeable area of the site).

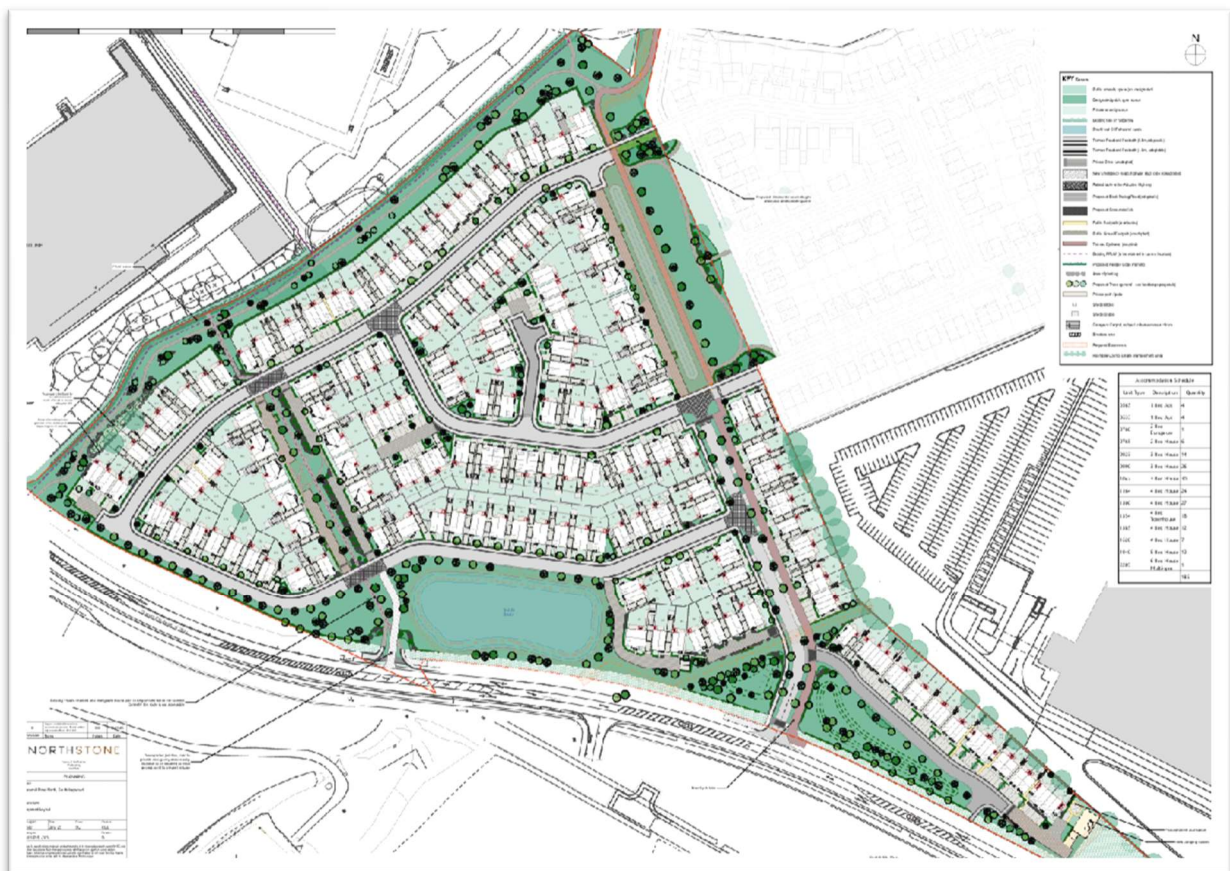


Figure 18: Proposed Site (Source: Client)

4.2 Fluvial Flood Management

The proposed development is within a Flood Zone 1, an area at low fluvial flood risk. Therefore, it is believed that fluvial flooding is at a low risk to the development.

4.3 Surface Water Flood Risk

There is surface water flooding on the site but not where housing will be situated.

5. DRAINAGE STRATEGY

5.1 Existing Drainage Arrangements

5.1.1 Surface Water

The existing site is a greenfield site. The surface water is assumed to discharge into the ground.

5.2 Infiltration Rates

It is considered that infiltration is unlikely to be feasible, according to the geo-environmental report infiltration is not feasible on the site.

5.3 Run-off

The site will discharge at 106.4l/s, as per the original discharge agreed at outline planning permission.

Please see Appendix D for the full calculations from the ordinal report which the planning permission is based on.

5.4 Surface Water Drainage Strategy

5.4.1 Hierarchy of Discharge

In accordance with the Flood Risk and Coastal Change Planning Practice Guidance, where possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:

1. Into the ground (infiltration);
2. To a watercourse;
3. To a surface water sewer, highway drain, or another drainage system; and
4. To a combined sewer.

Firstly, as detailed in section 2.3, infiltration is not feasible at this site due to impeded drainage and clay ground and failed infiltration tests.

Secondly, there is a pipe that connects into a culvert that runs under the link road to the South of the site. The culvert connects to a watercourse to the South of the link road. The site will discharge into the watercourse and all lower options on the hierarchy will be discounted.

5.4.2 Sizing of SUDS Features

As discussed in section 4.1 of this report, the proposed impermeable surface area of the dwellings and associated features is 4.97ha. It is intended that the proposed surface water system will be adopted by either United Utilities and/or a management company. Infiltration SUDS systems have been discounted as the ground does not infiltrate. An attenuation basin has been placed in a public open space in the South of the site.

The entire discharge for the site will be restricted to **variable** greenfield rates (up to the 1 in 100 year event plus climate change), via Hydrobreak up to and including the 1 in 100 year event plus climate change (45%). The storage will be held in an attenuation basin, up to and including the 1 in 100 year event plus 45% climate change.

Modelling of the surface water runoff to the design parameters was carried out using the Source Control of Info Drainage, an industry leading software which allows design and analysis of SuDS features. Micro Drainage modelling results. Appendix E. The following conservative assumptions and design parameters have been set within the Hydraulic model for the housing section of the site:

- Dwellings, walkways, parking spaces and access roads area equals 4.97ha.
- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology, and increased by 45%, the upper end allowance for climate change over the 100 years design life of the proposed residential development, in line with the requirements of the NPPF;
- No runoff loss has been assumed in the modelling, therefore, all the design rainfall landing on the impermeable surfaces is expected to reach the attenuation pond;
- As per the conclusions in Section 3.3, the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- A Hydro-Break has been used to restrict the total discharge from the site to the 106.4l/s as stated in section 5.3; and
- The required storage will be up to and including the 1 in 100 year event plus climate change of 45%.

Please see below the drainage strategy a full drawing and calculations are in Appendix E.

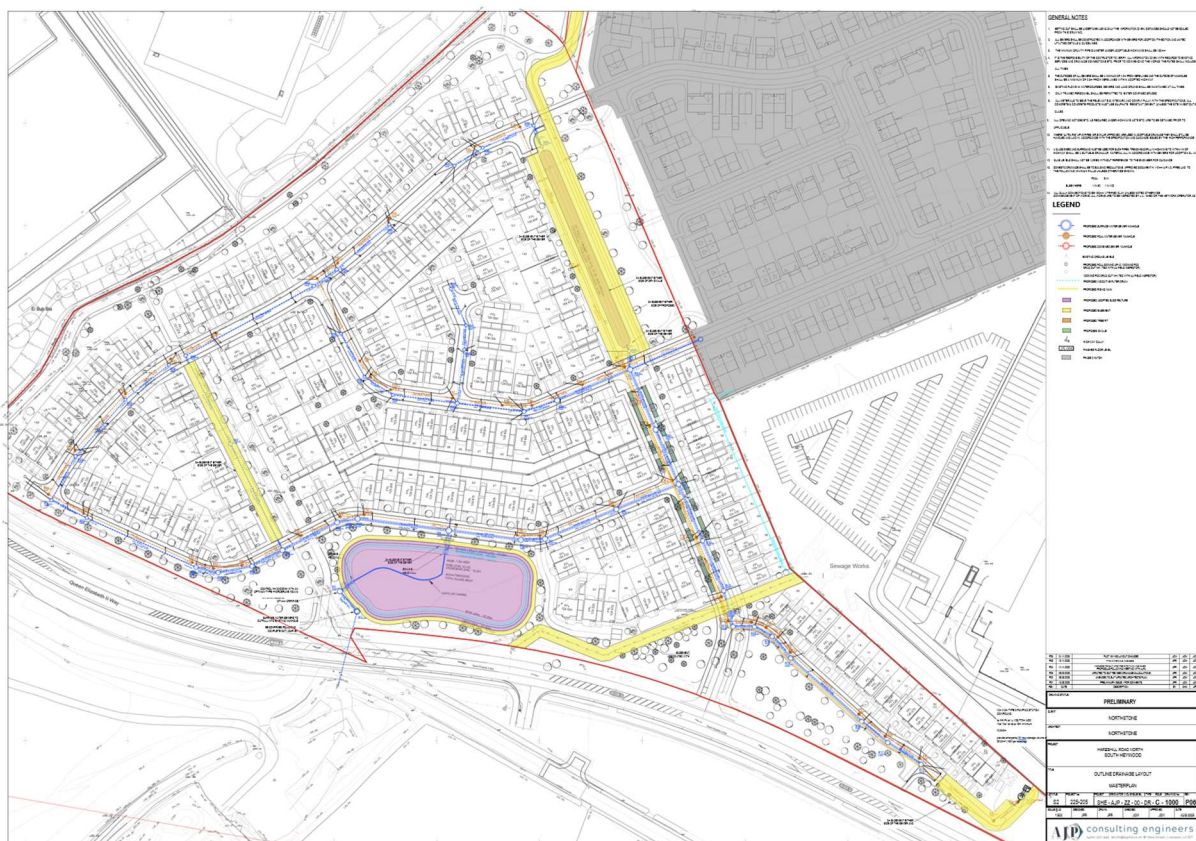


Figure 19: AJP Drainage Strategy

5.4.3 Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g., after heavy rainfall, should be established by the site owners to reduce the

risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed to offer this up for adoption:

Table 4: Operation & Maintenance Plan for Attenuation Basins

TABLE 23.1 Operation and maintenance requirements for ponds and wetlands		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

The detailed drainage strategy has been undertaken by AJP, please see Appendix E for a full Drainage Strategy Report.

6. SUMMARY & CONCLUSIONS

A summary of the main conclusions for the FRA is presented below:

- Development proposals are for a development of 186 residential dwellings at Hareshill Road North, South Heywood, Rochdale, OL10 2TB;
- The proposed development already has outline planning permission 16/01399/HYBR;
- The development site is approximately 8.29ha. The impermeable area is 4.97ha;
- The proposed development is within a Flood Zone 1, an area at low risk of fluvial flooding. Therefore, the risk of fluvial flooding is believed to be low;
- There is a surface water pipe in the east of the site that has a 3m easement;
- The proposed development passes the sequential test as it has planning permission;
- The site is not suitable for infiltration;
- The site is at mostly at low risk of surface water flooding, there is an area of surface water flooding in the south near the road. The layout has been carefully designed around the surface water flood risk area. Less vulnerable/ water compatible features have been placed in the high risk area. Houses have been placed in the low risk areas of surface water flooding. There will be a decrease in surface water flooding with the planned installation of the drainage infrastructure. Therefore, with the implementation of the new drainage system, we believe the site is at low risk of surface water flooding;
- The site is at low risk of groundwater flooding;
- It is recommended that a filter drain is placed on the north border of the site to catch any surface water from the industrial estate to the north. This will be drained to the pipe under the link road;
- AJP have undertaken the drainage design;
- The site will be attenuated in an attenuation basin that will drain to the surface water pipe that runs under the link road to the South of the site. The surface water pipe connects to a watercourse to the South of the link road. The site will discharge into the watercourse;
- The site will drain at 106.4l/s; and
- The proposed development will have storage up to and including the 1 in 100 year event plus climate change of 45% in an attenuation pond.

7. REFERENCES

Author	Date	Title/Description
Department for Communities and Local Government	Dec 2024	Guidance to the National Planning Policy Framework
Ministry of Housing, Communities and Local Government.	Dec 2024	National Planning Policy Framework

Appendix A: Topographical Survey

Appendix B: EP3 Geo-Environmental Site Assessment

EXECUTIVE SUMMARY

Site Address	Land off Hareshill Road, South Heywood, OL10 2TP	
Grid Reference	E385216, N409293	
Site Area	~13 Ha	
Current Site Use	The subject site is an irregular shaped parcel of land located off Hareshill Road in Heywood. The site is known as Hareshill Farm and comprises undeveloped agricultural fields largely used for livestock pasture. There is a farmhouse and associated buildings in the south west of the site. The site is variable in topography and generally falls from the north west to the south east from circa 131.0m AOD to 124.0m AOD.	
Proposed Development	Russell Homes intend to develop or divest the site for a residential end use comprising a series of low-rise dwellings with associated private garden and landscaped areas, public open space, estate roads and infrastructure.	
Environmental Setting	<i>Drift Geology</i>	Till (Devensian – Clay) Clay, Sand, Gravel
	<i>Bedrock Geology</i>	Pennine Lower Coal Measures Formation- Mudstone, Siltstone, Sandstone.
	<i>Hydrogeology</i>	Secondary undifferentiated (drift) overlying Secondary A aquifer (Solid). The site is not located in a groundwater SPZ.
	<i>Hydrology</i>	Whittle Brook is located approximately 325m to the South East.
	<i>Flood Risk</i>	Unaffected by flooding from rivers.
	<i>Subsidence Hazard</i>	No hazard identified in data searches.
Site History	Historical mapping suggests that the site has largely remained undeveloped agricultural land. Hares Hill Farm is recorded in the south west of the site from the earliest available mapping to present day. A sewage works is recorded immediately adjacent to the site Pre 1984-Present.	
Utility Locations	There is a BT cable which runs north east to south west of this development area. Utility connections are available throughout Hareshill Road to the south.	
Landfill Sites & Ground Gases	There are no historic or authorised landfill sites within 250m of the site. The onsite field boundaries and pond may have been partially infilled at some point.	
Radon	Unaffected – no special precautions required.	
Coal Mining / Land Stability	The Coal Authority does not record either the potential for unrecorded shallow mine workings or coal seams beneath this sector of the development area, however coal seams and probable shallow workings are recorded within 250m to the north east.	

E3P Intrusive Ground Investigation

Site Investigation Works	E3P has completed an intrusive Ground Investigation comprising mechanically excavated trial pits, window sample boreholes, dynamic cone penetrometers, cable percussive boreholes, rotary boreholes and environmental monitoring installations.
Ground Conditions	Made Ground The majority of the exploratory hole locations were surfaced by reworked topsoil deposits comprising soft brown slightly gravelly sandy clay with gravel of wood and sandstone. The reworked topsoil was generally encountered to depths of between 0.20m – 0.30mbgl. No other Made Ground deposits were encountered. Drift Deposits The majority of exploratory hole locations were underlain by cohesive drift deposits between 0.30m and 4.0mbgl, comprising firm medium strength to stiff high strength orange brown slightly gravelly sandy CLAY with gravel of sandstone and mudstone and cobbles of mudstone. SAND deposits were identified across the site between 0.30m and 2.20mbgl. Sand deposits generally comprised medium dense orange clayey fine to medium SAND. Several exploratory holes were also underlain by orange sandy GRAVEL of sandstone and mudstone between 0.80 and 5.70mbgl. Solid Geology The solid bedrock geology was encountered between 1.40m and 30.0mbgl. The bedrock comprised interbedded SANDSTONE and MUDSTONE with coal traces. The depth to bedrock generally increased from west to east. A depth of bedrock plan is included as drawing 13-222-006 in Appendix III. Groundwater Groundwater seepages were identified between 2.1m and 4.0mbgl.
Human Health	Chemical analysis completed has not highlighted any elevated determinants within the topsoil or underlying natural drift deposits. Therefore, the greenfield area of the site is considered to be suitable for use as a residential development with no specialist mitigation measures required. Topsoil deposits are reworked, however initial chemical testing suggests that the topsoil may be suitable for re-use following screening and confirmation that the topsoil meets British Standards. A supplementary post demolition ground investigation will be required in the location of the existing farm buildings to assess the potential for contaminants in this area of the site. Chemical analysis indicates that existing topsoil deposits will be suitable for utilisation within the proposed garden and landscaped areas.

EXECUTIVE SUMMARY

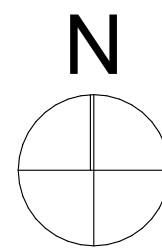
Controlled Waters	There is no unacceptable risk to the controlled water receptors and the wider environ.
Ground Gas	Ground gas monitoring thus far has indicated the site would be classed as Characteristic Situation 1 or Green, suggesting no gas protection measures will be required. However, the final ground gas regime will be confirmed following the completion of the ground gas monitoring programme.
Potable Water Infrastructure	It is likely that PE Pipe will be suitable for the proposed development.

Geotechnical Assessment

Underground Obstructions & Anomalies	No relic foundations or significant underground obstructions were identified during the Ground Investigation. However, obstructions will be present beneath the existing farm buildings and residential property.
Allowable Bearing Pressure (ABP)	The underlying natural clay drift deposits have been assessed as being firm low strength to very stiff very high strength with a net ABP in the order of 72-469kN/m² from 1.00-3.00mbgl. The clayey sand deposits have been assessed as being medium dense to dense with a net ABP of 173-434.
Foundation Options	Based on existing data and given the predominantly cohesive ground conditions, it is considered that the majority of the proposed dwellings could be constructed using traditional spread footings bearing in the firm to stiff Clay at a depth from 1.00m to 1.50m below current ground levels. Where deeper variable soft natural clays, or loose sand and gravels are identified, dependent on development levels, plots may require locally deepening to Mass Trench Fill. Alternatively, it is recommended that Ground Improvement by VSC be considered to ensure a safe and uniform ABP for a doubly reinforced strip foundation bearing within the treated substratum. In the location of soft clays, plots will require a driven pile foundation due to the incompatibility with VSC. Foundation depths should take account of the presence of existing and proposed trees with foundations deepened locally, to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards. It is recommended that at working drawing stage a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current / proposed locations of trees.
Building Floor Slabs	Ground bearing floor slabs are unlikely to be viable given the shallow cohesive soils.

Heave Precautions	The Clay soils are classified as Low to Medium Volume Change Potential and where it is present at a shallow depth within the conjectured zone of potential tree influence, heave precautions will be required within the construction of a shallow foundation and to the underside of floor residential floor slabs.
Soakaway Drainage	BRE365 infiltration testing suggests that soakaways will not be suitable for the proposed development.
Infrastructure Construction	Shallow bedrock is present in the western sector, therefore consideration must be given to the need to break and excavate this material to install drainage infrastructure. The in-situ CBR will be highly dependent on the climatic conditions, however an allowance should be made for addition capping to the highway sub-grade where clays will soften during periods of prolonged rainfall.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
CBR Design %	The natural cohesive and granular soils could be compacted to achieve a CBR in the order of 3-5% depending on climatic conditions at the time of the works.
Cut / Fill	Development levels unknown at this time, however an element of cut fill works will be required to prepare the development platform. Given the fine grained nature of the material, if site derived soils are use as upfill beneath plots where VSC is considered, this material will require compaction and engineering to an approved geotechnical specification. Site derived materials can be engineered as Class 1&2 bulk upfill in favourable climatic conditions, however it will be critical to ensure control of moisture content.
Waste Characterisation	Stable Non-Reactive (non-hazardous / inert). Any material that is to be disposed to landfill should undergo assessment using Technical Guidance WM3: <i>Waste Classification - Guidance on the classification and assessment of waste</i> .
Coal Mining	In due consideration of the potential presence of the Arley Coal seam, three rotary boreholes were advanced in accordance with Coal Authority Permission ref: 16633 to assess the potential presence of shallow workings within this seam and the potential for ground instability to induce a future subsidence event within the proposed development. The rotary boreholes have confirmed that sufficient rock cover is present above any coal seams, therefore there is considered to be no risk of instability.
Recommendations	Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:  Plot Specific Foundation Schedule (upon receipt of the final development levels);  Arboriculture Survey;  Post Demolition Site Investigation; and  Remediation Strategy

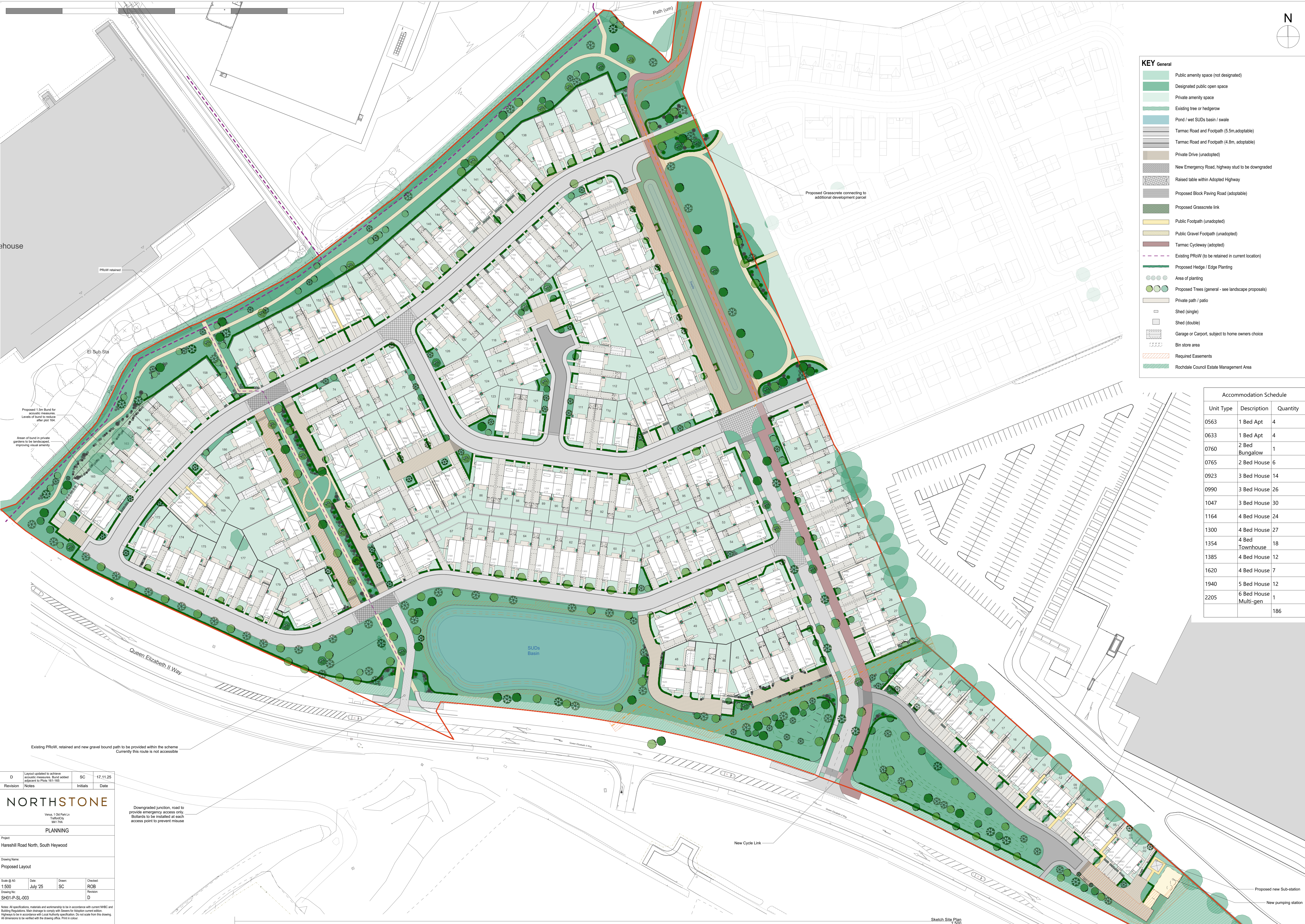
Appendix C: Layout Plan



KEY General

- Public amenity space (not designated)
- Designated public open space
- Private amenity space
- Existing tree or hedgerow
- Pond / wet SUDs basin / swale
- Tarmac Road and Footpath (5.5m, adoptable)
- Tarmac Road and Footpath (4.8m, adoptable)
- Private Drive (unadopted)
- New Emergency Road, highway stud to be downgraded
- Raised table within Adopted Highway
- Proposed Block Paving Road (adoptable)
- Proposed Grasscrete link
- Public Footpath (unadopted)
- Public Gravel Footpath (unadopted)
- Tarmac Cycleway (adopted)
- Existing PRoW (to be retained in current location)
- Proposed Hedge / Edge Planting
- Area of planting
- Proposed Trees (general - see landscape proposals)
- Private path / patio
- Shed (single)
- Shed (double)
- Garage or Carport, subject to home owners choice
- Bin store area
- Required Easements
- Rochdale Council Estate Management Area

Accommodation Schedule		
Unit Type	Description	Quantity
0563	1 Bed Apt	4
0633	1 Bed Apt	4
0760	2 Bed Bungalow	1
0765	2 Bed House	6
0923	3 Bed House	14
0990	3 Bed House	26
1047	3 Bed House	30
1164	4 Bed House	24
1300	4 Bed House	27
1354	4 Bed Townhouse	18
1385	4 Bed House	12
1620	4 Bed House	7
1940	5 Bed House	12
2205	6 Bed House Multi-gen	1
		186



D

Layout updated to achieve acoustic measures. Band added adjacent to Plots 161-165

SC

17.11.25

Revision

Notes

Initials

Date

NORTHSTONE

Venue, 1.0m Park Ln

Trafford City

M17 7RA

PLANNING

Project:

Harehill Road North, South Heywood

Drawing Name:

Proposed Layout

Scale @ A0:

1:500

Date:

July 25

Drawn:

SC

Checked:

ROB

Drawing No:

SH01-P-SL-003

Revision:

D

Notes: All specifications, materials and workmanship to be in accordance with current NRC and Building Regulations. Main drainage to comply with Sewers for Adoption current edition. Highways to be in accordance with Local Authority specification. Do not scale from the drawing. All dimensions to be verified with the drawing office. Print in colour.

Proposed new Sub-station
New pumping station

Appendix D: Extract of Campbell Reith

Appendix E: SW Management Strategy For Area 2

Site name: South Heywood
Site location: CATCHMENT 6

Site coordinates
Latitude: 53.57992° N
Longitude: 2.2257° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the CIRIA SUDS Manual (2007). It is not to be used for detailed design of drainage systems. It is recommended that every drainage scheme uses hydraulic modelling software to finalise volume requirements and design details before drawings are produced.

Reference: gcw2v3gm9mjb / 13.5
Date: 9 Sep 2016

Site characteristics

Total site area	13.5	ha
Significant public open space	0	ha
Area positively drained	13.5	ha

Methodology

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

Hydrological characteristics

	Default	Edited	
SAAR	1062	1062	mm
M5-60 Rainfall Depth	20	20	mm
'r' Ratio M5-60/M5-2 day	0.3	0.3	
FEH/FSR conversion factor	0.9	0.9	
Hydrological region	10	10	
Growth curve factor: 1 year	0.87	0.87	
Growth curve factor: 10 year	1.38	1.38	
Growth curve factor: 30 year	1.7	1.7	
Growth curve factor: 100 year	2.08	2.08	

Greenfield runoff rates

	Default	Edited	
Qbar	106.14	106.14	l/s
1 in 1 year	92.34	92.34	l/s
1 in 30 years	180.44	180.44	l/s
1 in 100 years	220.78	220.78	l/s

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

SITE 2 – QUICK STORAGE ESTIMATES FOR 1 in 100 Yr + 30 % cc (STORAGE VOLUMES)

CATCHMENT 6

The screenshot shows the 'Quick Storage Estimate' window with the 'Variables' tab selected. The left sidebar contains buttons for 'Variables', 'Results', 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The main area contains the following settings:

Variable	Value
FSR Rainfall	FSR Rainfall
Return Period (years)	100
Region	England and Wales
Map	M5-60 (mm)
	Ratio R
	20.000
	0.300
Cv (Summer)	0.750
Cv (Winter)	0.840
Impervious Area (ha)	8.700
Maximum Allowable Discharge (l/s)	220.8
Infiltration Coefficient (m/hr)	0.00000
Safety Factor	2.0
Climate Change (%)	30

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer: Enter Maximum Allowable Discharge between 0.0 and 999999.0

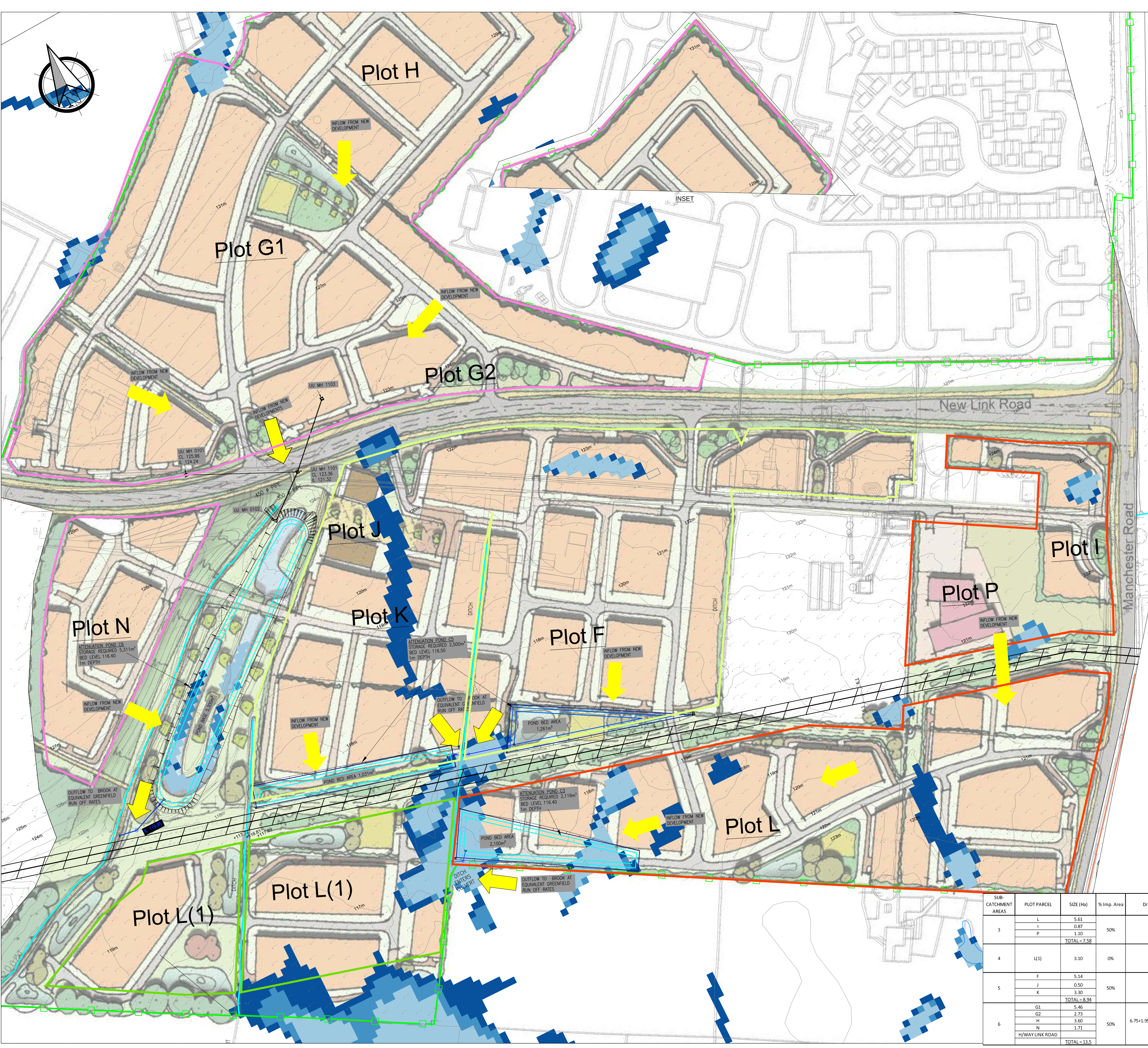
The screenshot shows the 'Quick Storage Estimate' window with the 'Results' tab selected. The left sidebar contains buttons for 'Variables', 'Results', 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The main area displays the following results:

Global Variables require approximate storage of between 3324 m³ and 5311 m³.

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

Buttons at the bottom: Analyse, OK, Cancel, Help.

Footer: Select required Rainfall Model from the list



- NOTES
- 1 DO NOT SCALE THIS DRAWING ON PRINT OR ELECTRONICALLY. WORK FROM FIGURED DIMENSIONS ONLY.

2 No deviation from the details shown on this drawing is allowed without CampbellReith's prior permission in writing.

3 Read this drawing with all Architects, Service Engineers and CampbellReith's relevant details and drawings.

4 All work is to be in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory requirements and the Contract Documents.

5 DRAWING STATUS:

P - PRELIMINARY - Evolving drawings for approvals, Tenders, Billings, etc.

C - CONSTRUCTION - Fully developed drawings issued under instruction for construction.

ONLY STATUS C DRAWINGS TO BE USED FOR CONSTRUCTION.

6 SUITABILITY CODE:

WORK IN PROGRESS:

S0 - Work in progress

SHARED WORK CONTRACTUAL:

S1 - For coordination, S2 - For information, S3 - For internal review and comment, S4 - For construction approval.

DOCUMENTATION (FOR CONTRACTOR PURPOSES):

D1 - For costing, D2 - For tender, D3 - For contractor design, D4 - For manufacture / procurement.

CONSTRUCTION:

A - For construction, B - For construction but with comments (i.e. areas in abeyance), C - Comprehensive revisions required.

7. All existing survey information shown or referred to is based upon topographical survey prepared by Aird Group drawing no. M/RC/14/003/001_3D_F, date 16/05/16 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
8. Ordnance Survey data supplied to Campbell Reith 27/06/16 - no warranty as to the accuracy of the information is given or implied.
9. All control stations and dimensions shall be checked and verified prior to commencement of works and any other discrepancies shall be reported to the engineer.
10. Do not scale from this drawing.
11. Utilities:

The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from United Utilities and other Utility companies. These must be regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquiries of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, size, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.



- KEY:
- Anticipated extent of existing Surface Water flooding during storm event with 1.3% annual probability for 1:75 year return period based on data supplied by the Environment Agency.

Anticipated extent of existing Surface Water flooding during storm event with 0.5% annual probability for 1:200 year return period based on data supplied by the Environment Agency.

Anticipated extent of existing Surface Water flooding during storm event with 0.1% annual probability for 1:1000 year return period based on data supplied by the Environment Agency.



P1	ISSUED FOR INFORMATION	17.10.16	BD
Status	Description	Date	By

CampbellReith

consulting engineers

LONDON 020 7340 1700

SURREY 01737 784 500

BRISTOL 0117 916 1066

☐ MANCHESTER

☐ BIRMINGHAM

☐ DUBAI

0161 819 3060
01675 467 484
00 971 4345 7088

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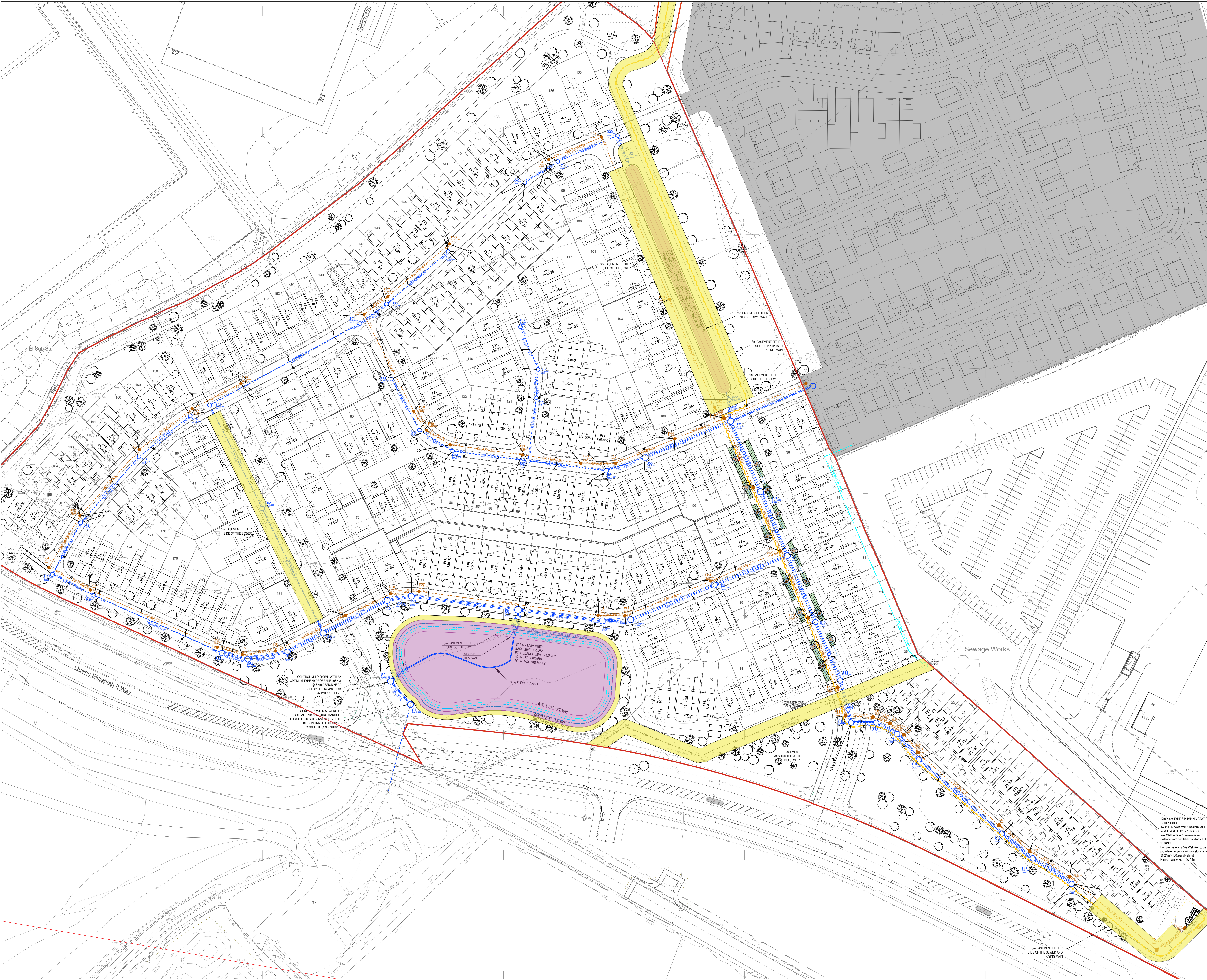
Job Title	SOUTH HEYWOOD, ROCHDALE
Client	RUSSELL HOMES

DRAINAGE STRATEGY CATCHMENT PLAN				
CATCHMENTS 3,4,5 & 6				
Drawn / BD	Date 17/10/16	Scale @ A0 1:1000	C1 checked CB	CR Project No. 12441

Drp No.	12441-CRH-Z1-XX-SK-C-4008	Suitability S2	Status/Revision P1
---------	---------------------------	----------------	--------------------

SUB CATCHMENT AREAS	PLOT PARCEL	SIZE (Ha)	% Imp. Area	Drained area (Ha)	GREENFIELD RUN OFF RATE		ATTENUATION REQUIRED (m³)
					1 in 100 Yr	1 in 100 Yr+CC	
3	L	5.61	50%	3.79	122.5	2,119	
	I	0.87					
	P	1.10					
	TOTAL =	7.58					
4	L(1)	3.10	0%	1.55	50.0	0	
	F	5.14					
	J	0.50					
	K	3.30					
5	TOTAL =	8.94	50%	4.47	144.4	2,500	
	G1	5.46					
	G2	2.73					
	H	3.60					
6	N	1.71	50%	6.75+1.95 H/WAY LINK ROAD = 8.70	220.8	5,311	
	H/WAY LINK ROAD						
	TOTAL =	13.5					

Appendix E: AJP Drainage Strategy



- GENERAL NOTES**
- SETTING OUT SHALL BE UNDERTAKEN USING ONLY THE INFORMATION GIVEN. DISTANCES SHOULD NOT BE SCALED FROM THIS DRAWING.
 - ALL SEWERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 7TH EDITION AND UNITED UTILITIES DETAILS & GUIDELINES.
 - THE MINIMUM GRAVITY PIPE DIAMETER UNDER ADOPTABLE HIGHWAYS SHALL BE 150mm.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL INFORMATION GIVEN WITH REGARDS TO EXISTING SERVICES AND DRAINAGE CONNECTIONS ETC. PRIOR TO COMMENCING THE WORKS. THE BATES SHALL INCLUDE FOR HAND DS AROUND SERVICES WHERE NECESSARY. THE CONTRACTOR SHALL ADHERE TO THE COM REGULATIONS AT ALL TIMES.
 - THE OUTSIDES OF ALL SEWERS SHALL BE A MINIMUM OF 1m FROM KERB LINES AND THE OUTSIDE OF MANHOLES SHALL BE A MINIMUM OF 0.5m FROM KERB LINES WITHIN ADOPTED HIGHWAY.
 - EXISTING FLOWS IN WATERCOURSES, SEWERS AND LAND DRAINS SHALL BE MAINTAINED AT ALL TIMES.
 - ONLY TRAINED PERSONNEL SHALL BE PERMITTED TO ENTER CONFINED SPACES.
 - ALL MATERIALS TO BEAR THE RELEVANT B.S. KITEMARK AND COMPLY FULLY WITH THE SPECIFICATIONS. ALL CONCRETE & CONCRETE PRODUCTS MUST USE SULPHATE RESISTANT CEMENT UNLESS THE SITE INVESTIGATION REPORT PROVES THAT SULPHATE ATTACK FROM SOILS AND GROUNDWATER WILL NOT OCCUR TO WITHSTAND A CLASS.
 - ALL OPENING NOTICES ETC. AS REQUIRED UNDER HIGHWAYS ACTS ETC. ARE TO BE OBTAINED PRIOR TO APPLICABLE.
 - WHERE 'ULTRA RIB' UPVC PIPES (OR SIMILAR APPROVED) ARE USED IN ADOPTABLE DRAINAGE THEY SHALL STILL BE HANDLED AND LAID IN ACCORDANCE WITH THE SPECIFICATION AND GUIDANCE ISSUED BY THE HIGH PERFORMANCE PIPE ASSOCIATION.
 - A CLASS 3 SED AND SURROUND MUST BE USED FOR SUCH PIPES. TRENCH BACKFILL IN HIGHWAYS TO WITHIN 1M OF HIGHWAY SHALL BE A SUITABLE GRANULAR MATERIAL ALL IN ACCORDANCE WITH SEWERS FOR ADOPTION CL. 4.3.4.
 - SLAB LEVELS SHALL NOT BE VARIED WITHOUT REFERENCE TO THE ENGINEER FOR GUIDANCE.
 - DOMESTIC DRAINAGE SHALL BE TO BUILDING REGULATIONS APPROVED DOCUMENT H: 110mm U.P.V.C. PIPES LAID TO THE FOLLOWING MINIMUM FALLS UNLESS OTHERWISE SHOWN.

FOUL	S.W.
HEAD RUN	1 IN 80
1 IN 80	1 IN 100
ELSEWHERE	1 IN 100
 - ALL GULLY CONNECTIONS TO BE 150mm VITRIFIED CLAY UNLESS NOTED OTHERWISE. COMMENCEMENT OF WORKS. ALL WORKS ARE TO BE INSPECTED BY L.A. NRC OR THE NETWORK OPERATOR AS APPLICABLE.

- LEGEND**
- PROPOSED SURFACE WATER SEWER MANHOLE
 - PROPOSED FOUL WATER SEWER MANHOLE
 - PROPOSED COMBINED SEWER MANHOLE
 - EXISTING GROUND LEVELS
 - PROPOSED FOUL 60MM Ø UPVC 120MM Ø PCC DRAG OUT MH (TBC WITH U/I FIELD INSPECTOR)
 - PROPOSED SURFACE WATER 60MM Ø UPVC 120MM Ø PCC DRAG OUT MH (TBC WITH U/I FIELD INSPECTOR)
 - PROPOSED INDICATIVE FILTER DRAIN
 - PROPOSED RISING MAIN
 - PROPOSED ADOPTED SUDS FEATURE
 - PROPOSED EASEMENT
 - PROPOSED TREE PIT
 - PROPOSED SHALE
 - HIGHWAY GULLY
 - FINISHED FLOOR LEVEL
 - PHASE 2 HATCH

REV	DATE	DESCRIPTION	BY	CHK	APP
P00	21.11.2025	PLOT 61-106 LAYOUT CHANGED	JCM	JCM	JCM
P01	12.11.2025	PIPE MATERIALS AMENDED	JPR	JCM	JCM
P02	11.11.2025	AMENDED TO SUIT UPDATED SITE PLAN AND SUDS PROPOSALS FOLLOWING MEETING WITH LULFA	JPR	JCM	JCM
P03	09.09.2025	UPDATED TO SUIT REVISED DRAINAGE CALCULATIONS	JPR	JCM	JCM
P04	30.08.2025	AMENDED TO SUIT UPDATES ARCHITECT'S PLAN	JPR	JCM	JCM
P05	12.08.2025	PRELIMINARY ISSUE - FOR COMMENTS	JPR	JCM	JCM

DRAWING STATUS:

PRELIMINARY

CLIENT: NORTHSTONE

ARCHITECT: NORTHSTONE

PROJECT: HARESHILL ROAD SOUTH HEYWOOD

TITLE: OUTLINE DRAINAGE LAYOUT MASTERPLAN

STATUS	PROJECT No	PROJECT	ORIGINATOR	DESIGNER	TYPE	ROLE	DRAWING No	REV
S2	225-205	SHE - AJP - ZZ - 00 - DR - C - 1000	JPR	JCM	DR	C	1000	P06

SCALE: 1:500

DATE: AUG 2025

AJP consulting engineers
0151 227 1462 | info@ajped.co.uk | 41 Dale Street, Liverpool, L2 2ET