



BDW Trading Ltd and Global Land & Property Ltd

Cowm Top Lane, Rochdale

Flood Risk Assessment and Drainage Report

881680 R1(07) FRA



**INVESTORS
IN PEOPLE**



AUGUST 2022

RSK GENERAL NOTES

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Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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1 INTRODUCTION

RSK Land and Development Engineering Ltd (RSK) was commissioned to carry out a Flood Risk Assessment (FRA) and Drainage Report for BDW Trading Ltd and Global Land & Property Ltd (the 'client'). The assessment is in support of the planning submission for a residential development off at Cowm Top Lane, Rochdale (the 'site').

The assessment has been prepared in accordance with the National Planning Policy Framework (NPPF)¹ and its accompanying Planning Practice Guidance², the Interim Code of Practice for Sustainable Drainage³, BS 8533-2017 Assessing and Managing Flood Risk in Development Code of Practice⁴ and the Non-statutory technical standards for sustainable drainage systems⁵, with site-specific advice from the Environment Agency (Environment Agency), the Lead Local Flood Authority (LLFA), the Local Planning Authority (LPA), the architect and the client.

The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere.

The key definitions within the PPG are:

- "Flood risk" is a combination of the probability and the potential consequences of flooding from all sources – including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.
- "Areas at risk of flooding" means areas at risk from all sources of flooding. For fluvial (river) and sea flooding, this is principally land within Flood Zones 2 and 3. It can also include an area within Flood Zone 1 which the Environment Agency has notified the local planning authority as having critical drainage problems.

For this site, the key aspects that require the assessment are:

- The Environment Agency's indicative flood zone map shows that the site is entirely located within Flood Zone 1. (**Figure 1.1**);
- The site area is in excess of 1ha therefore surface water drainage must be considered, and sustainable drainage systems (SuDS) be incorporated where feasible.

The comments given in this report and opinions expressed are subject to RSK Group Service Constraints provided in **Appendix A**.

¹ Communities and Local Government (2021), 'National Planning Policy Framework'.

² Communities and Local Government, 'Planning Practice Guidance - Flood Risk and Coastal Change, ID 7', March 2014. <http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

³ DEFRA (2004), 'Interim Code of Practice for Sustainable Drainage Systems' National SUDS Working Group, July 2004.

⁴ BSI (2017), 'BS 8533-2017 Assessing and managing flood risk in development Code of practice'.

⁵ DEFRA (2015), 'Sustainable Drainage Systems, Non-statutory technical standards for sustainable drainage systems'.

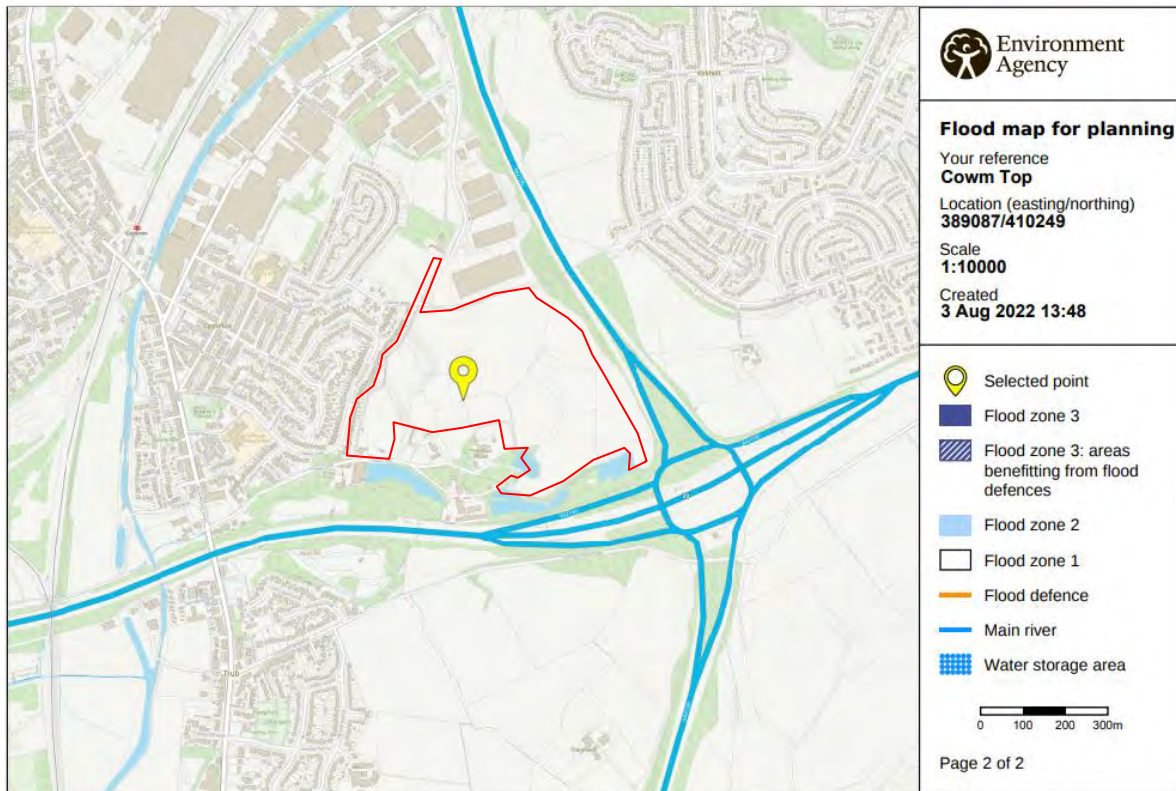


Figure 1.1: Environment Agency Flood Zone Map

2 CONTEXT AND SCOPE OF WORK

A key element of project development is to prepare a FRA to establish the flood risk associated with the proposed development and to propose suitable mitigation, if required, to reduce the risk to a more acceptable level.

The scope of work relating to a FRA is based on the guidance provided in Section 10 of the NPPF and its accompanying Planning Practice Guidance.

A site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. The scope of this assessment therefore comprises the following elements:

- To review architect plans, planning information and other studies to determine existing site conditions;
- To obtain information on the hydrology and hydrological regime in and around the site;
- To obtain the views of the Environment Agency/LLFA/LPA including scope, location and impacts;
- To determine the extent of new flooding provision and the influence on the site;
- To assess the impact on the site from climate change effects and anticipated increases in rainfall over a 100 year period for residential led scheme;
- To review site surface water drainage based on the proposed layout and, if necessary, to determine the extent of infrastructure required; and
- To prepare a report including calculations and summaries of the source information and elements reviewed.

3 SITE DESCRIPTION

3.1 Location

Site Name: Cowm Top Lane, Rochdale

Site Address: Land at Trows Lane Farm, Castleton, Rochdale

Site National Grid Reference: (E) 389163; (N) 410296

The site is approximately 19.65ha in size and is located to the south of Rochdale town centre.

Table 3.1: Site setting

Direction	Characteristic
North	Bounded by a industrial / commercial units and the A627(M), with the urban area of Rochdale and the town centre beyond.
East	Bounded by the A627(M), with farmland / scrubland and residential areas and the M62 beyond.
South	Bounded by several waterbodies and a small industrial complex, with the M62 and open farmland beyond.
West	Bounded by residential properties of Leander Drive, with further residential units and St. Gabriels RC primary school beyond

Figure 3.1 shows a Site Location plan.



Figure 3.1: Site location plan

3.2 Land use and topography

The site is currently existing open grassland.

The approximate land use of the site is as follows:

Table 3.2: Existing site land uses

Land use	Area (m ²)	Percentage
Impermeable	250	<1%
Permeable	196,250	>99%
Total	196,500	100%

A site-specific topographic survey has been carried out for the site. The data shows that the site falls in a southerly direction from a high point of 183.49mAOD (metres above ordnance datum) to a low point of 147.75mAOD in the southernmost section of the site.

The topographic survey and existing site layout is included in **Appendix B**.

3.3 Hydrology

The site is bounded to the south (in part) by a number of interconnected fishing lakes. Trub Brook runs from the westernmost lake beneath the industrial facilities before emerging and continuing west. Trub Brook flows parallel to the M62 for approximately 500m, passing beneath the A664 and the eastern and western branches of the Rochdale Canal, before emerging to the west of the Manchester to Rochdale railway line. After winding its way through the northern areas of Greater Manchester, Trub Brook eventually discharges (by way of Whit Brook and the River Irk) into the River Irwell in the vicinity of the Manchester Arena in Central Manchester.

Information with respect to the extents of the watercourses on site and in the surrounding areas was provided by Rochdale Council. This includes a Landmark Report showing the detailed river network in the area and an historic map from 1893, which again highlights the maximum extent of the surface watercourses on site. The Landmark Report showing local watercourses (**Appendix C**) shows the origins of the inflows into the fishing lodges arise in the southern areas of the site and to the east of the M627 and south of the M62. The Landmark Report also accords with the Historic Mapping from RBC from 1893 (**Appendix D**), which highlights two short sections of watercourses within the eastern section of the site only, along the lines of the tertiary watercourses shown in the Landmark Report.

The Rochdale Canal is located approximately 560m to the west of the site, running at its closest point in a north south direction.

Several springs are noted as being located on site, further investigation into these springs is currently ongoing with respect to their location, flow and contributing area. Further field drains and ditches are located in the wider area. Following a site walkover survey (detailed in section 3.7) it was confirmed that these onsite field drains / depressions predominantly fall towards and discharge to the pond to the south of the site.

A drainage connection survey has been undertaken by RSK Safeground with the view to map the current watercourses, drainage runs and pipe network serving the site. The Report and associated drawings are included in **Appendix E**, though in summary show the following.

- Not all mapped springs were visible during the site investigation;
- There are a number of connections (pipe) from the site to the fishing ponds to the south (westernmost pipe and outfall is still under investigation);
- A small watercourse is noted flowing along the hedgeline towards the pond to the south of the site (as shown on OS mapping).

Further consultation has been made with Rochdale Council regarding the options for management of the onsite springs. Following a meeting with Rochdale Council and Stephen McCann on 5/9/19, further site investigation have been undertaken on site (with Stephen McCann in attendance) to look at confirming the extent, location and flow from the springs and mitigation options.

The information obtained from this site walkover is currently being compiled, though following the site walkovers and the receipt of the two reports provided by Rochdale

Council, the information provided accords with investigations undertaken on site with respect to establishing the maximum extent of the watercourses (as shown on the provided plans from Rochdale Council) and is considered as the baseline moving forwards.

3.4 RSK onsite ground / surface flow assessment

RSK has been undertaking long term investigation and monitoring on the site with respect to the local water features. The full assessment of the onsite flows is included in **Appendix F**. The report concludes noting that;

'there is no reason to suggest a change to the existing designation of ordinary watercourse to the channels that have been identified on site. Once development is completed flows through the eastern valley will be negligible (0.2 – 0.5 l/sec) and are not indicative of significant flow. The tree lined channel originating in the centre of the site will be retained and incorporated into the site drainage scheme. The channel at the end of the eastern valley will also be retained and flow from the channels monitored by RSK will be intercepted and incorporated into the site drainage scheme to allow them to continue contributing to the flow of water at the bottom of the eastern valley.'

The response goes on to note that;

'the extremely low seepage rate will be easily controlled through the use of existing drainage techniques, which would normally include a connected corridor of coarse granular drainage medium wrapped with geotextile (similar to a French drain),' and that, 'a detailed drainage design will need to be undertaken but it is likely that a granular flow path would provide ample capacity for anticipated flows.'

3.5 Geology

Based on the British Geological Survey⁶ online mapping for the area, the site exhibits the following geology:

- Superficial Geology: Hummocky (moundy) Glacial Deposits. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.
- Base rock Geology: Pennine Lower Coal Measures Formation – Mudstone, Siltstone and Sandstone. The formation consists of interbedded grey mudstone, siltstone and pale grey sandstone, commonly with mudstones containing marine fossils in the lower part, and more numerous and thicker coal seams in the upper part.
- Base rock Geology: Old Lawrence Rock – Sandstone. Two thin linear strips of this formation extends north west – south east through the site and the surrounding area

Two separate series of borehole logs are present within the vicinity of the site. A set of records (SD81SE421-437) is available in the Cown Top Lane / Cripple Gate Lane area

⁶ British Geological Survey online mapping, available at <http://mapapps.bgs.ac.uk/geologyofbritain/home.html?location=&gobBtn=go>

to the north of the site, and a second set (SD81SE330-334) is available in the Bates Close area to the west of the site.

Data from the boreholes in the vicinity of Cown Top Lane / Cripple Gate Lane shows compositions of sandy clays and gravelly sand to a depth of 12mbgl (end of borehole). There was no substantial groundwater recorded in the set of borehole records in the vicinity of Cown Top Lane / Cripple Gate Lane (restricted to moist soils at depth).

Data from the boreholes in the Bates Close area show strata compositions of clays, silts, sands and gravels to depths of 6mbgl (end of borehole). Groundwater was encountered in one borehole in the Bates Close area, noted at 4.5mbgl.

3.6 Soils

According to the Landis Soilsclapes⁷ the soils underlying the site and the surrounding areas are described as *freely draining slightly acid sandy soils*. The soils in the area are outlined *to drain to groundwater*.

3.7 Infiltration

Falling head tests were undertaken on site by Smith Grant in September 2017 to provide an early estimation on the potential infiltration rates available at the site. The results from test are shown below. Based on the infiltration rates and the depths of tests, the results are not conducive to traditional soakaway designs.

(Depths are the top and base of the response zone below existing ground levels)

- BHG 10-20m 4.9×10^{-7} m/s
- BHD 1-10m 1.4×10^{-7} m/s
- BHH 10-20m 1.9×10^{-6} m/s
- BHI 10-20m 2.8×10^{-7} m/s
- BHK 5-15m 5.8×10^{-7} m/s
- BHL 10-20m 1.4×10^{-6} m/s
- BHM 1-10m 1.1×10^{-6} m/s
- BHN 5-15m 1.0×10^{-6} m/s

3.8 Hydrogeology

Hydrogeological information was obtained from the Environment Agency's online mapping service. These maps indicate that the site is underlain by a Secondary A bedrock aquifer and a Secondary A superficial aquifer.

The site is not shown to be located within a Groundwater Source Protection Zone on the Environment Agency groundwater maps.

⁷ Cranfield Soil and Agrifood Institute Soilsclapes mapping, available at <http://www.landis.org.uk/soilsclapes/>

3.9 Climate Change

Within the context of the existing flood risk at the site, and the requirements of the NPPF and PPG, climate change impacts from different flood sources have been considered alongside the present day scenario as described in Section 7.

In accordance with the recently published Flood Risk Assessments: Climate Change Allowances⁸ climate change allowances applicable to this site are predictions of anticipated change for peak river flow (by river basin district) and peak rainfall intensity.

3.9.1 Peak River Flow

The Guidance provides a range of peak river flow allowances against an Allowance Category. The allowance categories are based on percentiles (a measure used in statistics to describe the proportion of possible scenarios that fall below an allowance level), with:

- The central allowance based on the 50th percentile
- The higher central based on the 70th percentile
- The upper end based on the 90th percentile.

The determination of the allowance category applicable to the site is ascertained through the confirmation of the River Basin District in which the site lies, the flood risk vulnerability of the development and the flood zone designation of the site.

The new guidance provides information of peak river flow allowances for developments in Flood Zone 2 and 3, against the allowances noted above to assess future changes of peak river flow.

In accordance therefore with Table 1 of the Guidance, for a more vulnerable residential development (100 years design lifetime) with areas of Flood Zone 1 on site in the North West River Basin District, there is not a requirement to assess fluvial river flows against a climate change factor.

3.9.2 Peak Rainfall

In the North West River Basin District, wetter winters and more rain falling in wet spells may increase river flooding for rivers and tributaries. More intense rainfall causes more surface runoff, increasing localised flooding and erosion. In turn, this may increase pressure on drains, sewers and water quality. Storm intensity in summer could increase even in drier summers. Rising sea or river levels may increase local flood risk inland or away from major rivers because of interactions with drains, sewers and smaller watercourses.

In accordance with the recently published Flood Risk Assessments: Climate Change Allowances, for the surface water runoff assessment of a mixed use development (100 year lifetime), the flood risk assessment is required to assess both the central and upper end allowances to understand the range of impacts at the site.

⁸ Environment Agency, 'Flood Risk Assessments: climate change allowances' February 2016
<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

As such an allowance of a 40% increase in the rainfall intensity values for the period 2060 to 2115 have been included to account for the impact of climate change on the design of the development with respect to the Central (20%) and Upper End (40%) allowance, which has been considered to ensure that there is no flooding to properties during the events. These increases will apply towards the end of design lifetime of the development.

4 SITE WALKOVER NOTES

4.1 Walkover date 6th July 2017

A site walkover was undertaken on the 6th July 2017 to ascertain the hydrological influences at the site and the surrounding area. The following is a summary of the site walkover;

- Trub Brook (**Figure 4.1**) is located to the south of the site and appears in a well maintained condition, though the banks are slightly overgrown;



Figure 4.1: Trub Brook running adjacent to the southern boundary of the site

- A series of connected fishing ponds are located to the south of the site and discharge to Trub Brook (**Figures 4.2 and 4.3**) through 2 large culverts, one beneath the railway and one beneath the former railway bridge on Tithebarn Street;



Figure 4.2: Fishing ponds to the south of the site



Figure 4.3: Fishing ponds to the south of the site

- The site topography rises and falls significantly. (**Figures 4.4 and 4.5**);



Figure 4.4: Onsite topography



Figure 4.5: Onsite topography

- Undulating topography within the central areas of the site (**Figures 4.6 and 4.7**) discharge to offsite pond to the south (**Figure 4.8 and 4.9**);



Figure 4.6: Main central ditch to be retailed



Figure 4.7: Location where ditch spills over access track prior to discharge location to pond to the south



Figure 4.8: Offsite pond to the south



Figure 4.9: Offsite pond to the south

4.2 Walkover date 5th August 2019

A follow up walkover of the site was undertaken by RSK's hydrogeologist to assess the springs and flow routes on site. A summary of the walkover was provided and notes;

- The BGS maps show this area to be Morainic deposits – poorly sorted sand, gravel and silty clay with moundy topography. Bedrock is Lower Coal Measures and two sandstone bands (Old Lawrence Rocks (15-55m)) sub crop beneath the site – the sandstone is believed to dip to the SW, to a topographical low and therefore the site is likely to act as a recharge to the sandstone and not discharge from the sandstone. Ground to the northeast, associated with the A627(M) is slightly lower and the drainage along that road is likely to intercept shallow groundwater flow associated with higher ground to the north.
- The site was entered from the north – off Cown Top Lane.
- The site was traversed as per the red arrows on the below plan.
- There was flow in the southern channel at approximately 1-litre per 5-6 seconds. A pipe discharging through a home-made headwall is located upstream of the pond and flow rates could be measured here so long as the pond level is low enough. It was empty at the time of the visit. The pond was untidy and appeared poorly constructed/maintained.
- Many areas were wet with very boggy ground under foot although a discernible flow was only identifiable in certain locations. Aerial images allow identification of the wet parts of the site (via plants) and hence the areas where water flow and emergence of groundwater is likely. [My] initial notes identify just two springs – this is based on wet ground being identified on the side of hills but many other areas of wet ground were noted and these other areas will be generated by springs.
- Several groundwater monitoring wells were found around site. They were unlocked and accessible for monitoring – a dip meter wasn't taken to site so the wells were not dipped.
- Vegetation in the wooded area along the southern channel was very high – bracken was approximately 3m tall and there was Giant Hogweed. Access isn't easy!
- Areas to measure flow rate will be limited without significant work.



Figure 4.10 – August 2019 site walkover summary image

4.3 Walkover date 12th September 2019

As noted following a meeting with Rochdale Council and Stephen McCann on 5/9/19, further site investigation have been undertaken on site (with Stephen McCann in attendance) on the 12/9/19 to look at confirming the extent, location and flow from the springs and mitigation options.

As noted in Section 3.4, RSK has been undertaking long term investigation and monitoring on the site with respect to the local water features. The full assessment of the onsite flows in included in **Appendix F**.

5 DEVELOPMENT PROPOSALS

The proposed development is for a residential led scheme comprising residential units with associated parking, access and soft landscaping. The approximate land uses of the proposed site are summarised in Table 5.1 below, with the current parameters included in **Appendix G**.

Table 5.1: Proposed site land uses

Land use	Area (m ²)	Percentage
Indicative Development Area	135,500	69%
Green Space	61,000	31%
Total	196,500	100%

6 LEGISLATION AND POLICY CONTEXT

6.1 National policy

Table 6.1: National legislation and policy context

Legislation	Key provisions
National Planning Policy Framework (2021)	The aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe without increasing flood risk elsewhere and where possible, reducing flood risk overall.
Planning Practice Guidance (2014)	The NPPF is supported by an online Planning Practice Guidance, which provide additional guidance on flood risk.
Flood and Water Management Act 2010 ⁹	The Flood and Water Management Act (FWMA) aims to implement the findings of the 2007 Pitt Review and co-ordinate control of drainage and flood issues. There are a number of increased responsibilities within the Act that affect adoption of SuDS features and the role of the Environment Agency to expand on the mapping data they provide. The implementation of SuDS features has many beneficial impacts on the treatment of surface water during remediation works.
Water Resources Act 1991 ¹⁰	Section 24 – The Environment Agency is empowered under this Act to maintain and improve the quality of ‘controlled’ waters Section 85 – It is an offence to cause or knowingly permit pollution of controlled waters Section 88 – Discharge consents are required for discharges to controlled waters
Water Framework Directive (2000) ¹¹	The Water Framework Directive (WFD) requires all inland and coastal waters to reach ‘good’ chemical and biological status by 2015. Flood risk management is unlikely to have a significant impact on chemical water quality except where maintenance works disturb sediment (such as de-silting) or where pollutants are mobilised from contaminated land by floodwaters. The main impact of the WFD on flood risk management, both now and in the future, relates to the ecological quality of water bodies. Channel works, such as straightening and deepening, or flood risk management schemes that modify geomorphological processes

⁹ Flood and Water Management Act, 2010.

¹⁰ Water Resources Act, 1991

¹¹ European Commission (2000) , ‘Directive 2000/60/EC - Water Framework Directive’

Legislation	Key provisions
	can change river morphology. The WFD aims to protect conservation sites identified by the EC Habitats Directive and Birds Directive that have water-related features, by designating them as 'protected sites'.

6.2 Regional policy

Local policies ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding and making development safe without increasing flood risk elsewhere and where possible, reducing flood risk. The relevant policies for the Castleton area of Rochdale are contained within the recently adopted (October 2016) Rochdale Borough Council Core Strategy¹².

Table 6.1: Local policy legislation and policy context

Legislation	Key provisions
Policy G8- Managing Water Resources and Flood Risk	We will ensure that new development (including flood risk mitigation measures) does not lead to any form of increased flooding locally or further downstream, does not impede natural water and flood risk management, is not detrimental to existing or potential flood storage areas, contributes where possible to alleviating existing flood risk, is itself well protected from flood risk and ensures prudent use of water resources. We will require: - Compliance with a 'sequential' approach to new development and flood risk, directing development away from areas of high risk, in accordance with the National Planning Policy Framework; - Full regard to and compliance with the advice of the Environment Agency (or equivalent agency) and the objectives and priorities for flood risk management set out in the Local Flood Risk Management Strategy, including any mitigation measures recommended for particular sites; - Full regard to the published evidence of local flood risk and its significance as included in Strategic Flood Risk Assessments, Surface Water Management Plans and other recognised sources of flood risk data and the production of additional Flood Risk Assessments (FRAs) as appropriate; - Incorporation of appropriate measures for the management of surface and flood water, including flood storage areas, Sustainable Urban Drainage Systems (SUDS) and the protection of 'overland flow paths'; - Compliance with any Surface Water Management Plan or drainage strategies produced, such as for the identified critical drainage areas of Littleborough and Heywood;

¹² Rochdale Borough Council (2016), 'Rochdale Adopted Core Strategy'.

Legislation	Key provisions
	f. The avoidance of culverting, and support the opening up of existing culverts wherever possible; g. The incorporation of measures for the conservation of water to minimise potable water consumption, including rainwater collection measures, which should be integral to the design of buildings and spaces; h. Development that does not directly or indirectly lead to pollution of existing water resources such as watercourses and groundwater or the derogation of the quantity of groundwater; i. The incorporation of measures to improve water quality; and j. The taking of opportunities to improve the habitat value of watercourses and water bodies. In addition, we will identify additional flood storage areas which will be protected from development.

7 SOURCES OF INFORMATION

7.1 Introduction

Reliance has been placed on factual and anecdotal data obtained from the sources identified. RSK cannot be held responsible for any omissions, misrepresentations, errors or inaccuracies with the supplied information. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report in whole or in part.

The information in this report has been prepared following consultation with third party consultees, and receipt of third party information. In some instances this may only be verbal or informal responses.

Such information and opinions received from third parties are likely to be subjective to the individuals concerned, and may not necessarily represent the opinions of the bodies themselves. As such, said opinions may be subject to variation, clarification or expansion upon submission of more detailed proposals from the developer.

All opinions expressed are based upon current design standards and policies in force at the date of this report. These standards may be subject to change with the passage of time.

The opinions expressed herein are intended to provide general guidance as to how a problem related to a particular development might be resolved. Given the paucity of the original information, and the often-indirect nature of information received, they should not be relied upon as absolute or definitive guidance as to any particular solution. Such conclusions can only sensibly be arrived at upon detailed design.

As a consequence of the above, RSK LDE will not be held liable for any consequential losses, howsoever caused, as a consequence of inaccurate missing, incomplete, or erroneous data contained in this report, nor any data capable of being subject to variable interpretation by means of its generalised nature.

7.2 Environment Agency consultation

7.2.1 Flood zone maps

The Environment Agency Flood Zone mapping study for England and Wales is available on their website at <https://flood-map-for-planning.service.gov.uk/>

The relevant guidance notes from the Environment Agency is available online through the following link: <https://www.gov.uk/planning-applications-assessing-flood-risk>

7.2.2 Site specific consultation

The Environment Agency was formally consulted as part of this assessment, with request for flood related information (including flood levels) included in the consultation. Their full response is included in **Appendix H**.

The Product data request confirms the following points;

The Environment Agency has no records of the site flooding;

There are no flood defences in the vicinity of the site; and
The site is not located in an area of reservoir flooding.

7.3 Rochdale Borough Council

Rochdale Borough Council was contacted regarding local flood information. In summary their response notes;

- None of the site is in flood zones 2 or 3.
- Small areas of the site are designated as National Surface Water 1 in 30 years.
- We don't have any records of historic flooding / incidents in the area on the incomplete database that we have.
- No records of reservoir flooding but again our database is not necessarily complete. There does not appear to be any reservoirs on the site, but there are what I think are fishing lodges adjacent to the site.

The full response is contained in **Appendix I**.

Further consultation has been made with Rochdale Council regarding the options for management of the onsite springs. Following a meeting with Rochdale Council and Stephen McCann on 5/9/19, further site investigation have been undertaken on site (with Stephen McCann) with respect to confirming the extent, location and flow from the springs and mitigation options.

7.4 Canal & River Trust

The Rochdale Canal is located approximately 500m to the west of the site boundary.

7.5 Relevant studies

Table 7.1: Relevant studies

Study	Comments
SFRA: Bury, Rochdale and Oldham Strategic Flood Risk Assessment 2009 ¹³	The principle aim of the SFRA was to map all forms of flood risk in order to provide an evidence base to locate new development. It also aims to provide appropriate policies for the management of flood risk, and identify the level of detail required for site-specific FRAs. The SFRA contains information and maps detailing flood sources and risks. Information relevant to the site is detailed in Section 7 of this report.
PFRA: Rochdale Metropolitan	Preliminary Flood Risk Assessments (PFRAs) are produced by Lead Local Flood Authorities (LLFAs) in England and Wales. A Preliminary Flood Risk Assessment (PFRA) is the first part of the

¹³ Bury, Rochdale and Oldham Councils (2009), 'Bury, Rochdale, and Oldham Councils Strategic Flood Risk Assessment

Study	Comments
Borough Council Preliminary Flood Risk Assessment 2011 ¹⁴	planning cycle for flood risk management as set out in the Flood Risk Regulations (2009), which implement the requirements of the European (EU) Floods Directive (2007). The EU Floods Directive aims to provide a consistent approach to managing flooding across Europe. The PFRA is organised by the River Basin District (in this case the North West River Basin District) and produced by the LLFA (in this case Rochdale MBC). The PFRA considers local sources of flooding that the LLFA is responsible for: ordinary watercourses, surface water, groundwater and sewers where flooding is wholly or partially caused by rainwater or other precipitation entering or affecting the system. Information is gathered from existing sources on past floods and flood models to identify Flood Risk Areas. The PFRA concludes that the borough did not experience any past floods with "significant harmful consequences"
PFRA Addendum: Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment Addendum 2017 ¹⁵	The preliminary flood risk assessment (PFRA) and flood risk areas (FRAs) for Rochdale Metropolitan Borough Council were reviewed during 2017, using all relevant current flood risk data and information. There is no change to the assessment of risk following the review of Rochdale Metropolitan Borough Council.
CFMP: Irwell Catchment Flood Management Plan 2009 ¹⁶	Catchment Flood Management Plans (CFMP) give an overview of the flood risk from inland sources across each river catchment and recommend ways of managing those risks now and over the next 50-100 years. The Environment Agency is responsible for producing CFMPs. The site falls within the 'North Oldham, Rochdale, Whitworth and Littleborough' sub-catchment and the policy applicable to this site is Policy Option 4 which states "Areas of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change". There is an intended focus here on sustainable design of the urban environment, in particularly focusing on redevelopments rather than existing developments. The CFMP provides the following key proposed actions: - Continue to provide advice on development issues so as not to increase direct flood risk and/or surface runoff. - Continue to investigate cause of sewer flooding.

¹⁴ Rochdale Metropolitan Borough Council (2011), 'Preliminary Flood Risk Assessment'

¹⁵ Rochdale Metropolitan Borough Council (2017), 'Preliminary Flood Risk Assessment: Addendum' https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698407/PFRA_Rochdale_Metropolitan_Borough_Council_2017.pdf [Accessed 07.03.2019]

¹⁶ Environment Agency (2011), 'Irwell Catchment Flood Management Plan'

Study	Comments
	Look at culvert condition, undertake assessment of risk and where possible carry out remedial works. Carry out a study of flood risk on the River Roch to better understand the future flood risk and identify possible management options.
Rochdale Borough's Strategy for Flood Risk Management 2014-2024 ¹⁷	The Rochdale Borough's Strategy for Flood Risk Management outlines; - The current and future influences on flood risk in the borough; - The Council's objectives for flood risk management ; - The guiding principles for Rochdale Council's flood risk management approach; and - The delivery and monitoring of the strategy.

7.6 Drainage

7.6.1 Public sewer

Sewer details have been referenced from the provided United Utilities sewer record plans obtained for the site (**Appendix J**). The provided records show the following;

Surface water sewer

- There are no surface water sewers within the immediate vicinity of the site;
- Surface water sewers are located to the west of the site in Leander Drive;
- Surface water sewers are located to the north in the industrial estate.

Combined sewer

- An inspection chamber is shown within the cartilage of Trows House, though no further details are provided.

Foul sewer

- There are no foul sewers within the immediate vicinity of the site.
- Foul sewers are located west of the site in Leander Drive
- Foul sewers are located to the north in the industrial estate.

7.6.2 Private drainage

Following the drainage survey undertaken by RSK it is understood believed there are sections of a positive drainage system located on site on site. The site currently predominantly drains via overland flow towards the fishing ponds / Trub Brook to the south of the site or discharges to the ground, however piped networks have been

¹⁷ Rochdale Metropolitan Borough Council (2014), 'Rochdale Borough's Strategy for Flood Risk Management 2014-2024'



surveyed within the site (e.g. western area adjacent to existing farm access) which discharges out to the fishing ponds to the south of the site.

8 SOURCES OF FLOOD RISK

8.1 Criteria

In accordance with the NPPF and advice from the Environment Agency, a prediction of the flood sources and levels is required along with the effects of climate change from the present for the design life of the development (in this case assumed to be 100 years).

The flood risk elements that need to be considered for any site are defined in BS 8533 as the “Forms of Flooding” and are listed as:

- Flooding from Rivers (fluvial flood risk);
- Flooding from the Sea (tidal flood risk);
- Flooding from the Land;
- Flooding from Groundwater;
- Flooding from Sewers (sewer and drain exceedance, pumping station failure etc); and
- Flooding from Reservoirs, Canals and other Artificial Structures.

The following section reviews each of these in respect of the subject site.

8.2 Flooding from rivers (fluvial flood risk)

8.2.1 Main River

The latest Environment Agency published flood zone map (**Figure 1.1**), which does not take into account the effects of flood defences, shows the site to lie within Flood Zone 1 indicating that there is less than a 0.1 per cent (1 in 1000) chance of flooding occurring each year. As a result the risk of flooding to the site is considered **low**.

8.2.2 Ordinary watercourses

The site is bounded to the south by interconnected fisheries and sections of Trub Brook.

These waterbodies / Trub Brook are not thought to pose a risk to the site as they are located at lower elevation than the site and are mapped as heads of the watercourses.

The risk to the site from these watercourses is considered **low**.

8.2.3 Climate change

Fluvial flooding is likely to increase as a result of climate change. A greater intensity and frequency of precipitation is likely to raise river levels and increase the likelihood of a river overtopping its banks. Due to its location in Flood Zone 1, Climate Change is unlikely to impact upon the development in terms of fluvial flood risk.

8.3 Flooding from the sea (tidal flood risk)

The site is located far enough inland / at elevation to be considered not at risk of tidal flooding.

8.3.1 Climate change

Climatic changes are unlikely to raise the level of risk to the site from tidal flooding during the lifetime of the development.

8.4 Flooding from the land (overland pluvial flood risk)

If intense rain is unable to soak into the ground or be carried through manmade drainage systems, for a variety of reasons, it can run off over the surface causing localised floods before reaching a river or other watercourse.

Generally, where there is impermeable surfacing or where the ground infiltration capacity is exceeded, surface water runoff will occur. Excess surface water flows from the site are believed to drain naturally to the local water features, either by overland flow or through infiltration.

The Environment Agency's surface water flood map (**Figure 8.1**) shows that the site is predominantly at a very low risk of flooding from pluvial sources.



Figure 8.1: Environment Agency surface water flood risk map (accessed August 2022)

Two prominent flow paths are shown on the site. Both flow paths are along the lines of linear depressions in site topography running from north to south.

The areas adjacent to the southern boundary of the site (fisheries and Trub Brook) are shown to be areas at a high risk of surface water flooding. The flow path is shown

running from the east along the eastbound carriageway of the M62 before spilling into the area of the industrial units to the south of the site and joining the route of Trub Brook.

As such only isolated areas of low to high surface water flood risk are encountered on site.

On site flow paths should, where possible, be maintained and managed though the evolution of the design of the scheme to ensure that flooding on site is not exacerbated by the development.

Overall the risk of surface water flooding to the site is predominantly considered **low**, with isolated areas of medium to high risk confined to the onsite depressions.

8.5 Flooding from groundwater

Groundwater flooding occurs when the water held underground rises to a level where it breaks the surface in areas away from usual channels and drainage pathways. Groundwater flooding typically occurs following long periods of sustained intense rainfall and is typically associated with low-lying areas underlain by permeable aquifers.

In line with the Bury, Rochdale and Oldham Strategic Flood Risk Assessment, there is not a significant risk of groundwater flooding in the Rochdale area.

Borehole records in the areas (Cripple Gate Lane area) do not show encountered groundwater in the records (up to 12mbgl), while records in the Bates Close area to the west of the site show on instance of groundwater being recorded at 4.5mbgl. No groundwater records are available at the site.

Further investigation has being made into the springs on site to confirm whether they are predominantly groundwater or surface water (as per section 3.4) with the results and reporting contained in **Appendix F**.

From the above and due to the sporadic nature of groundwater flooding and the design of the development (no basement development), it is unlikely that groundwater flooding would affect the development.

The resultant residual groundwater flood risk is considered **low**.

8.5.1 Climate change

Climate change could increase the risk of groundwater flooding as a result of increased precipitation filtering into the groundwater body. If winter rainfall becomes more frequent and heavier, groundwater levels may increase. Higher winter recharge may however be balanced by lower recharge during the predicted hotter and drier summers. This is less likely to cause a significant change to flood risk than from other sources, since groundwater flow is not as confined. It is probable that any locally perched aquifers may be more affected, but these are likely to be isolated. The change in flood risk is likely to be **low**.

8.6 Flooding from sewers

Flood events occur when the capacity of a sewer is exceeded either due to a blockage in the sewer system or excess surface water runoff entering the system.

Most adopted surface water drainage networks are designed to the criteria set out in Sewers for Adoption¹⁸. One of the design parameters of which is, that sewer systems be designed such that no flooding of any part of the site occurs in a 1 in 30 year rainfall event. By definition, a 1 in 100 year event could exceed the capacity of the surrounding sewer network as well as any proposed drainage system.

When exceeded, the surcharged pipe work will lead to flooding from backed up manholes and gully connections. This will lead to immediate flooding within highways surrounding the site.

As there are no sewers within the immediate vicinity to the site, the risk of flood from this source is considered **very low**.

Development has the potential to cause an increase in impermeable area, an associated increase in surface water runoff rates and volumes, and a consequent potential increase in downstream flood risk due to overloading of sewers, watercourses, culverts and other drainage infrastructure.

To ensure that sewer and surface water flooding is not exacerbated; surface water must be considered within the design of the site. This ensures that any additional surface water and overland flows are managed correctly, to minimise flood risk to the site and the surrounding area. The proposed surface water network on the site should be designed to ensure exceedance of the network has been considered.

8.6.1 Climate change

The impact of climate change is likely to be negative regarding flooding from sewers. Increased rainfall and more frequent flooding put existing sewer and drainage systems under additional pressure resulting in the potential for more frequent surcharging and potential flooding. This would increase the frequency of local sewer flooding but not significant in terms of the proposed development.

8.7 Flooding from Reservoirs

Flood events can occur from a sudden release of large volumes of water from reservoirs, canals and artificial structures.

Figure 8.4 has been reproduced from the Environment Agency website and provides a worst case scenario of the maximum extent of flooding that would occur in the event that a reservoir were to fail and release the water it holds.

¹⁸ WRC (2012), 'Sewers for Adoption' 7th Edition.

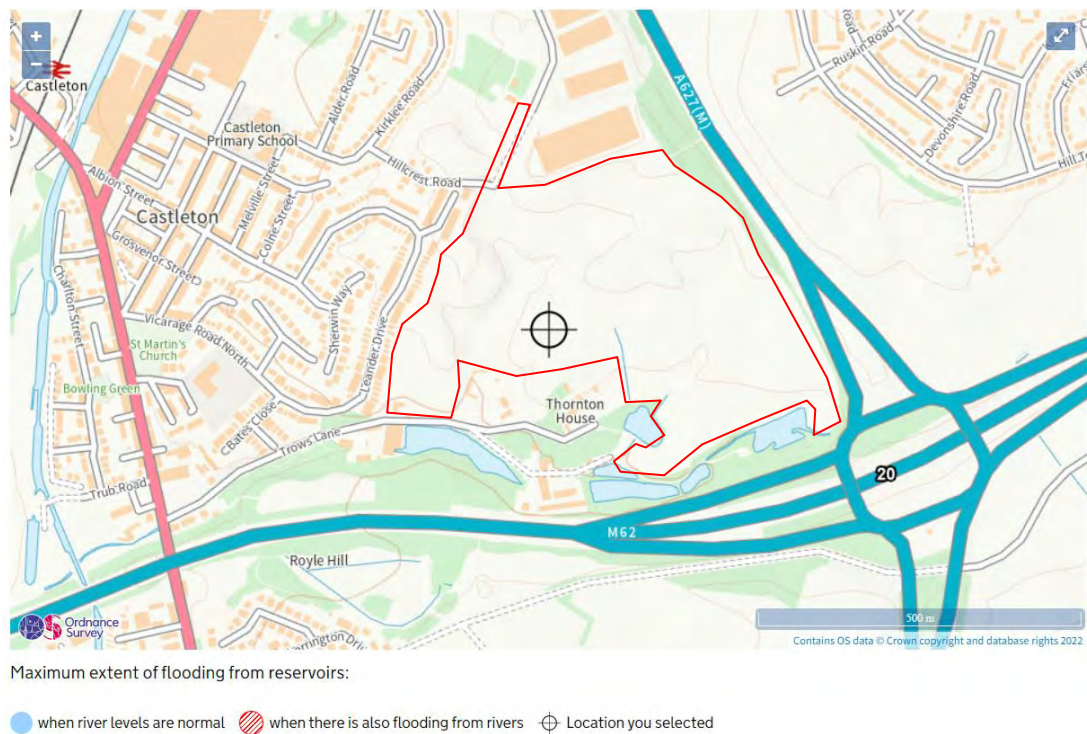


Figure 8.4: Environment Agency reservoir flood risk map (accessed August 2022)

The map indicates that the site is not located in an area at potential risk of flooding from this source.

The residual flood risk is therefore considered **very low / non-existent**.

8.7.1 Climate Change

Reservoirs can be managed over time, controlling inflow/outflow of water and therefore there is the capacity to control the effects of climate change.

8.8 Flooding from Canals

The Rochdale Canal is located approximately 500m to the west of the site, though is separated from the site by significant built infrastructure. There are also no records in the SFRA of canal breaches in this area, therefore the risk to the site from this source is considered very low.

8.9 Historic flooding

There are no records of historic flooding at the site in the SFRA or the PFRA.

8.10 Flood risk resulting from the development

In theory any development can increase flood risk downstream, if it is not designed properly. This potential is much increased where the site is on greenfield land, as development tends to increase impermeable surfaces, resulting in increased runoff from the site.

Due to the nature of the development, there will be a significant increase in impermeable area from the pre-development state. It will be ensured that the flood risk to the surrounding area, from development activities on site and the post development situation, will not be increased through the utilisation of SuDS techniques in the surface water drainage strategy. Further information on the surface water runoff from the development is outlined in Section 11.

8.11 Flood risk summary

The site area is located in Flood Zone 1, and as such according to the Environment Agency's Flood Map and as such the risk of fluvial flooding to the site is considered **low**.

Flood risk from other sources (tidal, pluvial, sewer, groundwater, reservoir and artificial bodies) to the proposed development site is predominantly considered to be **low** or **very low**. Areas of low to high pluvial flood risk are present on site in the linear flow paths running from the northern areas of the site towards the southern boundary associated with the onsite topographic depressions.

9 PLANNING CONTEXT

9.1 Application of planning policy

Section 14 of the NPPF includes measures specifically dealing with development planning and flood risk using a sequential characterisation of risk based on planning zones and the Environment Agency Flood Map. The main study requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

9.2 Land use vulnerability

Planning Practice Guidance includes a list of appropriate land uses in each flood zone dependent on vulnerability to flooding. In applying the Sequential Test, reference is made to **Table 9.1** below, reproduced from Table 3 of Planning Practice Guidance.

Table 9.1: Flood risk vulnerability and flood zone ‘compatibility’

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Zone 2	Appropriate	Appropriate	Exception Test Required	Appropriate	Appropriate
	Zone 3a	Exception Test Required	Appropriate	Should not be permitted	Exception Test Required	Appropriate
	Zone 3b functional floodplain	Exception Test Required	Appropriate	Should not be permitted	Should not be permitted	Should not be permitted

With reference to Table 2 of the Planning Practice Guidance, the proposed development, based on its residential use, is classed as 'More Vulnerable'. This classification of development is appropriate for areas within Flood Zone 1 and 2 and therefore appropriate for the development location.

9.3 Sequential Test

The Sequential Test is required to assess flood risk and the Planning Practice Guidance recommends that the test be applied at all stages of the planning process to direct new development to areas with the lowest probability of flooding (Flood Zone 1).

Therefore in general, according to the NPPF, if there is no reasonably available site in Flood Zone 1, the flood vulnerability of the proposed development (see Planning

Practice Guidance Table 2) can be taken into account in locating development in Flood Zone 2 and then Flood Zone 3. Within each Flood Zone new development should be directed to sites at the lowest probability of flooding from all sources.

The proposal is for a 'More Vulnerable' residential scheme to be developed on the site. With reference to Table 9.1 above, this aspect of the development would be appropriate for areas within Flood Zone 1 and 2, subject to the implementation of an appropriate surface water drainage strategy.

Therefore the proposed development passes the Sequential Test and does not require the Exception Test to be satisfied for this section of the site.

9.4 Exception Test

As noted above, with the more vulnerable nature of the residential use development and the built location of the development within Flood Zone 1, the Exception Test is not required.

10 FLOOD MITIGATION MEASURES

10.1 Overview

The developable area lies wholly within Flood Zone 1. To facilitate the development of the site, a surface water drainage network has been designed.

10.2 Overland flood flow

No further overland flow control measures are proposed as all surface water runoff up to the 1 in 100 year climate change storm will be stored on site and discharged to the existing on-site assumed culverted watercourse. Surface flows may be generated due to drainage capacity exceedance, which can be conveyed into the attenuation features via surface flows along the new roads.

10.3 Finished floor levels

As this site will not be affected by fluvial flooding there is no need to incorporate any freeboard levels into the finished floor levels of the design. Low lying areas that could lead to ponding of surface flows will be avoided by careful design of finished levels.

10.4 Ordinary watercourse easement and consents

Under the Water Resources Act 1991 and associated byelaws, works in, over, under or adjacent to main rivers require the consent of the EA and works in, over, under or adjacent to ordinary watercourses will require IDB, Local Authority or LLFA consent. This is to ensure that they neither interfere with the IDB/EA/LPA/LLFA's work nor adversely affect the environment, fisheries, wildlife and flood defence in the locality.

A maximum standoff of 6m from a watercourse would be required from Rochdale Council acting as the LLFA. Due to the nature of the onsite watercourses, there is potential to reduce this standoff, subject to satisfactory maintenance accessibility.

Any consent works usually take place post planning, prior to construction, however, the principals of any development within the appropriate easements should be agreed at the planning stage.

10.5 Flood compensation

The site is shown to be outside the 1 in 100 year climate change floodplain so floodplain compensatory measures are not deemed necessary.

10.6 Safe access/egress

The site lies outside of the 1 in 100 year climate change flood extent, safe access and egress will be available up to this storm event. For extreme events above this it is considered appropriate that site users should be able to safely escape to an area within Flood Zone 1 (i.e. above the 1 in 1000 year flood level). The site wholly lies within Flood Zone 1, so any development on-site will be within an area that is safe from extreme events.

11 DRAINAGE ASSESSMENT

11.1 Scope

This section discusses the potential quantitative effects of the development on both the risk of surface water flooding on-site and elsewhere within the catchment, as well as the type of potential SuDS features that could be incorporated as part of the masterplan.

Following discussions with Rochdale Borough Council, it was noted that; “[the Council] are not against use of SUDs but there must be no SUDs features underneath what will be Highway. Discharge rates will be limited to the current greenfield run-off rate.”

In accordance with the Defra Non-Statutory Technical Standards, the surface water drainage strategy should seek to implement a SuDS hierarchy that aspires to achieve reductions in surface water runoff rates to greenfield rates. Where a reduction to the greenfield rate is not practicable, the proposed surface water drainage strategy should not exceed the existing runoff rate.

In addition, Building Regulations Part H¹⁹ requires that the first choice of surface water disposal should be to discharge to an adequate soakaway or infiltration system, where practicable. If this is not reasonably practicable then discharge should be to a watercourse, the least favourable option being to a sewer (surface water before combined). Infiltration techniques should therefore be applied wherever they are appropriate.

11.2 Pre-development situation

The existing site area is approximately 19.65ha and comprises 99% permeable land.

The ICP SUDS method has been used to estimate the Greenfield surface water runoff for the entire site and pro rata per ha value. Calculations are contained in **Appendix K**.

Table 11.1 ICP SUDS surface water runoff (greenfield)

Return period	Total site area(19.65ha)	l/s/ha
QBar	144.6	7.36
1 in 1 year	125.8	6.40
1 in 30 year	245.2	12.48
1 in 100 year	300.8	15.31

¹⁹ HM Government (2010 with 2013 amendments), ‘The Building Regulations 2010: Approved Document H - Drainage and Waste Disposal (2002 Edition incorporating 2010 amendments)’.

11.3 Post-development situation

The proposed development is for a residential end use. As explained within Section 5 of this assessment a sketched proposed site plan has been provided highlighting a net developable area of 13.55ha (note increases to 13.98ha when allowing for access roads) which has been considered for the indicative drainage calculations. This area increase will result in a greater volume of surface water runoff across the site. It will therefore be necessary to manage surface water on-site in order to limit the discharge of surface water off-site to an agreed rate (as above), to provide sufficient on-site attenuation up to the 1 in 100 year climate change rainfall event and to provide improvements to water quality through appropriate source treatment.

11.3.1 Off site discharge options

11.3.1.1 Infiltration

Infiltration should be considered as the primary option to discharge surface water from the developed site. The effectiveness of infiltration is completely dependent on the physical conditions at the site. Potential obstacles include:

- Local variations in permeability preventing infiltration – It is understood from the local geology that the site is situated on an area predominantly underlain by glacial deposits overlying coal measures / sandstone, while borehole records in the area show strata of sands and gravels within the superficial deposits. Falling head test have been undertaken on site, with the results not proving adequate to facilitate infiltration drainage at the site;
- Shallow groundwater table - For infiltration drainage devices, Building Regulation approved document H2 states that these “*should not be built in ground where the water table reaches the bottom of the device at any time of the year*”; and
- Source Protection Zones - As discussed above, the site is not located within a Groundwater Source Protection Zone.

From the information available regarding the study area’s underlying geology, infiltration may be a viable option as part of the drainage strategy, though this should be confirmed following onsite infiltration tests to BRE 365.

11.3.1.2 Discharge to watercourse

Discharging surface water directly to a local watercourse is considered feasible as Trub Brook (fishing ponds) is in part located adjacent to the southern boundary of the site. The existing site drains ‘naturally’ in this way (or via infiltration), and therefore by connecting at this location will mimic the natural scenario.

There are two proposed onsite watercourse connections. The eastern area is proposed to discharge to the wider fishing lodge network via an attenuation basin located in the southern section of the parcel. The piped network along the existing access track is considered to be the point of connection for the western section of the site. It is considered that the piped network along the existing access tracks can be classified as a watercourse under the Land Drainage Act 1991, which notes that a watercourse is defined as

“all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act

1991) and passages, through which water flows.” (Land Drainage Act 1991 [section 72(1)].

This existing piped network discharges to the south and the fishing lodges via an existing outfall.

This discharge approach may be subject to third party consent.

11.3.1.3 Discharge to surface water sewer

As there are no surface water sewers located within the immediate vicinity of the site that represent an appropriate discharge location, discharge to surface water sewer is not considered a viable option for the site.

11.3.2 Proposed surface water drainage strategy

The proposed drainage strategy for the site (**Appendix L**) includes formalising the on-site drainage system discharging into the pond to the south of the site subject to third party consent. Surface water will be conveyed within the existing ditch / fishing lodge network and piped network to the south in line with the existing regime. These post development rates will be limited to the pre-development Greenfield Qbar Rates from the proposed developable area. By incorporating these drainage features into the site wide drainage design there will be no increase in flood risk to the development or others, provide ecological benefits and provide a level of treatment to the water being discharged.

The post development runoff rates for the site will be limited to the pre development greenfield rates from the developable area. With sufficient storage volume on site to attenuated flows from the 1 in 100 plus 40% climate change event.

The dimensions, volumes and location of the SuDS features will need to be revised as the development framework plan develops and during the detailed planning stage. Detailed design of individual features is not part of the scope of this report. Preliminary design criteria have been based upon guidance given in the CIRIA publication ‘The SuDS Manual’²⁰ and the information received to date.

In principle, the strategy contains the following features and criteria:

- Surface water discharge from the site via two outfalls;
 - o Western parcel via the existing drainage pipe adjacent to the access track (classed as a watercourse) at 47.39l/s (based on a 6.44ha contributing developable area (including access road of Trows Lane and drainage from Cowm Top Lane);
 - o Eastern parcel via the existing onsite watercourse in the south eastern area of the site discharging to fishing lodge at 55.64l/s (based on a 7.56ha contributing developable area);
- From the infiltration rates provided, infiltration techniques and traditional soakaways appear not to be suitable to incorporate as part of the drainage strategy on-site.
- Permeable paving can be incorporated within private drives. This will be used to collect and store runoff from the houses and surrounding hardstanding areas before joining the on-site surface water network. Main roads will not be constructed

²⁰ CIRIA, ‘The SUDS Manual – C753’, 2015

using permeable paving due to ownership and future maintenance issues, where responsibility will most likely lie with the highway authority.

- Swales should be considered alongside roads to convey runoff through the drainage network to the various attenuation features, this helps to increase the time on concentration whilst providing a level of treatment.
- Detention basins can be strategically located within the area of open space to the south of the proposed developable area. The topography in this area may be suitable for SuDS features as this is the lowest topographic location within the developable area and is located adjacent to the central on-site drainage ditch which currently conveys surface water flows off site.
- Rainwater harvesting is not proposed as part of this development and therefore has not been included as part of any of the calculations. Green roofs are not part of proposal.

By incorporating these drainage features into the site wide drainage design will not increase flooding to the development or others, provide ecological benefits and provide a level of treatment to the water being discharged whilst ensuring that the surface water feed to the fishing lodge is maintained.

11.3.3 Proposed foul drainage strategy

As part of the application, Barratt Homes approached United Utilities for a pre development enquiry with respect to the foul drainage at the site. Two options were put forward to United Utilities, a foul water connection;

- Northwards to Cown Top Lane via a pumped system; or
- Westwards along Trows Lane via a gravity sewer, though a pump station would be required on site in the low lying south east corner.

In their response to the Pre Development Enquiry (**Appendix M**), United Utilities confirmed that both approaches would be suitable, with the response noting, *'Foul will be allowed to drain to the public foul or combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself'*

As such the proposed for the site is to pump northwards to the existing adopted UU sewer within Cowm Top as shown on sketch 481-ED-10 (**Appendix N**). This approach will require 2no. pump-stations (one to the south of the western parcel, one to the south of the eastern parcel, each with its own rising main to the public sewer.

12 CONCLUSIONS AND RECOMMENDATIONS

This FRA complies with the NPPF and Planning Practice Guidance and demonstrates that flood risk from all sources has been considered in the proposed development. It is also consistent with the Local Planning Authority requirements with regard to flood risk.

The proposed development site lies in an area designated by the Environment Agency as Flood Zone 1 and is outlined to have a chance of flooding of less than 1 in 1,000 (<0.1%) in any year.

NPPF sets out a Sequential Test, which states that preference should be given to development located within Flood Zone 1. This flood risk assessment demonstrates that the requirements of the Sequential Test have been met, with the location of the developable area of the site within Flood Zone 1 and 'More Vulnerable' classification of the development.

This flood risk assessment has concluded that:

- The location at which the proposed development is located predominantly within Flood Zone 1, and as such is at a low risk of flooding from fluvial sources;
- Flood risk from surface water is predominantly considered very low at the site, with two flow paths encompassing areas of low to high surface water flood risk flowing from the northern areas of the site towards Trub Brook;
- Flood risk from other sources – tidal, groundwater, sewers, reservoirs and artificial sources – is demonstrated to be low;
- The development will have no impact on other forms of flooding; and
- In line with relevant policy, surface water runoff from the site will be limited to the pre-development Greenfield Rates from the developable area, with all flows in excess of this retained on site. This approach will ensure that the current surface water regime with respect to the fishing lodges is maintained and there are no adverse impacts downstream of the site.

Overall, taking into account the above points, the development of the site should not be precluded on flood risk grounds.

APPENDIX A

SERVICE CONSTRAINTS

RSK Group service constraints

1. This report and the Drainage design carried out in connection with the report (together the "Services") were compiled and carried out by RSK LDE Ltd (RSK) for BDW Trading Ltd and Global Land & Property Ltd (the "client") in accordance with the terms of a contract between RSK and the "client" dated April 2017. The Services were performed by RSK with the skill and care ordinarily exercised by a reasonable Civil Engineer at the time the Services were performed. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the client.

2. Other than that expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services.

3. Unless otherwise agreed the Services were performed by RSK exclusively for the purposes of the client. RSK is not aware of any interest of or reliance by any party other than the client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent or condone any party other than the client relying upon the Services. Should this report or any part of this report, or otherwise details of the Services or any part of the Services be made known to any such party, and such party relies thereon that party does so wholly at its own and sole risk and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent environmental consultant and/or lawyer.

4. It is RSK's understanding that this report is to be used for the purpose described in the introduction to the report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the report is used, or the proposed use of the site change, this report may no longer be valid and any further use of or reliance upon the report in those circumstances by the client without RSK's review and advice shall be at the client's sole and own risk. Should RSK be requested to review the report after the date hereof, RSK shall be entitled to additional payment at the then existing rates or such other terms as agreed between RSK and the client.

5. The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions contained in this report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the report in the future shall be at the client's own and sole risk. Should RSK be requested to review the report in the future, RSK shall be entitled to additional payment at the then existing rate or such other terms as may be agreed between RSK and the client.

6. The observations and conclusions described in this report are based solely upon the Services, which were provided pursuant to the agreement between the client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out or required by the contract between the client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the



Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this report, RSK did not seek to evaluate the presence on or off the site of asbestos, electromagnetic fields, lead paint, heavy metals, radon gas or other radioactive or hazardous materials.

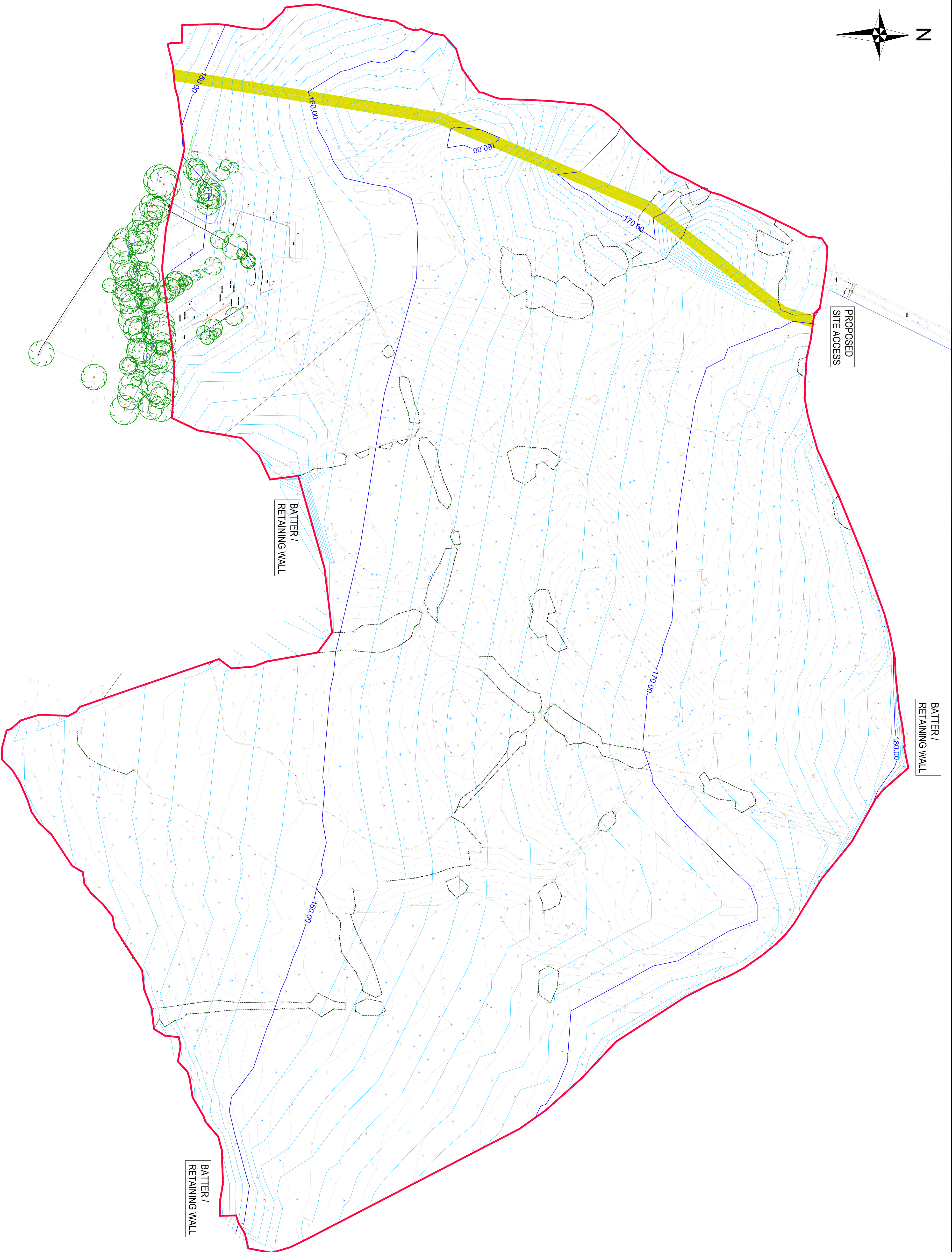
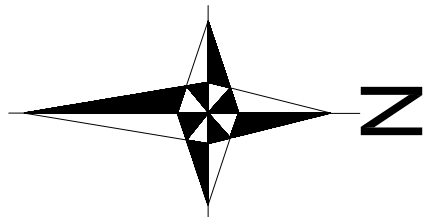
7. The Services are based upon RSK's observations of existing physical conditions at the site gained from a walk-over survey of the site together with RSK's interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The Services are also based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely. The Services clearly are limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the walk-over survey. Further RSK was not authorised and did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the Services. RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK and including the doing of any independent investigation of the information provided to RSK save as otherwise provided in the terms of the contract between the client and RSK.

8. The phase II or intrusive environmental site investigation aspects of the Services is a limited sampling of the site at pre-determined borehole and soil vapour locations based on the operational configuration of the site. The conclusions given in this report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent of the limited area depends on the soil and groundwater conditions, together with the position of any current structures and underground facilities and natural and other activities on site. In addition chemical analysis was carried out for a limited number of parameters [as stipulated in the contract between the client and RSK] [based on an understanding of the available operational and historical information,] and it should not be inferred that other chemical species are not present.

9. Any site drawing(s) provided in this report is (are) not meant to be an accurate base plan, but is (are) used to present the general relative locations of features on, and surrounding, the site.

APPENDIX B

TOPOGRAPHIC SURVEY



KEY

OPTION GROUND LEVEL PROFILE AND LEVEL
165.00
6m GAS MAIN EASEMENT

NOTES

PROFILE BASED ON SURVEY INFORMATION AND CONTOURS - DETAILED SURVEY REQUIRED.
DEVELOPMENT PROFILE ALLOWS FOR APPROXIMATE 1:15 TO 1:20 SITE FALL.
DRAINAGE OPTIONS TO BE REVIEWED ALONG WITH GROUND INVESTIGATION REPORT.
LEVELS PROVIDE EARTHWORKS BALANCE.
BOUNDARY LEVELS TO REMAIN AS EXISTING.
LEVEL ALONG GAS MAIN TO REMAIN AS EXISTING. 6m EASEMENT ASSUMED - TO BE CONFIRMED.
DEPENDENT ON LAYOUT AND DENSITY POSSIBLE REQUIREMENT FOR RETAINING WALLS.
PROFILE TO BE REVIEWED UPON RECEIPT OF LAYOUT.
PROFILE BASED ON ACCESS AS SHOWN.

B 26.03.16 A 16.03.16		ADDITIONAL JACO INCORPORATED SITE ENTRANCE ADDED FOR MAIN AND REVISION	
Rev	Date	Rev	Date



Project
**URBAN REGEN
TROWS LANE FARM
CASTLETON**

Title
**OPTION FINISHED GROUND
LEVEL PROFILE**

Scale 1:1000@A1	Date JANUARY 2016
Drawn UR	Checked UR/TROWSING.P B



APPENDIX C

LANDMARK REPORT (RBC)

General

-  Specified Site
-  Specified Buffer(s)
-  Bearing Reference Point
-  Map ID

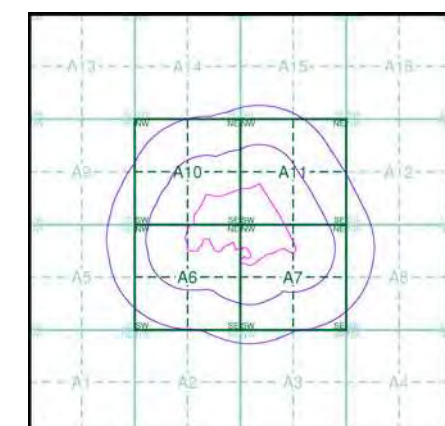
Detailed River Network Data

- | | |
|--|---|
|  Primary River |  Extended Culvert (greater than 50m) |
|  Secondary River |  Underground River (inferred) |
|  Tertiary River |  Underground River (local knowledge) |
|  Canal |  Downstream of High Water Mark |
|  Canal Tunnel |  Downstream of Seaward Extension |
|  Undefined River |  Not assigned River feature |
|  Lake/Reservoir | |
|  Offline Drainage Feature | |

Contours (height in metres)

- Standard Contour  105  MLW Mean Low Water
- Master Contour  100  MHW Mean High Water
- Spot Height  167.3

EANRW Detailed River Network Map - Slice A

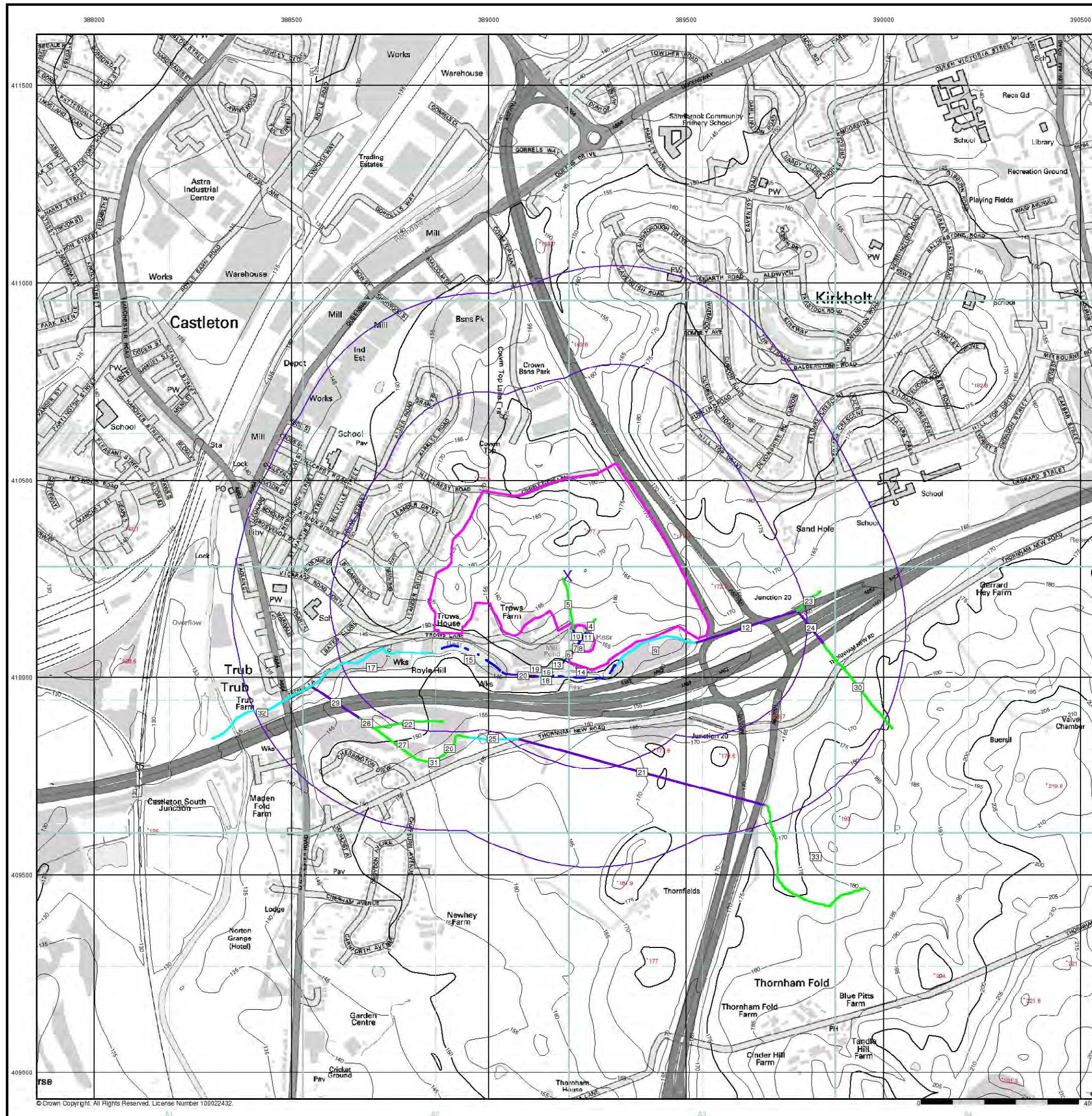


Order Details

Order Number: 77317590_1_1
 Customer Ref: R2228
 National Grid Reference: 389200, 410260
 Slice: A
 Site Area (Ha): 21.43
 Search Buffer (m): 500

Site Details

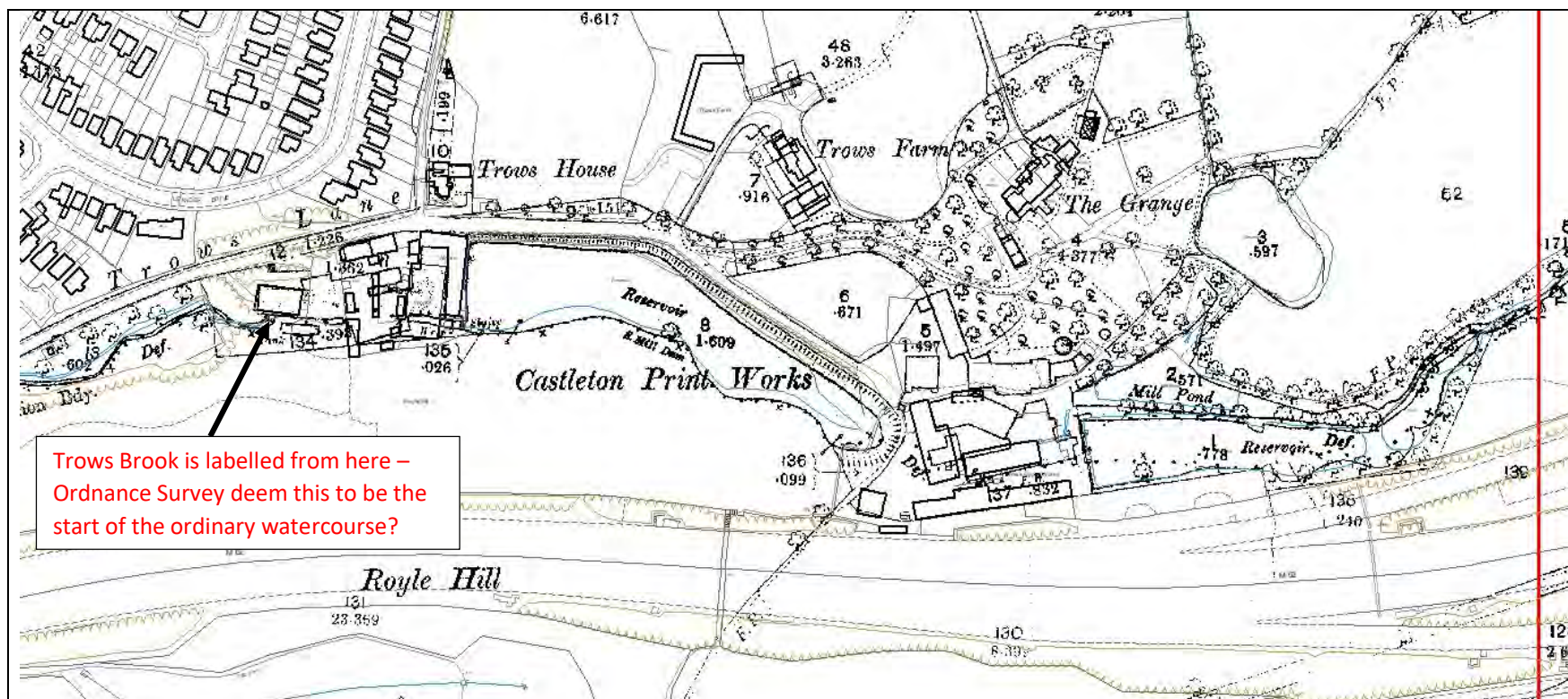
Site at 389190, 410260





APPENDIX D

1893 HISTORICAL MAPPING (RBC)



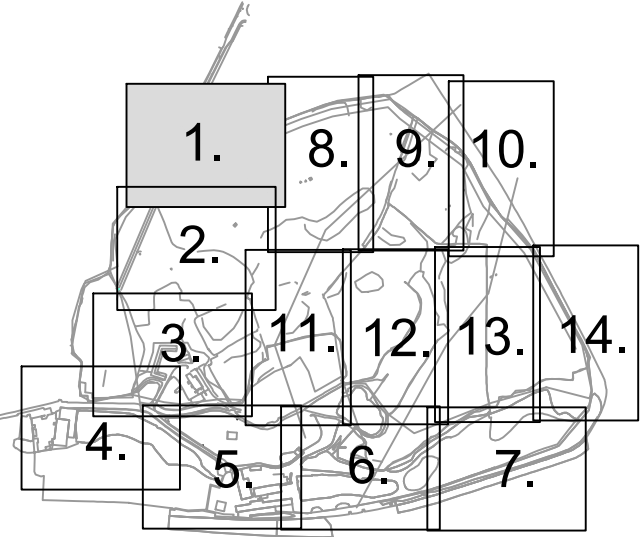


APPENDIX E

RSK SAFEGROUND DRAINAGE SURVEY

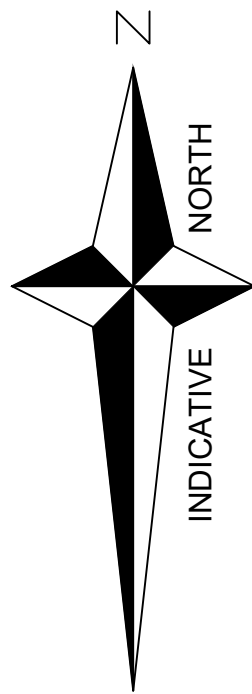
RESULTS

SHEET.LAYOUT



NOTES

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- SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
- CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

- A APPROXIMATE
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- CL COVER LEVEL
- CD CHAMBER DEPTH
- d DEPTH (metres)
- DBC DIRECTLY BURIED CABLE
- DP DRAIN PIPE
- ER EARTHING ROD
- ExLØ EXTERNAL DIAMETER (mm)
- FH FIRE HYDRANT
- G GULLY
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- ICe ELECTRICITY INSPECTION COVER
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- ICsw SURFACE WATER INSPECTION COVER
- ICsu TRAFFIC CONTROLS INSPECTION COVER
- ICel TELECOMMUNICATIONS INSPECTION COVER
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- ICW WATER INSPECTION COVER
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- IL INVERT LEVEL
- JB JUNCTION BOX
- LP LAMP POST
- NFI NO FURTHER INFORMATION
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- RE RODDING EYE
- RWP RAINWATER PIPE
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- SV STOP VALVE
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- TP TELEGRAPH POLE
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- VP VENT PIPE
- WD DEPTH TO WATER
- WL WATER LEVEL
- WM WATER METER
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- Ø DIAMETER (mm)

01	04/04/2019	Noted layers for new paths and watercourses	MG	SRO
02	10/04/2019	Added contours provided by client Created sheets for entire site	MG	SRO

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
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Client

BARRETT HOMES MANCHESTER

Project Title

TROWS LANE

Drawing Title

DRAINAGE SURVEY

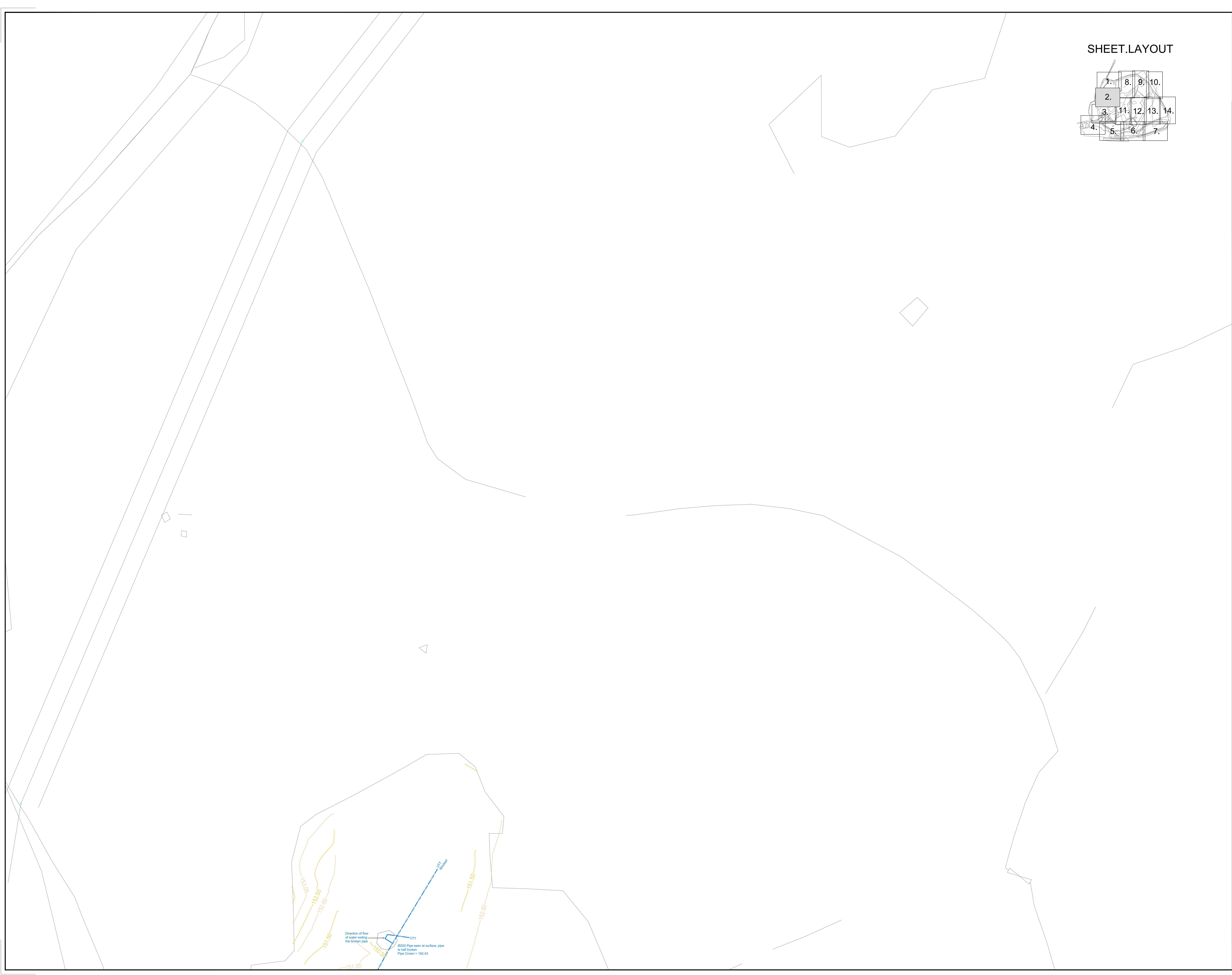
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MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19

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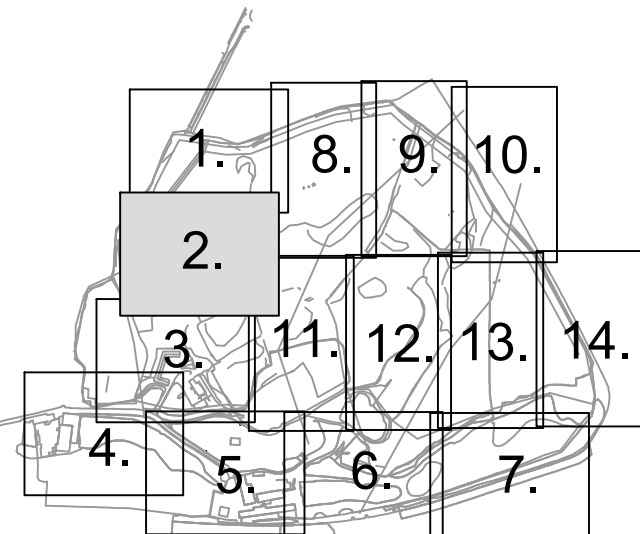
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Drawing No.	Rev.
55211-UTIL-02(02) Sheet 1 of 14	

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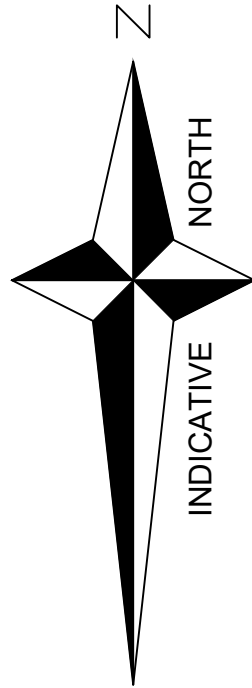


SHEET.LAYOUT



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01	04/04/2019	Added layers for flow paths and watercourses	MG	SRO
02	10/04/2019	Added contours provided by client	MG	SRO
		Created sheets for entire site	MG	SRO

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
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Client

BARRETT HOMES MANCHESTER

Project Title

TROWS LANE

Drawing Title

DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19

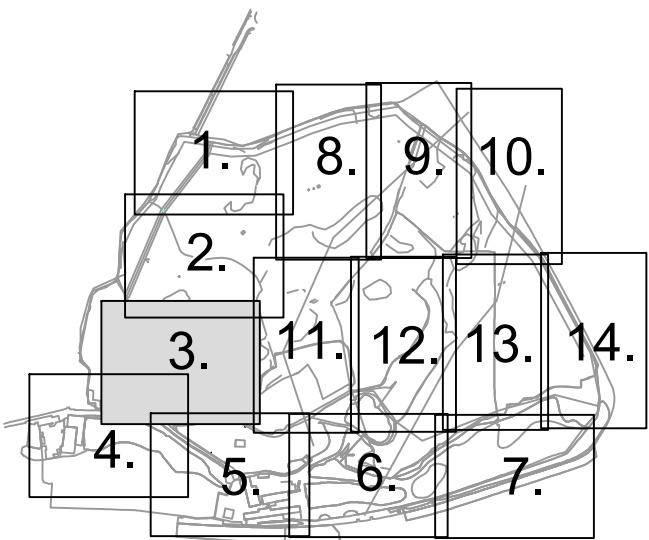
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Drawing No.	Rev.
55211-UTIL-02(02) Sheet 2 of 14	

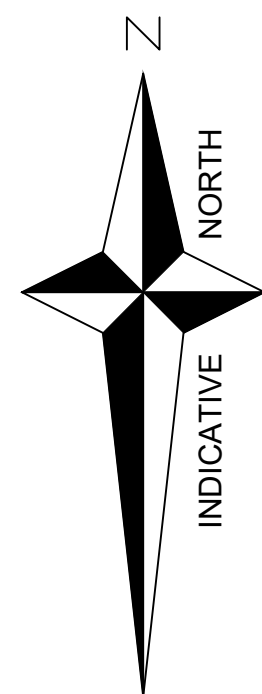


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02	10/04/2019	Add contours provided by client Created sheets for entire site	MG	SRO

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
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Project Title

TROWS LANE

Drawing Title

DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
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MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19
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Scale	Orig Size	Dimensions
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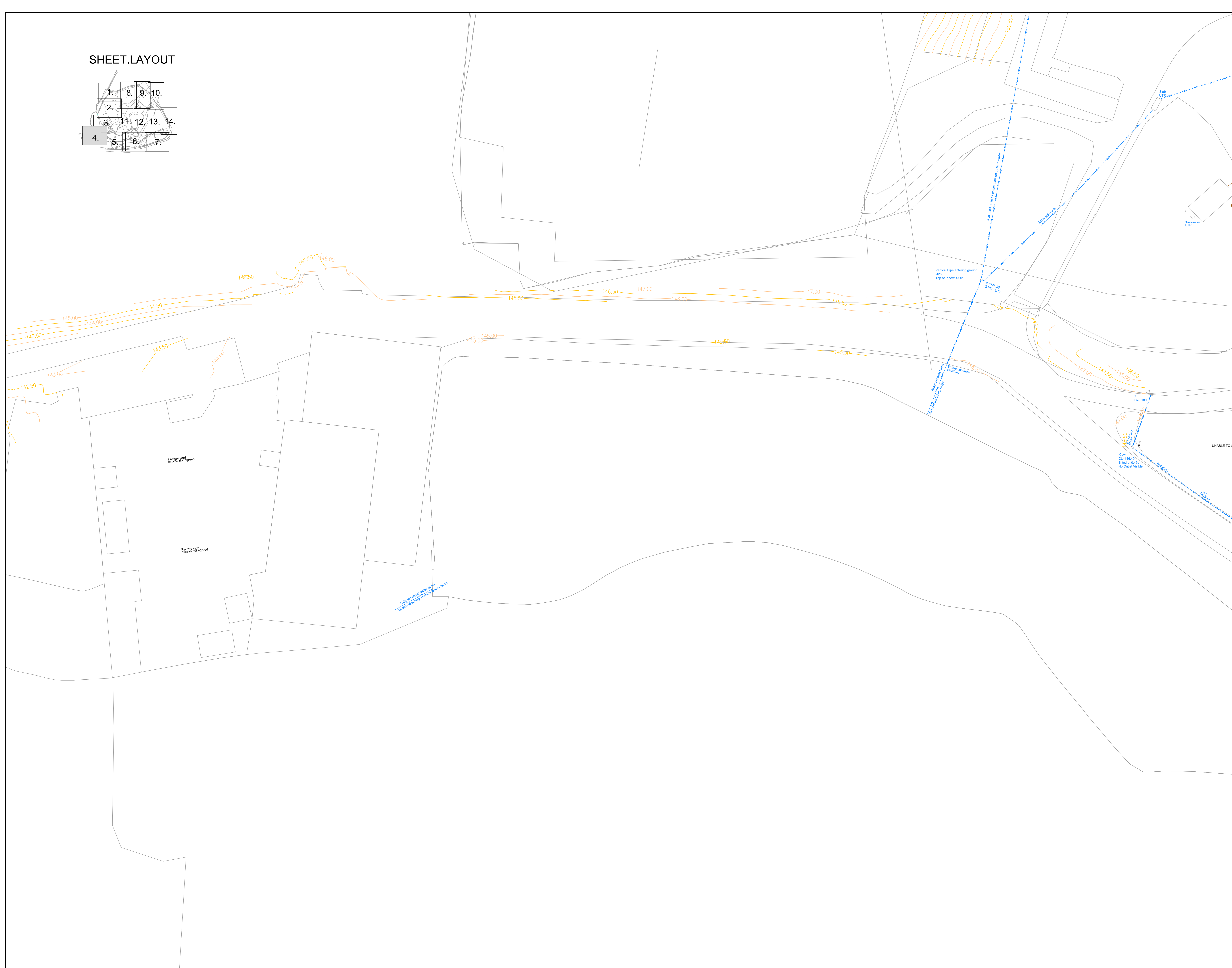
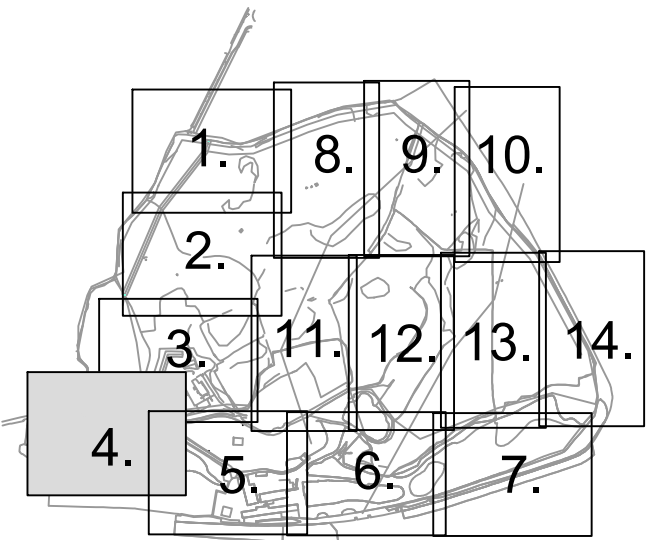
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Drawing No.	Scale	Rev.
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55211-UTIL-02(02) Sheet 3 of 14		
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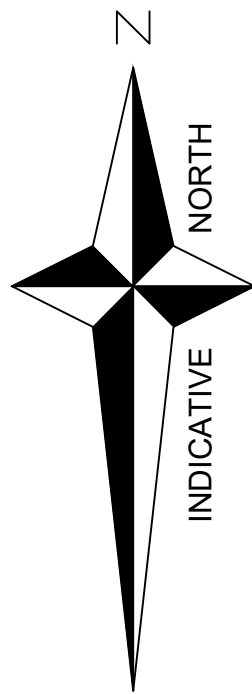
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SHEET.LAYOUT



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		Created sheets for entire site		

Rev.	Date	Amendment	Drawn	Chkd	Appd
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Client

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TROWS LANE

Drawing Title

DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
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MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19
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Scale	Orig Size	Dimensions
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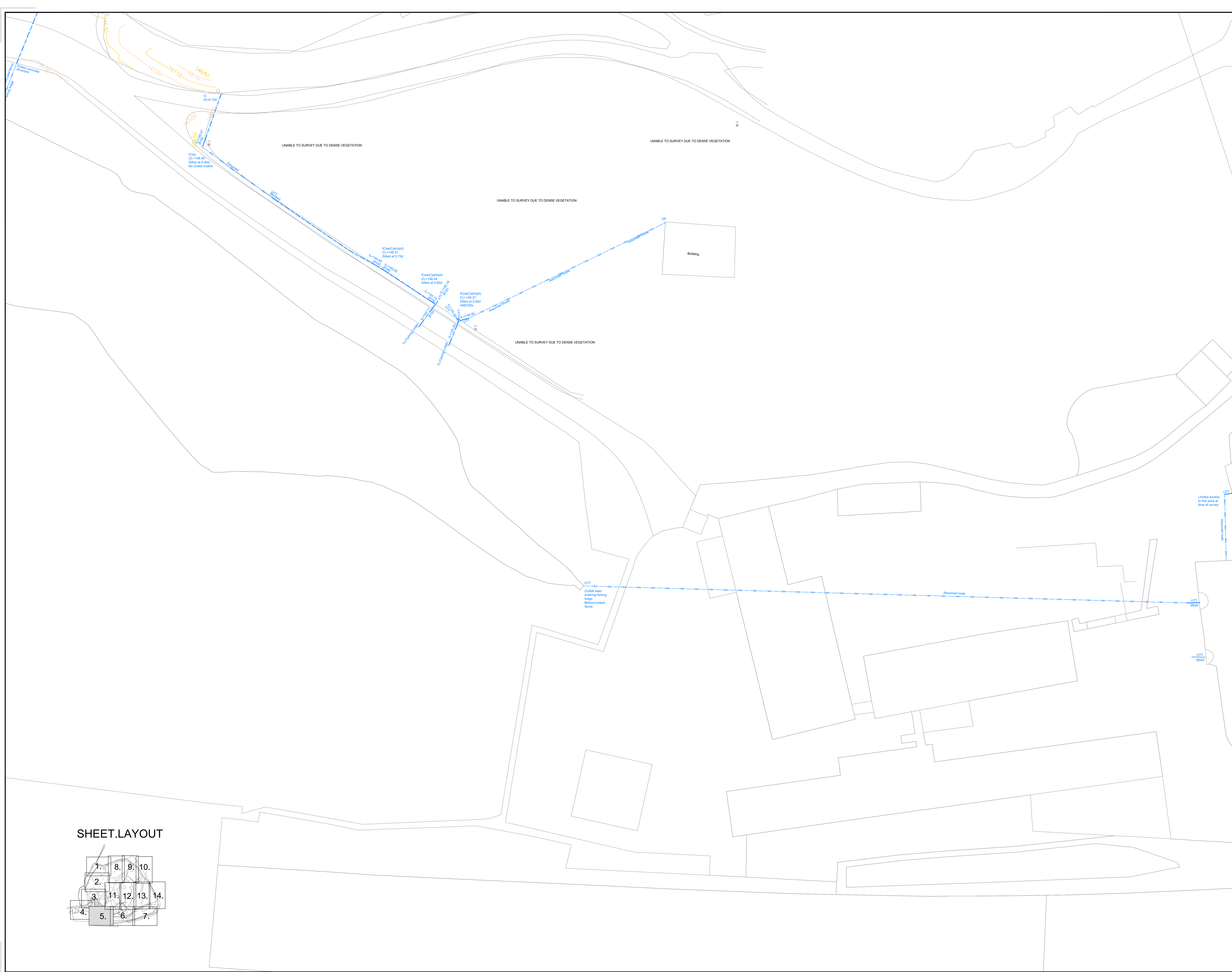
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Drawing No.	Scale	Rev.
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55211-UTIL-02(02) Sheet 4 of 14	30	
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KEY

	GULLY
	IC
	DRAINAGE COMBINED WATER WITH FLOW DIRECTION
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - PIPE
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - FLOW PATH
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - WATERCOURSE
	COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
	FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
	SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
	CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

A	APPROXIMATE
BT	BRITISH TELECOM
CL	COVER LEVEL
CD	CHAMBER DEPTH
d	DEPTH (metres)
DBC	DIRECTLY BURIED CABLE
DP	DRAIN PIPE
ER	EARTHING ROD
EXLO	EXTERNAL DIAMETER (mm)
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
ICW	COMBINED WATER INSPECTION COVER
ICe	ELECTRICITY INSPECTION COVER
ICW	FOUL WATER INSPECTION COVER
ICSW	SURFACE WATER INSPECTION COVER
ICsu	TRAFFIC CONTROLS INSPECTION COVER
ICel	TELECOMMUNICATIONS INSPECTION COVER
ICu	UNKNOWN INSPECTION COVER
ICW	WATER INSPECTION COVER
ID	INVERT DEPTH
IL	INVERT LEVEL
JB	JUNCTION BOX
LP	LAMP POST
NFI	NO FURTHER INFORMATION
OD	OUTLET DEPTH
RE	RODDING EYE
RWP	RAINWATER PIPE
SF	SOFFIT DEPTH
SV	STOP VALVE
TL	TRAFFIC LIGHT
TP	TELEGRAPH POLE
UTR	UNABLE TO RAISE
UTT	UNABLE TO TRACE
VP	VENT PIPE
WD	DEPTH TO WATER
WL	WATER LEVEL
WM	WATER METER
WSV	WATER STOP VALVE
Ø	DIAMETER (mm)

01	04/04/2019	Added layers for flow paths and watercourses	MG	SRO
02	10/04/2019	Added contours provided by client	MG	SRO
		Created sheets for entire site		

Rev.	Date	Amendment	Drawn	Chkd.	Appd.

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Client

BARRETT HOMES MANCHESTER

Project Title

TROWS LANE

Drawing Title

DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19

Scale	Orig Size	Dimensions
1:200	A0	

Project No.	Drawing File
55211	

Drawing No.	Scale	Rev.
55211-UTIL-02(02) Sheet 5 of 14	0 10 20 30 40 50m	

SHEET.LAYOUT



NOTES

The specific risks associated with the content of this drawing are considered to be:-

- (1) The topographical baseplan has been supplied by the client and has not been checked for accuracy.
- (2) Service routes have been identified by visual site inspection, lifting of inspection covers, and traced with electromagnetic locating techniques.
- (3) This utility lines represent assumed positions/routes.
- (4) Depth to top of pipes/features shown in metres.
- (5) A single line may represent multiple services in the same location.
- (6) It is recommended that the Client should confirm the location of the geophysical anomalies with hand dug pits within 0.5m to expose buried obstructions and services prior to the commencement of works.
- (7) Although every reasonable effort has been made to locate the buried services and obstructions using electromagnetic and radar techniques, RSK Environment Ltd cannot guarantee that every obstruction has been located.

KEY

	GULLY
	IC
	DRAINAGE COMBINED WATER WITH FLOW DIRECTION
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - PIPE
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - FLOW PATH
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - WATERCOURSE
	COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
	FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
	SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
	CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

A	APPROXIMATE
BT	BRITISH TELECOM
CL	COVER LEVEL
CD	CHAMBER DEPTH
d	DEPTH (metres)
DBC	DIRECTLY BURIED CABLE
DP	DRAIN PIPE
ER	EARTHING ROD
Ext.Ø	EXTERNAL DIAMETER (mm)
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
ICW	COMBINED WATER INSPECTION COVER
ICw	ELECTRICITY INSPECTION COVER
ICfW	FOUL WATER INSPECTION COVER
ICsW	SURFACE WATER INSPECTION COVER
ICsSu	TRAFFIC CONTROLS INSPECTION COVER
ICtel	TELECOMMUNICATIONS INSPECTION COVER
ICu	UNKNOWN INSPECTION COVER
ICW	WATER INSPECTION COVER
ID	INVERT DEPTH
IL	INVERT LEVEL
JB	JUNCTION BOX
LP	LAMP POST
NFI	NO FURTHER INFORMATION
OD	OUTLET DEPTH
RE	RODDING EYE
RWP	RAINWATER PIPE
SF	SOFFIT DEPTH
SV	STOP VALVE
TL	TRAFFIC LIGHT
TP	TELEGRAPH POLE
UTR	UNABLE TO RAISE
UTT	UNABLE TO TRACE
VP	VENT PIPE
WD	DEPTH TO WATER
WL	WATER LEVEL
WM	WATER METER
WSV	WATER STOP VALVE
Ø	DIAMETER (mm)

01	04/04/2019	Added layers for new paths and watercourses	MG	SRO
02	10/04/2019	Added contours provided by client Created sheets for entire site	MG	SRO

Rev.	Date	Amendment	Drawn	Chkd.	Appd.

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Client

BARRETT HOMES MANCHESTER

Project Title

TROWS LANE

Drawing Title

DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19

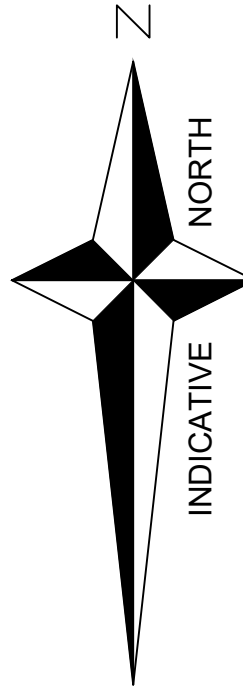
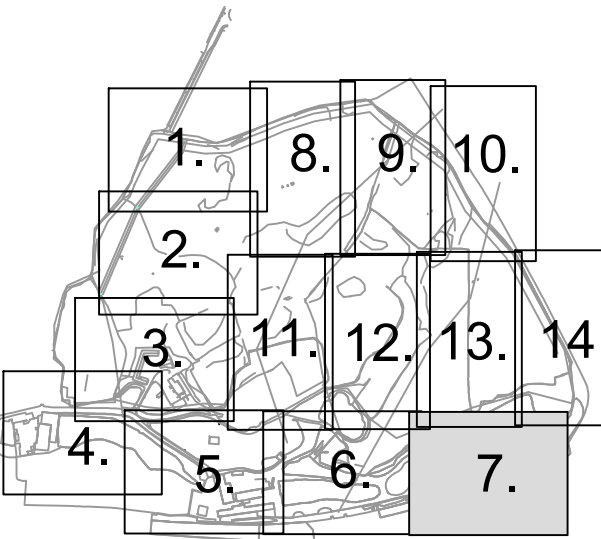
Scale	Orig Size	Dimensions
1:200	A0	

Project No.	Drawing File
55211	

Drawing No.	Scale	Rev.
55211-UTIL-02(02) Sheet 6 of 14		

0 10 20 30 40 50m

SHEET.LAYOUT



NOTES

The specific risks associated with the content of this drawing are considered to be:-

- (1) The topographical baseline has been supplied by the client and has not been checked for accuracy. Any topographic or geophysical locating techniques
- (2) Service routes have been identified by visual site inspection, lifting of inspection covers, and traced with electromagnetic locating techniques
- (3) Thin utility lines represent assumed positions/routes.
- (4) Depth to top of pipes/features shown in metres.
- (5) A single line may represent multiple services in the same location.
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KEY

	GULLY
	IC
	DRAINAGE COMBINED WATER WITH FLOW DIRECTION
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
	SPIRE
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
	-FLOW PATH
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
	-WATERCOURSE
	COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
	FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
	SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
	CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

A	APPROXIMATE
BT	BRITISH TELECOM
CL	COVER LEVEL
CD	CHAMBER DEPTH
D	DEPTH (metres)
DBC	DIRECTLY BURIED CABLE
DP	DRAIN PIPE
ER	EARTHING ROD
Ext Ø	EXTERNAL DIAMETER (mm)
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
ICow	COMBINED WATER INSPECTION COVER
Icfe	ELECTRICITY INSPECTION COVER
Icwf	FOUL WATER INSPECTION COVER
Icsw	SURFACE WATER INSPECTION COVER
Icscw	TRAFFIC CONTROLS INSPECTION COVER
Ictel	TELECOMMUNICATIONS INSPECTION COVER
Icu	UNKNOWN INSPECTION COVER
Icw	WATER INSPECTION COVER
ID	INVERT DEPTH
IL	INVERT LEVEL
JB	JUNCTION BOX
LP	LAMP POST
NI	NO FURTHER INFORMATION
OD	OUTLET DEPTH
RE	RODDING EYE
RFP	RAINFALL PIPE
SP	SOFFIT DEPTH
SV	STOP VALVE
TL	TRAFFIC LIGHT
TP	TELEPHONE
UTR	UNABLE TO RAISE
UTT	UNABLE TO TRACE
VP	VENT PIPE
WD	DEPTH TO WATER
WL	WATER LEVEL
WM	WATER METER
WSV	WATER STOP VALVE
	DIAMETER (mm)

01	04/04/2019	Notes added to drawings and watercourses added contours provided by client	MG	SRD	S
02	10/04/2019	Created sheets for entire site	MG	SRD	S
Rev.	Date	Amendment	Drawn	Checked	Approved

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Client

BARRETT HOMES MANCHESTER

Project Title

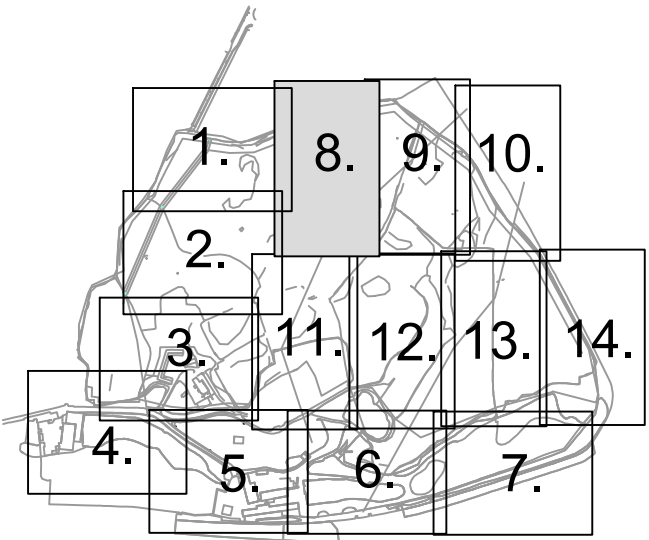
TROWS LANE

Drawing Title

DRAINAGE SURVEY

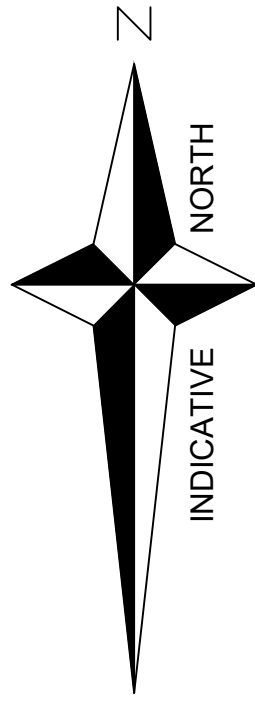
Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.J.L	25/02/19	G.J.L	25/02/19
Scale	Dimensions				
1:200	A0				
Project No	Drawing File				
55211					
Drawing No				Rev	
55211-UTIL-02(02)	Sheet 7 of 14				
Scale					
0	10	20	30	40	50

SHEET.LAYOUT



NOTES

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- (1) The topographical baseplan has been supplied by the client and has not been checked for accuracy.
 - (2) Service routes have been identified by visual site inspection, lifting of inspection covers, and traced with electromagnetic locating techniques. Thin utility lines represent assumed positions/routes.
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 - (7)



KEY

- GULLY
- IC
- DRAINAGE COMBINED WATER WITH FLOW DIRECTION
- DRAINAGE FOUL WATER WITH FLOW DIRECTION
- DRAINAGE SURFACE WATER WITH FLOW DIRECTION
- DRAINAGE FOWL WATER WITH FLOW DIRECTION
- FLOW PATH
- DRAINAGE SURFACE WATER WITH FLOW DIRECTION
- WATERCOURSE
- COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
- FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
- SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
- CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

- A APPROXIMATE
- BT BRITISH TELECOM
- CL COVER LEVEL
- CD CHAMBER DEPTH
- d DEPTH (metres)
- DBC DIRECTLY BURIED CABLE
- DP DRAIN PIPE
- ER EARTHING ROD
- ExD EXTERNAL DIAMETER (mm)
- FH FIRE HYDRANT
- G GULLY
- GV GAS VALVE
- ICw COMBINED WATER INSPECTION COVER
- ICe ELECTRICITY INSPECTION COVER
- ICfw FOUL WATER INSPECTION COVER
- ICsw SURFACE WATER INSPECTION COVER
- ICscu TRAFFIC CONTROLS INSPECTION COVER
- ICtel TELECOMMUNICATIONS INSPECTION COVER
- ICu UNKNOWN INSPECTION COVER
- ICw WATER INSPECTION COVER
- ID INVERT DEPTH
- IL INVERT LEVEL
- JB JUNCTION BOX
- LP LAMP POST
- NFI NO FURTHER INFORMATION
- OD OUTLET DEPTH
- RE RODDING EYE
- RWP RAINWATER PIPE
- SF SOFFIT DEPTH
- SV STOP VALVE
- TL TRAFFIC LIGHT
- TP TELEGRAPH POLE
- UTR UNABLE TO RAISE
- UTT UNABLE TO TRACE
- VP VENT PIPE
- WD DEPTH TO WATER
- WL WATER LEVEL
- WM WATER METER
- WSV WATER STOP VALVE
- Ø DIAMETER (mm)

01	04/04/2019	Added layers for flow paths and watercourses	MG	SRO	SRO
02	10/04/2019	Added contour provider by client	MG	SRO	SRO

Rev.	Date	Amendment	Drawn	Chkd	Appt.
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Client
BARRETT HOMES MANCHESTER

Project Title
TROWS LANE

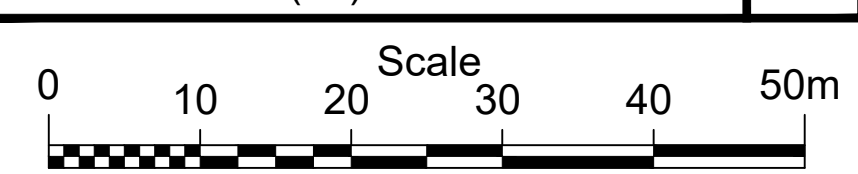
Drawing Title
DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.JL	25/02/19	G.JL	25/02/19

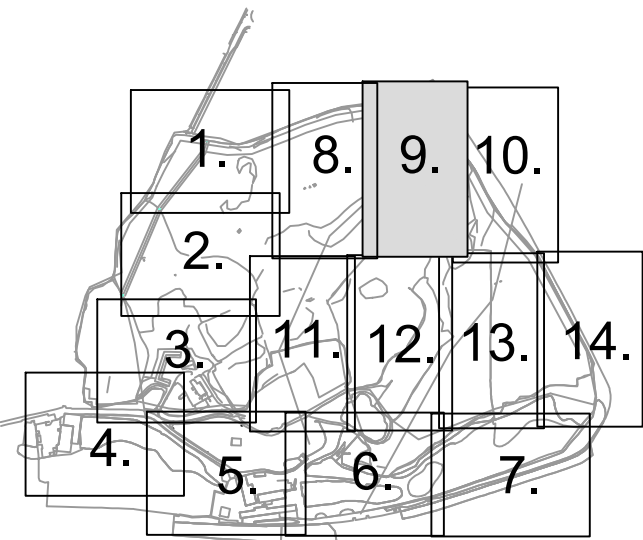
Scale	Orig Size	Dimensions
1:200	A0	

Project No.	Drawing File
55211	

Drawing No.	Rev.
55211-UTIL-02(02) Sheet 8 of 14	

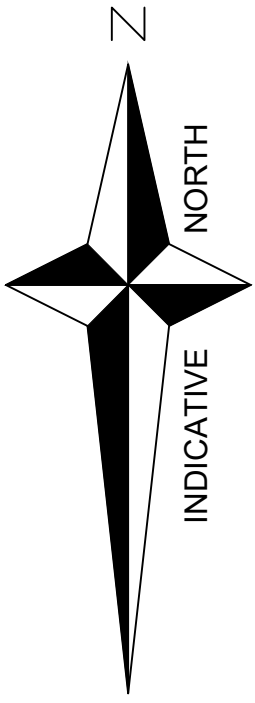


SHEET.LAYOUT



NOTES

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KEY

- GULLY
- IC
- DRAINAGE COMBINED WATER WITH FLOW DIRECTION
- DRAINAGE FOUL WATER WITH FLOW DIRECTION
- DRAINAGE SURFACE WATER WITH FLOW DIRECTION
- PIPE
- DRAINAGE FOUL WATER WITH FLOW DIRECTION
- FLOW PATH
- DRAINAGE SURFACE WATER WITH FLOW DIRECTION
- WATERCOURSE
- COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
- FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
- SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
- CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

- A APPROXIMATE
- BT BRITISH TELECOM
- CL COVER LEVEL
- CD CHAMBER DEPTH
- d DEPTH (metres)
- DBC DIRECTLY BURIED CABLE
- DP DRAIN PIPE
- ER EARTHING ROD
- EXLØ EXTERNAL DIAMETER (mm)
- FH FIRE HYDRANT
- G GULLY
- GV GAS VALVE
- ICow COMBINED WATER INSPECTION COVER
- ICe ELECTRICITY INSPECTION COVER
- ICfw FOUL WATER INSPECTION COVER
- ICsw SURFACE WATER INSPECTION COVER
- ICscu TRAFFIC CONTROLS INSPECTION COVER
- ICtel TELECOMMUNICATIONS INSPECTION COVER
- ICu UNKNOWN INSPECTION COVER
- ICw WATER INSPECTION COVER
- ID INVERT DEPTH
- IL INVERT LEVEL
- JB JUNCTION BOX
- LP LAMP POST
- NFI NO FURTHER INFORMATION
- OD OUTLET DEPTH
- RE RODDING EYE
- RWP RAINWATER PIPE
- SF SOFFIT DEPTH
- SV STOP VALVE
- TL TRAFFIC LIGHT
- TP TELEGRAPH POLE
- UTR UNABLE TO RAISE
- UTT UNABLE TO TRACE
- VP VENT PIPE
- WD DEPTH TO WATER
- WL WATER LEVEL
- WM WATER METER
- WSV WATER STOP VALVE
- Ø DIAMETER (mm)

01	04/04/2019	Added points for flow path and watercourses	MG	MG	SRO	SRO
02	10/04/2019	Added contours provided by client Created sheets for entire site	MG	MG	SRO	SRO

Rev.	Date	Amendment	Drawn	Chd.	Appt.
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Client

BARRETT HOMES MANCHESTER

Project Title

TROWS LANE

Drawing Title

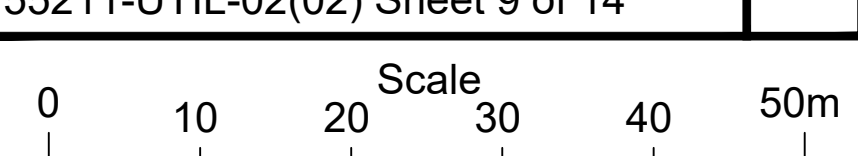
DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	GJL	25/02/19	GJL	25/02/19

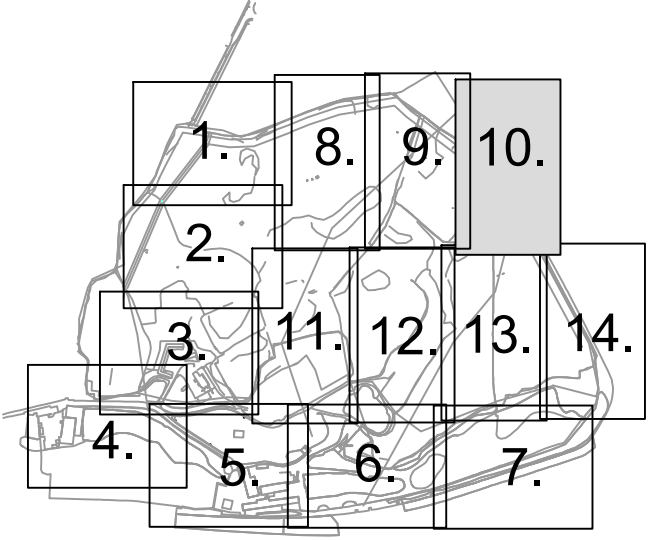
Scale	Dimensions
1:200	A0

Project No.	Drawing File
55211	

Drawing No.	Rev.
55211-UTIL-02(02) Sheet 9 of 14	

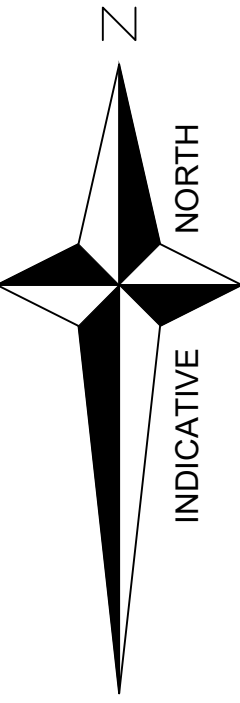


SHEET.LAYOUT



NOTES

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KEY

- IC GULLY
- IC DRAINAGE COMBINED WATER WITH FLOW DIRECTION
- IC DRAINAGE FOUL WATER WITH FLOW DIRECTION
- IC DRAINAGE SURFACE WATER WITH FLOW DIRECTION
- IC DRAINAGE SURFACE WATER WITH FLOW DIRECTION - PIPE
- IC DRAINAGE SURFACE WATER WITH FLOW DIRECTION - WATERCOURSE
- IC DRAINAGE SURFACE WATER WITH FLOW DIRECTION - COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
- IC DRAINAGE SURFACE WATER WITH FLOW DIRECTION - SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
- IC CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

- A APPROXIMATE
- BT BRITISH TELECOM
- CL COVER LEVEL
- CD CHAMBER DEPTH
- d DEPTH (metres)
- DBC DIRECTLY BURIED CABLE
- DP DRAIN PIPE
- ER EARTHING ROD
- EXLØ EXTERNAL DIAMETER (mm)
- FH FIRE HYDRANT
- G GULLY
- GV GAS VALVE
- ICow COMBINED WATER INSPECTION COVER
- ICe ELECTRICITY INSPECTION COVER
- ICf Foul WATER INSPECTION COVER
- ICsw SURFACE WATER INSPECTION COVER
- ICscu TRAFFIC CONTROLS INSPECTION COVER
- ICtel TELECOMMUNICATIONS INSPECTION COVER
- ICu UNKNOWN INSPECTION COVER
- ICw WATER INSPECTION COVER
- ID INVERT DEPTH
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- JB JUNCTION BOX
- LP LAMP POST
- NFI NO FURTHER INFORMATION
- OD OUTLET DEPTH
- RE RODDING EYE
- RWP RAINWATER PIPE
- SF SOFFIT DEPTH
- SV STOP VALVE
- TL TRAFFIC LIGHT
- TP TELEGRAPH POLE
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- UTT UNABLE TO TRACE
- VP VENT PIPE
- WD DEPTH TO WATER
- WL WATER LEVEL
- WM WATER METER
- WSV WATER STOP VALVE
- Ø DIAMETER (mm)

01	04/04/2019	Added layers for flow paths and watercourses	MG	SRO	SRO
02	10/04/2019	Created sheets for entire site	MG	SRO	SRO

Rev.	Date	Amendment	Drawn	Chkd	Appt.
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Client
BARRETT HOMES MANCHESTER

Project Title
TROWS LANE

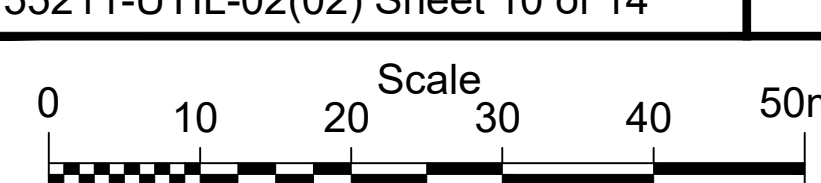
Drawing Title
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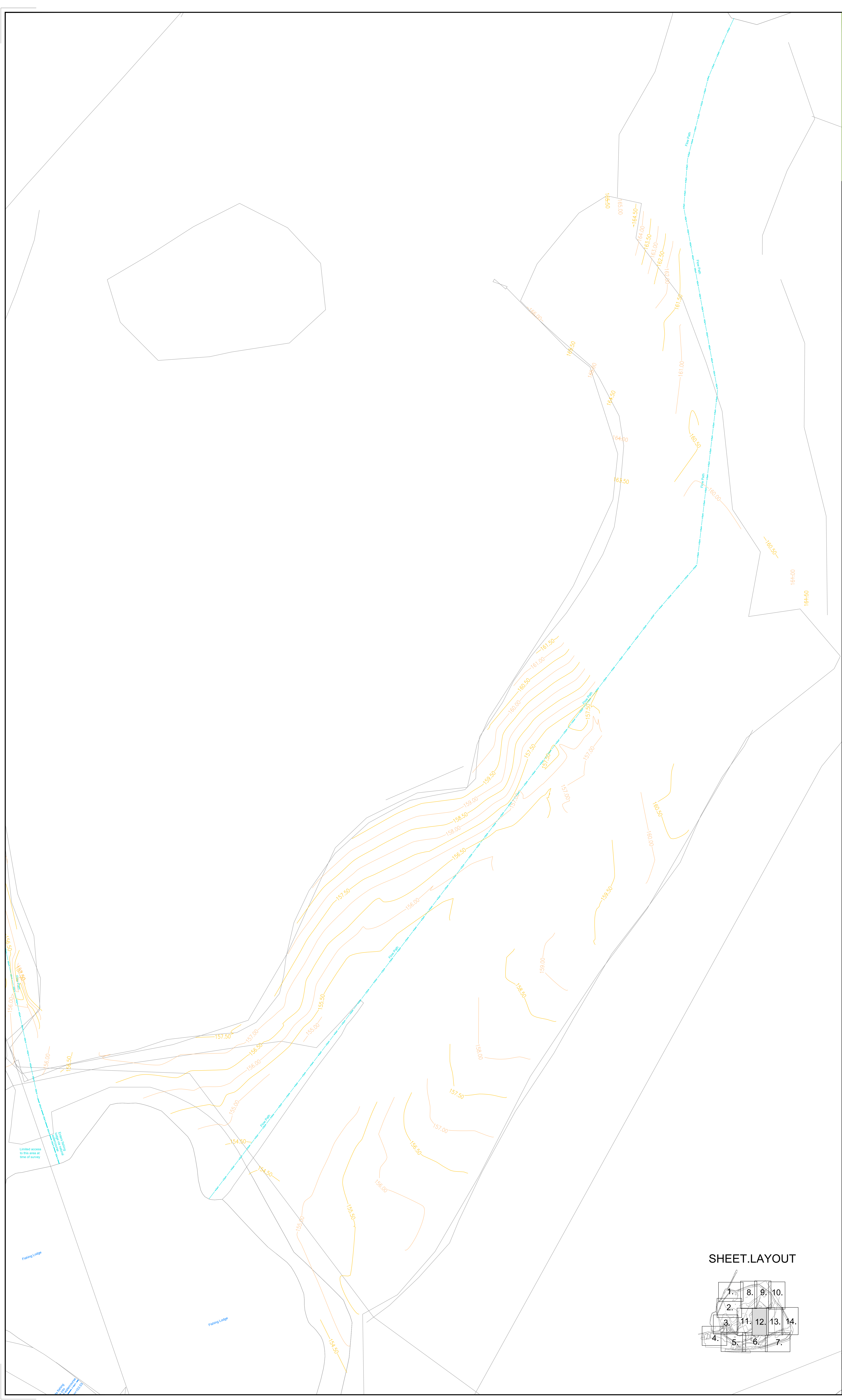
Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.JL	25/02/19	G.JL	25/02/19

Scale	Orig Size	Dimensions
1:200	A0	

Project No.	Drawing File
55211	

Drawing No.	Rev.
55211-UTIL-02(02) Sheet 10 of 14	

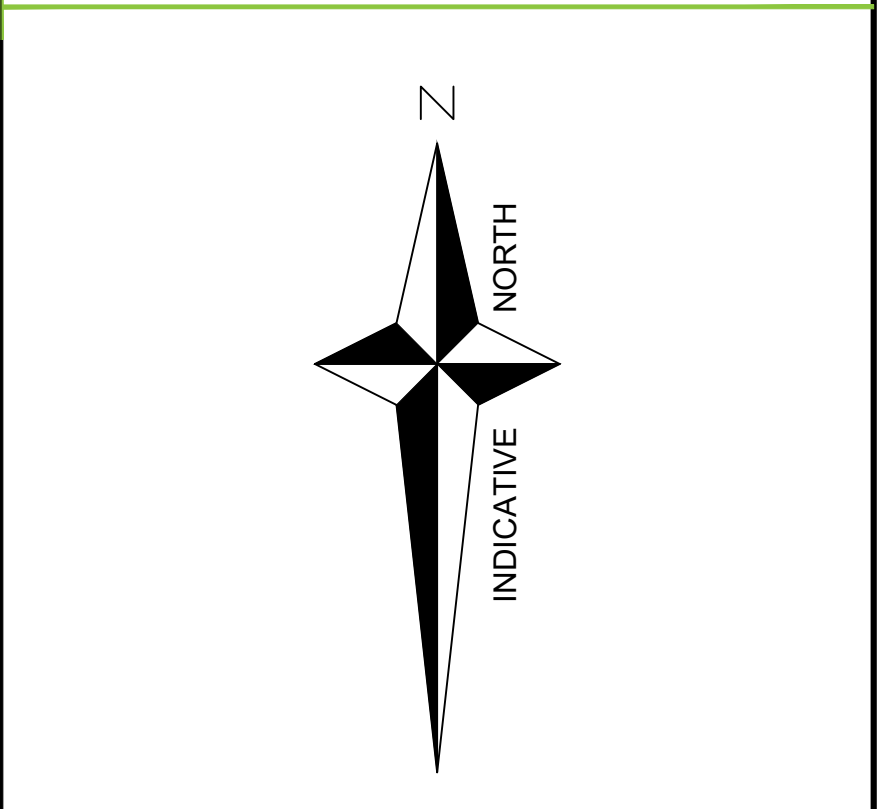




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KEY

	GULLY
	IC
	DRAINAGE COMBINED WATER WITH FLOW DIRECTION
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
	PIPE
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	FLOW PATH
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
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	COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
	FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
	SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
	CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

A	APPROXIMATE
BT	BRITISH TELECOM
CL	COVER LEVEL
CD	CHAMBER DEPTH
d	DEPTH (metres)
DBC	DIRECTLY BURIED CABLE
DP	DRAIN PIPE
ER	EARTHING ROD
ExLd	EXTERNAL DIAMETER (mm)
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
ICw	COMBINED WATER INSPECTION COVER
ICe	ELECTRICITY INSPECTION COVER
ICw	FOUL WATER INSPECTION COVER
ICsw	SURFACE WATER INSPECTION COVER
ICtsw	TRAFFIC CONTROLS INSPECTION COVER
ICtel	TELECOMMUNICATIONS INSPECTION COVER
ICu	UNKNOWN INSPECTION COVER
ICw	WATER INSPECTION COVER
ID	INVERT DEPTH
IL	INVERT LEVEL
JB	JUNCTION BOX
LP	LAMP POST
NFI	NO FURTHER INFORMATION
OD	OUTLET DEPTH
RE	RODDING EYE
RWP	RAINWATER PIPE
SF	SOFFIT DEPTH
SV	STOP VALVE
TL	TRAFFIC LIGHT
TP	TELEGRAPH POLE
UTR	UNABLE TO RAISE
UTT	UNABLE TO TRACE
VP	VENT PIPE
WD	DEPTH TO WATER
WL	WATER LEVEL
WM	WATER METER
WSV	WATER STOP VALVE
Ø	DIAMETER (mm)

01	04/06/2019	Added layers for flow paths and watercourse	MG	SRO	SRO
02	10/04/2019	Added contours provided by client	MG	SRO	SRO

Rev. **Date** **Amendment** **Drawn** **Chd.** **Appt.**

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Client
BARRETT HOMES MANCHESTER

Project Title
TROWS LANE

Drawing Title
DRAINAGE SURVEY

Drawn	Date	Checked	Date	Approved	Date
MG	22/02/19	G.J.L.	25/02/19	G.J.L.	25/02/19

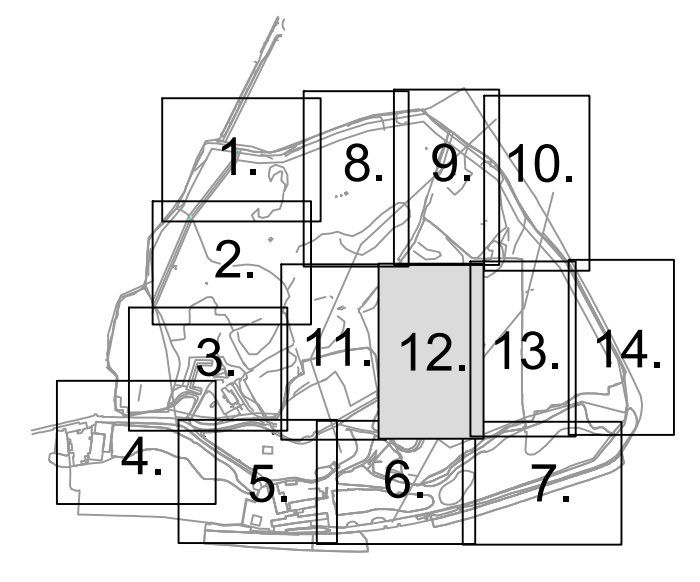
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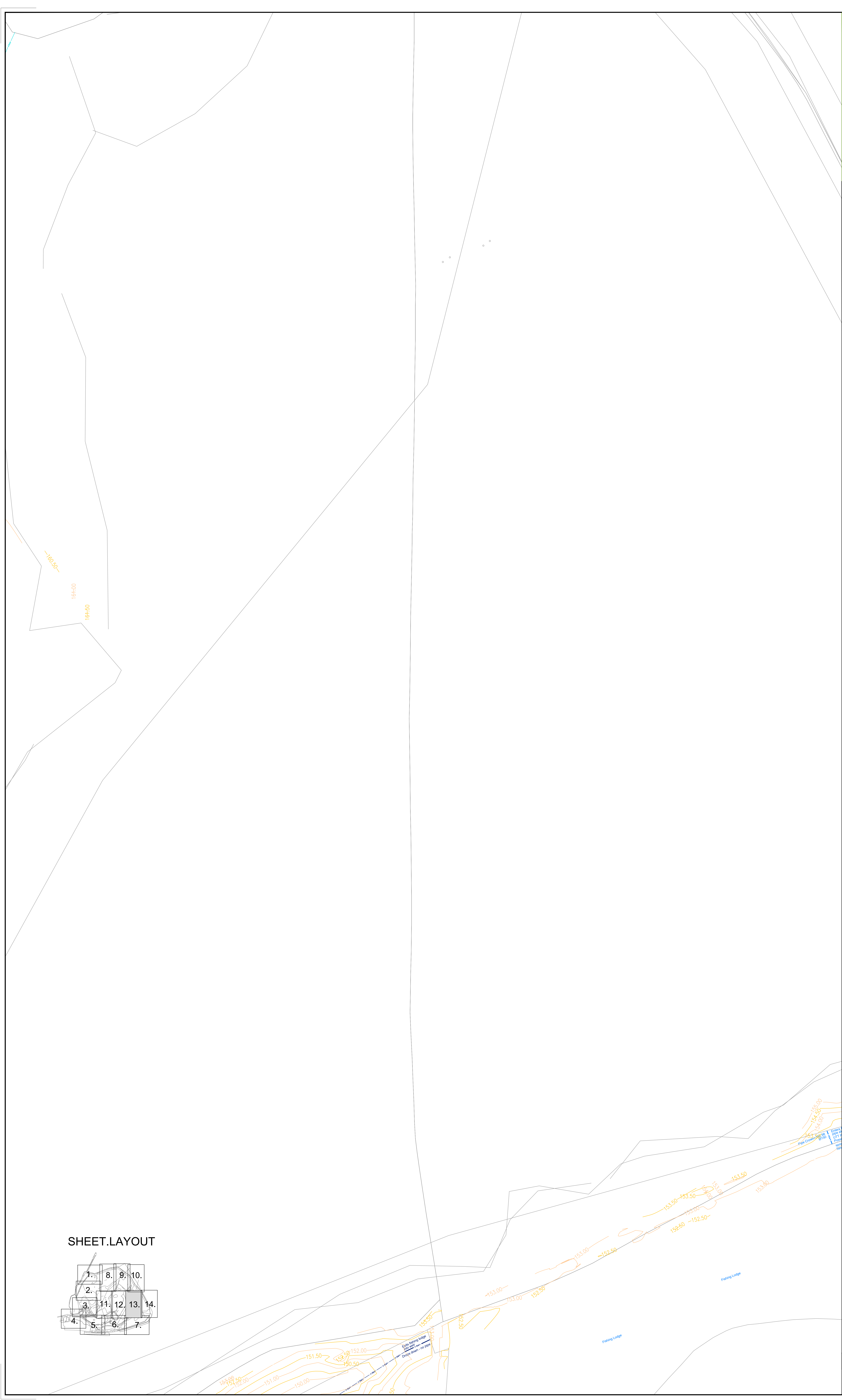
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Drawing No.	Rev.
55211-UTIL-02(02) Sheet 12 of 14	



SHEET.LAYOUT

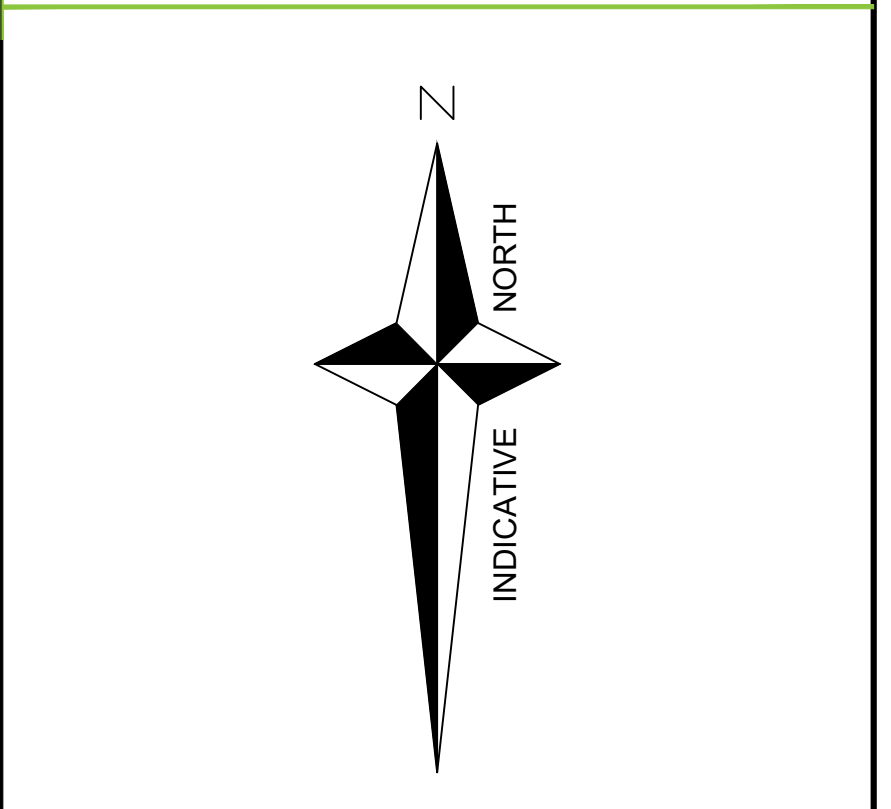




NOTES

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- (2) Service routes have been identified by visual site inspection, lifting of inspection covers, and traced with electromagnetic locating techniques.
- (3) Thin utility lines represent assumed positions/routes.
- (4) Depth to top of pipes/features shown in metres.
- (5) A single line may represent multiple services in the same location.
- (6) It is recommended that the Client should confirm the location of the geophysical anomalies with hand dug pits within 0.5m to expose buried obstructions and services prior to the commencement of works.
- (7) Although every reasonable effort has been made to locate the buried services and obstructions using electromagnetic and radar techniques, RSK Environment Ltd cannot guarantee that every obstruction has been located.



KEY

	GULLY
	IC
	DRAINAGE COMBINED WATER WITH FLOW DIRECTION
	DRAINAGE FOUL WATER WITH FLOW DIRECTION
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION
	PIPE
	DRAINAGE FOUL WATER WITH FLOW DIRECTION - FLOW PATH
	DRAINAGE SURFACE WATER WITH FLOW DIRECTION - WATERCOURSE
	COMBINED WATER SEWER RECORDS WITH FLOW DIRECTION
	FOUL WATER SEWER RECORDS WITH FLOW DIRECTION
	SURFACE WATER SEWER RECORDS WITH FLOW DIRECTION
	CHAMBER/REINFORCED SERVICE DUCT

ABBREVIATIONS

A	APPROXIMATE
BT	BRITISH TELECOM
CL	COVER LEVEL
CD	CHAMBER DEPTH
d	DEPTH (metres)
DBC	DIRECTLY BURIED CABLE
DP	DRAIN PIPE
ER	EARTHING ROD
EXLØ	EXTERNAL DIAMETER (mm)
FH	FIRE HYDRANT
G	GULLY
GV	GAS VALVE
ICw	COMBINED WATER INSPECTION COVER
ICe	ELECTRICITY INSPECTION COVER
ICfw	FOUL WATER INSPECTION COVER
ICsw	SURFACE WATER INSPECTION COVER
ICtsu	TRAFFIC CONTROLS INSPECTION COVER
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01	04/04/2019	Added layers for flow paths and watercourses	MG	SRO
02	10/04/2019	Added contours provided by client Created sheets for entire site	MG	SRO

Rev.	Date	Amendment	Drawn	Chd.	Appt.
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Client
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Project Title
TROWS LANE

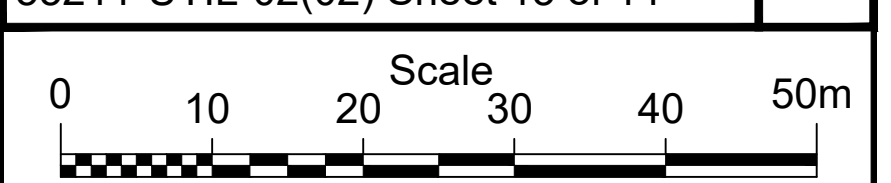
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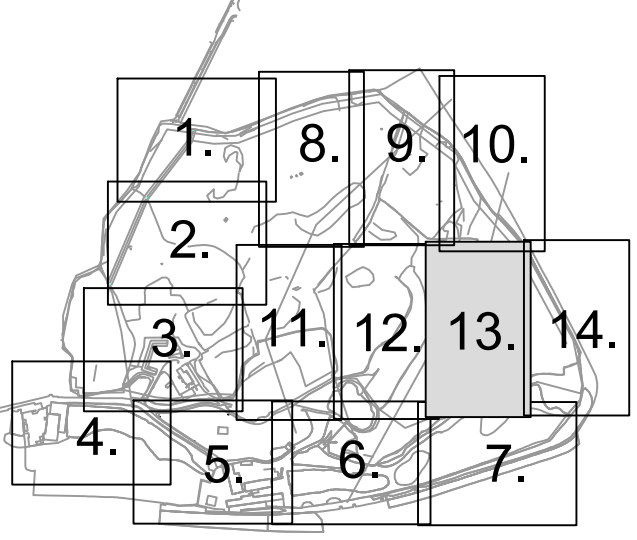
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Project No.	Drawing File
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Drawing No.	Sheet	Rev.
55211-UTIL-02(02)	13 of 14	



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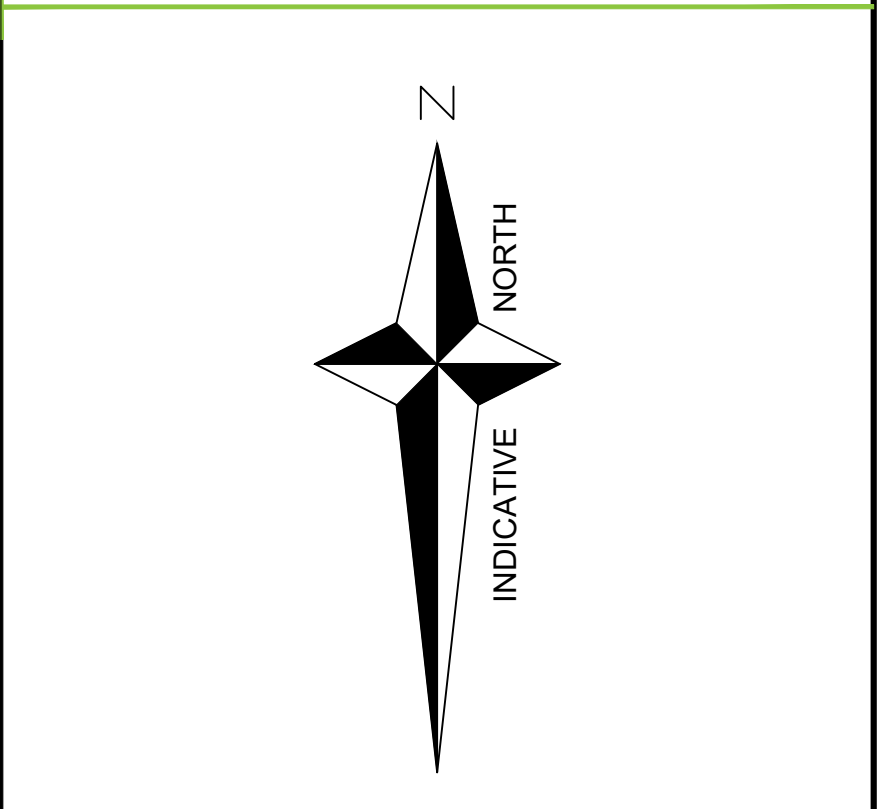




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	FLOW PATH
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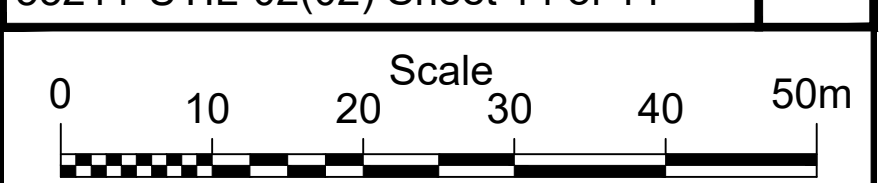
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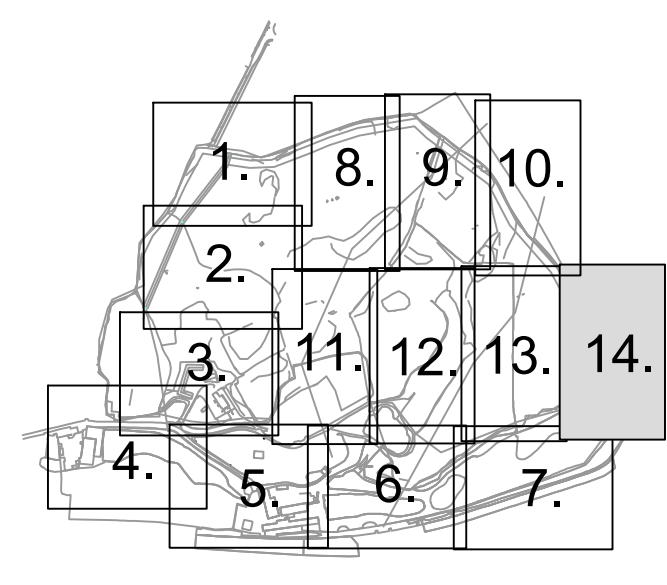
Scale	Orig Size	Dimensions
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Project No.	Drawing File
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Drawing No.	Rev.
55211-UTIL-02(02) Sheet 14 of 14	



SHEET.LAYOUT





APPENDIX F

RSK MONITORING REPORT



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01 May 2020

Our reference: 11440 L01 (01)

Mr Rick Brown
Barratt Homes (Manchester Division)
4 Brindley Road
City Park
Manchester
M16 9HQ

TROWS FARM - INVESTIGATION AND MONITORING OF SITE WATER SEEPAGES

Dear Rick,

Further to agreement of our tender (Ref: 11440 TL(01)) and subsequent discussions, we have pleasure in enclosing our findings for the above work.

The Trows Farm site (the Site) covers an area of approximately 20 hectares and includes some open fields used for grazing. The Site is characterised by a steeply sloping hummocky landform with several areas of waterlogged ground. It is understood that Barratt Homes (Manchester) wish to develop the Site for housing.

Ordnance Survey (OS) mapping show several water features on the Site, which include a series of springs and surface water channels. It is necessary to understand the nature of these features before development can commence so that they can be appropriately incorporated into the plans. As part of the planning process, preliminary discussions have been undertaken with Rochdale Borough Council (RBC) and these have included a site visit with their drainage engineer.

This letter report includes details of the fieldwork that RSK has undertaken to investigate the water features and it includes the relevant data that has been collected during the period of investigation. The results of the data assessment allow an understanding of how the features can be incorporated into the proposed development.

Environmental Setting

The Site covers an area of approximately 20 hectares and is situated between Cripple Gate (north), A627(M) (east), Leander Drive (west) and a series of ponds and properties along Trows Lane (south) with the M62 motorway beyond. The published geological map indicates that the Site is underlain by hummocky Glacial Deposits, comprising poorly sorted sand, gravel and silty clay with a moundy topography.



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Registered in Scotland No. 115530

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Beneath the Glacial Deposits are Till, which comprise clay to sandy clay, unsorted, with common pebbles, cobbles and some boulders. Beneath these superficial soil deposits are rock of the Pennine Lower Coal Formation, which include two bands of sandstone (Old Lawrence Rock).

OS mapping indicates five springs on the Site. However, through the period of investigation no discernible water flow from the ground has been observed at the locations identified by the OS. Instead, several areas of ground ranging from damp to saturated are identifiable but dense vegetation coverage in these areas prevents better observations.

Two valley features oriented north-east to south-west are found within the eastern and western half of the Site. These valleys are separated by raised ground, which is locally very steep and approximately 10 m higher than the bottom of the two valleys. The western valley includes a land drain, which was installed several years ago. A drainage survey has confirmed that this drain discharges into a pond south of Trows Lane although the point of discharge is submerged (>0.5 m) beneath the surface of the water and cannot be safely accessed. The eastern valley drains into a pond south of the Site via a narrow channel, which looks man-made. This channel is generally uniform in width, straight and with vegetation cleared along some parts. Ground cover within parts of the eastern and western valley are characterised by plants that grow in wet or boggy conditions and these plants and difficult ground conditions restrict observations of water seepages in these areas.

A short tree-lined channel (central channel) oriented from north to south connects the high ground located between the valley features and the pond into which water from the eastern valley feature discharges. These features can be seen in Plate 1.

The proposed site development is likely to require significant earthworks, which include the removal of soils from high spots and its re-use as backfill in low-spots. This backfill material has the potential to cover the areas marked by the OS as springs and some channels that allow water to drain. The status of these channels are uncertain so monitoring was undertaken to collect data, which may assist with their classification and incorporation into the site development.

Status of Water Features

Larger rivers and streams are usually termed main rivers and are managed and maintained by the Environment Agency (EA). An ordinary watercourse is a watercourse that is not part of a main river and includes rivers, streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows. It is not required for water to flow through the watercourse at all times for it to be considered as an ordinary watercourse. Management of ordinary watercourses is the responsibility of the lead local flood authority (LLFA), which for the Site is RBC.

The EA publishes data on its main rivers network and the closest such designation to site relates to Trub Brook, which is approximately 1,200 m west-southwest of the Site. Water in the ponds to the south of the Site discharge into Trub Brook. The Landmark Group publish environmental data for a range of settings and a plan showing the river network around the Site has previously been obtained (2015). The Landmark data for the 2015 plan utilised EA data, which included main rivers and other smaller channels that were referred to as secondary and tertiary river networks. An excerpt of the Landmark report, which is included as Plate 4 shows two tertiary river network channels on site (green lines). More recently (2016), the EA has removed secondary and tertiary river networks (now referred to as ordinary watercourses) from its

published data because they are no longer responsible for their management. The management of an ordinary watercourse falls to RBC, but they have yet to make publicly available maps showing the extent of ordinary watercourses within their area of governance.

After the EA stopped managing data for ordinary watercourses the OS now provides data on water networks, which is based on its own mapping information. The OS data has been obtained from an updated (30 April 2020) Landmark report for the site, which shows two watercourses on site. These two watercourses are the same as the tertiary network data previously reported by the EA.

Water draining from the eastern valley feature discharges into a pond immediately south of the Site. The discharge is via a shallow channel, which was previously classified by the EA as a tertiary river from a point 19 m inside the site boundary. RBC has produced a plan, which shows the extent of watercourses on the Site. The plan is superimposed over OS mapping from 1893 and is presented as Plate 2.

In addition, the tertiary watercourse at the bottom of the eastern valley is shown on OS mapping from 1956 to originate at mapped 'issues' (springs), which area approximately 20 m along this channel (see Plate 3). Water seeping from the ground along the eastern valley makes its way to the tertiary river, through open fibrous soils with abundant dense plants or via a small channel, which appears partly man-made.

Water discharging from the western valley has no similar designation and it is not shown on old OS mapping as a watercourse.

The tree-lined channel extending into the centre of the site and discharging into the pond is also previously classified by the EA as a tertiary river. In similar to the discharge from the eastern valley feature this channel shows up on the 1956 OS mapping and also the RBC drawing (Plate 2 and 3).

In lieu of a definitive designation from RBC it is reasonable to adopt the classification formerly adopted by the EA for tertiary river channels. These channels are now considered ordinary watercourses and the alignment of affected channels on Site are presented in Plate 2 to Plate 4. The fieldwork undertaken by RSK is presented in support of this designation.

The proposed earthworks to enable the development will require some of the seepages to be covered along with the flow path towards the mapped discharge point at the pond to the south. RSK undertook fieldwork over several months to confirm the hydrologic regime on the Site, particularly along the eastern valley. The reported data can be used to design appropriate engineering solutions to manage water during construction works and following completion of the development.

Flow Monitoring

Flow monitoring within discreet points along the eastern valley and at the end of the tree-lined channel was undertaken. These points were chosen through ease of safe access and where flow could be identified at the surface. At several locations along the eastern valley, the water seeped through waterlogged soil or through dense clumps of vegetation and so a discernible channel and flow was not present for flow monitoring to be undertaken.

Flow monitoring was undertaken on six occasions. An attempt was made to coincide the monitoring visits to periods of different rainfall events including immediately following rainfall, during rainfall and some time after rainfall had occurred.

The monitoring locations and methodology were discussed with RBC before commencement and an agreement to the plan was received. Water flow rates within the small channel along the eastern valley were made using a v-notch weir, this methodology is outlined in Appendix 1.

It was not possible to monitor flow rates through the drainage pipe, which is present beneath the western valley feature. No pipe entry point was identified and the point of discharge at the pond south of Trows Lane terminates approximately 0.5 m below the water level.

The central tree-lined ditch, which originates close to the central high ground discharges into the pond at the end of the eastern valley feature. The discharge is captured by a series of pipes that direct the discharge into the pond. For the purpose of the flow monitoring exercise, the discharge from this pipe was recorded.

The monitoring locations are all shown on Plate 5 and include:

- Weir A (eastern valley) - approximately 10m downstream of the confluence of the channels measured by Weir B and Weir C
- Weir B (eastern valley) - small channel close to an area of saturated ground
- Weir C (eastern valley) - small channel with flow from higher up the eastern valley
- Weir D (eastern valley) - site boundary and immediately upstream of the pond into which the water from the eastern valley discharges
- Weir E (central ditch) - series of pipes collecting water from the tree-lined ditch, oriented north to south

Flow Data

The flow data for each location is presented as Graph 1 and is also included on Plate 4. The flow data is an average of three readings that were taken at each location during each monitoring visit.

Flow data at all locations and during all rounds follow a similar pattern. Data from Round 1 and Round 4 generally provided the lowest flow rates and these monitoring events followed a period of relatively low precipitation. The lowest recorded flow from the central tree-lined channel (Weir E) is 0.31 l/sec and from Weir D (discharge point from the eastern valley) it was 0.53 l/sec. These two discharge rates are the lowest readings obtained during the six monitoring events and they represent the flow at the Site boundary immediately before discharging into the pond.

Flow rates at Weir D are between 10% and 89% greater than flow rates in Weir A, which is a sum of the flow rates from Weir B and Weir C. This records the contribution to the flow from the springs that are included on the OS map from 1956 and which are at the head of the tertiary river formerly designated by the EA.

Precipitation data

Antecedent total precipitation for 10-days prior to each monitoring round was acquired from a weather station local to the site (Thornham Summit, IOLDHA2). A graph of total rainfall during the monitoring period is presented as Graph 3. The rainfall (mm) for a period of 5-days and 10-days before the monitoring are presented and this ranges from 19 mm to 107 mm for 10-days and 4 mm to 54 mm for 5-days.

The daily rainfall and cumulative rainfall data for the 10-day period before each monitoring event are presented as Graph 4 (a and b) to Graph 9 (a and b). The cumulative rainfall data for the 10-day period before each monitoring event is also combined on Graph 10.

Groundwater data

Groundwater levels within accessible groundwater monitoring wells were recorded between Round 2 and Round 6. The data from this monitoring is included in Graph 11 and Graph 12. The data show variation of groundwater level during the monitoring period of between 0.19 m and 0.64 m.

Conclusion from monitoring

Flow data from all locations are very low with a maximum recorded flow of 1.9 l/sec recorded at Weir D (end of eastern valley). The minimum flow rate at Weir D was 0.5 l/sec and at Weir E (tree-lined channel) it was 0.3 l/sec.

The low flow in the central tree-lined channel is likely to be due to the very limited catchment for this channel, which will receive the majority of flow from the boggy ground at the head of the channel. Flow data from Weir E does not appear to be linked to long-term rainfall as the greatest rainfall intensity (5-day and 10-day period) does not coincide with the highest flow rates. The highest rainfall rates for the period before monitoring relate to Round 2 and the flow data for Weir E during Round 2 are in the lower range recorded at that location. Rainfall from 24-48 hours before the monitoring event does appear to be correlated to flow records from Weir E. There appears to be a greater correlation with rainfall intensity, where the highest flow data correspond to the highest rainfall intensity, which occurred some days after a relatively dry period (Round 5). Flow data from Weir E ranges from 0.3 l/sec to 1.0 l/sec, which is over 200% variation although the flow rates are very low and slight variations in flow can result in large swings in flow data. Such high variations support a surface water fed channel following rain and the data suggests flows of 0.4 l/sec are likely to be close to the low flow rates with seepages from groundwater playing a potential contributory role.

Data from Weir B and Weir C are generally equal to the data from Weir A when summed. However, this was not true for two occasions where data from Weir A was slightly lower than anticipated (a recorded variation of <0.1 l/sec). The variations were recorded during Round 5 and Round 6 and it is possible this represents a potential deterioration of performance of the weirs with a greater water flow rate occurring around Weir A and not through the v-notch.

Water flowing over Weir A generally comprises water flow recorded at Weir B and Weir C. Data from Weir A shows a variation between 0.37 l/sec and 1.61 l/sec but generally below 0.7 l/sec. The highest recorded value was recorded during Round 5, which was undertaken during a period of rainfall and shortly after a period of intense rainfall. This increase in flow rate was recorded at all locations during Round 5, demonstrating the close correlation in flow with recent rainfall intensity, which was also observed elsewhere.

Flow data from Weir D includes flow from Weir A and any additional water entering from springs at the head of the designated ordinary watercourse in the eastern valley. The average difference between Weir A and Weir data is 0.3 l/sec, suggesting this is the additional volume contributed by the springs at the head of the ordinary watercourse. Total flow data for Weir D range from 0.5 l/sec to 1.9 l/sec.

All flow data from each monitoring location are governed by rainfall having fallen within the 48-hours prior to monitoring. Significant increases in flow data correlate with high intensity rainfall and therefore surface run-off or shallow groundwater flow is the dominant mechanism to contribute to flow within the channels. A base component of flow is attributed to groundwater (i.e. spring flow) and this is likely to be typified by data collected during Round 6, i.e. 0.2 l/sec to 0.5 l/sec. These flows rates are negligible.

Groundwater levels show no obvious correlation with rainfall, but this may be due to the relatively short period of monitoring along with the duration of time between each monitoring round. The highest flow rates that were recorded at each weir coincide with a lowering groundwater level and the period of increasing groundwater levels coincide with steady weir data measurements. This confirms that the groundwater component to surface flows are very low and characterised by a low degree of fluctuation. This observation

is typical of seepages that become developed in granular soils where the discharge rate is governed by the hydraulic conductivity of the soil.

The proposed development will result in the backfilling of the eastern and western valley features and the excavation of high ground on which some seepages are mapped. The removal of the seepages at the highest points of the site will reduce the contribution of water, which would normally flow through the valleys to the pond south of the Site. In addition, the proposed development platform will include impermeable surfaces comprising roadways, paths and buildings, which will be connected to a site-wide drainage system to manage surface water. Areas of soft landscaping will be incorporated into the site development and this will allow some surface water infiltration into shallow soils, but the drainage system may locally reduce rates of infiltration by up to approximately 60%. The reduction in infiltration will reduce the volume of water, which would normally contribute to the flow at the mapped springs and seepages.

The reduction of infiltration in to soils within the eastern valley will result in a reduction of the water flow into the pond, through the ground to the south. This is different to the proposed surface water drainage, which will operate through a different system, but which will ultimately discharge into the same pond. A reduction of approximately 60% infiltration will reduce flows into the pond from the seepages and springs to between 0.2 and 0.5 l/sec at the point identified to be the start of the inland river (OS data, EA data). This estimation relates to data collected during the wettest part of the year and the estimate of 0.2 l/sec is likely to be typical of flows through other parts of the year.

Ordinary watercourse status

There is no reason to suggest a change to the existing designation of ordinary watercourse to the channels that have been identified on the site. Once the development is completed flows through the eastern valley will be negligible (0.2 to 0.5 l/sec) and are not indicative of a significant flow. The tree-lined channel originating in the centre of the site will be retained and incorporated into the site drainage scheme. The channel at the end of the eastern valley will also be retained and flow from the channels monitored by RSK will be intercepted and incorporated into the site drainage scheme to allow them to continue contributing to the flow of water at the bottom of the eastern valley.

Drainage solution for the proposed development earthworks

The proposed earthworks are likely to result in the soils above the seepages at the head of the eastern valley being excavated and the base of the eastern valley being backfilled. Clearly this would result in water contribution from the higher seepages being removed from the downstream flow and the need to engineer a flow path to allow any contribution to continue, despite this being negligible.

The combined contribution in flow from seepages up the eastern valley are anticipated to be 0.2 to 0.5 l/sec at the point where the OS and EA data shows the inland river to start. Discreet areas of seepages along the valley can be identified from the distribution of surface vegetation but it is not anticipated that the seepages will originate from a single point within the ground. Seepages are therefore more likely to originate from a dispersed area of granular soils (sand), which when uncovered following excavation are likely to be easily identifiable.

The extremely low seepage rate will be easily controlled through the use of existing drainage techniques, which would normally include a connected corridor of coarse granular drainage medium wrapped with geotextile (similar to a French drain). This drainage design can be implemented along the alignment of the existing drainage route until it connects into the head of the channel at the bottom of the valley via a landscaped area constructed with cobbles and boulders to mimic a spring. It is not considered necessary

to formally design a termination to the drainage feature through construction of a headwall (etc) since the anticipated flows are so low.

A detailed drainage design will need to be undertaken but it is likely that a granular conduit with a 1m² surface area along the flow path would provide ample capacity for anticipated flows. It will be necessary to excavate soils with a poor engineering quality and replace them with more appropriate material and this may include granular soils that are site won and that could be hydraulically linked to the conduit and enhance the intercepting ability and hydraulic performance of the proposed scheme. An alignment of the proposed drainage is presented as Plate 7, and this shows the route of the granular conduit, which features it will intercept and where it will terminate.

We trust this information is suitable for your discussions with the landowners and the local authority. Please contact the undersigned at your earliest convenience if you need more information

Yours sincerely

For RSK Environment Limited



Joe Silverwood
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 (Author)



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Plates

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Graph 8 (a and b)	Rainfall and cumulative rainfall before Round 5
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Graph 10	Cumulative rainfall – all rounds
Graph 11-12	Groundwater level monitoring

APPENDICES

Appendix 1	Weir development methodology (Time filling procedure for small flow rates)
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REFERENCES

1. Smith Grant LLP. Land at Trows Lane Farm, Castleton. Ground Investigation for GLP Ltd. June 2017. R2374-R01-v1 Draft.
2. United Utilities – property search (Trows Lane, Rochdale. OL11 2UE) 25/07/2017 – sewer records
3. Barratt Homes, Manchester (drawing) Preliminary development layout (481/ED/08 Rev. E, dated 05/02/19)
4. Detailed River Network Data (from Envirocheck, December 2015. 77317590_1_1)
5. OS Water Network Data (from Envirocheck, April 2020. 241930327_1_1)

Plate 1 : Site features. Observations made during site walkover and a review of aerial photographs. Also note the location of the springs that are identified by OS mapping (2020) on magic.defra.gov (23/04/2020).



Plate 2: Excerpt from 1893 OS map with RBC 2019 overlay (from RBC 2019)

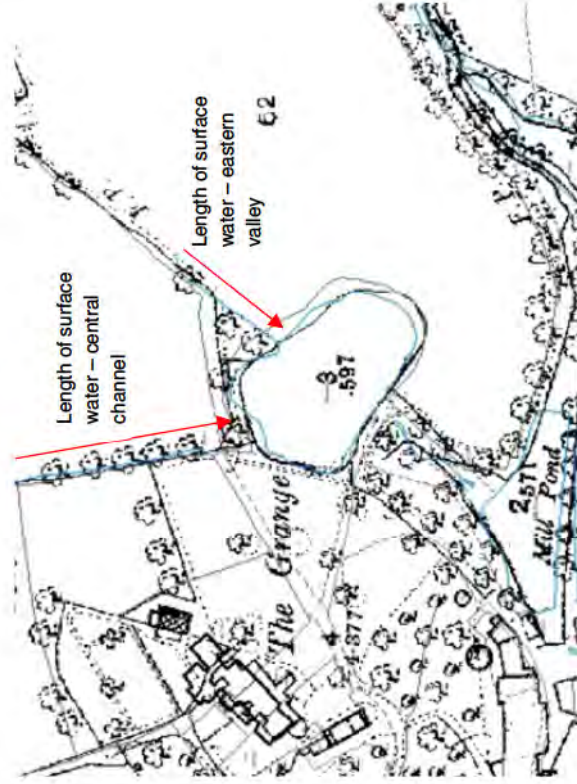


Plate 3: Excerpt from 1956 OS map showing ordinary watercourse status is based on the 'issues' that are mapped just inside the site boundary.



Plate 4: Detailed River Network Data (from Envirocheck, December 2015, 77317590_1_1)

Tertiary Network – EA data: —

Site boundary: —

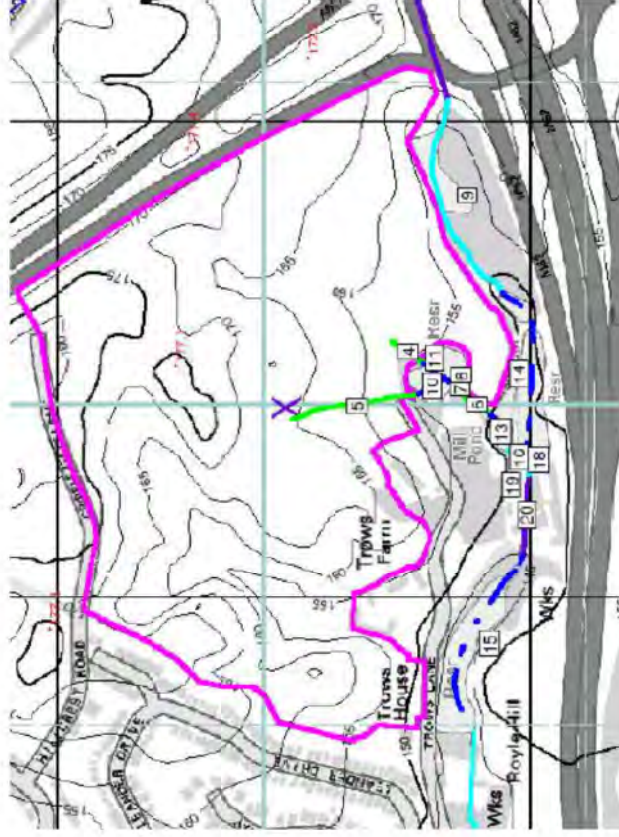


Plate 5: OS Water Network Data (from Envirocheck, April 2020, 241930327_1_1)

Inland River – OS data: —

Arbitrary Site boundary (reporting purposes only): —

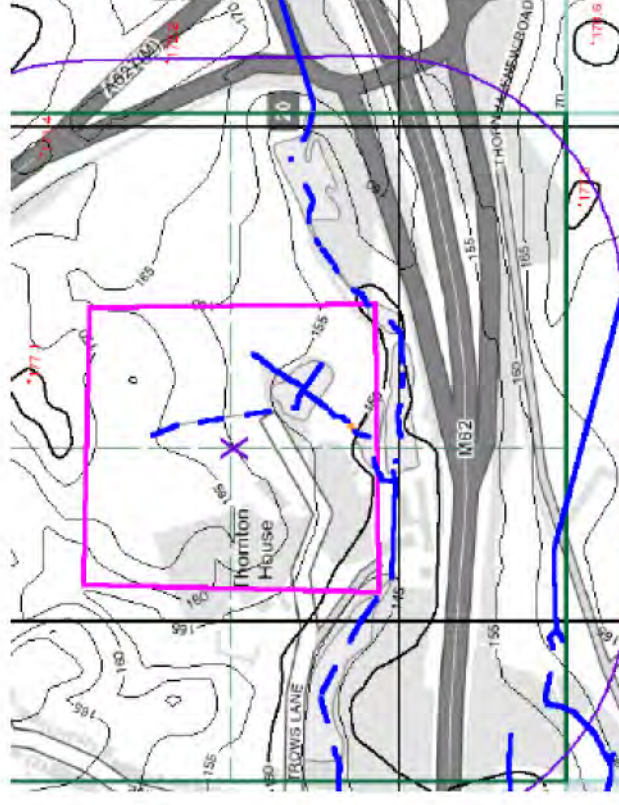
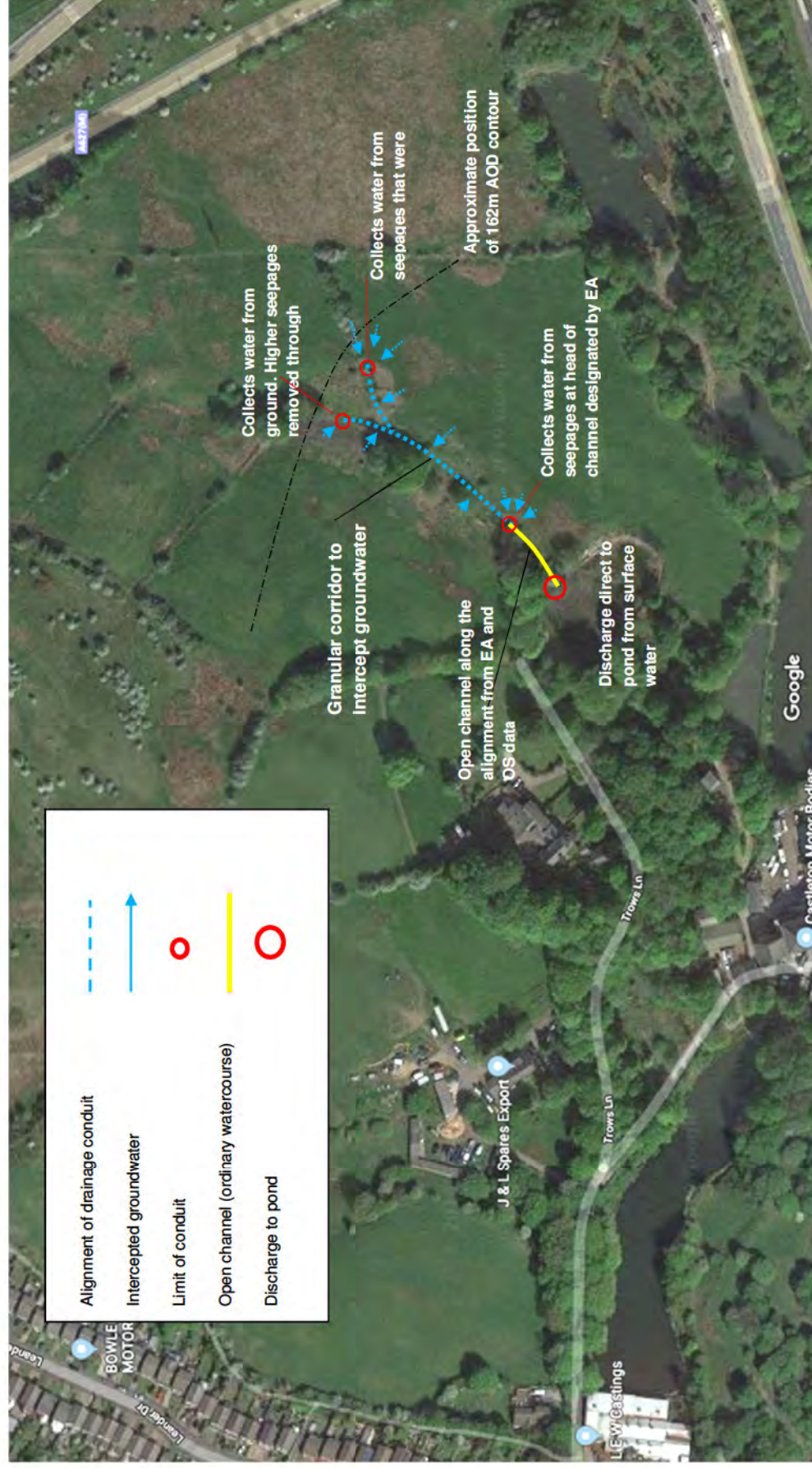


Plate 6: Weir Locations – Location of each weir showing the average recorded flow rates on each of the six visits



Plate 7: Proposed granular drainage conduit



Graph 1: Average Flow Rates in Weirs During Monitoring

This table shows the average (of three readings) measured flow rate over each weir at the given location. Flow rates are reported in litres per second (l/sec). Weir A is downstream of Weir B and C with Weir D at the point of discharge into the pond. Weir E is from a pipe connected to the discharge from the wooded channel to the north. The arrangement at Weir E changed during the period of monitoring.

Average Flow Rates in Weirs During Monitoring Period						
Round No. / Date	Weir I.D.					
	Weir A	Weir B	Weir C	Weir D	Weir E	
Round 1 (22/11/2019)	0.46	0.20	0.21	0.69	0.36	
Round 2 (18/12/2019)	0.54	0.22	0.31	0.90	0.40	
Round 3 (09/01/2020)	0.67	0.33	0.34	1.15	0.53	
Round 4 (31/01/2020)	0.37	0.18	0.18	0.70	0.31	
Round 5 (20/02/2020)	1.61	0.63	1.08	1.91	1.00	
Round 6 (19/03/2020)	0.48	0.21	0.29	0.53	0.49	

Graph 2: Weir Flow Data

This is a graphical representation of the data presented in Graph 1 with the same colour used to represent each monitoring round.

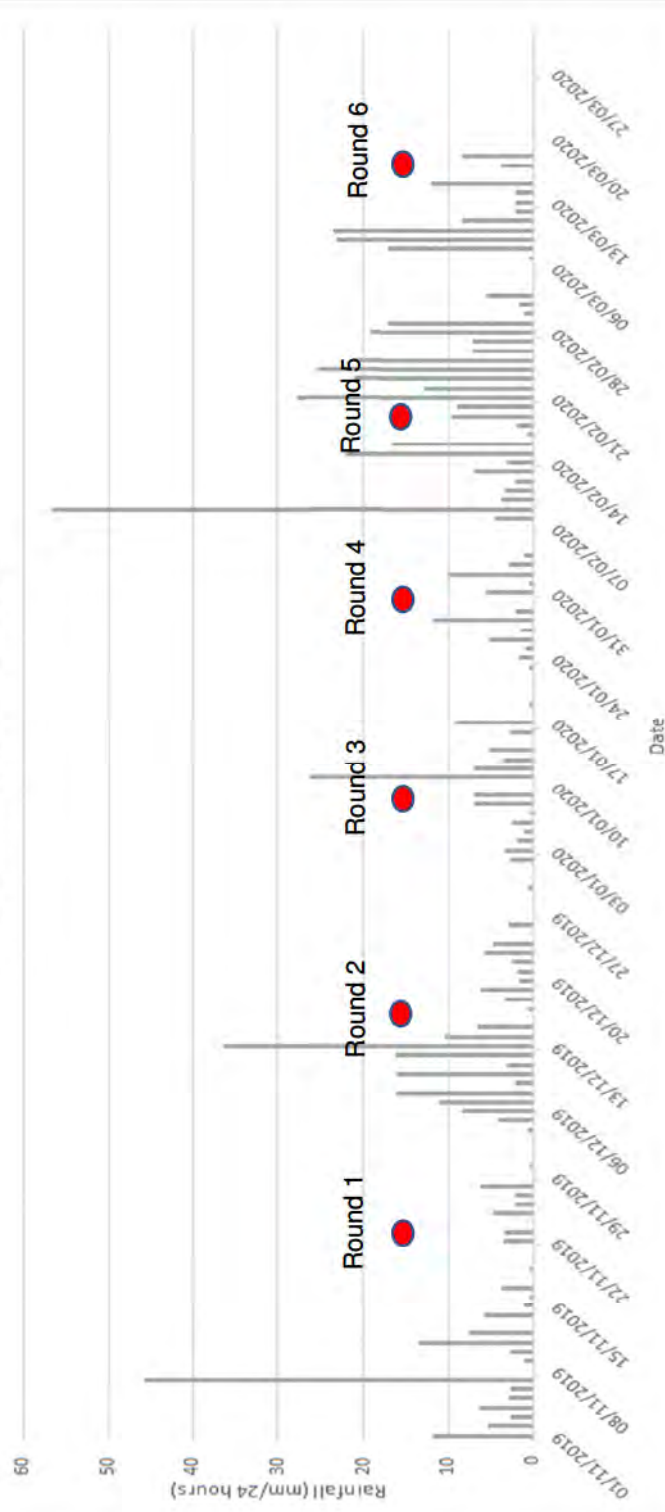


Graph 3: Antecedent Precipitation – All Rounds.

Rainfall data was obtained from the weather station at Thornham Summit (IOLDHA2) [<https://www.wunderground.com/dashboard/pws/IOLDHA2>]. Rainfall data for 10-days prior to the monitoring round has been assessed with the flow data. The rainfall data for the period of 5-days and 10-days prior to each round is tabulated (right) and all the rainfall data obtained from the weather station is presented with marks to show the time of each monitoring round.

	Rainfall (mm)	
	5-days	10-days
Round 1	4	19
Round 2	54	107
Round 3	12	19
Round 4	20	23
Round 5	51	70
Round 6	26	85

Antecedent Precipitation - All Rounds



Rainfall - Before Round 1



Cumulative Rainfall - Before Round 1



Graph 4 (a and b): Rainfall and Cumulative Rainfall Before Round 1

Line graphs showing the daily rainfall before Round 1 (maximum intensity is 13mm/24hr) and the cumulative rainfall, which shows a gradual increase for the first 5-days and a levelling off for the second five days. 19mm of rain fell during the 10-days before the monitoring round

Rainfall - Before Round 2

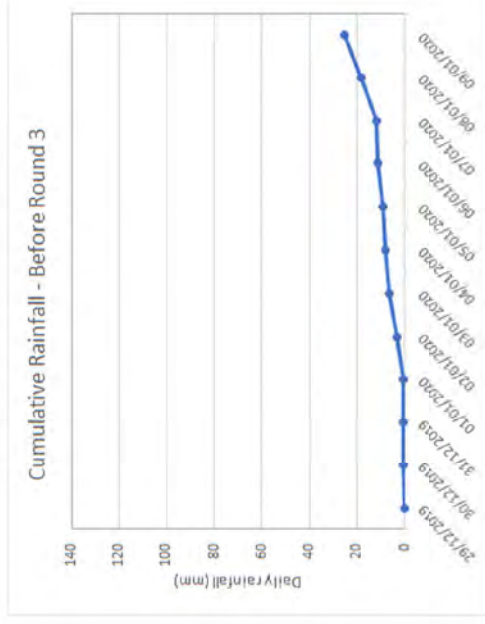
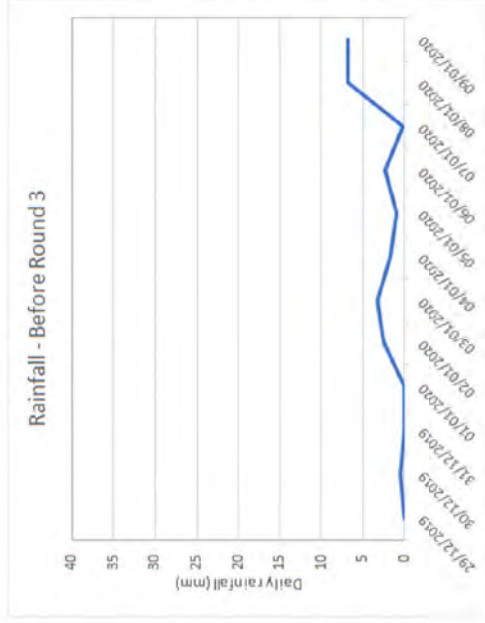


Cumulative Rainfall - Before Round 2



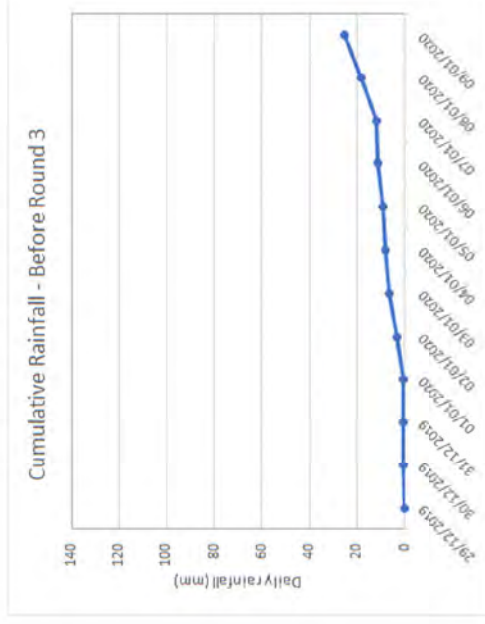
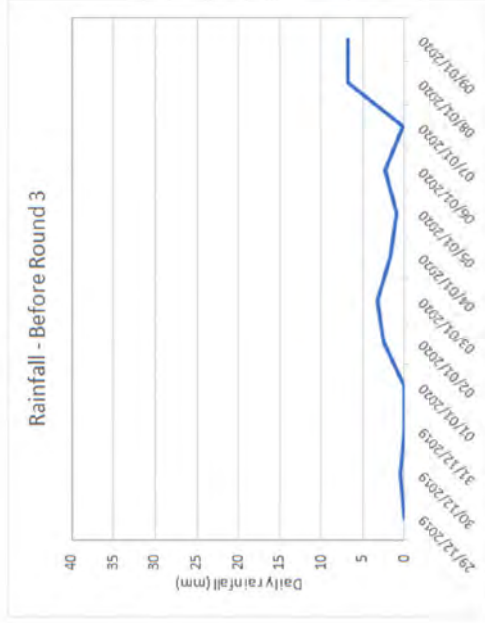
Graph 5 (a and b): Rainfall and Cumulative Rainfall Before Round 2

Line graphs showing the daily rainfall before Round 2 (maximum intensity is 37mm/24hr) and the cumulative rainfall, which shows a relatively steady increase over the monitoring period although settling somewhat immediately before the 10-days before the monitoring round during the 10-days before the monitoring round and 54mm of rain fell within the five days before the monitoring round.



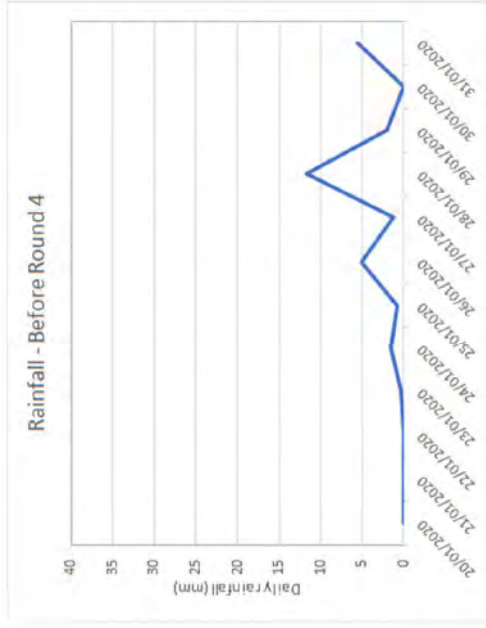
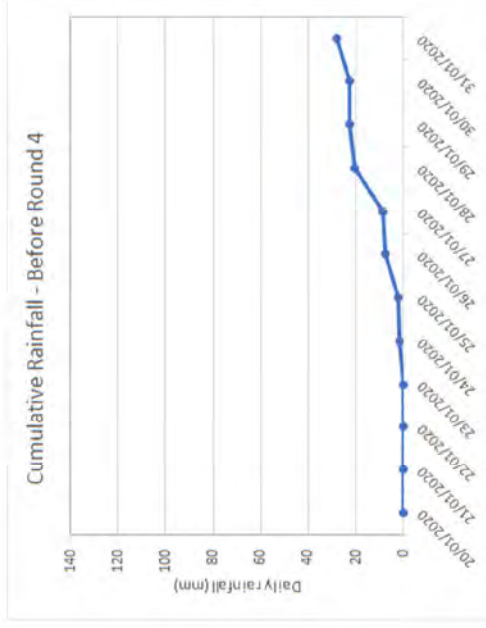
Graph 6 (a and b): Rainfall and Cumulative Rainfall Before Round 3

Line graphs showing the daily rainfall before Round 3 (maximum intensity is 7mm/24hr) and the cumulative rainfall, which shows a relatively subdued increase with only 19mm of rain falling during the 10-days before monitoring and 12mm of that total falling within five days of the monitoring.



Graph 7 (a and b): Rainfall and Cumulative Rainfall Before Round 4

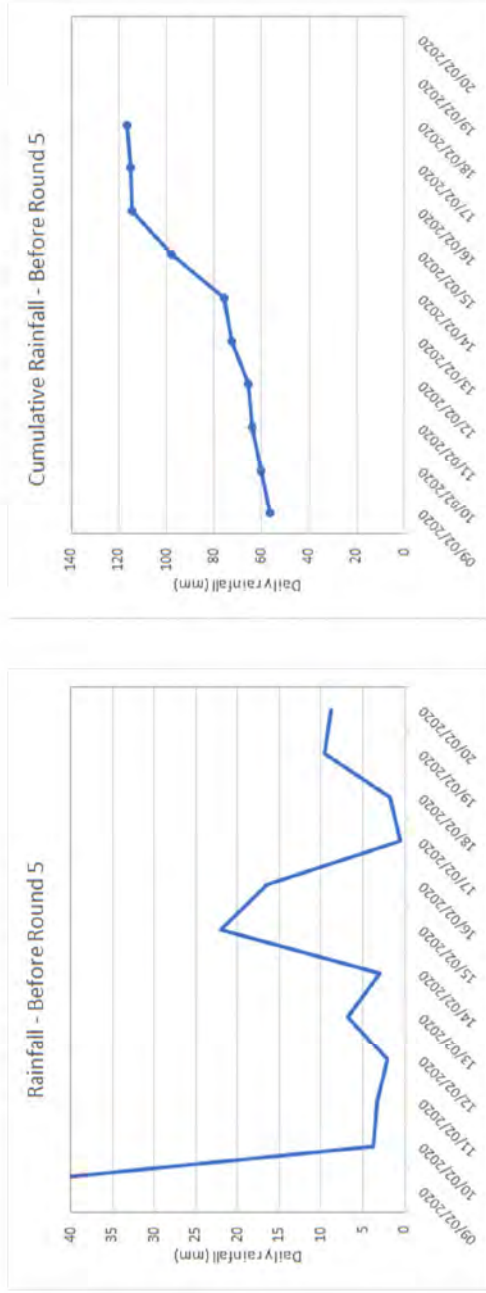
Line graphs showing the daily rainfall before Round 4 (maximum intensity is 12mm/24hr). Rainfall pattern is similar to that before Period 3 and the cumulative rainfall shows almost all the 23mm of rainfall over the 10-days before monitoring to have fallen within 5-days of the monitoring event.





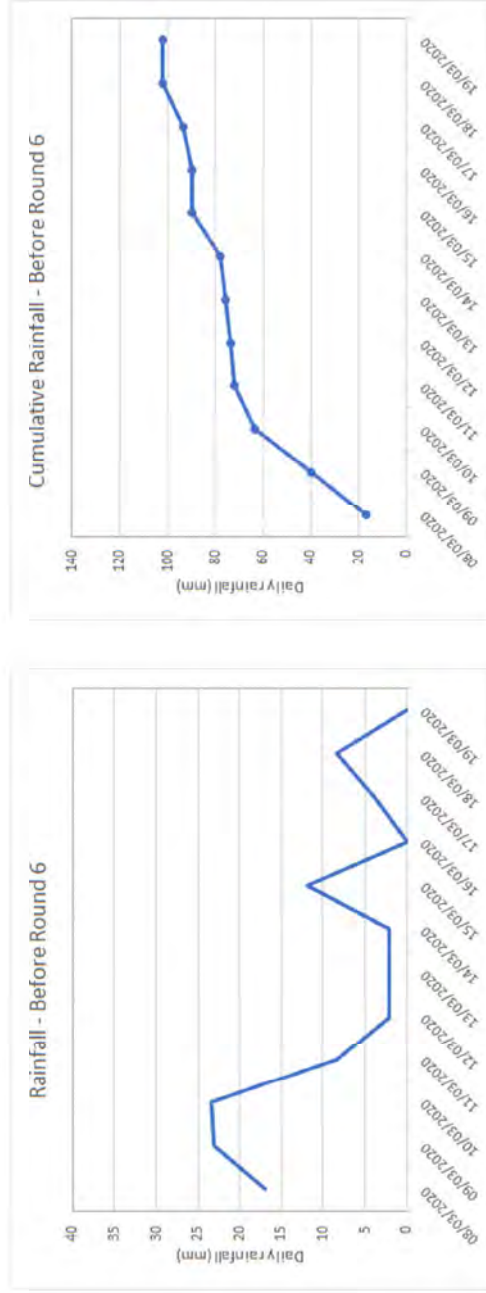
Graph 8 (a and b): Rainfall and Cumulative Rainfall Before Round 5

Line graphs showing the daily rainfall within 10-days before Round 5 (maximum intensity is 22mm/24hr). There is an intense rainfall period 11-days before monitoring, where 57mm of rainfall was recorded. Within 5-days of the monitoring 51mm of rain fell compared to 70mm within 10-days of the monitoring event.



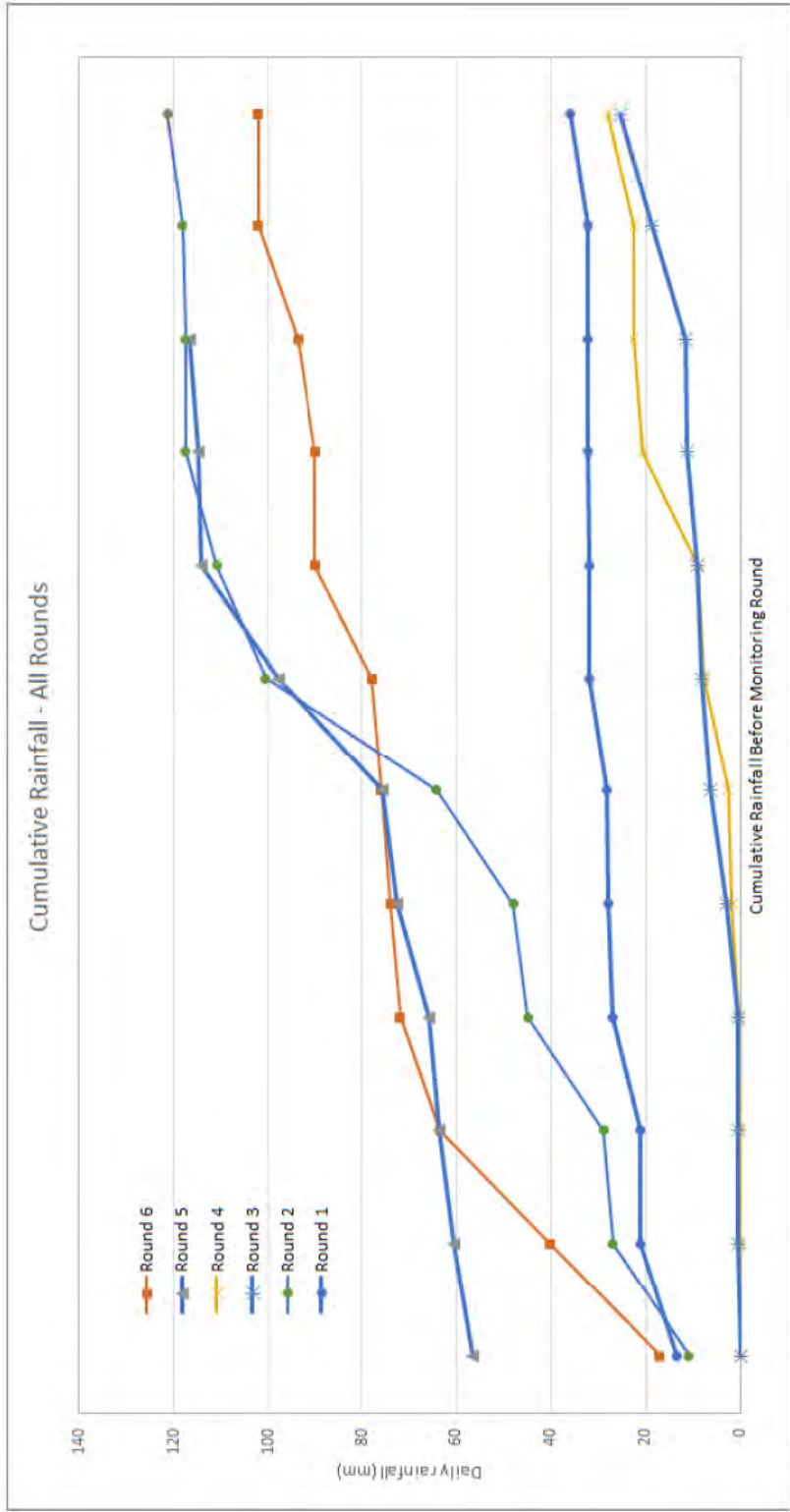
Graph 9 (a and b): Rainfall and Cumulative Rainfall Before Round 6

Line graphs showing the daily rainfall within 10-days before Round 6 (maximum intensity is 24mm/24hr). The initial rainfall intensity before the monitoring period reduced to a steady rainfall so that 10-days before monitoring 85mm of rain fell and within 5-days of monitoring this was 26mm of rain.



Graph 10: Cumulative Rainfall – All Rounds

Line graphs showing the daily rainfall within 10-days of each monitoring round. Round 1, 3 and 4 have low levels of rainfall relatively equally spread during the antecedent period. Round 2, 5 and 6 have a relatively high rainfall event during the 10-day period with each high rainfall event coming at different points through the period.

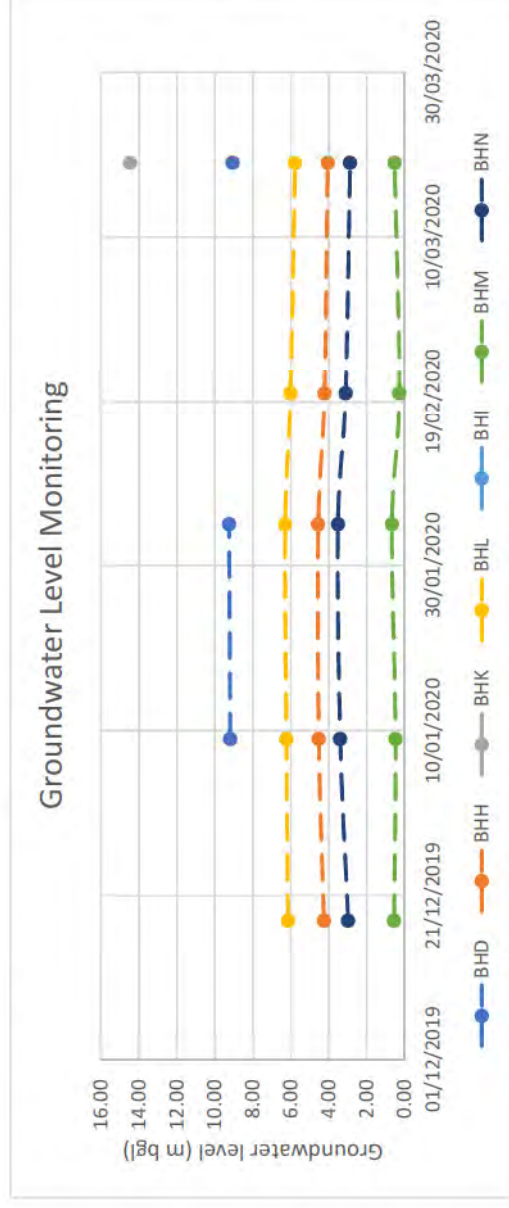


Round No.	R1	R2	R3	R4	R5	R6	Depth to base of monitoring well
Exploratory Hole	Unknown datum (m)	DTW (m bgl)	DTW (m bgl)	DTW (m bgl)	DTW (m bgl)	DTW (m bgl)	
Date	09/06/2017	18/12/2019	09/01/2020	04/02/2020	20/02/2020	19/03/2020	18/12/2019
BHD	-	DRY	9.20	9.26	DRY	9.07	9.54
BHH	-	4.26	4.53	4.55	4.23	4.06	15.39
BHK	-	DRY	DRY	DRY	DRY	14.47	14.93
BHL	-	6.15	6.24	6.30	6.02	5.78	19.38
BHI	-	DRY	DRY	DRY	DRY	DRY	19.93
BHM	-	0.56	0.48	0.67	0.29	0.53	9.22
BHN	-	2.98	3.40	3.52	3.11	2.88	14.93
BHF	Not installed						
BHG	Vandalised- no evidence of BH						
BHJ	Not installed						

Graph 11-12: Groundwater Level Monitoring

Data and graph showing the groundwater level in monitoring wells located on site. Monitoring during Round 1 was not undertaken.

Ground elevation data was not included in the ground investigation logs so comparison of groundwater levels in different wells cannot be undertaken.



APPENDIX 1

WEIR DEVELOPMENT METHODOLOGY

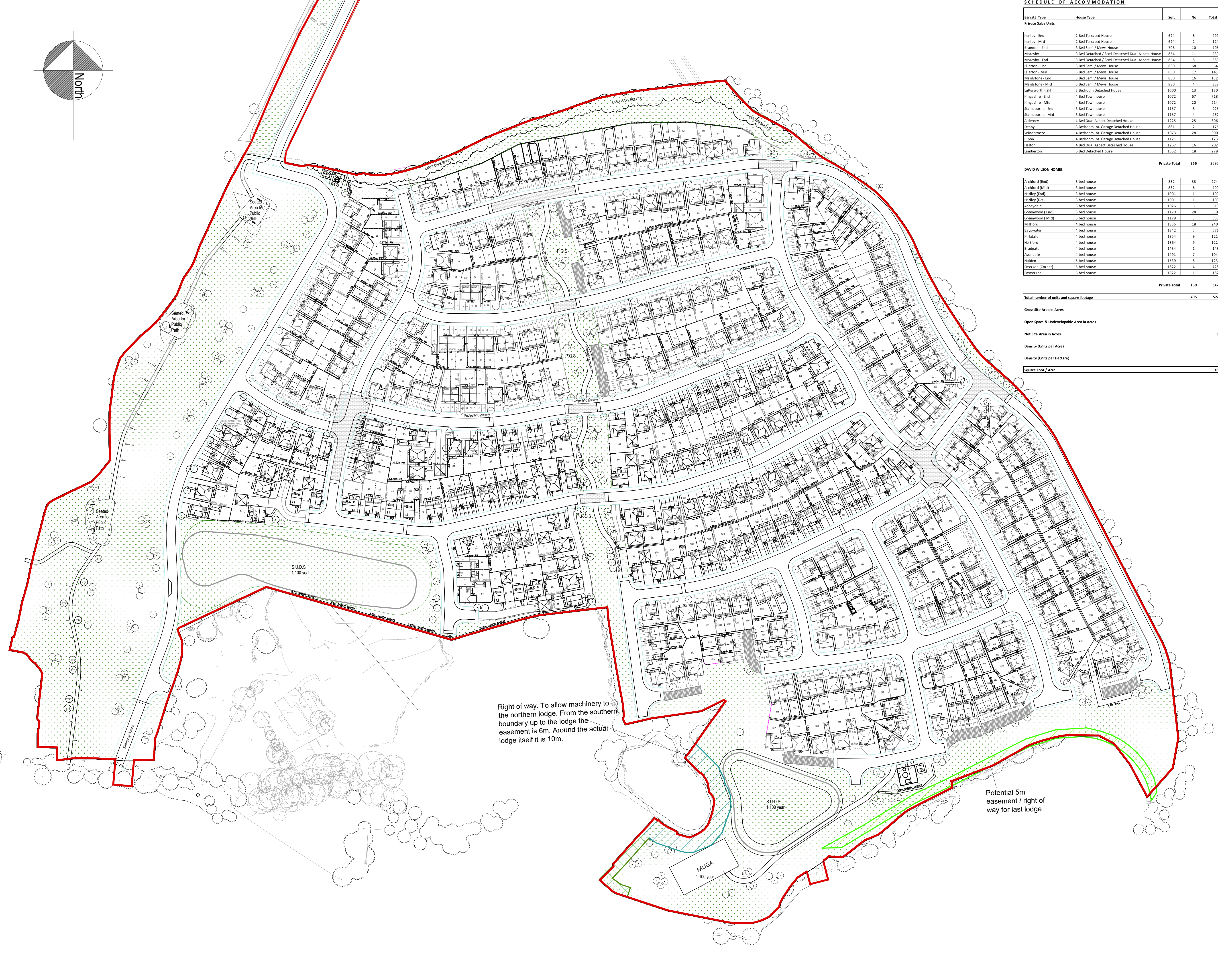
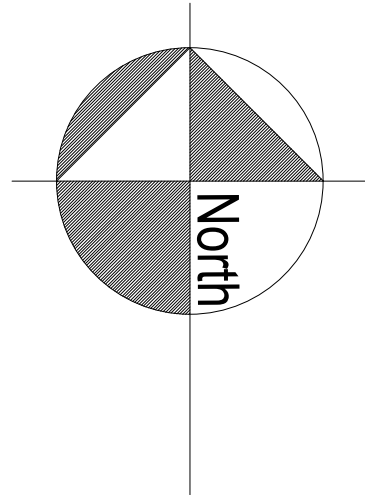
TIME FILLING PROCEDURE FOR SMALL FLOW RATES

1. Excavate a small trench (c. 120x 10x 15cm) by hand, perpendicular to the seepage flow. Preferentially choose a section where banks are present.
2. Cut a V-notch in a plywood board (c. 120 x 45 cm, i.e. the weir) such that the bottom of the V rests at the water level when the board is placed vertically in the trench.
3. File the V-notch, particularly at the bottom, such that the water may pass through the notch with minimal resistance (facilitating the formation of a small air void just beneath the waterfall).
4. Sink the board into the trench, if possible, using a mallet/hammer, such that the bottom of the V notch is submerged just below the water surface.
5. Backfill the excavated trench, within which the weir stands, such that there are minimal discharge losses around the sides of and beneath the weir.
6. If required (i.e. in coarse topsoil), stake the weir in place to prevent the water flow from flattening the weir.
7. Provided the water has a sufficient gradient, two distinct water levels will form up and downstream of the weir. This elevation change maybe increased by excavating material from the stream bed (dredging immediately beneath the weir) and/or by widening the stream/removing any blockages downstream, to ensure a sufficient water evacuation.
8. Following step 7, a small air void just beneath the waterfall (against the weir) should form. The air void maybe increased by angling the weir slightly in the direction of water flow.
9. Hold a bucket of known volume beneath the weir, such that the brim of the bucket sits beneath the waterfall (in the air void created) and the water plunges directly into the bucket, and time how long it takes for the bucket to fill. If water continues to run down the face of the weir, then duct taping the bucket to the weir may reduce some discharge losses.
10. Repeat step 9 to ensure reliable results which can be averaged to calculate the average discharge (l/s).



APPENDIX G

SITE FRAMEWORK PLAN



Right of way. To allow machinery to the northern lodge. From the southern boundary up to the lodge the easement is 6m. Around the actual lodge itself it is 10m.

Potential 5m easement / right of way for last lodge.

SCHEDULE OF ACCOMMODATION				
Barratt Type	House Type	Sqft	No	Total Sqft
Private Sales Units				
Kensley - End	2 Bed Terraced House	624	8	4992
Kensley - Mid	2 Bed Terraced House	624	2	1248
Brandon - End	3 Bed Semi / Mews House	706	10	7060
Moresby	3 Bed Detached / Semi Detached Dual Aspect House	854	11	9394
Moresby - End	3 Bed Detached / Semi Detached Dual Aspect House	854	8	6832
Ellerton - End	3 Bed Semi / Mews House	830	68	56440
Ellerton - Mid	3 Bed Semi / Mews House	830	17	14110
Maidstone - End	3 Bed Semi / Mews House	830	16	13280
Maidstone - Mid	3 Bed Semi / Mews House	830	4	3320
Lutterworth - SH	3 Bedroom Detached House	1000	13	13000
Kingville - End	4 Bed Townhouse	1072	67	71824
Kingville - Mid	4 Bed Townhouse	1072	20	21440
Stambourne - End	3 Bed Townhouse	1157	8	9256
Stambourne - Mid	3 Bed Townhouse	1157	4	4628
Alderny	4 Bed Dual Aspect Detached House	1225	25	30625
Denby	3 Bedroom Int. Garage Detached House	861	2	1762
Windermere	4 Bedroom Int. Garage Detached House	1073	28	30044
Ripon	4 Bedroom Int. Garage Detached House	1121	11	12331
Halton	4 Bed Dual Aspect Detached House	1267	16	20272
Lamberton	5 Bed Detached House	1552	18	27936
Private Total		356		359794

DAVID WILSON HOMES				
Achford (End)	3 bed house	832	33	27456
Achford (Mid)	3 bed house	832	6	4992
Hadley (End)	3 bed house	1001	1	1001
Hadley (Del)	3 bed house	1001	1	1001
Abbeylea	3 bed house	1026	5	5130
Greenwood (End)	3 bed house	1179	28	33012
Greenwood (Mid)	3 bed house	1179	3	3537
Millford	4 bed house	1335	18	24030
Baywater	4 bed house	1342	5	6710
Kirkdale	4 bed house	1354	9	12186
Hertford	4 bed house	1364	9	12276
Bradgate	4 bed house	1454	1	1454
Alfordale	4 bed house	1491	7	10437
Holiden	5 bed house	1539	8	12312
Emerson (Corner)	5 bed house	1822	4	7288
Emmerson	5 bed house	1822	1	1822
Private Total		139		164624

Total number of units and square footage	495	524418
Gross Site Area in Acres		TBC
Open Space & Undevelopable Area in Acres		TBC
Net Site Area in Acres		31.21
Density (Units per Acre)		16
Density (Units per Hectare)		39
Square Foot / Acre		16,803

WARNING TO HOUSE PURCHASERS

Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the specified matters prescribed by any Order made under the above act. The contents of this drawing may be subject to change at any time, and alterations and variations can occur during the progress of the works without revisions of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract, or warranty.

KEY:

Application Boundary Red Edge

5m Access Way

6m Access Way

10m Access Way

Landscape Buffer

Proposed dwelling and house type code

Proposed garage(s) to be built

AS/OPP

Denotes handing of plot (As or Opposite)

Personnel gates

Indicative Tree Planting
Refer to PGLA Landscaping Design for actual positions

04

Amended to LPA Comments

02.08.22

CL

03

Amended to noise report and JS comments.
Also considered engineers comments

01.07.22

CL

02

Amended to initial LPA comments

23-05-22

AA

01

Amended to WSP comments

18-05-22

AA

Rev	Description	Date	Drawn	Chk'd

BARRATT HOMES MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job

TROWS FARM CASTLETON

Title

PLANNING LAYOUT FULL

Design By	Date	Drawing Number	Rev
AA	APR 22	496 - P - PLF - 01	04
Drawn By	Scale @ A1		
NC	1: 1000		



APPENDIX H

ENVIRONMENT AGENCY CORRESPONDENCE

Kristian Jackson

From: Cooke, Claire [Claire.Cooke@environment-agency.gov.uk] on behalf of GMMC Info Requests [Inforequests.gmmc@environment-agency.gov.uk]
Sent: 13 July 2017 14:15
To: Kathryn Olive
Subject: GMMC52000CC - Response from the Environment Agency
Attachments: GMMC52000CC_Map.pdf; GMMC52000CC_Table.pdf; CCA - Area External Guidance v5.pdf

Dear Kathryn Olive

Thank you for your enquiry which was received on 27 June 2017.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004.

Please find attached product 3 data. Please also see our officers comments and answers to your queries below:

Confirmation of the site's Flood Zone designation, alternatively could you provide the flood flows and levels for a range of return periods including the 1 in 2, 10, 30, 100, 100+CC, 200, 1000. See Product 3 Map and table. **All available return periods have been provided. We can provide a product 7 in order for you to rerun the model.**

Information on the recently published climate change guidance for this area and how this may impact on the data available for the area. **See Climate Change PDF attached.**

Information on surface water flood risk including flow pathways and depths. **The Local Authority is responsible for issues relating to surface water and hold information on surface water flooding.**

Information on historic flooding. **We have no records of flooding affecting the site. However, this does not mean flooding has not occurred in the past or that it will not flood in future. We recommend that you also contact United Utilities and Rochdale Council who may hold additional information (the former especially in relation to sewer flooding).**

Information on flood defences in the area, if any. **There are no flood defences in the vicinity of the site.**

Any information on reservoir flooding. **The Environment Agency Flood map shows that the site is not located in an area at risk of reservoir flooding.**

Any data on groundwater flooding.

We do not hold any records related to groundwater flooding. The customer should contact the relevant lead local flood authority, who are responsible body with regard to groundwater flooding, for further details.

Finally, please could you provide any recommendation on how the surface water is to be managed; for example, restrictions in discharge rates the requirements for SuDS, possible discharge locations and attenuation requirements?

If it is proposed to discharge surface water to ground using infiltration SuDS devices it will be necessary to ensure that the system is designed to include sufficient stages of treatment prior to discharge.

Any data on existing surface water discharges to the surrounding watercourses,

With regards to the question concerning surface water discharges to the surrounding watercourses, there are no Discharge Consents or Exemptions, within the site boundary.

Any information on culverted watercourses or privates sewers which you know of which do not show up on the public sewer records.

No culvert info for the area highlighted on attachment, the watercourse south of the highlighted area is unnamed Trows Brook, this is non main, land owners and local authority maintained, have no info but possibly some culvert sections under the factories.

Please refer to the [Open Government Licence](#) which explains the permitted use of this information.

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Kind regards,

Claire Cooke
Customer and Engagement Officer
Greater Manchester, Merseyside and Cheshire
External: 0208 474 9502
Email: inforequests.gmmc@environment-agency.gov.uk

From: KOlive@rsk.co.uk [<mailto:KOlive@rsk.co.uk>]
Sent: 27 June 2017 13:06
To: Enquiries, Unit <enquiries@environment-agency.gov.uk>
Subject: 170630/SR10 Trows Lane, Rochdale - Flood Information Request

Dear Sir/Madam,

Please could I order information on flooding and drainage for the following site in order to inform a Flood Risk Assessment:

Trows Lane,
Rochdale,
OL11 2UE

Grid reference – 389142 E, 410271 N

I would like all the flooding information you have including the following, if available:

- Confirmation of the site's Flood Zone designation, alternatively could you provide the flood flows and levels for a range of return periods including the 1 in 2, 10, 30, 100, 100+CC, 200, 1000,
- Information on the recently published climate change guidance for this area and how this may impact on the data available for the area,
- Information on surface water flood risk including flow pathways and depths,
- Information on historic flooding,
- Information on flood defences in the area, if any,
- Any data on existing surface water discharges to the surrounding watercourses,
- Any data on groundwater flooding,
- Any information on reservoir flooding; and,
- Any information on culverted watercourses or privates sewers which you know of which do not show up on the public sewer records.

Finally, please could you provide any recommendation on how the surface water is to be managed; for example, restrictions in discharge rates the requirements for SuDS, possible discharge locations and attenuation requirements?

We have a relatively quick turn around on this project and would therefore appreciate a quick response.

If you have any queries please don't hesitate to contact me.

Kind regards,

Kathryn

Kathryn Olive
Administrator
Land & Development Engineering

RSK

14 Beecham Court, Pemberton Business Park, Wigan, WN3 6PR, UK

Switchboard: +44 (0) 1942 493255

<http://www.rsk.co.uk>

RSK Land & Development Engineering Ltd is registered in England at Spring Lodge, 172 Chester Road, Helsby, Cheshire, WA6 0AR, UK

Registered number: 4723837

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APPENDIX I

ROCHDALE COUNCIL CORRESPONDENCE

Kristian Jackson

From: Chris Woods [chris.woods@rochdale.gov.uk]
Sent: 05 July 2017 14:10
To: Kathryn Olive
Cc: Highways
Subject: Service Request: Trows Lane, Rochdale - Flood Information Request (HMG-001786)
CRM:0031670

Hi Kathryn,

Thank you for your recent service request for information regarding Trows Lane, I can provide the following information;

There is a climate change strategy in the Core Strategy (adopted 2016) – policy G1(‘tackling and adapting to climate change’). Additionally, there is the Climate Change Adaptation Supplementary Planning Document, but this dates back to 2012. Both are on the Council website.

None of the site is in flood zones 2 or 3.

Small areas of the site are designated as National Surface Water 1 in 30 years.

We don’t have any records of historic flooding / incidents in the area on the incomplete database that we have.

No records of reservoir flooding but again our database is not necessarily complete. There does not appear to be any reservoirs on the site, but there are what I think are fishing lodges adjacent to the site.

We are not against use of SUDs but there must be no SUDs features underneath what will be Highway. Discharge rates will be limited to the current greenfield run-off rate. It would also be good if you can contact United Utilities and start consultation with them on any of the drainage proposals you have that expect to be publicly managed.

Let me know if you need anything else.

Chris

Chris Woods

Team Leader Network Improvement & Development
Highways, Property & Strategic Housing



☎ 01706 924615

☎ 07896 599778

✉ chris.woods@rochdale.gov.uk

Rochdale Borough Council
Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

To access our services go to www.rochdale.gov.uk

For news and social media updates go to www.rochdale.gov.uk/news



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APPENDIX J

UNITED UTILITIES SEWER RECORDS



RSK Land and Development Engineering Limited
Spring Lodge
172 Chester Road
Helsby
Cheshire
WA6 0AR

FAO:

Dear Sirs

Location: TROWS LANE ROCHDALE OL11 2UE

I acknowledge with thanks your request dated 25/07/17 for information on the location of our services.

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

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

If you are planning works anywhere in the North West, please read our access statement before you start work to check how it will affect our network.

<http://www.unitedutilities.com/work-near-asset.aspx>

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

If you have any queries regarding this matter please telephone us on 0370 7510101.

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited

Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone 0370 751 0101

Property.searches@uu plc.co.uk

Your Ref: 881239 TROWS FARM

Our Ref: 1312381

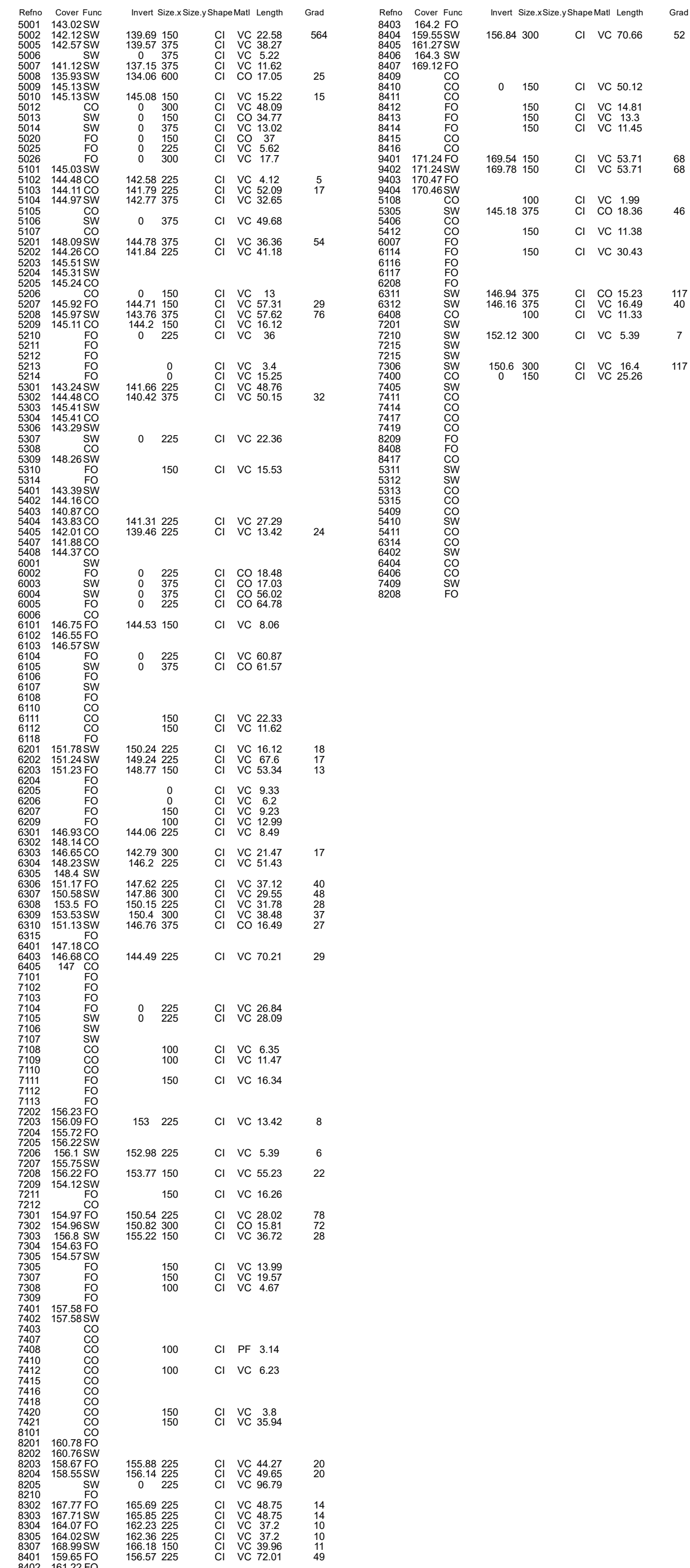
Date: 25/7/2017

TERMS AND CONDITIONS - WASTERWATER & WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

1. This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
2. This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
3. In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only and given in accordance with the best information available. The nature of the relevant system and/or its actual position may be different from that shown on the plan and UUWL is not liable for any damage caused by incorrect information provided save as stated in section 199 of the Water Industry Act 1991. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
4. The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
5. The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
6. This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
7. No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
8. If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



WASTE WATER SYMBOLOLOGY

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

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

LEGEND

MANHOLE FUNCTION			
FO	Foul		
SW	Surface Water		
CO	Combined		
OV	Overflow		
SEWER SHAPE			
CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		
SEWER MATERIAL			
AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown. Crown copyright and database rights [2016] Ordnance Survey 100022432.

OS Sheet No: SD8810SE

Scale: 1:1250 Date: 25/07/2017

206 Nodes

Sheet 1 of 1

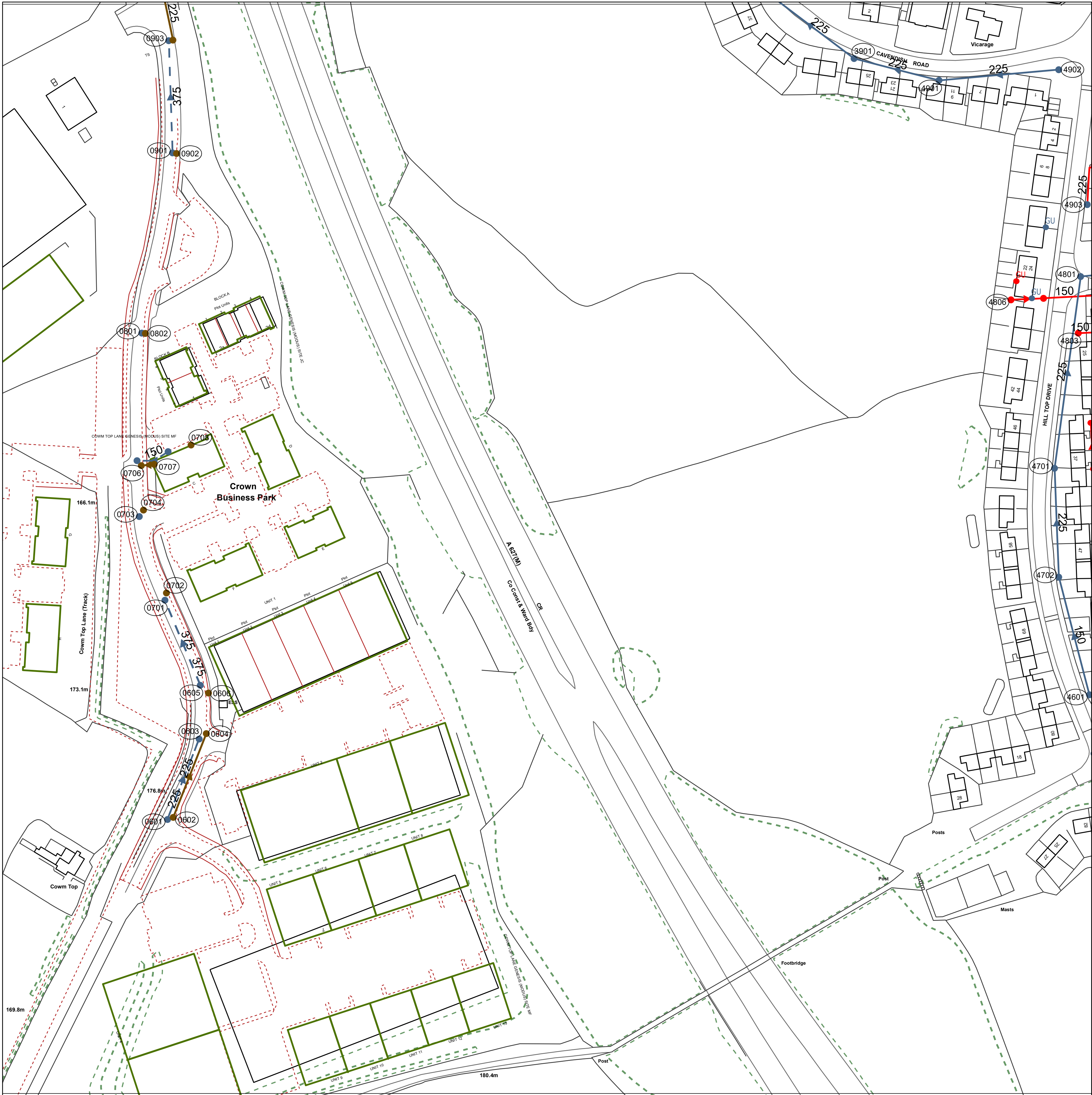


SEWER RECORDS

OS Sheet No: SD8810SE

Scale: 1:1250 Date: 25/07/2017

Printed By: Property Searches



Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad	Reho	Cover	Func	Invert	Size	xSize	yShape	Mat	Length	Grad
0601		SW	174.2	225		CI	VC	38.79	32										
0602		FO	173.72	225		CI	VC	41.36	21										
0603		SW																	
0604		FO																	
0605		SW	171.39	375		CI	CO	42.29	12										
0606		FO																	
0701		SW																	
0702		FO																	
0703		SW																	
0704		FO																	
0705		SW																	
0706		FO																	
0707		FO	165.25	150		CI	VC	5.94	6										
0708		FO																	
0709		SW				CI	VC	15.52											
0801		SW																	
0802		FO																	
0901		SW	157.94	375		CI	CO	51.59	94										
0902		FO																	
0903		FO	157.55	225		CI	VC	56.27											
0904		FO																	
3901		SW	172.13	SW		CI	VC	55.79											
4601		SW	0	150															
4701		SW	180.89	SW		CI	VC	50.04											
4702		SW	183.62	SW		CI	VC	52.24	18										
4801		SW	174.39	SW		CI	VC	52.24											
4802		CO	176.3	150		CI	VC	40.05											
4803		CO	177.3	CO		CI	VC	14.98											
4806		CO	0	150		CI	VC	40.36											
4901		SW	0	225		CI	VC	55.23											
4902		SW	171.34	SW		CI	VC	111.02	18										
4903		SW	176.4	SW		CI	VC	111.02											
4805		SW																	
4807		SW																	
4808		CO																	

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

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

MANHOLE FUNCTION		SEWER SHAPE		SEWER MATERIAL	
FO	Foul	CI	Circular	AC	Asbestos Cement
SW	Surface Water	EG	Egg	BR	Brick
CO	Combined	OV	Oval	PE	Polyethylene
OV	Overflow	FT	Flat Top	RP	Reinforced Plastic Matrix
		RE	Rectangular	CO	Concrete
		SQ	Square	CSB	Concrete Segment Bolted
				CSU	Concrete Segment Unbolted
				CC	Concrete Box Culverted
				PSC	Plastic/Steel Composite
				GRC	Glass Reinforced Concrete
				GRP	Glass Reinforced Plastic
		TR	Trapezoidal	DI	Ductile Iron
		AR	Arch	PVC	Polyvinyl Chloride
		BA	Barrel	CI	Cast Iron
		HO	HorseShoe	SI	Spun Iron
		UN	Unspecified	ST	Steel
				VC	Vitrified Clay
				PP	Polypropylene
				PF	Pitch Fibre
				MAR	Masonry, Random
				U	Unspecified

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown. Crown copyright and database rights [2016] Ordnance Survey 100022432.

OS Sheet No: SD8910NW
Scale: 1:1250 Date: 25/07/2017
35 Nodes
Sheet 1 of 1



OS Sheet No: SD8910NW

Scale: 1:1250 Date: 25/07/2017

Printed By: Property Searches

Wastewater Symbolology

Combined	Foul	Surface	Overflow	
				Manhole
				Manhole, side entry
				Public sewer
				Private sewer
				S104 sewer
				Rising main, public
				Rising main, private
				Rising main, S104
				Highway drain, private
				Screen chamber
				Discharge point
				Outfall
				Control kiosk
				Sludge main

Abandoned pipe

	Public sewer
	Rising main
	Private sewer
	Sludge main

Manhole function

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

Sewer shape

CI	Circular	U	Unspecified
EG	Egg	SQ	Square
OV	Oval	TR	Trapezoidal
FT	Flat top	AR	Arch
RE	Rectangular	BA	Barrel
		HO	Horse shoe

Sewer material

AC	Asbestos cement	DI	Ductile iron
BR	Brick	VC	Vitrified clay
CO	Concrete	PP	Polypropylene
CSB	Concrete segment	PF	Pitched fibre
CSU	Concrete segment	MA	Masonry, coursed
CC	Concrete box culverted	MA	Masonry, random
PSC	Plastic	RP	Reinforced plastic
GR	Glass reinforced	CI	Cast iron
GRP	Glass reinforced	SI	Spun iron
PVC	Polyvinyl chloride	ST	Steel
PE	Polyethylene	U	Unspecified

			WW pumping station
			Inspection chamber
			Extent of survey
			Head of system
			Soakaway
			Rodding eye
			Lamp hole
			T junction/saddle
			Gully
			Air valve
			Non return valve
			Sewer overflow
			Cascade
			Flow meter
			Hatch box
			Hydrobrake
			Inlet
			Bifurcation
			Catchpit
			Oil interceptor
			Penstock
			Summit
			Valve
			Valve chamber
			Washout chamber
			Drop shaft
			WW treatment works
			Septic tank
			Vent column
			Network storage tank
			Orifice plate
			Vortex chamber
			Penstock chamber



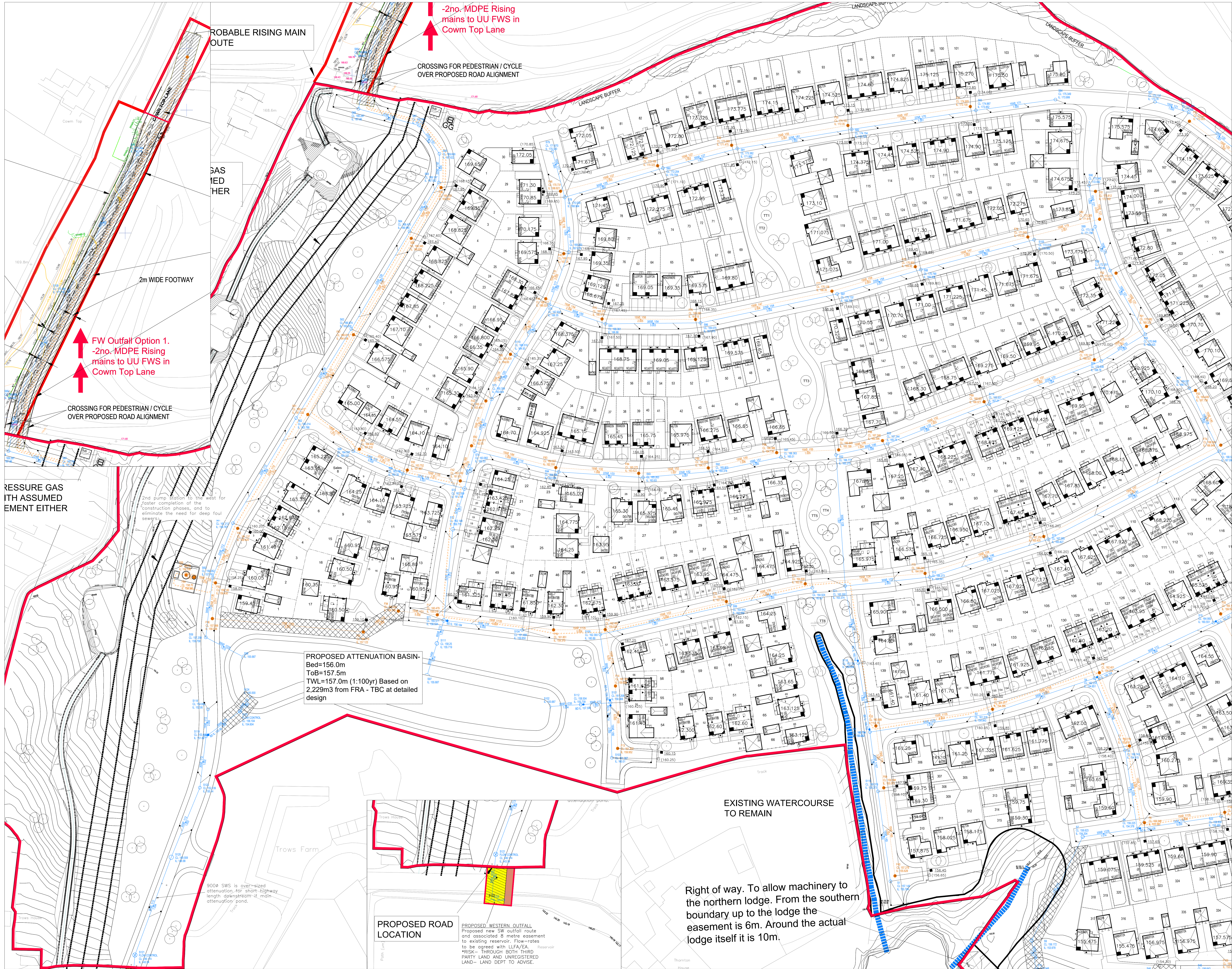
APPENDIX K MICRODRAINAGE GREENFIELD CALCULATIONS

RSK LDE Ltd		Page 1																								
18 Frogmore Road Hemel Hempstead Herts, HP3 9RT	Trows Farm Site Area 19.65																									
Date 12/10/2020 10:59 File	Designed By kjackson Checked By																									
Elstree Computing Ltd	Source Control W.12.5																									
<u>ICP SUDS Mean Annual Flood</u> Input <table> <tr> <td>Return Period (years)</td> <td>100</td> <td>Soil</td> <td>0.450</td> </tr> <tr> <td>Area (ha)</td> <td>19.650</td> <td>Urban</td> <td>0.000</td> </tr> <tr> <td>SAAR (mm)</td> <td>1088</td> <td>Region Number</td> <td>Region 10</td> </tr> </table> Results l/s <table> <tr> <td>QBAR Rural</td> <td>144.6</td> </tr> <tr> <td>QBAR Urban</td> <td>144.6</td> </tr> <tr> <td>Q100 years</td> <td>300.8</td> </tr> <tr> <td>Q1 year</td> <td>125.8</td> </tr> <tr> <td>Q30 years</td> <td>245.2</td> </tr> <tr> <td>Q100 years</td> <td>300.8</td> </tr> </table>			Return Period (years)	100	Soil	0.450	Area (ha)	19.650	Urban	0.000	SAAR (mm)	1088	Region Number	Region 10	QBAR Rural	144.6	QBAR Urban	144.6	Q100 years	300.8	Q1 year	125.8	Q30 years	245.2	Q100 years	300.8
Return Period (years)	100	Soil	0.450																							
Area (ha)	19.650	Urban	0.000																							
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Q1 year	125.8																									
Q30 years	245.2																									
Q100 years	300.8																									
©1982-2010 Micro Drainage Ltd																										



APPENDIX L

INDICATIVE CATCHMENT DRAINAGE STRATEGY



Please note the drainage shown is a basic indication to prove the site will drain. further detail design is required.

- Levels**
- All levels shown are approximate FINAL EXTERNAL LEVELS. These are subject to production grade level to suit levels, foundation types and the production of a full cut/fill exercise and arisings calculations to check that there is an approximate balance.
- Drainage Rates**
- All attenuation figures are estimates only and based upon assumed allowable surface water discharge rates. Rates are to be agreed with the LLFA and EA.
- Natural Drainage Paths**
- All levels shown are subject to undertaking of a drainage and hydrological study to investigate possible incoming surface water drainage connection/watercourses and to assess the feasibility/impacts of installing of natural drainage channels and any measures required to maintain natural flow-paths.
- General Drainage Notes:**
- RSK must update FRA to reflect the most recent SW network divide. The proposed eastern/western attenuation basin sizes to be confirmed once RSK have updated their FRA.
 - Proposed pipe sizes are indicative. SW/FW drainage needs running through Windes to confirm actual pipe sizes and gradients.
- NOTES**
- This drawing is preliminary only. Offsets from existing watercourses to be agreed with LLFA, LPA and tree officer.
- All contours are preliminary only and subject to review on receipt of a preliminary housing layout.
- Extents of watercourses to remain to be agreed with LLFA, LPA, LPA Ecology and Tree Officer.
- KEY**
- Approximate Total Site Boundary
 - Easement Land requiring Land Owners to sign a United Utilities Section 104 Agreement and Deed of Grant allowing off-site outfall route.
 - Land required temporarily by developer and developers contractor in order to complete the outfall works.
 - Proposed Foul Water Outfall Route - Subject to UU approval.
 - Proposed 2x Foul Water Pump Stations Subject to UU approval.
 - UU legal Easements approx 8m/9m total where of FW & SW pipes.
 - Adoptable S.W. Sewer & Manhole Subject to detail design
 - Adoptable F.W. Sewer & Manhole Subject to detail design
 - S. Water Drag-Out and Invert Subject to detail design
 - Foul Drag-Out and Invert Subject to detail design
 - Proposed inductive Rising Main Route Subject to detail design
 - Adoptable Road Gully Subject to detail design

REV DESCRIPTION DATE DRAWN

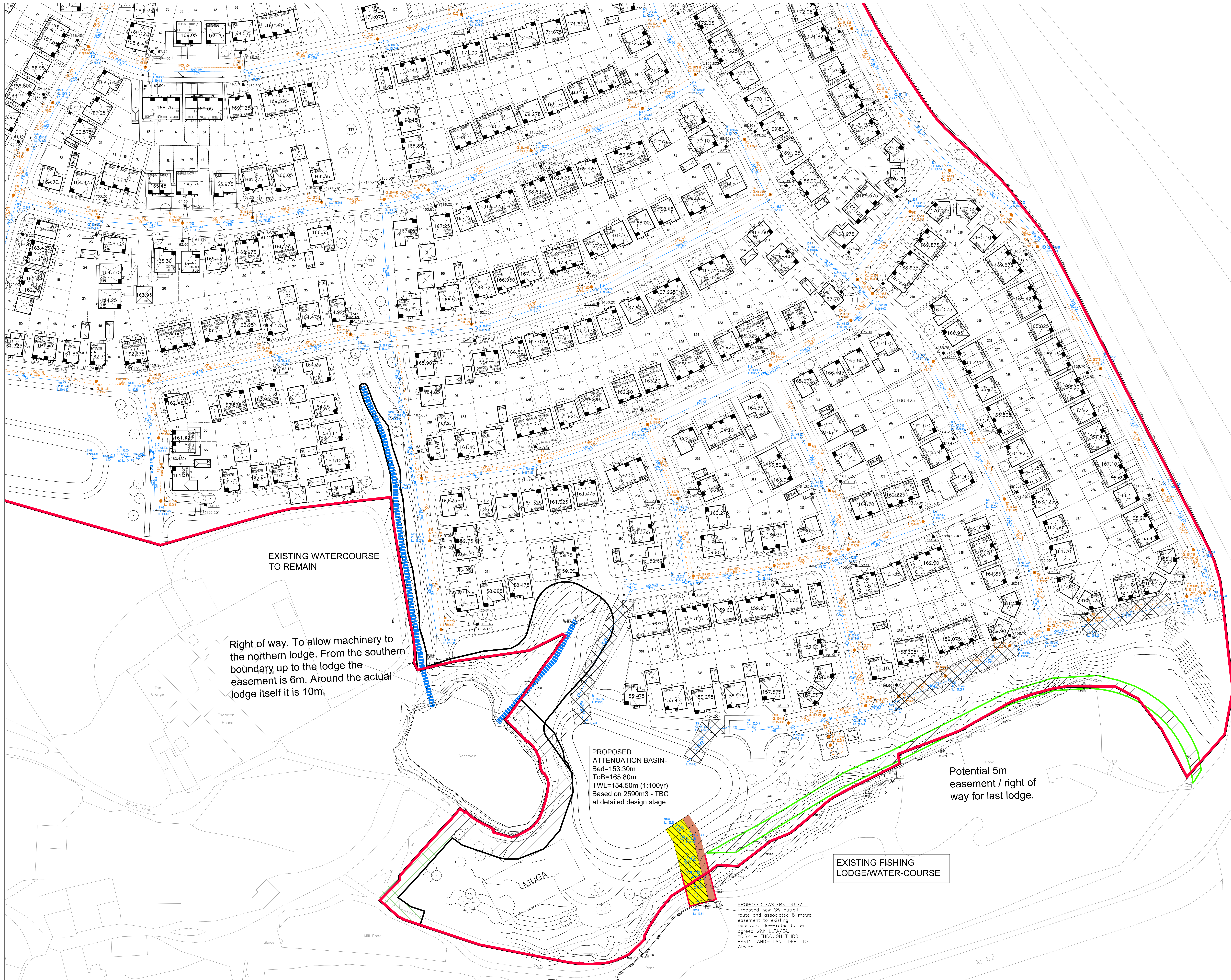
BARRATT HOMES MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9UD
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: Cwm Top, Castleton, Rochdale

Title: Preliminary Drainage Layout Sheet 1

Design By: LB	Date: August 2022	Drawing Number: 496/ED/02	Rev: -
C.A.D. By: LB	Scale: A0 1:500		



Please note the drainage shown is a basic indication to prove the site will drain. further detail design is required.

Levels

All levels shown are approximate FINAL EXTERNAL LEVELS. These are subject to production regrade level to suit likely foundation types and the production of a full cutfill exercise and arisings calculations to check that there is an approximate balance.

Drainage Cuts:

All attenuation figures are estimates only and based upon assumed allowable surface water discharge rates. Rates are to be agreed with the LLFA and EA.

Natural Drainage Paths:

All levels shown are subject to undertaking of a drainage and hydrological study to investigate possible incoming surface water drainage connection watercourses and to assess the feasibility/impacts of rifling of natural drainage channels and any measures required to maintain natural flow-paths.

General Drainage Notes:

- RSK must update FRA to reflect the most recent SW network divide. The proposed eastern/western attenuation basin size's to be confirmed once RSK have updated their FRA.
- Proposed pipe sizes are indicative. SW/FW drainage needs running through Windes to confirm actual pipe sizes and gradients.

NOTES

This drawing is preliminary only. Offsets from existing watercourses to be agreed with LLFA, LPA and tree officer.

All contours are preliminary only and subject to review on receipt of a preliminary housing layout.

Extents of watercourses to remain to be agreed with LLFA, LPA, LPA Ecology and Tree Officer.

KEY

- Approximate Total Site Boundary
- Easement Land requiring Land Owners to sign a United Utilities Section 104 Agreement and Deed of Grant allowing off-site outfall route.
- Land required temporarily by developer and developers contractor in order to complete the outfall works.
- Proposed Foul Water Outfall Route - Subject to UU approval.
- Proposed 2x Foul Water Pump Stations Subject to UU approval.
- UU legal Easements approx 8m/9m total where of FW & SW pipes.
- Adoptable S.W. Sewer & Manhole Subject to detail design
- Adoptable F.W. Sewer & Manhole Subject to detail design
- S. Water Drag-Out and Invert Subject to detail design
- Foul Drag-Out and Invert Subject to detail design
- Proposed indicative Rising Main Route Subject to detail design
- Adoptable Road Gully Subject to detail design

REV DESCRIPTION DATE DRAWN

BARRATT HOMES MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9UG
Tel: 0161 872 0161
Fax: 0161 855 2828

Job: Cown Top, Castleton, Rochdale

Title: Preliminary Drainage Layout, Sheet 2

Design By: LB	Date: June 2022	Drawing Number: 496/ED/03	Rev: -
C.A.D. By: LB	Scale: A0 1:500		



APPENDIX M

UNITED UTILITIES PRE DEVELOPMENT ENQUIRY - FOUL

Kristian Jackson

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 05 March 2019 14:59
To: Browne, Rick; Wastewater Developer Services
Subject: *EXTERNAL: RE: Trows Lane, Rochdale FW pre-development enquiry.- 4200024572



EXTERNAL EMAIL WARNING

Please do not click on LINKS or ATTACHMENTS where you are unsure of its origin. In such cases delete the email.

Dear Customer

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

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

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

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

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

Connection Application

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

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

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

Regards

Neil O'Brien

Developer Engineer
Developer Services and Planning

From: Browne, Rick [mailto:rick.browne@barratthomes.co.uk]
Sent: 20 February 2019 14:12
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Trows Lane, Rochdale FW pre-development enquiry.

Hi.

Please can we have a foul water point of connection for our new site as per the attached 'pre-development enquiry form'?

The site slopes southwards at an average gradient of approx. 1:20 down to 2no. low areas.
We are looking at two alternative options for foul water connections:

1. Northwards to Cowm Top Lane. If there is a UU sewer within a short distance to the north of our site then this may be an option as we may be able to pump to that outfall sewer without needing to enter third party land (depending how far along Cowm Top Lane it is). This scheme would require 2no. adoptable pump-stations. One for the south-east corner and one for south west corner.
2. A gravity sewer Westwards along Trows Lane from the south west corner of the site. Though we don't own Trows Lane, so would need a sewer requisition. This solution needs 1no. adoptable pump-station in the low-lying south-east corner of the site.

We'd be grateful if you could confirm which of these connections would be an acceptable point of connection. Hopefully both are acceptable, so we can try to explore the legals and timescales of each possible route, though look forward to your response.

Regards

Richard Browne
Senior Design Engineer
Rick.browne@barratthomes.co.uk

Barratt Homes Manchester
(a trading name of BDW Trading Limited)
 4 Brindley Road, City Park, Manchester, M16 9HQ  0161 872 0161

The sender of this e-mail is a member of the Barratt Developments PLC group of companies, the ultimate parent of which is Barratt Developments PLC (company number 00604574). Barratt Developments PLC is registered in England and Wales with its registered office at Barratt House, Cartwright Way, Forest Business Park, Bardon Hill, Coalville, Leicestershire LE67 1UF, together with its principal subsidiaries BDW Trading Limited (03018173), and Wilson Bowden Developments Limited (00948402). Barratt Homes, Barratt London and David Wilson Homes are trading names of BDW Trading Limited. This e-mail message is meant only for use by the intended addressee and may contain privileged and/or confidential information. If you have received this message in error please notify us and remove it from your system. Please view our 'Email Addendum v2.0' at www.barrattcommercialsupport.co.uk/barratt-developments-plc-email-a for further details.

EMGateway3.uuplc.co.uk made the following annotations

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Wastewater pre-development enquiry



This form is for all first time enquiries you may have when planning your development.

If your enquiry relates to advice on **connection points and discharge rates**, please complete all sections, providing as much information as you have available. You will notice some fields are marked as optional, all other fields are mandatory.

For all other enquiries, please complete Sections 1, 2, 7 and 8.

When answering the yes/no questions please mark an 'x' in the appropriate box.

All enquiries must be accompanied by a site location plan, clearly identifying the site boundary.

Once completed, please return this form by email to **WastewaterDeveloperServices@uuplc.co.uk** or post to United Utilities Developer Services, Grasmere House, Second Floor, Lingley Mere Business Park, Lingley Green Avenue, Great Sankey, Warrington WA5 3LP.

We aim to respond to enquiries within 15 working days from receipt of your completed enquiry form.

Section 1: About you					
	Applicant		Agent (if applicable)		
Name	Rick Browne. Senior Design Engineer				
Company's name	Barratt Homes Manchester				
Home or company address (including postcode)	4 Brindley Road, City Park, Manchester, M16 9HQ				
Contact telephone number (a mobile number is fine)	0161 872 0161				
Email	rick.browne@barratthomes.co.uk				
What is your enquiry	Please can we have a foul point of connection?				
Who should we send the enquiry response to?	Applicant ☒ Agent ☐ Both ☐				
Section 2: About your site					
Site name	Trows Farm. Castleton.				
Site Address (or nearest main road)	Trows Farm, Trows Lane, Castleton, Manchester, OL11 2UE				
Site grid reference (mid point)	X:	389144	Y:	410274	
Approx. number of dwellings	573				
Total site area (hectares)	20.8Hectares				
Site name	Trows Farm, Castleton				
Development area (hectares) (Optional)	15.2Ha				
Estimated onsite date (Optional)	01/07/19				
Estimated first occupation (Optional)	02/12/19				
Does the site have planning permission	Full	Yes ☐ No ☒	Application submitted	☐	Planning ref (if applicable)
	Outline	Yes ☐ No ☒	Application submitted	☐	Planning ref (if applicable)
Have you approached us about this site previously?	Yes ☐ No ☒		If yes, please provide Ref No. and/or contact details		

Section 3: Your site drainage strategy

Type of site	GREENFIELD (Go to Q 3.1) ☒ BROWNFIELD (Go to Q 3.2) ☐
3.1 Greenfield site (Optional)	Confirmed attachment:
Please provide full calculations to show existing greenfield run off rates	Yes ☒ No ☐
3.2 Brownfield site (Optional)	Confirmed attachment:
Please provide a plan showing existing foul water drainage from this site to the public sewer network (including location of existing drains, pipe sizes and points of connection)	Yes ☐ No ☐
Please provide a plan showing the existing surface water drainage from this site to the public sewer network, including location of existing drains, pipe sizes and points of connection	Yes ☐ No ☐
Will this development produce trade effluent?	Yes ☐ No ☐
Separate approval must be obtained for the discharge to the public sewer of any trade effluent from a factory, manufacturing or commercial process. You can apply for consent through a retailer of wastewater services who will apply to us on your behalf. A list of retailers can be found via the Market Operator here: www.mosl.co.uk/members/member-list A copy of the consent will be needed for you to make a sewer connection application.	Yes ☐ No ☐
If yes, to which sewer?	

Section 4: Foul water connection

Are you proposing to use an existing connection to the public sewer?	Yes ☐ No ☒
If Yes , please provide manhole number or grid reference number If no , please provide the proposed flow rate and connection points (litres per second)	26.5l/s Peak. (4.4l/s ave usage)
Is the foul water discharge to be pumped?	Yes ☒ No ☐ (DEPENDS ON OUTFALL GRADIENT)

Section 5: Surface water connection

If you are proposing to connect surface water to a public sewer, please attach evidence that all options for Sustainable Urban Drainage Systems (SUDs) have been explored in accordance with part H of the Building Regulations 2010.

Details of SUDs can be found at http://www.ciria.com/sudsdesign_guidance.htm

How do you propose to drain surface water from the site?	SUDs (Go to Section 6) ☒ Discharge to public sewer (Go to Q5.1) ☐
5.1 Does the site have existing surface water connections to the public sewer?	Yes (Go to Q5.2) ☐ No (Go to Q5.3) ☒
5.2 Proposed surface water discharging to public sewer via existing connection	
Are you proposing to use an existing connection?	Yes ☐ No (Go to Q5.3) ☐
If yes , please provide manhole number or grid reference number & proposed flow rates	
5.3 Proposed surface water discharging to public sewer via a new connection	
Have you completed a flood risk assessment in support of your planning application?	Yes ☒ No ☐
Is the surface water to be controlled? (Optional)	Yes ☒ No ☐
Is the surface water to be pumped?(Optional)	Yes ☐ No ☒

Section 6: Development details (Optional)

Is the development part of a larger site that will be developed in phases or will be subject to separate planning applications? If yes , please provide details below.	Yes ☐ No ☒						
Phase number	1	2	3	4	5	6	7
Start date on site	01.07.19						
Anticipated date of first occupation	02.12.19						
Anticipated completion date	01.12.25						
No. of dwellings	573						
Sustainability code for dwellings							
Public houses and/or restaurants	No. of seats						
	Floor space (m²)						
Hotels: Total No. of beds							
Schools: Total No. of pupils							
Hospitals: Total No. of beds							
Retail units: Total No. of units							
Office space: Total No. of units							
Industrial / manufacturing: Total No. of units							
Other: Foul water (litres per second)							

Section 7: Supporting information

Please confirm you have included all supporting information in relation to your enquiry

Site location plan	☒ Yes ☐ No
Site boundary	☒ Yes ☐ No
Proposed drainage layout plan (optional)	☒ Yes ☐ No
Indicative layout plan (optional)	☒ Yes ☐ No
Calculations in support of proposed flow rates or run off rates (optional)	☒ Yes ☐ No
Flood risk assessment (if appropriate)	☐ Yes ☒ No

Section 8: Declaration

I understand that the submission of this form is to be treated as a preliminary enquiry and the information may be subject to change. In particular, I understand that the information United Utilities Water Limited provides in response is valid only in conjunction with the information provided in relation to this enquiry, any changes to regulation or development layout will invalidate our response.

Name	Rick Browne	Signature	
Company	Barratt Homes Manchester	Date	20 01 21 2 0 1 9

UU use only

Date received	DD MM YY YY	UUW Ref No	\
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**About us**

United Utilities is the North West's water company. We keep the taps flowing and toilets flushing for seven million customers every day. From Crewe to Carlisle, we work hard behind the scenes to help your life flow smoothly.

United Utilities Water Limited, Haweswater House, Lingley Mere Business Park, Lingley Green Avenue, Warrington WA5 3LP.
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APPENDIX N

SKETCH 481-ED-10 FOUL DRAINAGE

PROPOSALS

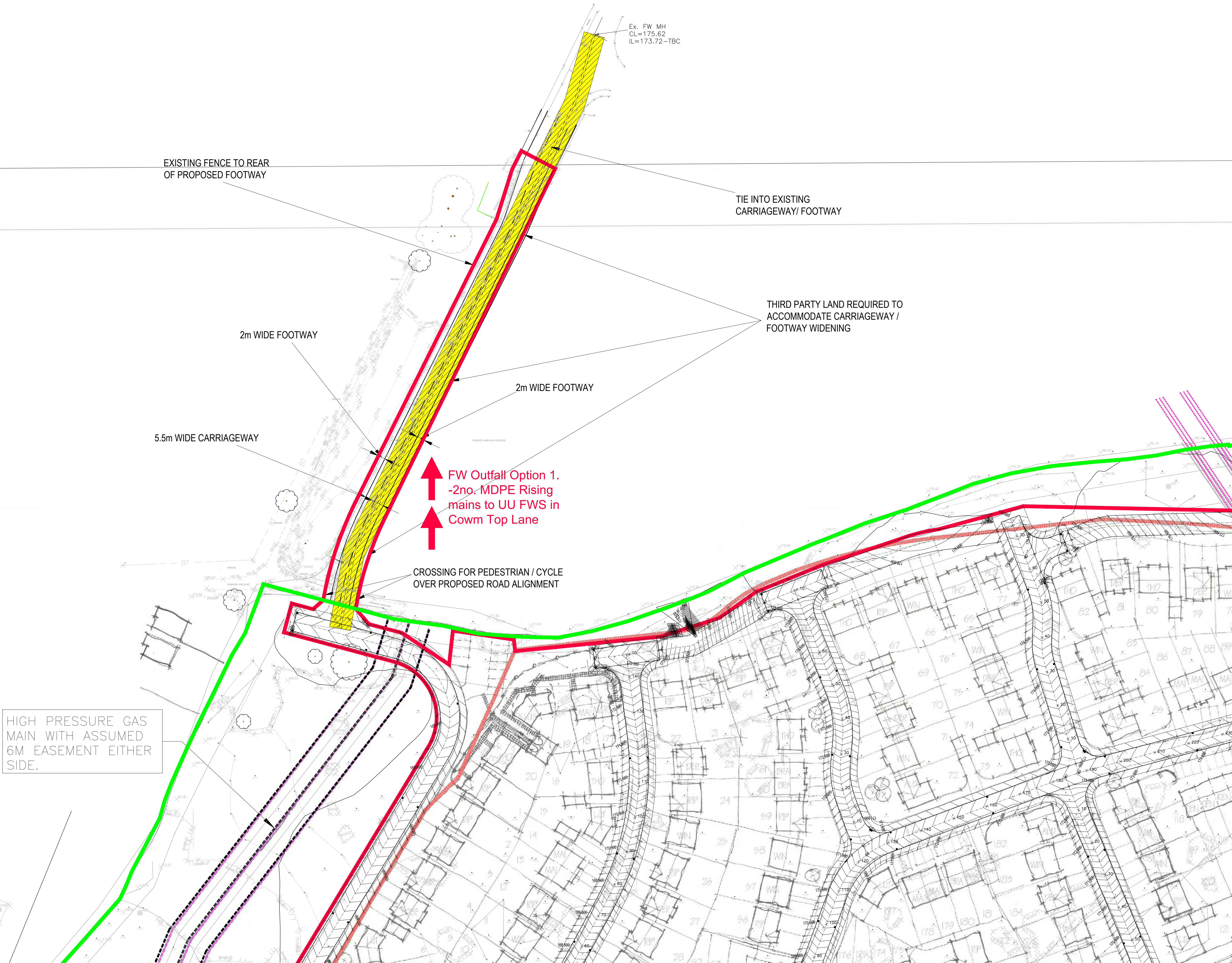
WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991
Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

KEY

Approximate Total Site Boundary

Approximate Development Boundary

Proposed Foul Water Outfall Route – Subject to UU approval.



REV	DESCRIPTION	DATE	DRAWN
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BARRATT
HOMES

MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job Trows Farm Castleton			
Title Proposed Foul Connection			
Design By RB	Date 23.09.19	Drawing Number 481/ED/10	Rev -
CAD By RB	Scale @ A1 1:500		