CampbellReith
consulting engineers

Confidential

Land off Blackmoorfoot Road and Felks Stile Road, Huddersfield

Flood Risk Assessment & Drainage Strategy

For

Empire Knight Group Limited

Project Number:

13354

February 2021

Campbell Reith Hill LLP
No. 1 Marsden Street
Manchester
M2 1HW

T:+44 (0)161 819 3060
E:manchester@campbellreith.com
W:www.campbellreith.com

Document History and Status

Revision	Date	Purpose/Status	Author	Check	Review
P1	30/07/2020	Issued for information	EH	RBG	RBG
P2	12/02/2021	Drainage Strategy updated to suit comments from the LLFA	CS	EH	CAB

Document Details

Last saved	12/02/2021
Path	13354-CRH-ZZ-XX-RP-C-0001-P2_FRA
Author	EH
Project Partner	CAB
Project Number	13354
Project Name	Blackmoorfoot Road, Huddersfield

Contents

Appendices

Tables

Figures

1.0 EXECUTIVE SUMMARY

1.1. The Client is proposing to re-develop land off Blackmoorfoot Road in Huddersfield for residential end use. CampbellReith was commissioned to produce a Flood Risk Assessment and Drainage Strategy in support of the forthcoming Outline Planning Application for up to 770 residential dwellings (Use Class C3), including up to 70 care apartments (Use Classes C2/C3) with doctors surgery of up to 350 sq. m (Use Class D1) and up to 500 sq. m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use).

1.2. The site extends to approx. 29.3 Ha in area and is currently utilised as a firework storage, distribution factory and agricultural land.

1.3. The Environment Agency (EA) Flood Map for Planning confirmed the development to lie wholly within Flood Zone 1 and as such, is considered to have a low risk of flooding from fluvial sources.

1.4. In accordance with the National Planning Policy Framework (NPPF), residential development, which is classed as 'More Vulnerable' is considered appropriate development within Flood Zone 1.

1.5. Surface water flooding and flooding from artificial drainage systems were also considered to potentially affect the site. However, an assessment of these sources determined that they pose low residual risk to the proposed development.

1.6. Borehole logs produced as part of a Ground Investigation undertaken by e3p in February 2018, confirmed the north and south eastern regions of the site to be underlain by sand. The remainder of the site was shown to be underlain by clay.

1.7. Infiltration testing was carried out by Ground Solve in July 2020 in the areas considered to be underlain by sand. The results concluded that 4 out 5 trial pits successfully drained water, indicating that soakaways would be feasible as an option for the disposal of surface water runoff in these areas. Runoff from the remainder of the site, underlain by clay, is to be discharged to the nearby public sewer system. However, comments received from the Lead Local Flood Authority (LLFA) have stated that infiltration is unsuitable for the site based on the site's steep topography and potential risk of groundwater emergence. The use of soakaways across the whole site was therefore discounted as an option for surface water disposal.

1.8. A pre-planning enquiry from Yorkshire Water confirmed that surface water can *"discharge to Crosland Hill Road at a rate not exceeding 27 litres/second and to Blackmoorfoot Road at a rate not exceeding 61 litres/second."*

1.9. The Preliminary Drainage Strategy has therefore been divided into two main systems. Surface water runoff from the north west, west and south of the development is to discharge to the public 225mm diameter combined sewer located within Blackmoorfoot Road. For the remainder of the development surface water runoff is to be discharged to the 300mm diameter public combined sewer on Crosland Hill Road.

1.10. In accordance with the consultation with the Lead Local Flood Authority and local policy, the SuDs features have been designed to attenuate surface water runoff up to the 1 in 100 year plus 30% climate change event.

1.11. The Preliminary Drainage Strategy demonstrates that runoff from the proposed development can be attenuated on-site, with post-development discharge rates restricted to agreed runoff rates.

1.12. For foul water, the pre-planning enquiry response received from Yorkshire Water confirmed that foul water can drain to the public combined sewer network on Blackmoorfoot Road and Crosland Hill Road. Based on the existing topography it is proposed that flows from the north of the development are discharged via a gravity system to the 300mm public combined sewer on Crosland Hill Road with the south of the development discharging via gravity to the 225mm public combined sewer on Blackmoorfoot Road.

1.13. It is noted that a connection into the combined sewer on Crosland Hill Road is likely to cross third party and permission will need to be sought and agreed prior to a connection to the sewer.

2.0 INTRODUCTION

2.1. Scope of Works

2.1.1. The site is located at Black Cat Fireworks Limited, off Blackmoorfoot Road in Huddersfield, West Yorkshire. The Client is proposing to re-develop the site for up to 770 residential dwellings (Use Class C3), including up to 70 care apartments (Use Classes C2/C3) with doctors surgery of up to 350 sq. m (Use Class D1) and up to 500 sq. m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use). A masterplan has been prepared by Planit and is included in Appendix 2.

2.1.2. CampbellReith was appointed by Gerald Eve on behalf of Empire Knight Group Limited to prepare a Flood Risk Assessment (FRA) and Preliminary Drainage Strategy to assess the risk of flooding both to and from the site in support of the forthcoming Outline Planning Application.

2.1.3. This Report aims to assess all potential sources of flooding including fluvial, pluvial, groundwater, overland flows, artificial drainage system and infrastructure failure to ensure the proposed development is sustainable from a Flood Risk point of view.

2.2. Sources of Information

2.2.1. Elements of this Assessment are based on information supplied or provided by Others from the following sources:

Table 2-1: Sources of Information

Source of Information	Author / Originator	Date
Kirklees Local Plan Strategy and Policies	Kirklees Council	February 2019
Calder Catchment Strategic Flood Risk Assessment – Volume 2 (Kirklees Council)	JBA Consulting	July 2016

2.2.2. CampbellReith has endeavoured to assess all information provided to them during this assessment but this report summarises information from a number of external sources and CampbellReith do not offer any guarantees or warranties as to the completeness or accuracy of information relied upon.

2.3. Limitations

2.3.1. This Report has been prepared for exclusive use by the Client for the purpose of assisting them in evaluating the potential risk of flooding associated with the site.

2.3.2. CampbellReith accepts no liability for any use of this document other than by its Client and only for the purposes stated in the document, for which it was prepared and provided. No person other than the Client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Campbell Reith Hill LLP. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole.

2.3.3. This Flood Risk Assessment addresses the flood risk posed to and from the proposed development, the extent and type of which is shown on the indicative concept plan enclosed herein. This Assessment has been undertaken on the assumption that the site will be developed in accordance with these proposals without significant change. The conclusions resulting from this Assessment are not necessarily indicative of future conditions or operating practices at or adjacent to the site.

3.0 PLANNING FRAMEWORK AND FLOOD RISK POLICY

3.1. National Planning Policy Framework

3.1.1. The National Planning Policy Framework (NPPF) sets out the Government's national policies on land-use Planning in England and how land-use Planning should be applied in relation to flood risk.

3.1.2. The NPPF requires a site specific flood risk assessment for proposals of *"1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding"*[1]

3.1.3. Information regarding a site's vulnerability to flood risk has been defined in accordance with Table 2 'Flood Risk Vulnerability Classification'[2]. Similarly, the development's suitability to be located within a flood zone has been assessed in accordance with Table 3 'Flood Risk Vulnerability and Flood Zone Compatibility'[3].

3.2. Local Planning Policy

Kirklees Council – Local Plan Strategy and Policies

3.2.1. The Kirklees Council Local Plan was adopted in February 2019 and sets out the Council's policies on development of the borough up to 2031. Of particular relevance to the site are Policies LP27 'Flood Risk' and LP28: 'Drainage', which have been taken into consideration as part of this Assessment.

3.2.2. Relevant extracts from the Kirklees Local Plan are attached in Appendix 3.

Calder Catchment Strategic Flood Risk Assessment Volume 2

3.2.3. Kirklees Council's Strategic Flood Risk Assessment (SFRA) was completed in July 2016. The information produced as part of the SFRA indicates that the site is at risk of surface water flooding. This will be assessed further in Section 5. No other sources of flooding within the SFRA were considered to pose a risk to the site.

3.2.4. Relevant Extracts from the SFRA are attached in Appendix 3.

[1] National Planning Policy Framework, DCLG, 2018 – Footnote 50.
[2] National Planning Policy Framework, DCLG, 2018 Paragraph: 066 Reference ID: 7-066-20140306
[3] National Planning Policy Framework, DCLG, 2018 Paragraph: 067 Reference ID: 7-067-20140306

4.0 SITE CONTEXT

4.1. Site Location

4.1.1. The site is located at Black Cat Fireworks Ltd. off Blackmoorfoot Road in Huddersfield, HD4 7AD at National Grid Reference 411333E 414819N, which is approximately 3.5km south west of Huddersfield town centre.

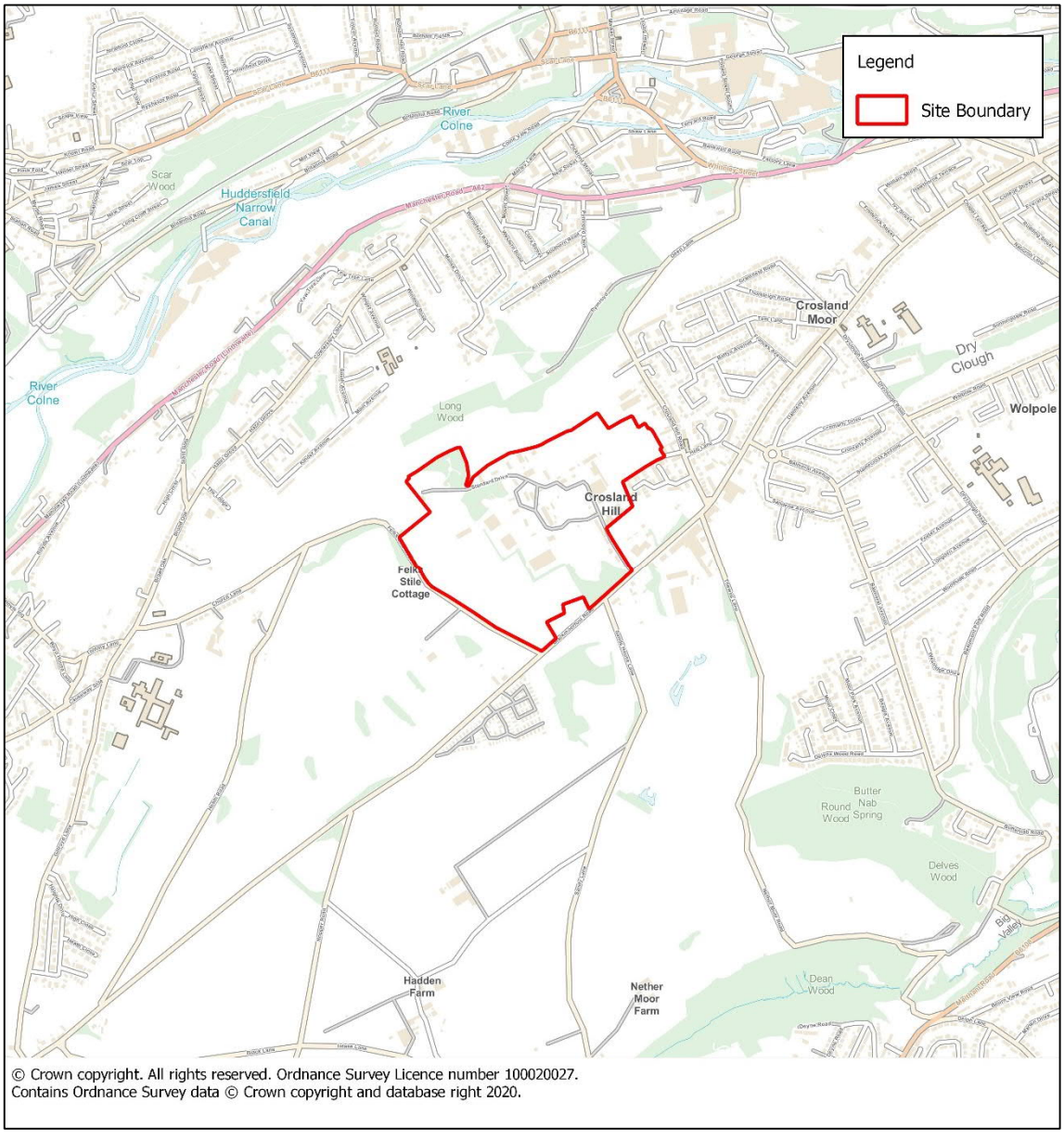


Figure 4.1: Site Location (not to scale)

4.2. Site Characterisation

4.2.1. The site extends to approximately 29.3Ha in area and is made up of three distinct areas comprising an industrial firework storage and distribution compound, an area of agricultural land to the west and a series of small-scale agricultural fields to the east.

Image provided courtesy of Google 2020 via Google Earth Pro. ©Google

Figure 4.2: Aerial Image (not to scale)

4.2.2. The site is bounded to the north by open fields, to the east by residential and commercial developments, to the south by Blackmoorfoot Road and to the west by Felks Stile Road. Vehicular access to the site is currently available off Blackmoorfoot Road.

4.2.3. The surrounding area is predominantly residential to the north and east with a golf course located to the west and an airfield and quarry located to the south.

4.3. Existing Site Topography

4.3.1. A topographical survey of the site was undertaken by JLP Surveying Consultants Ltd. in May 2017 and is attached in Appendix 1. Levels on the topographical survey relate to the Ordnance Survey (OS) datum.

4.3.2. The site is shown to be relatively steep with a general fall from west to east. Ground levels typically range from 250m above Ordnance Datum (AOD) in the west of the site to 202m AOD in the east.

4.4. Existing Ground Conditions

4.4.1. British Geological Survey maps indicate that the site is likely to be underlain by Rough Rock – Sandstone with the Landis Soilscapes Map[4], showing ground conditions at the site to be *"freely draining slightly acid loamy soils"*.

4.4.2. Borehole logs produced as part of a Ground Investigation undertaken by e3p in February 2018, confirmed the north and south eastern regions of the site to be underlain by sand. The remainder of the site was shown to underlain by clay and was not considered suitable for infiltrating SuDS.

4.4.3. However, infiltration testing was carried out by Ground Solve on the 14th-15th July 2020 in the areas considered to be underlain by sand and a summary of the results are tabulated below:

Table 4-1: Summary of Infiltration Test Results

Location	Depth (mBGL)	Test Number	Soil Infiltration Rate (m/sec)	Groundwater (mBGL)
SA1	3.0	1	9.09×10^{-6}	None encountered
SA2	2.2	1	$>1.04 \times 10^{-2}$ (Inferred Value)	None encountered
SA3	2.0	1	$>1.04 \times 10^{-2}$ (Inferred Value)	None encountered
SA4A	1.6	1	1.01×10^{-5}	None encountered
	1.6	2	1.31×10^{-5}	None encountered
	1.6	3	1.17×10^{-5}	None encountered
SA5	2.2	1	$>1.04 \times 10^{-2}$ (Inferred Value)	None encountered

4.4.4. It is noted in the Infiltration Test Report, that it was not possible to complete 3 test cycles on SA1 in the north east of the site due to slow infiltration. As such, infiltrating SuDS are not considered to be feasible in this location.

4.4.5. In addition, trial pits SA2, SA3 and SA5 proved unable to fill due to the high permeability of the made ground. Since Ground Solve were unable to fill the pits fast enough the infiltration rate for these pits have been inferred as in excess of 1.04×10^{-2} m/s.

4.4.6. Therefore, the use of infiltrating SuDS are considered to be feasible in the north west, south and central regions of the site and have been discounted in the north east and east. However, comments received from the Lead Local Flood Authority (LLFA) have stated that infiltration is unsuitable for the site based on the site's steep topography and potential risk of groundwater emergence. As such, the use of soakaways across the whole site has been discounted as an option for surface water disposal.

4.4.7. A copy of the Infiltration Test Report prepared by Ground Solve is included in Appendix 5

4.5. Existing Drainage Infrastructure

4.5.1. The sewer infrastructure network in the vicinity of the site is owned and operated by Yorkshire Water (YW) and a copy of their Sewer Plans is included within Appendix 4.

[4] http://www.landis.org.uk/soilscapes/#

4.5.2. The Plan shows the area is predominantly served by a combined sewer network. A 225mm diameter public combined sewer runs east along Blackmoorfoot Road directly south of the site and a 300mm combined sewer runs north along Crosland Hill Road approx. 55m east of the site.

4.5.3. A review of the on-site drainage network, undertaken during a visit on the 14th July 2020 confirmed the roof areas in the eastern

4.5.4. A high level drainage survey, undertaken during the site visit on the 14th July 2020, confirmed the presence of rainwater pipes and a private drainage system serving the buildings in the east of the site. Based on the direction of the outlet pipes and anecdotal evidence from the Site Manager, runoff from this section of the site is considered to discharge into the YW combined sewer on Crosland Hill Road.

4.5.5. No positive drainage network was identified in the north of the site. Runoff from the hardstanding areas in the north of the site are shown to either discharge to ground or flow overland along the existing roads to a gully located in the east of the site, where it is discharged in to the on-site drainage network.

4.5.6. Rainfall runoff from buildings 111, 167, 165 and 166 was shown to be drained via rainwater pipes to either gravel filter strips or to the nearest vegetated area where it was then discharged directly to ground.

4.5.7. The access road and the adjacent buildings off Standard Drive, were shown to discharge into a private drain on Standard Drive prior to discharge into the YW combined sewer on Blackmoorfoot Road.

5.0 FLOOD RISK ASSESSMENT

5.1. Potential Flood Hazards

5.1.1. There are a variety of flood mechanisms that can affect the risk of flooding to a site, most of which are largely dependent on the site's characteristics and location. Based on a review of available documentation, the flood mechanisms that are considered to potentially affect the site are highlighted in Table 5-1.

Table 5-1: Categories of Flood Mechanisms (From Box 2.3 CIRIA C624)

Category	Flood Mechanism	Potential to affect site Y/N?
Fluvial Flooding	Exceedance of the flow capacity of the channel of a river, stream or other natural watercourse, typically associated with heavy rainfall events. Excess water spills onto the flood plain	N – Site is located within Flood Zone 1 of the Environment Agency's Flood Map for Planning and no watercourses are located within close proximity to the site.
Coastal & Tidal Flooding	High tides, storm surges and wave action, often in combination	N – not in close proximity to coast.
Estuarial flooding and watercourses affected by tidelocking	Often involving high tidal levels and high fluvial flows in combination	N- not in close proximity to any estuary.
Groundwater Flooding	Raised groundwater levels, typically following prolonged rain (may be slow to recede). High groundwater levels may result in increased overland flow flooding	N – not located in area at risk of groundwater flooding.
Flooding from overland flow	Water flowing over the ground surface that has not reached a natural or artificial drainage channel. This can occur when intense rainfall exceeds the infiltration capacity of the ground, or when the ground is so highly saturated that it cannot accept any more water.	Y - Surface water flood maps shows the site to be at risk of surface water flooding.
Flooding from artificial drainage systems	Blockage or overloading of pipes, sewers, canals, and drainage channels or failure of pumping systems. Typically following heavy rain or as a result of high water levels in a receiving watercourse	Y – Private sewers located on site.
Flooding from infrastructure failure	Structural, hydraulic or geotechnical failure of infrastructure that retains, transmits or controls the flow of water	N - not located in close proximity to structural, hydraulic or geotechnical infrastructure.

5.2. Fluvial flooding

5.2.1. The Environment Agency's Flood for Map for Planning shows the site to lie entirely within Flood Zone 1, defined as land having a less than 1 in 1000 year (0.1%) annual probability of river flooding.

5.2.2. Furthermore, the nearest watercourse is the River Colne, located over 920m to the north of the site.

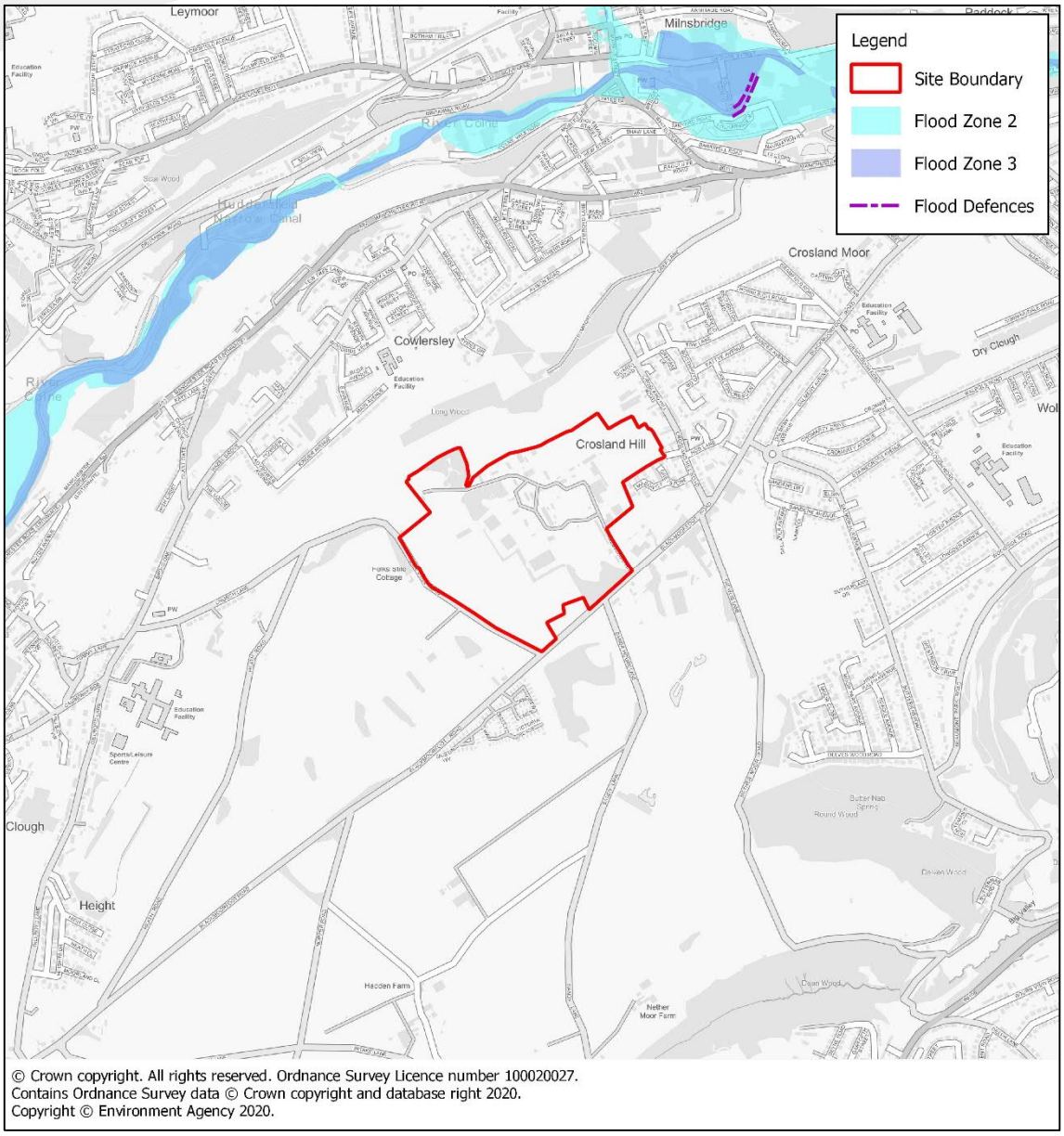


Figure 5.1: Current EA Fluvial Flood Map (not to scale)

5.2.3. As such the risk of fluvial flooding to the site is regarded as low.

5.3. Overland Flow

5.3.1. The Gov.uk surface water flood map shows the site to be predominantly at very low risk of surface water flooding. Small areas of high risk are located in the west and south east of the site, however, taking into account the scale and location of the high risk areas it is assumed these are a result of topographical depressions, which will be engineered out during the construction phase.

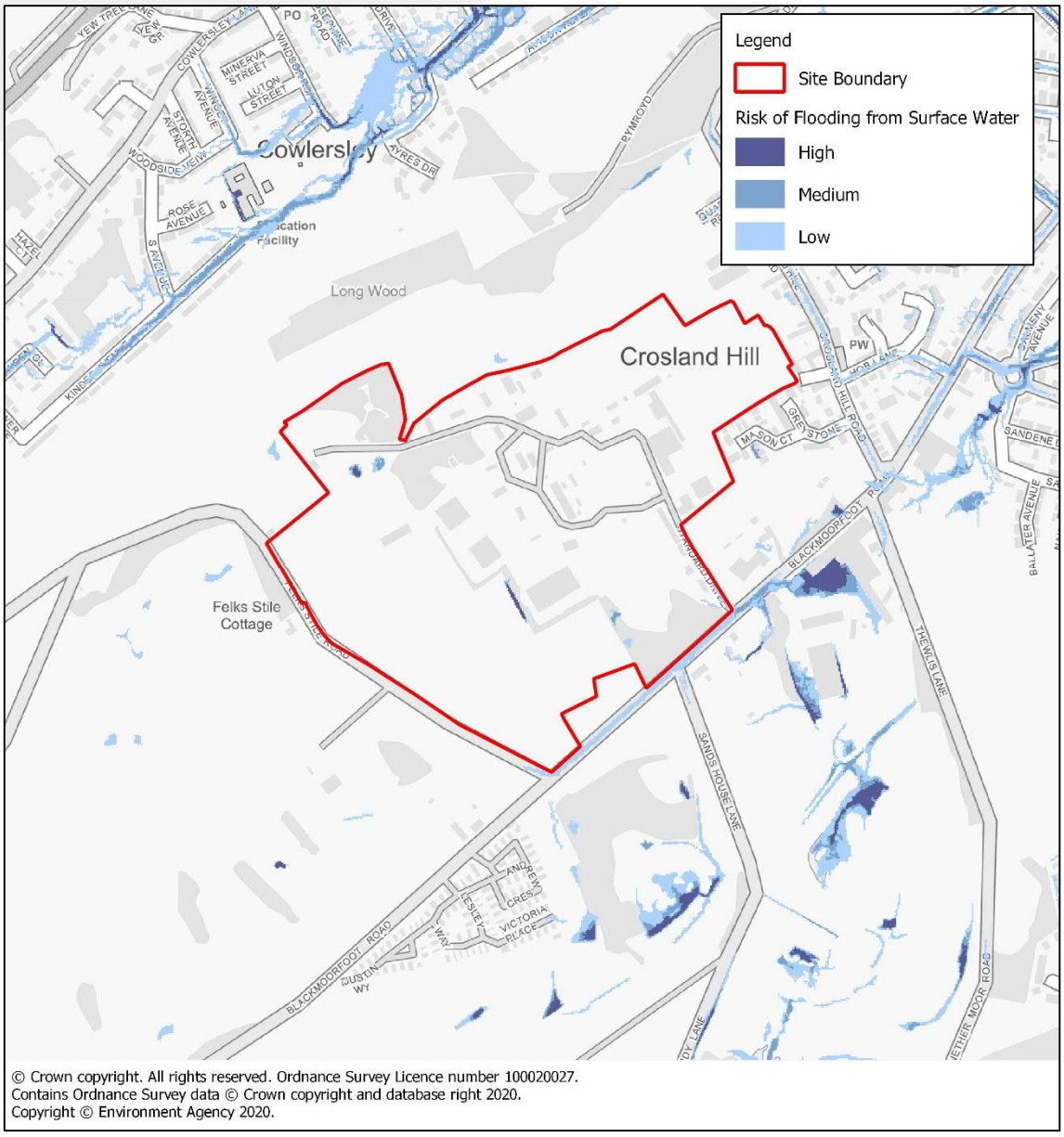


Figure 5.2: Current EA Surface Water Flood Map (not to scale)

5.3.2. Furthermore, the Drainage Strategy for the proposed development will ensure that no surface water flooding/overland flow occurs during the 1:30 year and 1:100 year events. Surface water in excess of agreed runoff rates are to be attenuated on site up to the 1:100 year plus 30% climate change.

5.3.3. As such the risk of flooding from overland flow is regarded as low.

5.4. Flooding from Artificial Drainage Systems

5.4.1. A review of Yorkshire Water sewer plans identified a public combined sewer directly south of the site. Private sewers are also present in the south and east of the site, discharging into the nearby Yorkshire Water sewer network on Blackmoorfoot Road and Crosland Hill Road.

5.4.2. The information provided in the SFRA shows no historic sewer flooding incidents located at or within close proximity to the site. Furthermore, the site is shown to be situated outside of a Critical Drainage Area.

5.4.3. Furthermore, the Drainage Strategy for the proposed development will replace the existing private sewer system with a new drainage network, which will be designed to adoptable standards and put forward for Adoption for future maintenance by Yorkshire Water, subject to approval. As mentioned in section 5.3.2 the proposed Drainage Strategy will ensure no surface water flooding/overland flow occurs during the 1:30 year and 1:100 year events.

5.4.4. Therefore, the risk posed from flooding from artificial drainage systems is considered to be low.

6.0 PROPOSED DEVELOPMENT

6.1. Existing Drainage Regime

6.1.1. The centre of the site is currently utilised as an industrial storage and distribution facility associated with Black Cat Fireworks Ltd. During a site reconnaissance on the 14th July 2020, approximately 2.1 Ha of the hardstanding areas within the site are shown to be positively drained. These areas are currently served by two drainage networks as follows:

- The north and east of the site (1.6 Ha) are considered to discharge into the public combined sewer on Crosland Hill Road (outfall A).
- The access road, Standard Drive and the buildings located along Standard Drive (0.47 Ha) discharge to the public combined sewer on Blackmoorfoot Road (outfall B).

6.1.2. The remainder of the hardstanding areas and the rest of the site, which currently comprises open grassland or agricultural land, is considered to discharge rainfall runoff directly to ground over time.

6.1.3. Using the Modified Rational Method, the existing runoff rate from the site to the public sewers has been calculated as follows:

Table 6-1: Brownfield Runoff Rates

Catchment	Outfall Location	Return Period Discharge Rate (l/s)		
		1:1 year	1:30 year	1:100 year
A	A	177.7	361.6	429.8
B	B	52.2	106.2	126.3

6.1.4. However, these rates are shown to exceed the capacity of the receiving sewers. After consultation with Yorkshire Water, the discharge of surface water runoff to Crosland Hill Road and Blackmoorfoot Road is to be restricted to 27 l/s and 61 l/s respectively. This was also supported by the Lead Local Flood Authority (Kirklees Council). A copy of the consultation responses is included in Appendix 4.

6.1.5. Surface water runoff in excess of these rates will need to be attenuated on-site prior to discharge into the receiving sewer to ensure the existing runoff regime on the site is maintained.

6.2. Proposed Drainage Regime

Potential outfall locations for the discharge of surface water runoff have been assessed in accordance with the hierarchy set out within H3 of the Building Regulations. The results of the assessment are tabulated in Table 6-2.

Table 6-2: Surface Water Disposal Hierarchy

Order of Priority	Outfall Location	Suitability (Y/N)	Comments
1	Soakaway/Infiltration System	N	Discounted – Discounted by the LLFA based on the sites steep topography and the risk of ground water emergence
2	Watercourse	N	Discounted – No watercourses within close proximity to the site.
3	Surface Water Sewer	N	No surface water sewers are accessible from the site
4	Combined Sewer	Y	Yorkshire Water sewer records show a combined sewer directly south of the site on Blackmoorfoot Road and to the east of the site on Crosland Hill Road.

6.2.1. Taking in to account the topography of the site and the unsuitable ground conditions it is proposed that surface water runoff is discharged to the combined sewer. This is in line with comments from the LLFA who stated 'we advise against the use of soakaways on a sloping site of this nature'.

6.3. Proposed Surface Water Strategy

6.3.1. The future maintenance of any drainage system is always a consideration and 'Adoption' by a Utility company generally provides the best option, whereby the drainage system is vested in the Utility Company, subject to the completion of a Legal Agreement and the system being designed in accordance with recognised standards. An infrastructure-based Surface Water (SW) Drainage Strategy has therefore been designed in accordance with recognised standards to aid with future maintenance.

6.3.2. The Design and Construction Guidance (DCG), adopted in March 2020, requires SW drainage systems to be designed *"not to flood any part of the site in a 1 in 30 year return period design storm".* As such, it is generally accepted that new SW drainage systems are designed to wholly contain all flows during the 1 in 30 year event within the system itself (i.e. all below ground with no surface flooding), although surcharging is permitted. Some surface flooding is permitted during the 1 in 100 year event, so long as this occurs in controlled areas and does not pose a risk to life or property. To ensure the SW Drainage Strategy meets these requirements the network has been modelled using MicroDrainage version 2020.1.

6.3.3. Based on the Masterplan provided by Planit (included in Appendix 2), the site is to be predominantly developed for residential end use. For residential developments it is generally anticipated that 60% of the developable area will be converted to impermeable hardstanding areas. In accordance with guidance provided by the LLFA a further 10% of impermeable area has been applied to account for urban creep in the future. Therefore the impermeable area within the site is expected to increase to approximately 14.8Ha.

6.3.4. Surface water runoff for the development is to be discharged to the public sewer system. A pre-planning enquiry from Yorkshire Water confirmed that surface water can *"discharge to Crosland Hill Road at a rate not exceeding 27 litres/second and to Blackmoorfoot Road at a rate not exceeding 61 litres/second."*

6.3.5. Based on the existing topography, the first drainage network serving the north west, central and south of the site is proposed to discharge surface water into the 225mm dia. combined sewer

on Blackmoorfoot Road at a discharge rate of 61l/s. Attenuation has been provided in the form of eight online detention basins located in green open space areas. The basins have been designed to accommodate flows up to the 1 in 100 year plus 30% climate change event.

6.3.6. However, minor flooding is noted during the 1 in 100 year plus 30% climate change event at three locations within the central region of the site, with a total flood volume of 4.4m^3. The flood waters will be contained within the highway before returning into the downstream network.

6.3.7. The second drainage network serving the east of the site is proposed to discharge into the 300mm dia. combined sewer on Crosland Hill Road at a discharge rate of 27l/s. Attenuation has been provided in the form of two online detention basins located in green open space areas. The basins have been designed to accommodate flows up to the 1 in 100 year plus 30% climate change event. Connection into the combined sewer is likely to cross third party land and therefore permission will need to be sought and agreed prior to connection.

6.3.8. At the time of writing the Report, no proposed ground levels were available for the proposed development. As such, the cover levels utilised within the Preliminary Drainage Strategy have been based on existing ground levels and therefore, the depths of the manholes and SuDS features are subject to change following the production of a ground model of the proposed levels.

6.3.9. Refer to Appendix 6 for the Proposed Drainage Layout and calculations. This is by no means a definitive solution at this stage and the exact form of the final drainage system will need to be determined at detailed design stage. This possible solution does however, demonstrate that a system could be provided, which manages surface water runoff.

6.4. Surface Water Flood Route Exceedance

6.4.1. A review of the Environment Agency's surface water flood risk map showed small areas of flood risk within the site, however these are not indicated to be surface water flood routes. Therefore is no requirement to redirect any existing overland flow routes within the site.

6.4.2. As mentioned previously, minor flooding is proposed during the 1 in 100 year plus 30% climate change event. These areas are located within the adoptable highways and it is therefore anticipated that the flood waters will be confined to the channel of the highway and picked up further downstream by the proposed highway drainage network.

6.4.3. For the remainder of the site, in the event of a blockage the highway network should be designed to direct any excess runoff to the proposed Public Open Space (POS) areas located within the site. A flood route exceedance plan is attached within Appendix 6.

6.5. Proposed Foul Water Drainage Strategy

6.5.1. Yorkshire Water (YW) Sewer Records identified a 225m dia. combined sewer running east, directly south of the site on Blackmoorfoot Road and a 300mm dia. combined sewer on Crosland Hill Road, approx. 57m east of the site. A pre-planning enquiry from YW confirmed that foul will be allowed to drain to the public combined sewer network on Blackmoorfoot Road and Crosland hill Road. A copy of the pre-planning enquiry response is included in Appendix 4.

6.5.2. Taking into account the existing topography of the site it is proposed that foul flows from the development are divided into two systems. System 1 aims to serve the north of the development,

discharging into the 300mm dia. Combined sewer on Crosland Hill Road, whereas System 2 aims to serve the south of the development, discharging into the 225mm dia. Combined sewer on Blackmoorfoot Road.

6.5.3. It is noted that a connection into the combined sewer on Crosland Hill Road is likely to cross third party land and therefore permission will need to be sought and agreed prior to connection. The preliminary Foul Water Drainage Strategy is attached in Appendix 6.

7.0 CONCLUSIONS & RECOMMENDATIONS

7.1.1. The Client is proposing to redevelop land off Blackmoorfoot Road in Huddersfield for residential end-use. An Outline Planning Application is to be submitted in support of the development for up to 770 residential dwellings (Use Class C3), including up to 70 care apartments (Use Classes C2/C3) with doctors surgery of up to 350 sq. m (Use Class D1) and up to 500 sq. m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use).

7.1.2. Flood Zone mapping from the Environment Agency identified the site to lie wholly within Flood Zone 1. As such, the site is considered to have low risk of fluvial flooding.

7.1.3. Residential development is considered 'More Vulnerable' in the Flood Risk Vulnerability Classification, detailed in Table 2 of the Planning Practice Guidance to the NPPF.

7.1.4. In accordance with Table 3 of the Planning Practice Guidance to the NPPF, the proposed development would be considered sustainable in terms of Flood Risk.

Table 7-1: Flood Risk Vulnerability & Flood Zone Compatibility (Table 3 Practice Guidance)

Flood Risk Vulnerability classification (See Table 2 PPG)		Essential Infrastructure	Water Compatible	Highly vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table 1 PPG)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b Functional Floodplain	Exception Test required	✓	×	×	×

7.1.5. Two other sources of flooding were also considered to potentially affect the site – Overland Flow and Flooding from Artificial Drainage Systems. These sources were assessed and were considered to pose low residual risk.

7.1.6. A Preliminary Surface Water (SW) Drainage Strategy has been formulated for the site, which utilises an infrastructure-based solution to manage runoff from the impermeable areas within the proposed development. The SW Drainage Strategy demonstrates that it is possible to provide a feasible drainage solution for the site, which includes a SuDS system to attenuate surface water runoff up to the 1:100 year plus 30% climate change event. As such, SW run-off from the proposed development can be managed in such a way to ensure that it does not pose a risk to the site or its occupants and does not increase flood risk to the wider catchment.

7.1.7. Foul water flows from the proposed development are to split between the public combined sewers on Crosland Hill Road and Blackmoorfoot Road, as agreed with Yorkshire Water.

7.1.8. The exact form of any future drainage system will be subject to detailed design at the appropriate stage of development.

7.1.9. Based on the information provided to CampbellReith, the proposed redevelopment of the site for residential use would be considered sustainable in terms of both Flood Risk and the management of Surface Water runoff.

Appendix 1: Existing Site Information

FELKS STILE ROAD

Felks Stile Cottage

Stone

Club House

Matlock House Quarry (disused)

242.6m

231.0m

228.9m

224.3m

233.8m

Heather Mount

Shaw Green Farm

N

SURVEY ORIENTATED TO REAL TIME GPS

0m 10m 20m 30m 40m

SCALE BAR 1:500

NOTES AND AMENDMENTS

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS PRIOR TO WORK COMMENCING

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD. THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

REVISIONS

REV.	DESCRIPTION	DRAWN	CHKD.	DATE

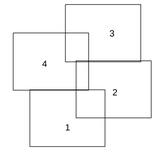
Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bol	Bollard	TPS	Tactile paving stabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VC	Vent pipe
DR	Drain	WH	Water Heater
Elec	Electrical ic	WO	Wash Out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod		Fence annotation
FH	Fire hydrant	C/B	Close boarded
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/L	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hit/rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Letter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
MH	Utility manhor	W/M	Wire mesh
MP	Mile post		Miscellaneous annotations
MW	Monitoring Well	AL	Arch level
NP	Name plate	BL	Bed level
OP	Post	CL	Cover level
PM	Parking meter	EH	Eaves level
RE	Rodding eye	IL	Invert level
RS	Road sign	IL	Invert level
rwp	Rain water pipe	PL	Parapet level
SP	Sign post	RH	Roof/ridge level
ST	Stop cock	SL	Soffit level
SB	Service Box	TL	Top of hedge/ring level
SV	Stop valve	Top	Top of pipe/culvert
TCB	Telephone call box	WH	Wall height
TH	Trial Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to OSBM Newyln

Datum Generated by VRS GPS



SURVEY STATIONS

stna	411617.259	414551.523 209.983
stna1	411580.704	414616.201 211.548
stna2	411545.255	414622.787 213.830
stna3	411630.572	415156.962 206.694
stna4	411584.639	415120.518 207.698
stna5	411609.594	415141.559 207.037
stnc	411497.153	414444.566 219.861
stn1	411545.549	414676.042 213.303
stn1a	411567.569	414635.463 212.200
stn2a	411548.969	414739.971 213.113
stn3	411515.261	414738.532 214.528
stn4	411503.691	414762.703 215.304
stn5	411477.274	414813.307 216.990
stn6	411507.644	414825.467 214.986
stn6a	411488.940	414856.347 215.956
stn7	411467.971	414848.570 217.086
stn8	411473.393	414869.876 216.853
stn8a	411519.864	414899.886 215.944
stn9	411266.867	414687.845 231.240
stn9a	411238.905	414644.829 232.851
stn9b	411264.613	414610.658 232.742
stn10	411313.845	414616.519 226.823
stn11	411343.019	414549.166 227.177

JLP Surveying

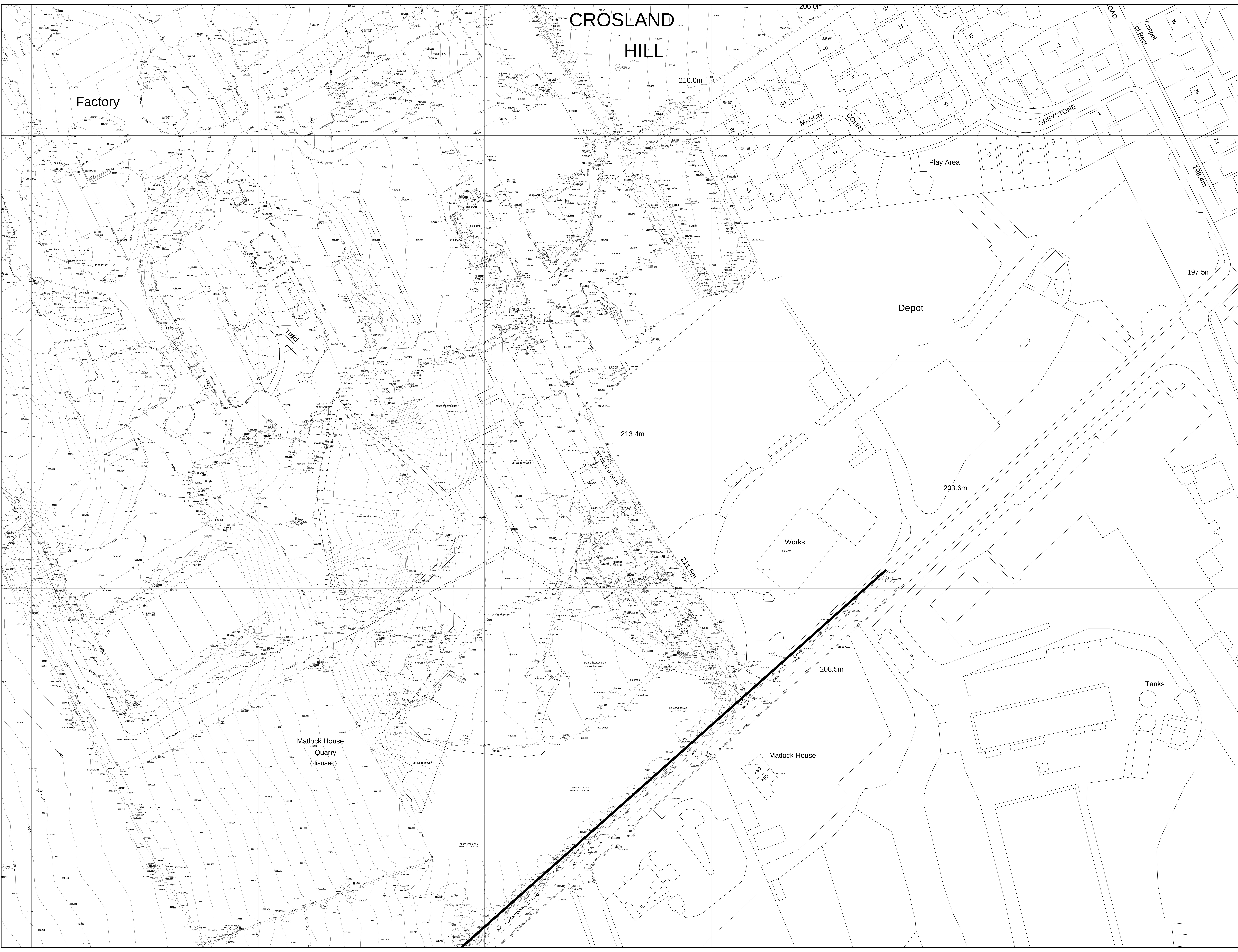
JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL - peterhouston@jlpsurveys.com

PROJECT
EMPIRE KNIGHT, HUDDERSFIELD

DRAWING TITLE
Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1:500	A1	4	18.05.17	

DRAWING NUMBER
S17-338-1



SURVEY ORIENTATED TO REAL TIME GPS

0m 10m 20m 30m 40m

SCALE BAR 1:500

NOTES AND AMENDMENTS

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS PRIOR TO WORK COMMENCING

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD. THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

REVISIONS

REV.	DESCRIPTION	DRAWN	CHKD.	DATE

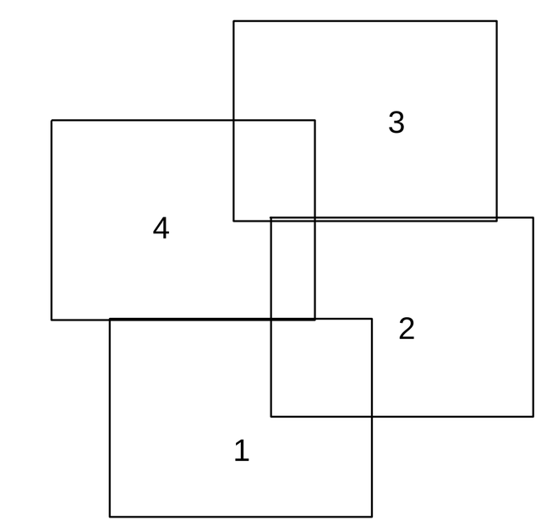
Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bol	Bollard	TPS	Tactile paving slabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VP	Vent pipe
DR	Drain	WM	Water meter
Elec	Electrical ic	WO	Wash Out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod	Fence annotation	
FH	Fire Hydrant	B/W	Barbed wire
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/I	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hand rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Letter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
Mkr	Utility marker	W/M	Wire mesh
MP	Mile post	Level prefix descriptions	
MW	Monitoring Well	AL	Arch level
NP	Name plate	BL	Bed level
P	Post	CL	Cover level
PM	Parking meter	EH	Eaves level
RE	Rodding eye	FL	Floor level
RS	Road sign	IL	Invert level
rwp	Rain water pipe	PL	Parapet level
SP	Sign post	RH	Roof/ridge level
ST	Stop tap	SL	Soffit level
SB	Service Box	Spr	Arch springing level
SV	Stop valve	Top	Top of pipe/culvert
TCB	Telephone call box	WH	Wall height
TH	Trial Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to OSBM Newyln

Datum Generated by VRS GPS



SURVEY STATIONS			
stna	411617.259	414551.523	209.983
stna1	411580.704	414616.201	211.548
stna2	411545.255	414622.787	213.830
stna3	411630.572	415156.962	206.694
stna4	411584.639	415120.518	207.698
stna5	411609.594	415143.559	207.037
stnc	411497.153	414444.566	219.861
stn1	411545.549	414676.042	213.303
stn1a	411567.569	414635.463	212.200
stn2a	411548.969	414739.971	213.113
stn3	411515.265	414738.532	214.528
stn4	411503.691	414762.703	215.304
stn5	411477.274	414813.307	216.990
stn6	411507.644	414825.467	214.986
stn6a	411488.940	414856.347	215.956
stn7	411467.971	414848.570	217.086
stn8	411473.393	414869.876	216.853
stn8a	411519.864	414899.886	215.944
stn9	411266.867	414687.845	231.240
stn9a	411238.905	414644.829	232.851
stn9b	411264.633	414610.658	232.742
stn10	411313.845	414616.519	226.823
stn11	411343.019	414549.166	227.177

JLP Surveying

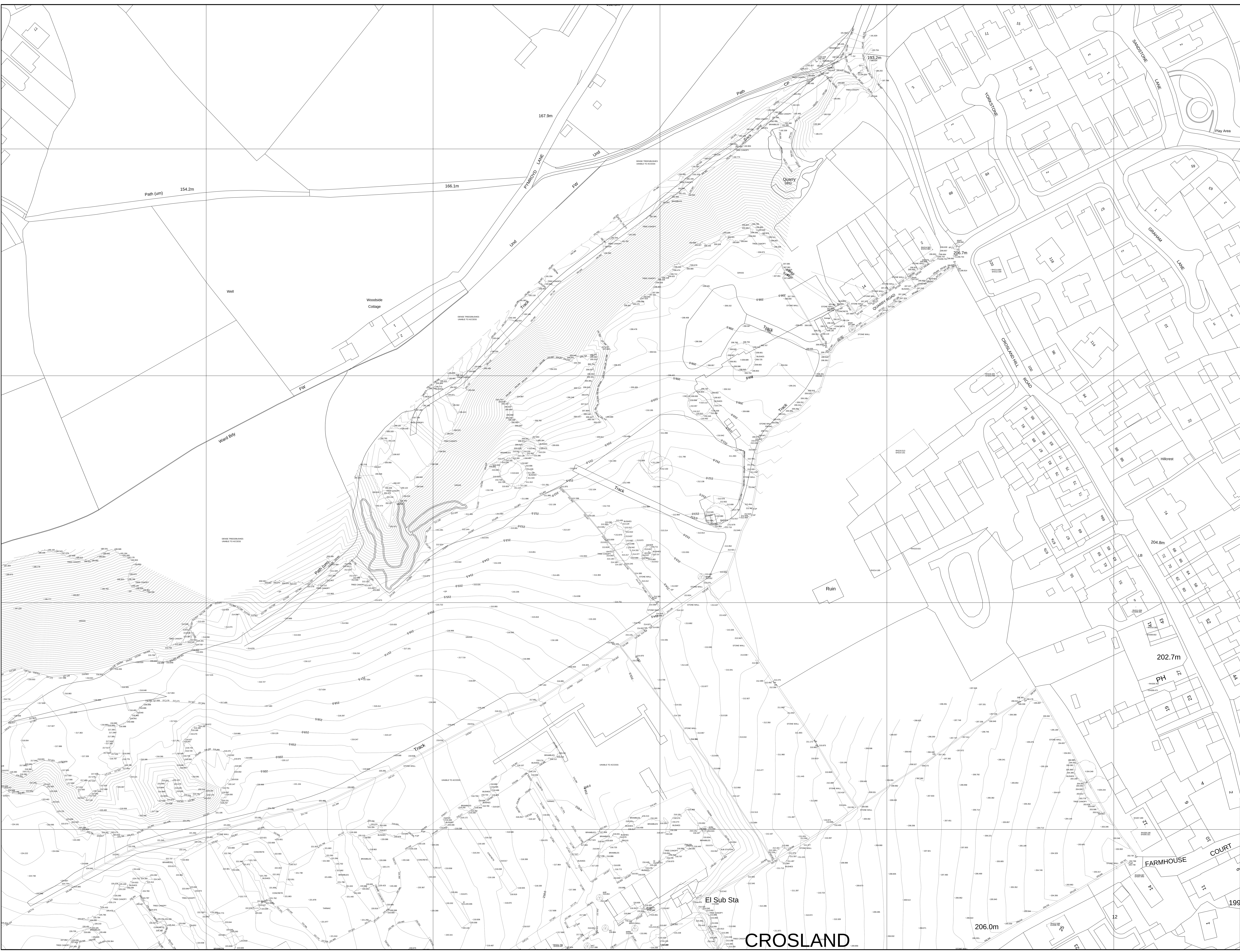
JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL:- peterhouston@jlpsurveys.com

PROJECT
EMPIRE KNIGHT, HUDDERSFIELD

DRAWING TITLE
Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1:500	A1	4	18.05.17	

DRAWING NUMBER
S17-338-2



SURVEY ORIENTATED TO REAL TIME GPS

0m 10m 20m 30m 40m

SCALE BAR 1:500

NOTES AND AMENDMENTS

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS PRIOR TO WORK COMMENCING

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD.

THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

REVISIONS

REV.	DESCRIPTION	DRAWN	CHKD.	DATE

Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bol	Bollard	TPS	Tactile paving slabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VP	Vent pipe
DR	Drain	WM	Water meter
Elec	Electrical ic	WO	Wash Out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod	Fence annotation	
FH	Fire Hydrant	B/W	Barbed wire
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/I	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hand rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Letter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
Mkr	Utility marker	W/M	Wire mesh
MP	Mile post	Level prefix descriptions	
MW	Monitoring Well	AL	Arch level
NP	Name plate	BL	Bed level
P	Post	CL	Cover level
PM	Parking meter	EH	Eaves level
RE	Rodding eye	FL	Floor level
RS	Road sign	IL	Invert level
rwp	Rain water pipe	PL	Parapet level
SP	Sign post	RH	Roof/ridge level
ST	Stop tap	SL	Soffit level
SB	Service Box	Spr	Arch springing level
SV	Stop valve	Top	Top of pipe/culvert
TCB	Telephone call box	WH	Wall height
TH	Trial Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to OSBM Newyln

Datum Generated by VRS GPS

3

4

2

1

SURVEY STATIONS			
stna	411617.259	414551.523	209.983
stna1	411580.704	414616.201	211.548
stna2	411545.255	414622.787	213.830
stna3	411630.572	415156.962	206.694
stna4	411584.639	415120.518	207.698
stna5	411609.594	415143.559	207.037
stnc	411497.153	414444.566	219.861
stn1	411545.549	414676.042	213.303
stn1a	411567.569	414635.463	212.200
stn2a	411548.969	414739.971	213.113
stn3	411515.265	414738.532	214.528
stn4	411503.691	414762.703	215.304
stn5	411477.274	414813.307	216.990
stn6	411507.644	414825.467	214.986
stn6a	411488.940	414856.347	215.956
stn7	411467.971	414848.570	217.086
stn8	411473.393	414869.876	216.853
stn8a	411519.864	414899.886	215.944
stn9	411266.867	414687.845	231.240
stn9a	411238.905	414644.829	232.851
stn9b	411264.633	414610.658	232.742
stn10	411313.845	414616.519	226.823
stn11	411343.019	414549.166	227.177

JLP Surveying

JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL:- peterhouston@jlpsurveys.com

PROJECT

EMPIRE KNIGHT, HUDDERSFIELD

DRAWING TITLE

Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1:500	A1	4	18.05.17	

DRAWING NUMBER

S17-338-3

SURVEY ORIENTATED TO REAL TIME GPS

0m 10m 20m 30m 40m

SCALE BAR 1:500

NOTES AND AMENDMENTS

ONLY MANHOLES AND SERVICES VISIBLE AT TIME OF SURVEY SHOWN

DRAINAGE INFORMATION MUST BE CHECKED AND VERIFIED WITH LOCAL AUTHORITY RECORDS PRIOR TO WORK COMMENCING

Levels defining edge of carriageway are observed at channel (bottom of kerb). Unless otherwise stated.

TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE THE AVERAGE SPREAD. THE DRIP LINE LAYER DENOTES THE TREES EXTREMITY

REVISIONS

REV.	DESCRIPTION	DRAWN	CHKD.	DATE

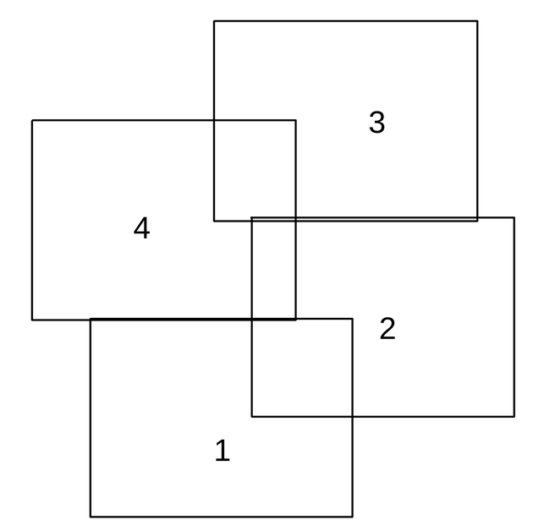
Topographical Survey Legend

Bin	Litter bin	TL	Tie line
BH	Bore Hole	TP	Telegraph pole
Bol	Bollard	TPS	Tactile paving slabs
BS	Bus stop	TS	Traffic signal light
BT	British telecom ic	TV	Television cover
CPS	Concrete paving slabs	VP	Vent pipe
DR	Drain	WM	Water meter
Elec	Electrical ic	WO	Wash Out
EP	Elec. pole	UTL	Unable to lift
ER	Earth rod	Fence annotation	
FH	Fire Hydrant	B/W	Barbed wire
FP	Flagpole	C/B	Closed boarded
FT	Floodlight	C/I	Corrugated iron
G	Gully	C/L	Chain link
GP	Gate post	C/P	Concrete panel
GV	Gas valve	H/R	Hand rail
IC	Inspection cover	I/R	Iron railings
JB	Junction box	O/B	Open boarded
KO	Kerb outlet	P/C	Post & chain
LB	Letter box	P/R	Post & rail
LP	Lamp post	P/W	Post & wire
Mkr	Utility marker	W/M	Wire mesh
MP	Mile post	Level prefix descriptions	
MW	Monitoring Well	AL	Arch level
NP	Name plate	BL	Bed level
P	Post	CL	Cover level
PM	Parking meter	EH	Eaves level
RE	Rodding eye	FL	Floor level
RS	Road sign	IL	Invert level
rwp	Rain water pipe	PL	Parapet level
SP	Sign post	RH	Roof/ridge level
ST	Stop tap	SL	Soffit level
SB	Service Box	Spr	Arch springing level
SV	Stop valve	Top	Top of pipe/culvert
TCB	Telephone call box	WH	Wall height
TH	Trial Hole	WL	Water level

BENCH MARK INFORMATION

All levels relate to OSBM Newyln

Datum Generated by VRS GPS



SURVEY STATIONS

stna	411617.259	414551.523	209.983
stna1	411580.704	414616.201	211.548
stna2	411545.255	414622.787	213.830
stna3	411630.572	415156.962	206.694
stna4	411584.639	415120.518	207.698
stna5	411609.594	415143.559	207.037
stnc	411497.153	414444.566	219.861
stn1	411545.549	414676.042	213.303
stn1a	411567.569	414635.463	212.200
stn2a	411548.969	414739.971	213.113
stn3	411515.265	414738.532	214.528
stn4	411503.691	414762.703	215.304
stn5	411477.274	414813.307	216.990
stn6	411507.644	414825.467	214.986
stn6a	411488.940	414856.347	215.956
stn7	411467.971	414848.570	217.086
stn8	411473.393	414869.876	216.853
stn8a	411519.864	414899.886	215.944
stn9	411266.867	414687.845	231.240
stn9a	411238.905	414644.829	232.851
stn9b	411264.633	414610.658	232.742
stn10	411313.845	414616.519	226.823
stn11	411343.019	414549.166	227.177

JLP Surveying

JLP Surveying Consultants Ltd,
Suite 25 Rodney House,
King Street,
Wigan
WN1 1BT
Tel - 01942 243313
Fax - 01942 492230
Mobile - 07710 428498
EMAIL:- peterhouston@jlpsurveys.com

PROJECT

EMPIRE KNIGHT, HUDDERSFIELD

DRAWING TITLE

Topographical Land Survey

SCALE	SHEET SIZE	No. of SHEETS	DATE	REVISION
1:500	A1	4	18.05.17	

DRAWING NUMBER

S17-338-4

Appendix 2: Masterplan

NOTES:
1. Do not scale from this drawing.
2. Always work to noted dimensions.
3. All dimensions are in millimetres unless otherwise stated.
4. All setting out, levels and dimensions to be agreed on site.
5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

KEY

1. Main vehicular entrance
2. Spine road
3. Village green
4. Existing pub
5. Retail unit
6. Arrival space
7. Community parkland area provides recreational resource and ecological mitigation
8. Natural play area
9. Linear park providing enhanced connectivity to wider landscape
10. Linear park providing enhanced connectivity between village green and natural play area
11. Pedestrian connection to surrounding area
12. Existing stone walls retained
13. Existing field retained as buffer between Crosland Hill Road and new development
14. Community Square
15. Pocket park
16. Extra care facility

Revision	Date	Description	Drawn	Apprvd.
S1-P03	24-07-20	Colour and annotation added	HB	AR
S1-P02	17-07-20	Revised 770 unit layout	HB	AR
S1-P01	xx-xx-xx	xx-xx-xx	XX	XX

Planit I.E. Limited
E: info@planit-ie.com W: planit-ie.com
MANCHESTER
2 Back Grafton St , Altrincham, WA14 1DY
T: 0161 928 9281
LONDON
Unit 6 Waterside, 44-48 Wharf Road, London, N1 7UX
T: 0207 253 5678
LIVERPOOL
Tempest 5,3, 12 Tithebarn Street, Liverpool, L2 2DT
T: 0151 363 1230

Client Empire Knight Group Limited

Project Land off Blackmoorfoot Road and Felks Stile Road, Huddersfield

Drg Title DEVELOPMENT LAYOUT

Created on	Created by	Approved by
13.11.19	HB	AR

Scale	Size	Workstage
1.1000	A0	FOR INFO

Drg No.	Suitability	Revision
PL1713-PLA-XX-XX-DR-U-0010	S1	P03

Appendix 3: Local Policy

Kirklees
Local Plan

Kirklees Local Plan Strategy and Policies

Adopted 27 February 2019

Kirklees COUNCIL

12.2 Water management

Policy LP27

Flood risk

Proposals for development which require a Sequential Test in accordance with national planning guidance will need to demonstrate that development has been directed to areas at the lowest probability of flooding, following a sequential risk based approach. The whole Kirklees district should be the starting point for the sequential test with applicants required to provide justification where a smaller area of search is proposed. If following application of the sequential test, there are no reasonably available sites which could accommodate the development in zones with a lower probability of flooding, it should also be demonstrated that a sequential approach has been applied within sites. This is to ensure that highly vulnerable and more vulnerable uses are directed towards the areas of lowest flood risk within the site. Proposals will also need to demonstrate that the exception test is passed, where applicable, as set out in national planning policy.

Proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but with all of the following additional restrictions:

a. no new highly vulnerable or more vulnerable uses will be permitted;
b. less vulnerable uses may only be permitted provided that the sequential test has been passed and;

   i. where extensions are linked operationally to an existing business or,

   ii. where redevelopment of a site provides buildings with the same or a smaller footprint;

c. all proposals will be expected to include flood mitigation measures such as compensatory storage which should be identified and considered through a site specific Flood Risk Assessment;

d. development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role.

Proposals must be supported by an appropriate site specific Flood Risk Assessment in line with national planning policy. This must take account of all sources of flooding set out in the Strategic Flood Risk Assessment and demonstrate that the proposal will be safe throughout the lifetime of the development (taking account of climate change). The proposal must also not increase flood risk elsewhere and where possible should reduce flood risk. Mitigation measures, where necessary, should be proposed.

Proposals involving building over existing culverts or the culverting or canalisation of water courses will not be permitted unless it can be demonstrated to be in the interests of public safety or to provide essential infrastructure and that there will be no detrimental effect on flood risk and biodiversity. Where feasible, development proposals should incorporate re-opening of culverts, modification of canalised water courses and consideration of mitigation measures to achieve a more natural and maintainable state.

Proposals for natural management such as targeted vegetation planting in upper catchments and along river banks will be supported in appropriate locations where consistent with national and local plan policies and relevant water catchment management plans to reduce flood risk and improve water quality.

Policy justification

12.17 As a consequence of climate change, it is predicted that the risk of flooding will increase. As such, the council will apply a sequential approach to the location of development in accordance with national planning guidance to avoid, where possible, flood risk to people and property. Local Plan allocations were subject to a flood risk sequential test during the plan preparation process so proposals in accordance with the allocated land use would not require a further sequential test during the plan period. The Kirklees district should be the starting point for the sequential test search area although smaller areas of search may be justified in certain circumstances. It is the responsibility of the applicant to provide evidence where a smaller area of search is proposed.

12.18 If following the application of the Sequential Test, it has been demonstrated to the satisfaction of the local planning authority that it is not possible for the development to be located in zones with a lower probability of flooding, evidence in relation to the Exception Test, where relevant, in accordance with the national planning policy framework will be assessed.

12.19 The sequential approach should also be applied within a proposed development site to ensure that highly vulnerable and more vulnerable uses are positioned in the lowest risk part of the site. All sources of flood risk set out in the Calder Catchment Strategic Flood Risk Assessment (SFRA) must be considered through a site specific flood risk assessment in accordance with criteria set out in national planning policy including surface water flood risk.

12.20 The Environment Agency Flood Map for Planning identifies areas at risk of flooding from river or sea flooding. For Kirklees, the Flood Map identifies fluvial flood zones 1 (lowest risk), 2 (medium risk) and 3 (high risk). The Calder Catchment SFRA provides more detailed flood risk information including identifying which parts of flood zone 3 are within the functional floodplain (flood zone 3b).

12.21 Using the recommended 5% probability of flooding as a starting point for determining the functional floodplain does not reflect the fact that some land within these areas will already contain buildings and therefore cannot perform a functional floodplain role. Such areas have therefore been excluded from the functional floodplain but have been identified in the Calder Catchment SFRA as flood zone 3ai to highlight the higher risk than flood zone 3a. The following flood risk zones therefore apply in Kirklees:

- Flood Zone 1
- Flood Zone 2
- Flood Zone 3a
- Flood Zone 3ai
- Flood Zone 3b

12.22 Proposals within flood zone 3ai will be assessed using criteria in national policy for flood zone 3a but with additional restrictions to reflect the higher risk. The probability of flooding in flood zone 3ai remains the same as the functional floodplain (flood zone 3b) therefore highly vulnerable or more vulnerable developments would not be appropriate within this zone. In certain circumstances less vulnerable development proposals could be justified, subject to a sequential test, such as proposals for an operationally linked extension to an established businesses or redevelopment with the same or smaller footprint.

12.23 Where possible, proposals for redevelopment in these areas should reduce the built form in these areas and if possible create additional water storage areas. Compensatory storage will be required for all schemes in flood zone 3ai and areas shown to be acting as functional floodplain by a site specific flood risk assessment should be retained as undeveloped areas.

12.24 As the Environment Agency Flood Map for Planning is updated regularly, this should be used as the starting point when considering flood risk through the planning system, with further detail provided by the Calder Catchment SFRA.

12.25 For surface water flood risk, the latest Environment Agency Surface Water Flood Map outlines risk areas although information from the Lead Local Flood Authority may indicate further areas at risk of surface water flooding. Where potential surface water flooding has been identified on a site, mitigation measures will need to be implemented and buildings and their curtilage should avoid risk areas. In addition, the management of surface water run-off from sites can have a significant impact on flood risk issues including minimising surface water flood risk to lower lying areas and reducing the flow of water into the river system to prevent problems downstream.

12.26 A site specific Flood Risk Assessment (FRA) must be submitted to support planning applications in line with criteria set out in national planning policy and needs to assess flood risk from all sources identified in the Calder Catchment Strategic Flood Risk Assessment (SFRA). The FRA will need to provide evidence that the proposal will be safe throughout the lifetime of the development, take account of climate change and demonstrate that the proposal will not lead to increased flood risk elsewhere.

12.27 Building over existing culverts should be avoided and the culverting and canalisation of water courses may exacerbate flood risk through an increased risk of blockage. It is also likely to be detrimental to wildlife and amenity as it can, for example create barriers to fish movement and reduce green amenity space / recreation opportunities alongside the water course. There may be some circumstances where building over culverts may be appropriate including where such a change is in the interests of public safety or to provide essential infrastructure such as that relating to roads.

12.28 For these reasons the reopening and restoration of existing culverts, modification of canalised water courses and consideration of mitigation measures such as fish passes are desirable in order to achieve a more natural state. The Humber River Basin Management Plan mitigation measures for heavily modified water bodies should be considered whenever work is being carried out on modifications, to maximise potential benefits of any scheme and ensure compliance with the EU Water Framework Directive. It is unlikely that building over culverts could be justified in flood risk terms unless in exceptional circumstances.

12.29 The council will be supportive of proposals for natural flood management such as targeted vegetation planting in upper catchments and along river banks in appropriate locations where consistent with national policies, the Kirklees Local Plan and wider catchment management objectives. This will contribute to the protection of watercourse banks by improving stability, improvement of water quality and also increase the lag time between rainfall events and water entering watercourses which should help to contribute to a reduction in flood risk.

Delivery and implementation

12.30 The evidence requirements in this policy will be provided by developers during the planning applications process. The council will provide information through the Strategic Flood Risk Assessment (SFRA) and pre-application discussions. The council and the Environment Agency will assess the evidence put forward by developers to ensure that inappropriate development will not be located in the high flood risk areas.

Links with strategic objectives

- Protect and improve green infrastructure to support health and well-being, giving residents access to good quality open spaces, sport and recreation opportunities, and to support habitats, allowing wildlife to flourish.

- Promote development that helps to reduce and mitigate climate change, and development which is adapted so that the potential impact from climate change is reduced and to help the transition towards a low carbon economy.
- Protect and enhance the characteristics of the built, natural and historic environment, and local distinctiveness which contribute to the character of Kirklees, including the South Pennine Moors, Moorland fringe and the area's industrial heritage.

Supporting evidence

- EU Water Framework Directive
- Humber River Basin Management Plan, December 2015, Environment Agency
- Calder Catchment Strategic Flood Risk Assessment (SFRA)
- Kirklees Surface Water Management Plan (SWMP)

Policy LP28

Drainage

The presumption is that Sustainable Drainage Systems (SuDS) will be used to assist in achieving the following on each site:

a. for proposals on greenfield sites, typical greenfield run-off rates should not be exceeded;
b. for proposals on brownfield sites there should be a minimum 30% reduction in surface water run-off where previous positive surface water connections from the site can be proven. New connections will be subject to at least greenfield restrictions;
c. No negative impact on local water quality and improvements in water quality where practicable;
d. Consider whether proposed open spaces and green infrastructure within sites can contribute to the sustainable drainage of the site.

Local conditions including the existence of critical drainage areas may require a lower run-off rate to be agreed to reflect volume control, local surface water risks, water course capacity and flood risk further downstream.

There will be a general presumption against pumping surface water. It must also be demonstrated that the surface water management solution is designed to meet requirements over the lifetime of the development including evidence that management and maintenance arrangements have been secured to cover that period. This includes ensuring proposals to store water meet national standards and latest best practice.

Flow paths accommodating water from outside the site or due to an exceedance event should be designed to avoid buildings and curtilages.

Development will only be permitted if it can be demonstrated that the water supply and waste water infrastructure required is available or can be co-ordinated to meet the demand generated by the new development.

Policy justification

12.31 When proposing new developments, surface water issues need to be addressed in terms of existing surface water and potential increases to run-off resulting from the development. Effective management of surface water can help to prevent increased flood risk and negative impacts on water quality with associated biodiversity benefits.

12.32 Sustainable drainage systems (SuDS) comprise a variety of attenuation methods to manage surface water and reduce the need for combined sewer overflows or emergency overflows and should be applied to new development. SuDS should be considered at the earliest possible opportunity when devising proposals to ensure that they can be fully incorporated into the scheme. SuDS must be designed and installed in line with the latest national and local best practice and guidance in order to prevent an increased risk of pollution to watercourses and must be designed to meet requirements over the lifetime of the development.

12.33 In order to ensure that flood risk is not increased, it is expected that run-off rates will be minimised. The starting point for this will be a maximum greenfield run-off rate (5 litres per second per hectare) for greenfield sites and a minimum 30% reduction in run-off rates on brownfield sites. The 30% reduction to run-off rates on brownfield sites was agreed between Kirklees, its neighbouring West Yorkshire councils, the Environment Agency and Yorkshire Water. For proposals on brownfield sites, unless it can be demonstrated that positive connections to the main drainage system still function appropriately (i.e. the arrangements for dealing with drainage from the previous use are still intact, have the required capacity and are not contaminated from misconnections), the site will be treated as a greenfield site for surface water purposes.

12.34 Lower discharge rates may be required due to local circumstances, such as where emerging evidence indicates a lower run-off rate is required within an area, national volume control standards, proposals impacting on a critical drainage area, capacity issues within existing water courses and systems and potential flood risk further downstream. Retrofitting of SuDS should also be considered.

12.35 There will be a presumption against the water management solution relying on surface water pumping as mechanical failure could lead to surface water flooding within an area. SuDs should contribute to green infrastructure and provide biodiversity benefits wherever practicable. It is important that inappropriately or poorly managed SuDS do not lead to a reduction in water quality in surrounding areas and watercourses and where possible, (in accordance with LP34) act to improve water quality in line with the Water Framework Directive and Humber River Basin Management Plan. Consideration should also be given to whether areas of open space within a development proposal can contribute to the sustainable drainage of the site.

12.36 The council has a duty under the Flood and Water Management Act to manage flood risk from surface water and watercourses. The council's Surface Water Management Plan (SWMP) identifies measures to manage this local risk, including risk from flows from the upper catchment onto lower sites. Areas which have been identified as being at higher risk of surface water flooding have been highlighted in the SWMP. The council, as Lead Local Flood Authority, will continue to develop a Kirklees Local Flood Risk Management Strategy including SWMP and produce technical guidance to provide an increasing amount of information and guidance on managing surface water flood risk.

12.37 It must be demonstrated that the surface water management solution meets national standards and follows current best practice as well as being designed to meet requirements over the lifetime of the development. To further mitigate potential surface water problems, potential flow routes for surface water run-off, including water entering the site from adjacent areas or through exceedance events within the site, should be considered within the design of schemes avoiding existing buildings. Such flows should also be designed to avoid the curtilage of buildings where practicable.

12.38 Where development is proposed it must be demonstrated that there is sufficient infrastructure for providing water supply and demonstrate that access to sewers, wastewater and surface water removal infrastructure can be achieved.

Delivery and implementation

12.39 The council will provide advice in relation to the interpretation of the policy and clarify whether areas are within Critical Drainage Areas. Developers will be required to implement the policy requirements in terms of surface water drainage using the latest published guidance including best practice. This will ensure effective management of surface water.

Links with strategic objectives

- Protect and improve green infrastructure to support health and well-being, giving residents access to good quality open spaces, sport and recreation opportunities, and to support habitats, allowing wildlife to flourish.
- Promote development that helps to reduce and mitigate climate change, and development which is adapted so that the potential impact from climate change is reduced and to help the transition towards a low carbon economy.
- Protect and enhance the characteristics of the built, natural and historic environment, and local distinctiveness which contribute to the character of Kirklees, including the South Pennine Moors, Moorland fringe and the area's industrial heritage.

Supporting evidence

- EU Water Framework Directive
- Humber River Basin Management Plan, December 2015, Environment Agency
- Calder Catchment Strategic Flood Risk Assessment (SFRA)
- Kirklees Surface Water Management Plan (SWMP)
- Kirklees Local Flood Risk Management Strategy
- Sustainable Drainage Systems: Non-technical standards for sustainable drainage systems, 2015 (DEFRA)
- Code of practice for surface water management for development sites (BS8582:2013)
- Non-statutory technical standards for sustainable drainage: Best practice guidance (Local Authority SuDS Officer Organisation)

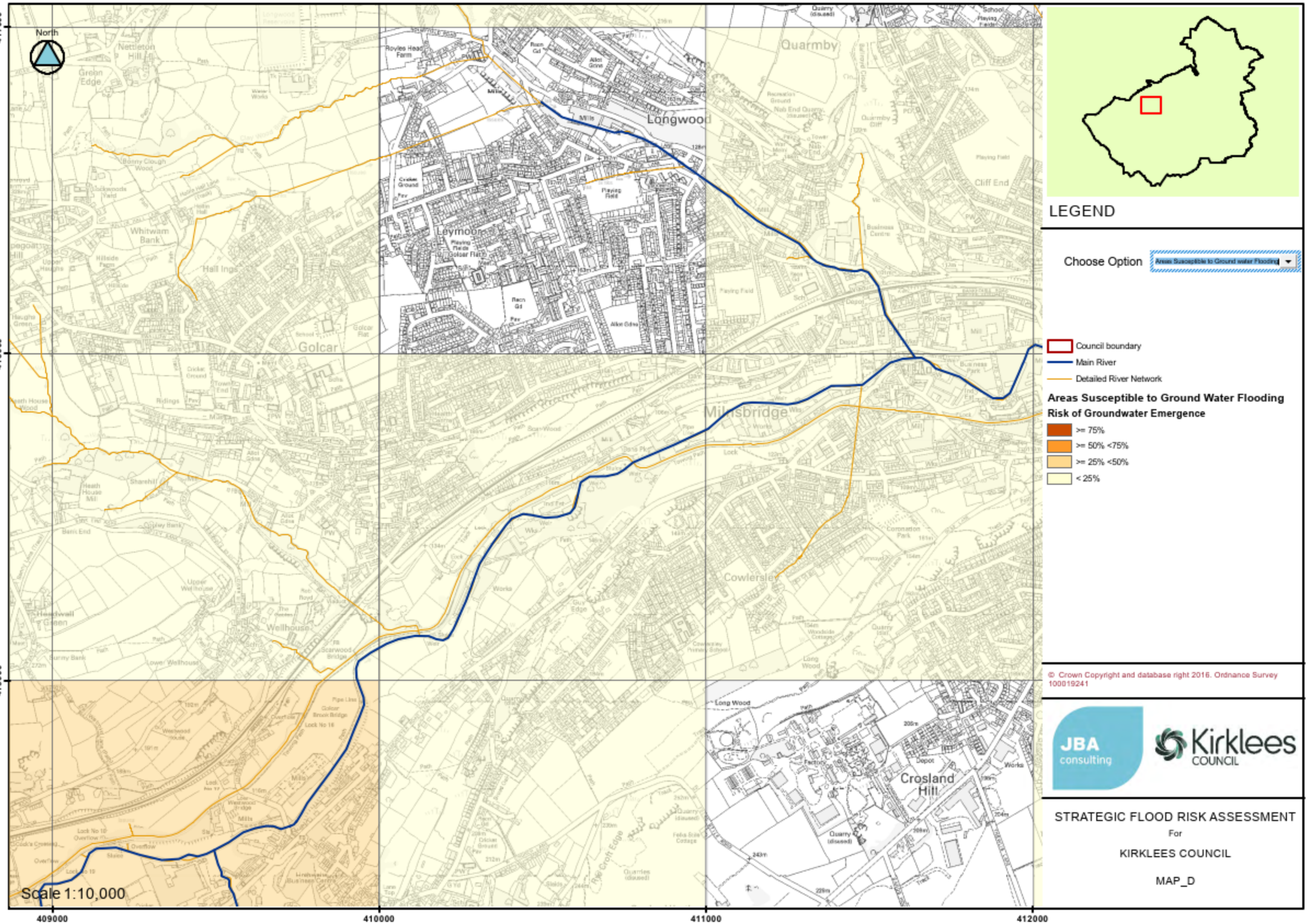
Policy LP29

Management of water bodies

Where it is proposed to develop a site already containing a water area, this should normally be retained as part of the proposal and include a future management plan for the maintenance of the water area to ensure the safety of residents for the lifetime of the development. This includes bodies of water associated with existing buildings, even where they are remote from the building, and also includes ancillary elements linked to the operation of the water body.

Policy justification

12.40 Where proposals include an existing area of water, there needs to be careful consideration of the potential flood risk and biodiversity implications of the development proposals. Larger reservoirs (capacity greater than 25,000m^3) are regulated under the Reservoirs Act 1995 and are responsibly managed and maintained by their owners. The Flood and Water Management Act makes provision for this threshold to be amended to 10,000m^3, however this has yet to be implemented.



LEGEND

Choose Option: Areas Susceptible to Ground water Flooding

- Council boundary
- Main River
- Detailed River Network

Areas Susceptible to Ground Water Flooding
Risk of Groundwater Emergence

- >= 75%
- >= 50% <75%
- >= 25% <50%
- < 25%

JBA consulting

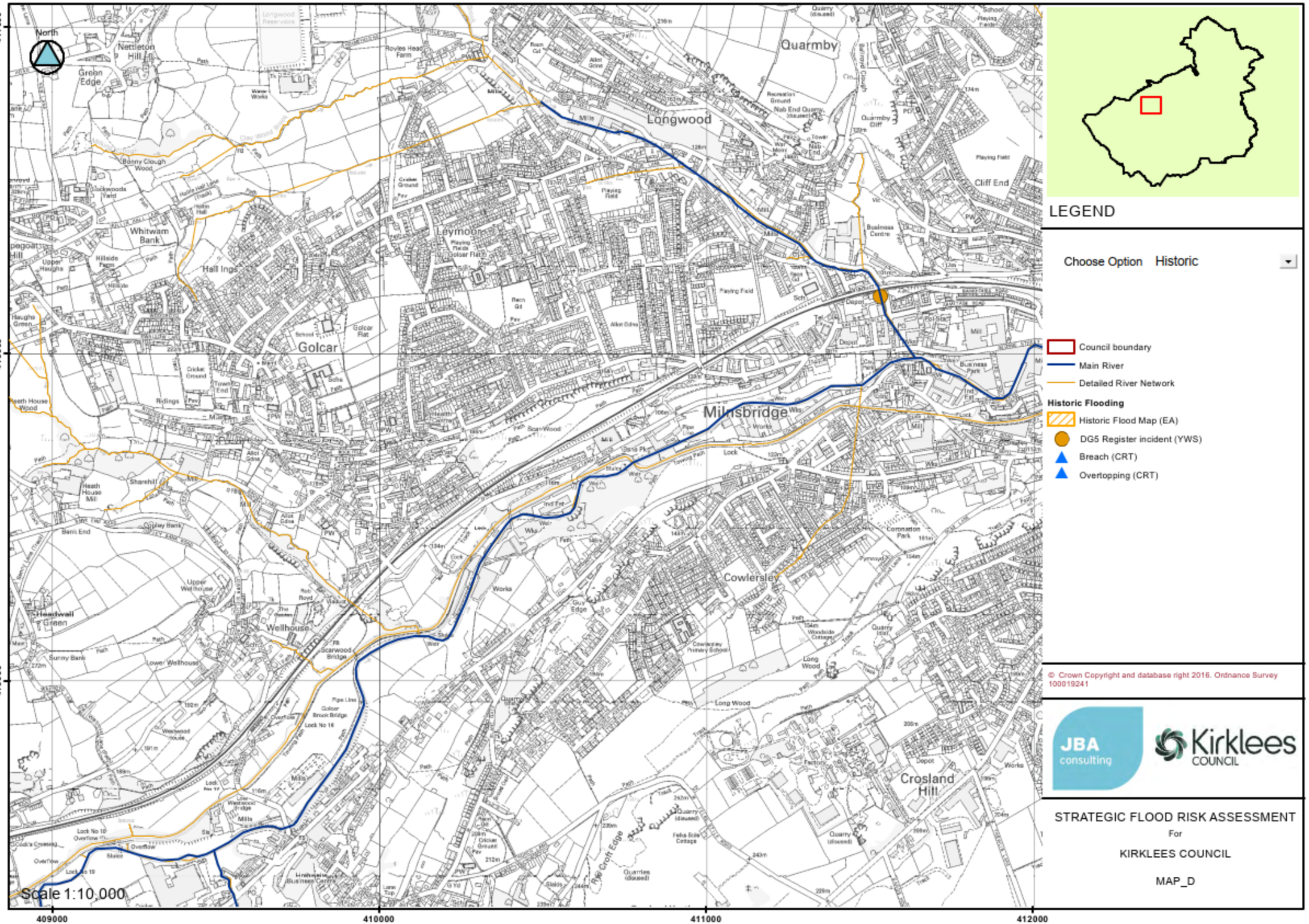
Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_D



LEGEND

Choose Option Historic

- Council boundary
- Main River
- Detailed River Network

Historic Flooding

- Historic Flood Map (EA)
- DG5 Register incident (YWS)
- Breach (CRT)
- Overtopping (CRT)

JBA consulting

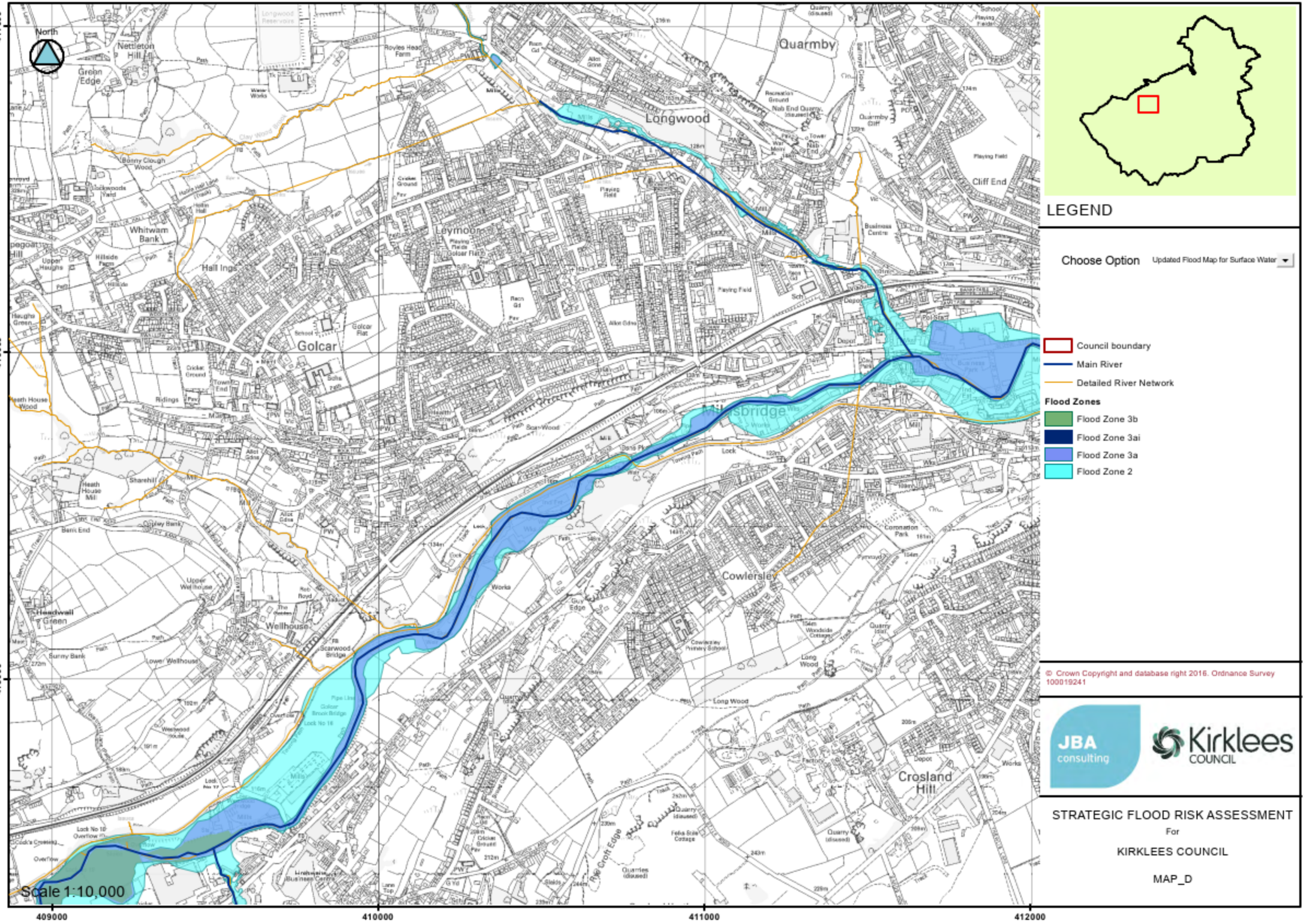
Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_D



LEGEND

Choose Option: Updated Flood Map for Surface Water

- Council boundary
- Main River
- Detailed River Network

Flood Zones

- Flood Zone 3b
- Flood Zone 3ai
- Flood Zone 3a
- Flood Zone 2

JBA consulting

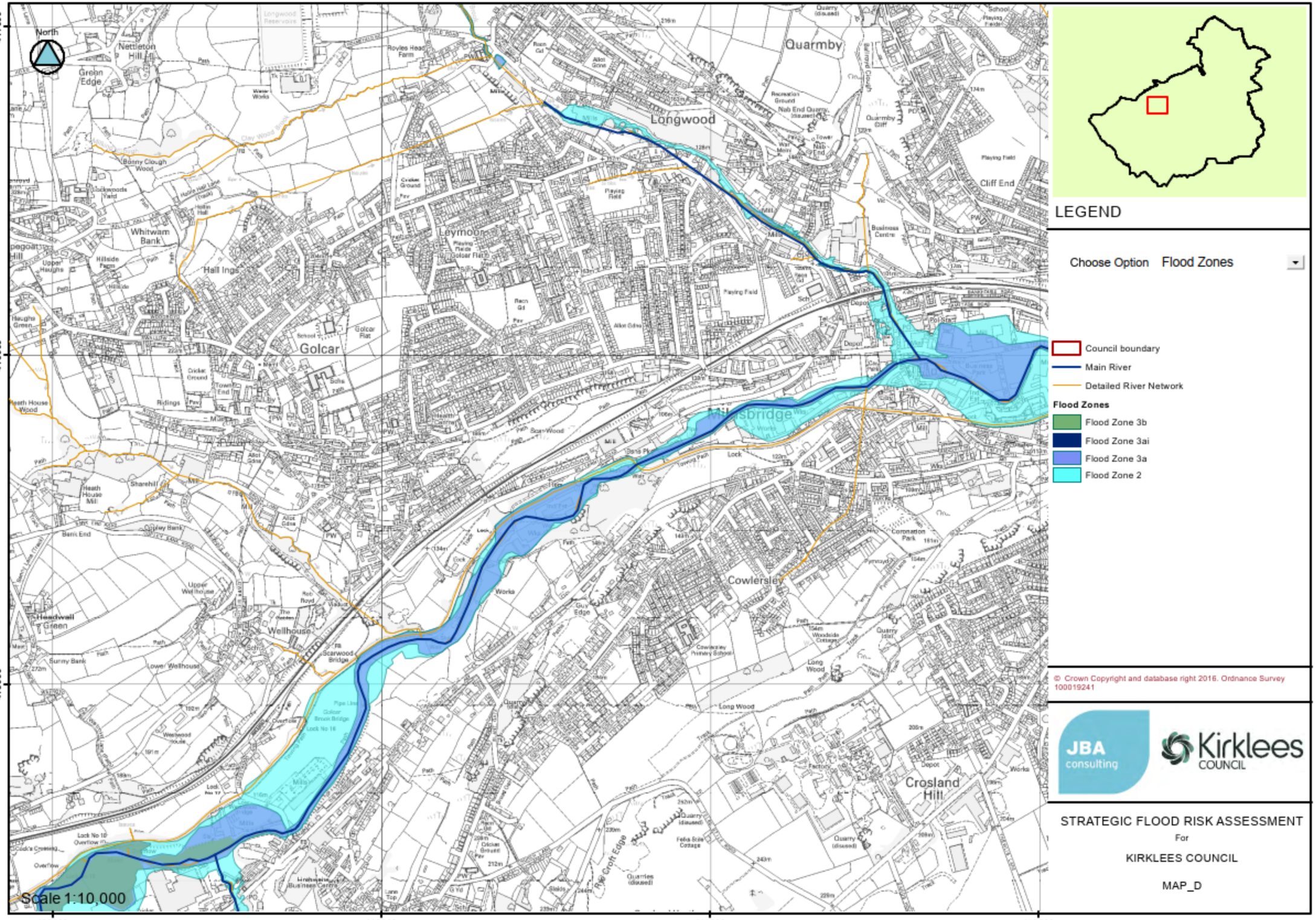
Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_D



LEGEND

Choose Option: Flood Zones

- Council boundary
- Main River
- Detailed River Network

Flood Zones

- Flood Zone 3b
- Flood Zone 3ai
- Flood Zone 3a
- Flood Zone 2

JBA consulting

Kirklees COUNCIL

STRATEGIC FLOOD RISK ASSESSMENT

For

KIRKLEES COUNCIL

MAP_D

Appendix 4: Consultation Correspondence

Lead Local Flood Authority Statutory Consultation

Consultation on Application Number: 2018/90748

Address: Land off Blackmoorfoot Road and Felks St, Huddersfield, HD4 7AD

Proposal: Outline application for the development of up to 630 residential dwellings (Use Class C3), up to 70 care apartments with doctors surgery of up to 350 sq m (Use Classes C2/C3/D1), up to 500 sq m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use), vehicular and pedestrian access points off Blackmoorfoot Road and Felks Stile Road and associated works

Planning Officer: Bill Topping

Drainage Officer: Paul Farndale

Comments:-

Summary

Kirklees Flood Management can SUPPORT this OUTLINE application with LAYOUT and other matters reserved.

Steepness of the site and large areas shown as unsuitable for soakaways give rise for concern over re-emergence issues. Soakaways are rules out.

Yorkshire Water has stipulated maximum discharge rates to the public sewer network.

A formal consideration of the future drainage of Felks Stile Road (Section 278) is required to be discussed with the LLFA, Highways DC and the Planning Officer. This road appears to be drained via ditches but an access is required to the site.

A section 106 undertaking is required for maintenance and management of SUDS systems until such a time as they are formally adopted by a corporate body. Details of maintenance and management should be worded to be agreed at detailed design stage.

Additional Advice Notes

Permeable paving for an adopted system is unlikely to be accepted and will be assumed to fail. These areas will therefore need to be counted in any estimation for storage which as a result is likely to be greater than the estimate in the FRA.

The adoption of basins should be explored further given recent Yorkshire Water advice which may result in the need for a private management company to maintain for the whole lifetime of the development.

Suggested Conditions

DR01 Drainage Details

Development shall not commence until a scheme detailing foul, surface water and land drainage, (including off site works, outfalls, balancing works, plans and longitudinal sections, hydraulic calculations, phasing of drainage provision, existing drainage to be maintained/diverted/abandoned) has been submitted to and approved in writing by the Local Planning Authority. The scheme shall include a surface water drainage maintenance and management plan for the whole life of the developed site. None of the dwellings shall be occupied until such approved drainage scheme has been provided on the site to serve the development or each agreed phasing of the development to which the dwellings relate and thereafter retained thereafter.

DR04/5 Surface Water Attenuation

Development shall not commence until a scheme restricting the rate of surface water discharge from the site to a maximum of 27 l/s to Outfall A in Crosland Hill Road and 61l/s to Outfall B in Blackmoorfoot Road as described in the Flood Risk Assessment & Drainage Strategy by Waterman, 4th issue, has been submitted to and approved in writing by Local Planning Authority. The drainage scheme shall be designed to attenuate flows generated by the critical 1 in 100 + 30% climate change event. The scheme shall include a detailed maintenance and management regime for the storage facility including the flow restriction. There shall be no piped discharge of surface water from the development and no part of the development shall be brought into use until the flow restriction and attenuation works comprising the approved scheme have been completed. The approved maintenance and management scheme shall be implemented thereafter.

DR07 Overland Flood Routing

The development shall not commence until an assessment of the effects of 1 in 100 year storm events with an additional allowance for climate change, blockage scenarios and exceedance events, on drainage infrastructure and surface water run-off pre and post development between the development and the surrounding area, in both directions, has been submitted to and approved in writing by the Local Planning Authority. No part of the development shall be brought into use (dwellings shall not be occupied) until the works comprising the approved scheme have been completed and such approved scheme shall be retained thereafter.

DR10 Temporary Drainage

Development shall not commence until a scheme, detailing temporary surface water drainage for the construction phase (after soil and vegetation strip) has been submitted to and approved in writing by the Local Planning Authority. The scheme shall detail:

- phasing of the development and phasing of temporary drainage provision.
- include methods of preventing silt, debris and contaminants entering existing drainage systems and watercourses and how flooding of adjacent land is prevented.

The temporary works shall be implemented in accordance with the approved scheme and phasing. No phase of the development shall be commenced until the temporary works approved for that phase have been completed. The approved temporary drainage scheme shall be retained until the approved permanent surface water drainage system is in place and functioning in accordance with written notification to the Local Planning Authority.

DR12 Interceptor

Development shall not commence until a scheme, detailing the treatment of all surface water flows from concentrated parking areas greater than 800 square metres or 50 parking spaces, through an oil interceptor, (**or a full petrol oil interceptor**) reedbed or alternative treatment system, has been submitted to and approved in writing by the Local Planning Authority. Use of the parking areas/hardstandings shall not commence until the works comprising the approved treatment scheme have been completed. Treatment shall take place prior to discharge from the treatment scheme. The treatment scheme shall be retained, maintained to ensure efficient working and used thereafter. Roof water shall not pass through the interceptor.

Signed: Paul Farndale

Date: 14th August 2018

Planning Consultation Request

Town and Country Planning Act 1990

APPLICATION FOR PERMISSION TO DEVELOP LAND

Observations By:	**KC, Lead Local Flood Authority**

Application No.	**2020/92546**
Proposed Development:	**Outline application (with details of points of access only) for the development of up to 770 residential dwellings (Use Class C3), including up to 70 care apartments (Use Classes C2/C3) with doctors surgery of up to 350 sq m (Use Class D1); up to 500 sq m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use), vehicular and pedestrian access points off Blackmoorfoot Road and Felks Stile Road and associated works.**
Location:	**Land off, Blackmoorfoot Road and Felks Street, Crosland Moor, Huddersfield, HD4 7AD**
OS Map Reference	**SE 411329.1154 414683.3657**
Applicant/Agent:	**Gerald Eve LLP**
Class:	**Other Developments**

Your comments on the above proposal are requested. Please e-mail your comments in either a Microsoft Word or PDF Document to DC.Admin@kirklees.gov.uk by 04-Sep-2020.

If you would like to contact the Case Officer: Kate Mansell for any reason then please do so on: Tel. 72130 .

The submitted plans and documents for the application can be viewed online at the Planning Service Website by holding down Ctrl and Clicking the link below: http://www.kirklees.gov.uk/beta/planning-applications/search-for-planning-applications/detail.aspx?id=2020/92546 *

***If the plans are not available online after 5 working days of the date of this letter then please e-mail: DC.Admin@kirklees.gov.uk**

If I do not receive your response by 04-Sep-2020 then the application may be decided without the benefit of your views.

Dated: 14-Aug-2020

Mathias Franklin
Head of Planning and Development

Consultation Response from KC, Lead Local Flood Authority		
2020/92546 Land off, Blackmoorfoot Road and Felks Street, Crosland Moor, Huddersfield, HD4 7AD		
Outline application (with details of points of access only) for the development of up to 770 residential dwellings (Use Class C3), including up to 70 care apartments (Use Classes C2/C3) with doctors surgery of up to 350 sq m (Use Class D1); up to 500 sq m of Use Class A1/A2/A3/A4/A5/D1 floorspace (dual use), vehicular and pedestrian access points off Blackmoorfoot Road and Felks Stile Road and associated works.		
Date Responded: 3rd November 2020	**Responding Officer: Paul Farndale**	**Responding Ref:**

Summary

Kirklees Flood Management & Drainage acting as Lead Local Flood Authority, statutory consultee for surface water management, OBJECTS to this application on the grounds that flood risk and drainage strategy goes against advice previously given under application 2018/90748 and pre-application advice.

Detailed Response

Whilst it is recognised that this application is outline with all matters reserved, we feel we cannot condition this application due to the submission of flood risk assessments and drainage strategies that we cannot approve and go against previous advice and instruction given.

Kirklees Flood Management and Drainage is the Land Drainage Authority and Lead Local Flood Authority for Kirklees.

As such we advise against the use of soakaways on a sloping site of this nature that will be reprofiled to create steeper sections. Re-emergence of soakaways cannot be readily tested and should be viewed in the context of a cautionary approach.

Large parts of the site are not suitable for soakaways with clay soils. British Geological Survey data confirms that a significant proportion of the site will have severe constraints for infiltration.

Where declarations have been made for a limited number of tests, these are on higher parts of the site that which differs by circa 50m in levels from west to east. As a footnote, many of the tests are interpolated and should be rejected in line with CIRIA guidance.

In this respect, a suggested condition by Yorkshire Water, is both Ultra Vires and contradictory, first ruling out connections to sewer and then giving a limited discharge in a second paragraph. Connections to sewer cannot be ruled out where a process is to be followed with assessment of infiltration and watercourse connection through consultation with the LLFA only.

It should be noted that on previous application 2018/90748 as stated in the Flood Risk Assessment that Yorkshire Water previous advised that despite large areas of the existing site proven to discharge to the public sewer network, a reduced allowance in excess of Kirklees Brownfield Drainage policy and guidelines was advised simply due to the limitation of the existing pipe sizes that would cause on site flooding above a given flow rate. The LLFA agrees with this on its comments under the same application where discharge rates of 27l/s and 61l/s (88l/s in total) were set out. This should be adhered to on this application.

An indicative drainage plan showing infiltration swales, detention ponds and crate storage should therefore be ignored. Despite being indicative Kirklees LLFA are concerned that no indication of overland flow routes for the existing site has been assessed in the FRA and therefore shown how this would change potentially through development. In terms of flood risk management, a developer should always look at potential mains drainage and attenuation location and examine blockage scenarios and exceedance events. These should be confined to road networks and open space avoiding property and curtilage. As a result, the FRA is incomplete and should include all the above and other pre-application advice as an official consultation with the LLFA which is also missing from the document.

Treatment of water quality can be considered for this application but is less important given connections need to be to public combined sewer and ultimately will reach a treatment works as

opposed to a connection to a watercourse. Where there are 50 or more concentrated parking spaces and interceptor, or SUDS alternative will be required for this specific area. Any end use that has a canteen or commercial food preparation areas will require Fats, Oils and Grease mitigation.

Section 106 Unilateral Undertaking to ensure maintenance and management of any accepted surface water scheme will apply to this site.

Kirklees LLFA would like to be reconsulted when the above information is taken into account in a submitted FRA.

411386 : 414639	Map Name : SE1014SE	Title	Partial Key
Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : YorMap Advisor C ROBERTS Contact Tel : 87 2582		Notes	Foul Sewer = F Combined Sewer = C Surface Water Sewer = SW Trade Sewer = TD Partially Separate = PS

This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.

Date Req : 12/07/2020, 14:44:38
Date Gen : 12/07/2020, 14:58:04
Source : Sewer Network Enquiry

UPN: Undefined Originator: C ROBERTS, YorMap, 87 2582

YorkshireWater

Ruxandra Ekman
Campbell Reith
1 Marsden Street
Manchester
M2 1HW
manchester@campbellreith.com

Yorkshire Water Services
Developer Services
Pre-Development Team
PO BOX 52
Bradford
BD3 7AY

Tel: 0345 120 8482
Fax:

Email:
technical.sewerage@yorkshirewater.co.uk

For telephone enquiries ring:
Chris Roberts on 0345 120 8482

Your Ref:
Our Ref: W008822

13th July 2020

Dear Ruxandra Ekman,

Blackmoorfoot Road, Huddersfield, HD4 7AD - Pre-Planning Sewerage-Enquiry-Residential T865744

Thank you for your recent enquiry and remittance. Our official VAT receipt has been sent to you under separate cover. Please find enclosed a complimentary extract from the Statutory Sewer Map which indicates the recorded position of the public sewers. Please note that as of October 2011 and the private to public sewer transfer, there are many uncharted Yorkshire Water assets currently not shown on our records.

The following comments reflect our view, with regard to the public sewer network only, based on a 'desk top' study of the site and are valid for a maximum period of twelve months:

Development of the site should take place with separate systems for foul and surface water drainage. The separate systems should extend to the points of discharge to be agreed.

Foul Water

Foul water domestic waste can discharge to the 300 mm diameter public combined sewer recorded in Crosslands Road, at a point to the east of the site.

Foul water from kitchens and/or food preparation areas of any restaurants and/or canteens etc. must pass through a fat and grease trap of adequate design before any discharge to the public sewer network.

Surface Water

The developer's attention is drawn to Requirement H3 of the Building Regulations 2000. This establishes a preferred hierarchy for surface water disposal. Consideration should firstly be given to discharge to soakaway, infiltration system and watercourse in that priority order.

Sustainable Drainage Systems (SuDS), for example the use of soakaways and/or permeable hardstanding etc, may be a suitable solution for surface water disposal appropriate in this situation. You are advised to seek comments on the suitability of SuDS in this instance from the appropriate authorities.

As previously agreed for this site and as last resort and subject to providing satisfactory evidence as to why the other methods of surface water disposal have been discounted, curtilage surface water may discharge to the

As a last resort, and upon receipt of satisfactory evidence to confirm the reasons for rejection of surface water disposal via infiltration, curtilage surface water may discharge to Crosland Hill Road at a rate not exceeding 27 litres/second and to Blackmoorfoot Road at a rate not exceeding 61 litres/second.

Surface water run-off from communal parking (greater than 800 sq metres or more than 50 car parking spaces) and hardstanding must pass through an oil, petrol and grit interceptor/separator of adequate design before any discharge to the public sewer network. Roof water should not pass through the traditional 'stage' or full retention type of interceptor/separator. It is good drainage practice for any interceptor/separator to be located upstream of any on-site balancing, storage or other means of flow attenuation that may be required.

Other Observations

Any new connection to an existing public sewer will require the prior approval of Yorkshire Water. You may apply on line or obtain an application form from our website (www.yorkshirewater.com) or by telephoning 0345 120 84 82.

An off-site foul and surface water sewer may be required which may be provided by the developer and considered for adoption under Section 104 of the Water Industry Act 1991. Please telephone 0345 120 84 82 for advice on sewer adoptions. Alternatively, the developer may in certain circumstances be able to requisition off-site sewers under Section 98 of the Water Industry Act 1991 for which an application must be made in writing. For further information, please telephone 0345 120 84 82.

Prospectively adoptable sewers and pumping stations must be designed and constructed in accordance with the WRc publication "Sewers for Adoption - a design and construction guide for developers" 6th Edition as supplemented by Yorkshire Water's requirements, pursuant to an agreement under Section 104 of the Water Industry Act 1991. An application to enter into a Section 104 agreement must be made in writing prior to any works commencing on site. Please contact our Developer Services Team (telephone 0345 120 84 82) for further information.

All the above comments are based upon the information and records available at the present time and is subject to formal planning approval agreement. The information contained in this letter together with that shown on any extract from the Statutory Sewer Map that may be enclosed is believed to be correct and is supplied in good faith. Please note that capacity in the public sewer network is not reserved for specific future development. It is used up on a 'first come, first served' basis. You should visit the site and establish the line and level of any public sewers affecting your proposals before the commencement of any design work.

Yours sincerely

Chris Roberts
Pre-Development Technician
Developer Services
Yorkshire Water Services Limited

RE: Blackmoorfoot Road, Huddersfield, HD4 7AD - Pre-Planning Sewerage-Enquiry-Residential T865744
Chris Roberts to: ElannaHerod@campbellreith.com 22/07/2020 15:41

Hi Elanna,

I would have no objection to a gravity connection for 340 domestic properties to discharge to the 225 mm combined sewer in Blackmoorfoot Road. Please note the drainage you connect must not be greater than 225 mm in diameter.

Kind Regards

YorkshireWater

We are open Monday to Friday
0800 – 1700
We are closed Bank Holidays and Weekends

Chris Roberts

Sewerage Technical Team
Developer Services

Tel: 0345 1 20 84 82

***** Please note, all correspondence must be sent to technical.sewerage@yorkshirewater.co.uk *****

Yorkshire Water plays a key role in protecting public health and we're doing everything we can to continue to provide essential water and waste water services to customers during the Covid-19 outbreak. As a result we have decided to scale back some of our developer services activity. This is to allow colleagues from our developer services team to support frontline colleagues in delivering our core services to customers. This will mean we aren't able to respond as quickly as usual. Thank you for your patience, we will keep you updated as the situation progresses.

From: ElannaHerod@campbellreith.com <ElannaHerod@campbellreith.com>
Sent: 22 July 2020 15:33
To: Chris Roberts <Chris.Roberts@yorkshirewater.co.uk>
Subject: Fw: Blackmoorfoot Road, Huddersfield, HD4 7AD - Pre-Planning Sewerage-Enquiry-Residential T865744

Hi Chris,

I hope you are well.

I was just wondering if you've had a chance to review the potential foul water connection to the sewer on Blackmoorfoot Road?

Kind Regards

Elanna Herod
Project Engineer

CampbellReith
consulting engineers

No. 1 Marsden Street
Manchester
M2 1HW

Tel: +44 (0)161 819 3062
www.campbellreith.com
----- Forwarded by Elanna Herod/CRH on 22/07/2020 15:30 -----

From: Elanna Herod/CRH
To: "Chris Roberts" <Chris.Roberts@yorkshirewater.co.uk>
Date: 20/07/2020 11:30
Subject: RE: Blackmoorfoot Road, Huddersfield, HD4 7AD - Pre-Planning Sewerage-Enquiry-Residential T865744

Hi Chris,

We would be looking at approximately 340 dwellings discharging to Blackmoorfoot Road.

Kind Regards

Elanna Herod
Project Engineer

CampbellReith
consulting engineers

No. 1 Marsden Street

Appendix 5: Infiltration Test Report

GroundSolve Ltd
Consulting Geotechnical, Engineering Geology and Environmental Engineers.

Unit 1 Charter Court,
Well House Barns,
Chester Road, Bretton,
Flintshire, CH4 0DH
Tel: 01244 661361
Mob: 07931 259435
Email: samfishburne@groundsolve.com

REF: 2378/BFT/Soakaways/sf

Renata Bochenek

By email
RenataBochenek@campbellreith.com

17th July 2020

Dear Renata,

RE: BLACK CAT FIREWORKS SITE, HUDDERSFIELD – SOAKAWAY TESTING

As instructed, soakaway testing was carried out at the Black Cat Fireworks site on the 14th – 15th July 2020.

Six trial pits were excavated by a JCB 3CX to a maximum depth of 3.00mbgl, at locations provided to GroundSolve Ltd (GSL) by Campbell Reith (CR). Five test locations were initially proposed however SA4 was unsuitable for soakaway testing due to instability and was reattempted as SA4A. The test locations are shown in Appendix A.

The trial pits were logged by a Geotechnical Engineer from GSL, in general accordance with BS 5930:2015. The trial pit logs are presented in Appendix B.

The trial pits revealed the ground conditions to comprise a thin layer of topsoil overlying made ground or highly weathered bedrock deposits (depending on location). Where made ground was encountered, it was not possible to determine the base.

The trial pits were then rapidly filled with water from a 2000-gallon water bowser, and the rate of fall monitored over a period of time. Three of the trial pits proved unable to fill due to the high permeability of the made ground. It was only possible to complete testing on SA1 and SA4A with the remainder requiring water volumes in excess of 1000ltr/min to fill. It was not possible to complete 3 test cycles on SA1 due to slow infiltration.

Infiltration rates were calculated for each of the test cycles. The calculations and results are presented in Appendix C, and summarised in the table below:

Trial Pit & Test Cycle	Test Depth (m)	Infiltration Rate (m/s)
SA1 Cycle 1	3.00	9.09×10^{-6}
SA2	2.20	$>1.04 \times 10^{-2}$
SA3	2.00	$>1.04 \times 10^{-2}$
SA4A Cycle 1	1.60	1.01×10^{-5}
SA4A Cycle 2	1.60	1.31×10^{-5}
SA4A Cycle 3	1.60	1.17×10^{-5}

SA5	2.20	$>1.04 \times 10^{-2}$

*Note: The result for SA2, SA3 and SA5 are inferred as in excess of 1.04×10^{-2} due to being unable to fill the trial pits fast enough.

We trust this is satisfactory, should you have any queries please call Sam Fishburne on 01244 661361.

Yours sincerely,

Sam Fishburne.

APPENDIX A

Exploratory Hole Location Plan

SCALE NTS

Figure Title

Blackmoorfoot Road
Exploratory Hole
Location Plan

Job No: 2386

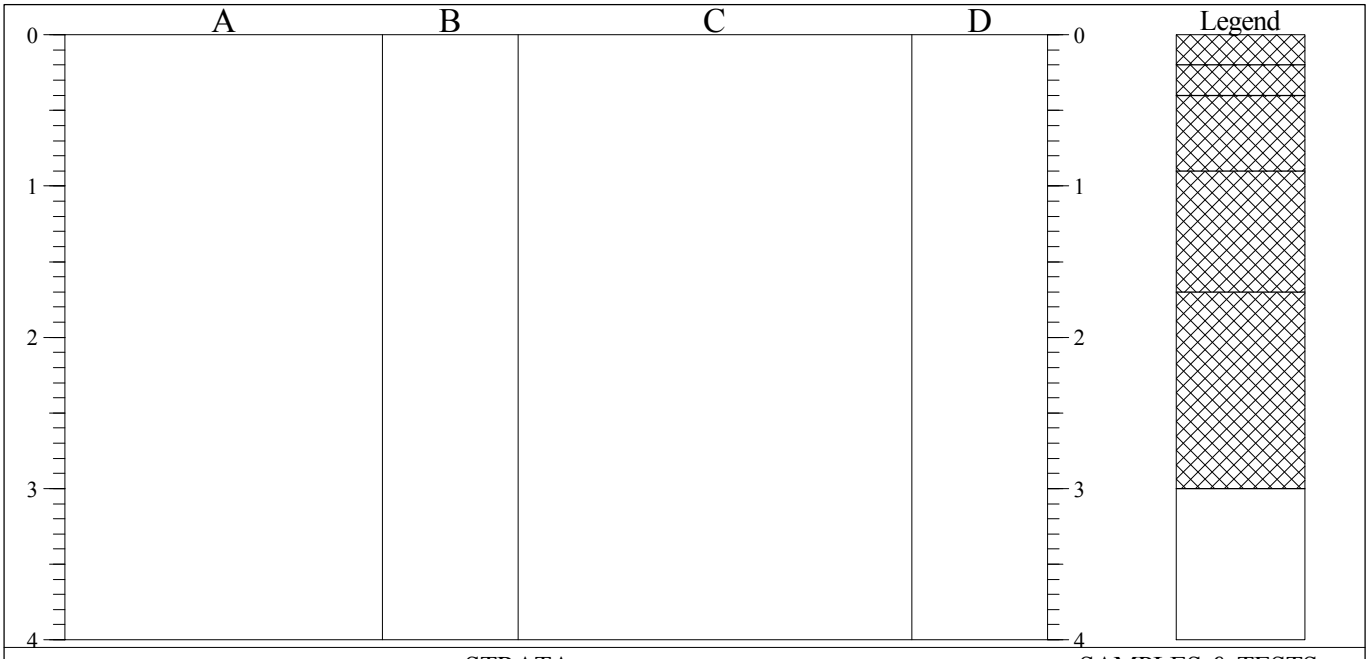
APPENDIX B

Trial Pit Logs

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

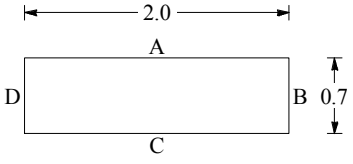
TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA1
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	14-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Scrub over loose dark brown gravelly sandy SILT. Gravel is angular to subangular fine to coarse of brick and concrete (MADE GROUND).			
0.20-0.40					
0.40-0.90		Dense black gravelly fine to coarse SAND with high cobble content of angular brick. Gravel is angular to subangular fine to coarse of brick and clinker. (MADE GROUND).			
0.90-1.70		Dense light brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone (MADE GROUND). Medium dense black gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of clinker (MADE GROUND).			
1.70-3.00		Soft to firm black to dark grey sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of clinker and sandstone (MADE GROUND).			

Shoring/Support:
Stability: Stable



GENERAL REMARKS

1.) Soakaway carried out at 3.00m.

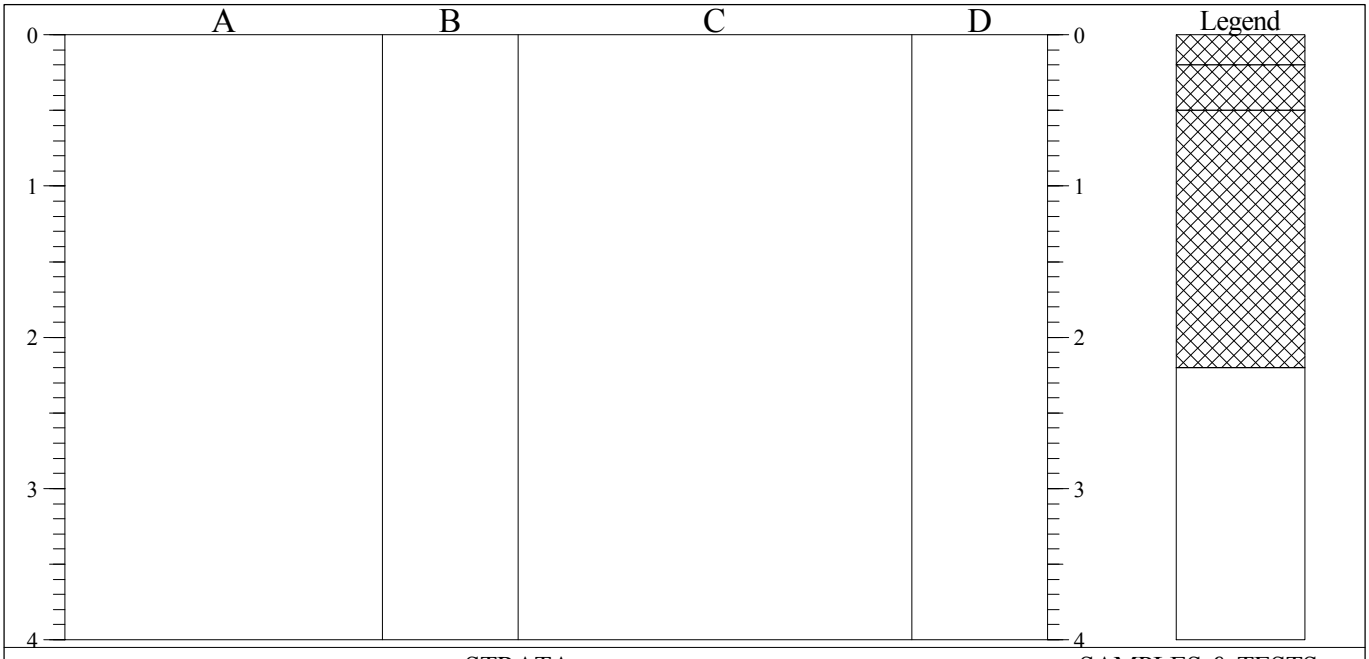
All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

AGS3 UK TP 2386 BLACKMOORE.GPJ GINT STD AGS 3_1.GDT 17/7/20

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA2
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	14-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1



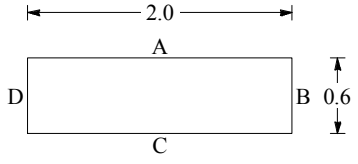
STRATA

Depth	No	DESCRIPTION
0.00-0.20		Scrub over loose dark brown gravelly sandy SILT. Gravel is angular to subangular fine to coarse of brick and concrete (MADE GROUND).
0.20-0.50		Medium dense black gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick clinker and tar (MADE GROUND).
0.50-2.20		Loose light brown sandy angular to subangular fine to coarse GRAVEL of sandstone with high cobble and boulder content of subangular sandstone (MADE GROUND).

SAMPLES & TESTS

Depth	No	Remarks/Tests

Shoring/Support:
Stability: Unstable



GENERAL REMARKS

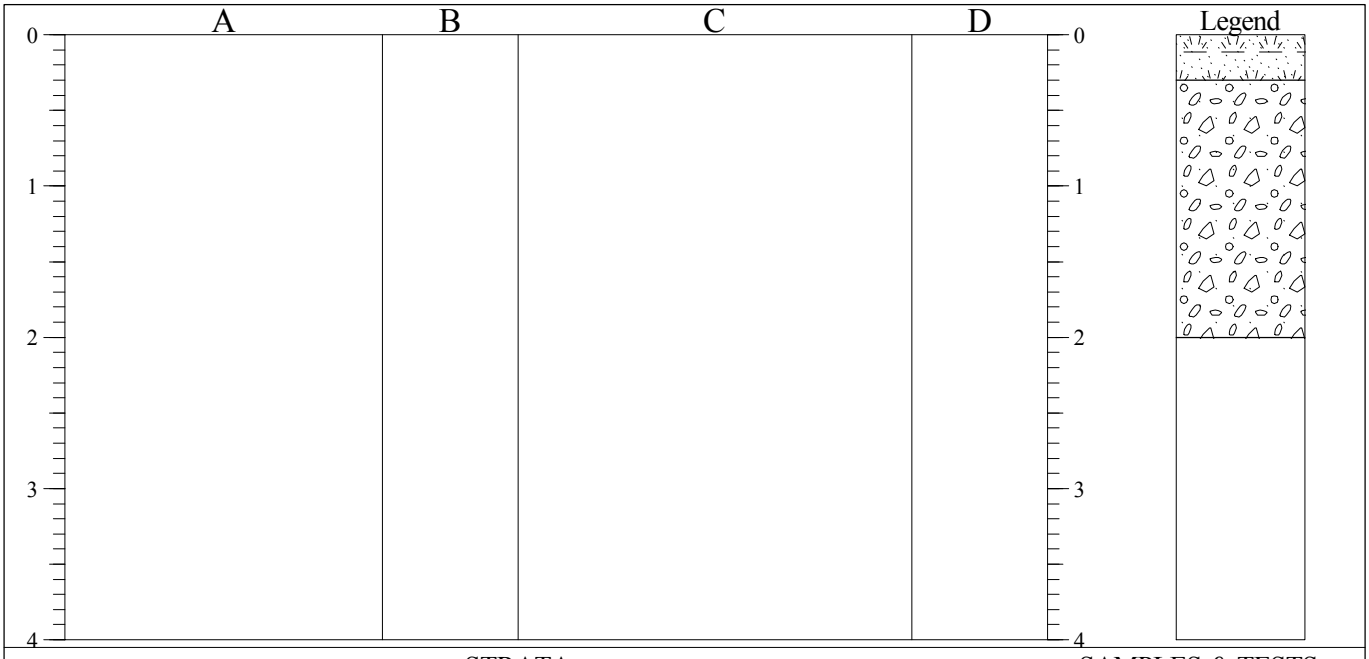
1.) Halted at 2.20m due to collapse,
2.) Unable to initiate soakaway test due to rapid drainage.

All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA3
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	14-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1

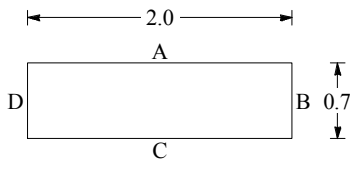


STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Scrub over loose dark brown sandy SILT (TOPSOIL).			
0.30-2.00		Medium dense to dense light brown sandy angular to subangular fine to coarse GRAVEL of sandstone. High cobble and medium boulder content of subangular sandstone (WEATHERED BEDROCK).			

Shoring/Support:
Stability: Unstable



GENERAL REMARKS

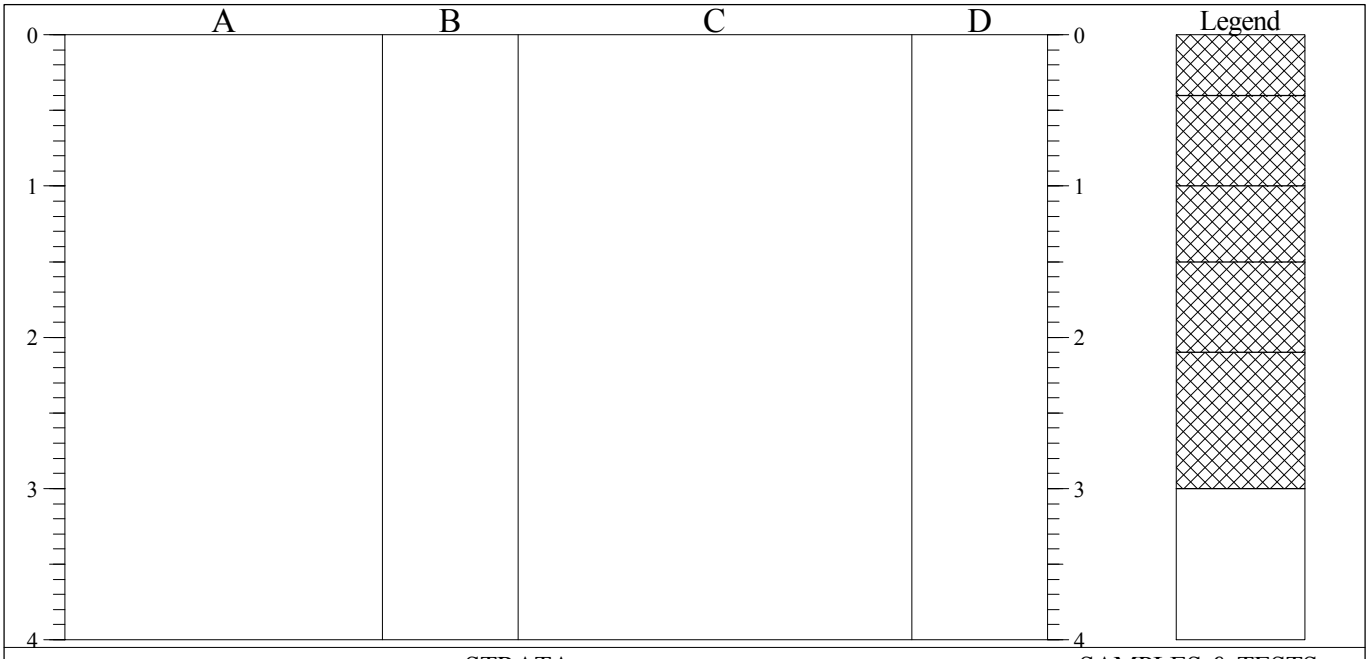
1.) Halted at 2.00m due to collapse,
2.) Unable to initiate soakaway test due to rapid drainage.

All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA4
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	15-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1



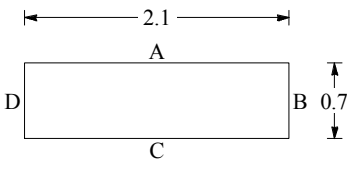
STRATA

Depth	No	DESCRIPTION
0.00-0.40		Scrub over loose dark brown gravelly sandy SILT with rootlets. Gravel is angular to subangular fine to coarse of brick (MADE GROUND).
0.40-1.00		Loose dark greyish brown gravelly fine to coarse SAND with high cobble medium boulder content of subangular brick and sandstone. Gravel is fine to coarse subangular to angular of brick sandstone and concrete with occasional metal and plastic (MADE GROUND).
1.00-1.50		Loose light brown gravelly fine to coarse SAND with a medium cobble and boulder content of angular to subangular sandstone. Gravel is angular to subangular fine to coarse of sandstone (MADE GROUND).
1.50-2.10		Loose reddish brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of clinker (MADE GROUND).
2.10-3.00		Loose dark brown to black gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of clinker (MADE GROUND).

SAMPLES & TESTS

Depth	No	Remarks/Tests

Shoring/Support:
Stability: Unstable



GENERAL REMARKS

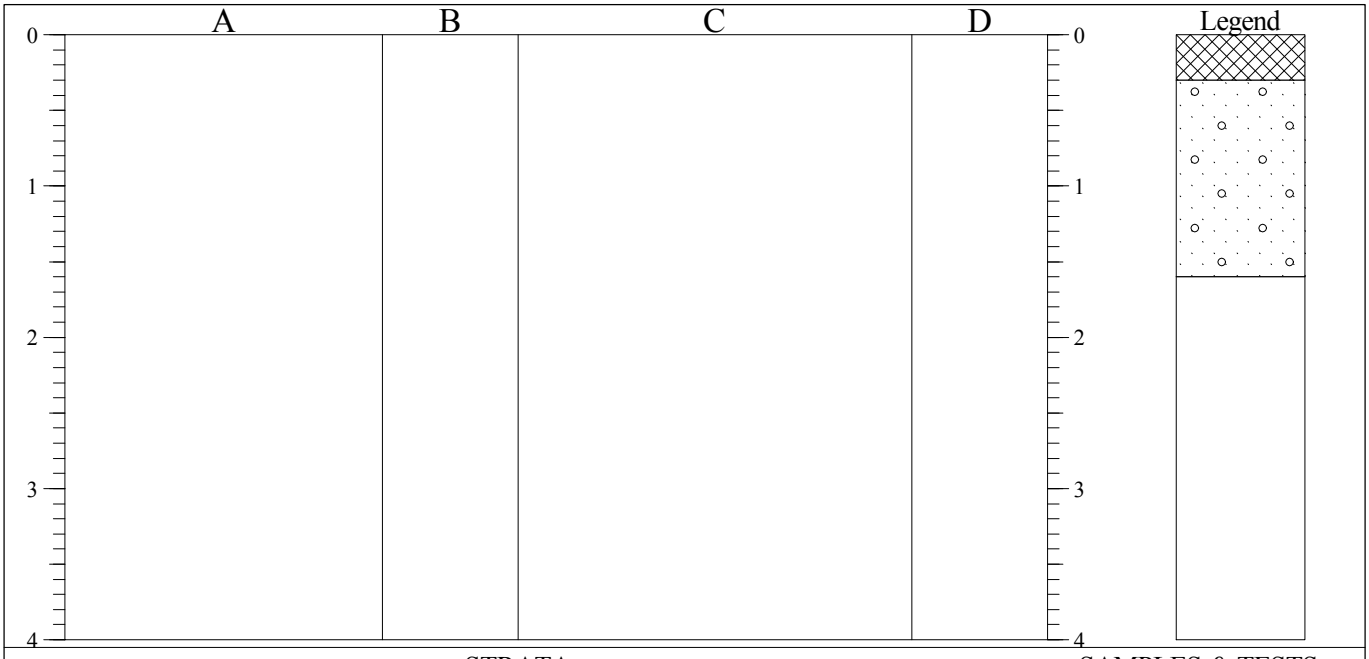
1.) Halted at 3.00m due to collapse,
2.) Unable to undertake soakaway test due to instability.

All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

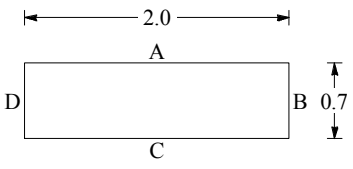
TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA4A
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	15-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.30		Scrub over loose dark brown slightly gravelly sandy SILT. Gravel is angular to subangular of brick (MADE GROUND).			
0.30-1.60		Medium dense to dense light brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of sandstone (WEATHERED BEDROCK).			

Shoring/Support:
Stability: Stable



GENERAL REMARKS

1.) Terminated at 1.60m unable to advance through rock,
2.) Soakaway test carried out from 1.60m.

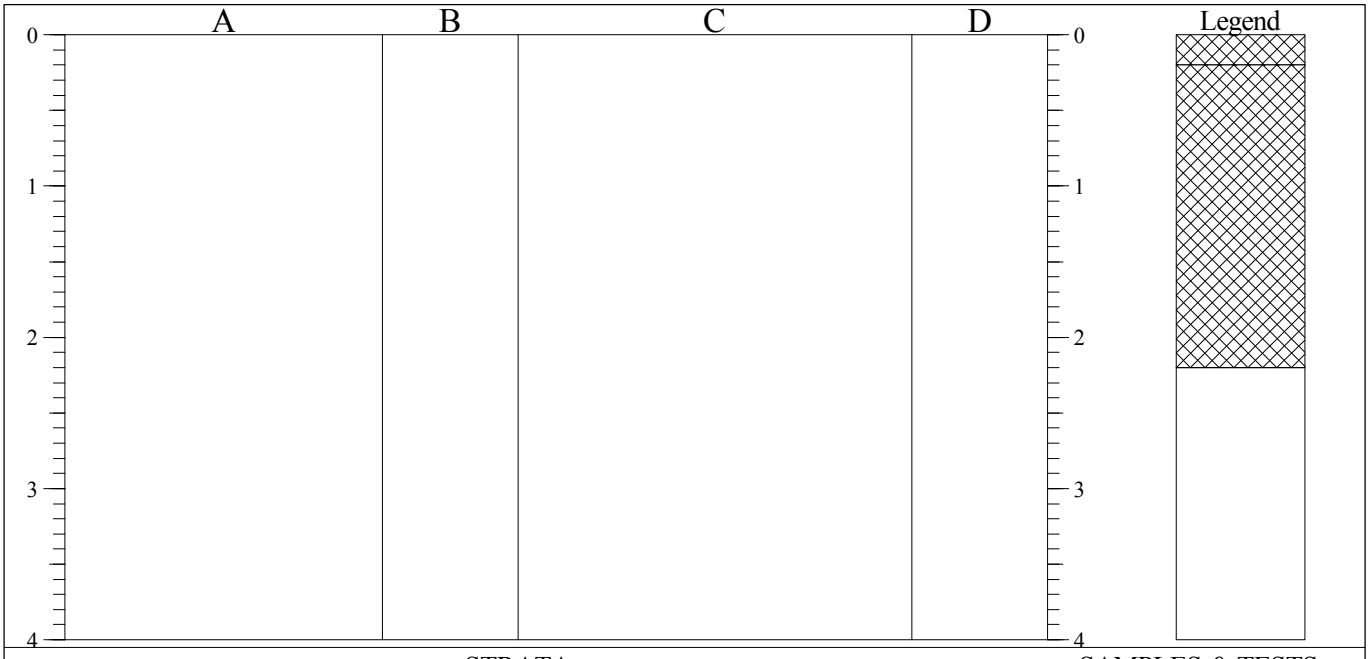
All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

AGS3 UK TP 2386 BLACKMOORE.GPJ GINT STD AGS 3_1.GDT 17/7/20

GroundSolve Ltd
Unit 1 Well House Barns
Flintshire CH4 0DH
Telephone: 01244 661361
Fax: 01244 661289

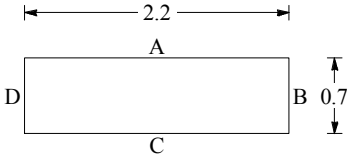
TRIAL PIT LOG

Project				TRIAL PIT No
Blackmoorfoot Road, Huddersfield				SA5
Job No	Date	Ground Level (m)	Co-Ordinates ()	
2386	15-07-20			
Contractor				Sheet
GROUNDSOLVE LTD				1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.20		Scrub over loose dark brown gravelly sandy SILT with rootlets. Gravel is angular to subangular fine to coarse of brick and sandstone with ocassional glass and plastic. (MADE GROUND)			
0.20-2.20		Medium dense light greyish brown gravelly fine to coarse SAND with high cobble and medium boulder content of subangular sandstone. Gravel is angular to subangular fine to coarse of sandstone. (MADE GROUND).			

Shoring/Support:
Stability: Unstable



GENERAL REMARKS

1.) Unstable due to boulder content from 1.00m,
2.) Unable to initiate soakaway test due to rapid drainage.

All dimensions in metres Scale 1:50	Client Campbell Reith	Method/ Plant Used JCB 3CX	Logged By TG

AGS3 UK TP 2386 BLACKMOORE.GPJ GINT STD AGS 3_1.GDT 17/7/20

APPENDIX C

Trial Pit Photos

SA1 Pit

SA1 Spoil

SA2 Pit

SA2 Spoil

SA3 Pit

SA3 Spoil

SA4 Pit

SA4 Spoil

SA4A Pit

SA4A Spoil

SA5 Pit

SA5 Spoil

APPENDIX D

Soakaway Test Results & Calculations

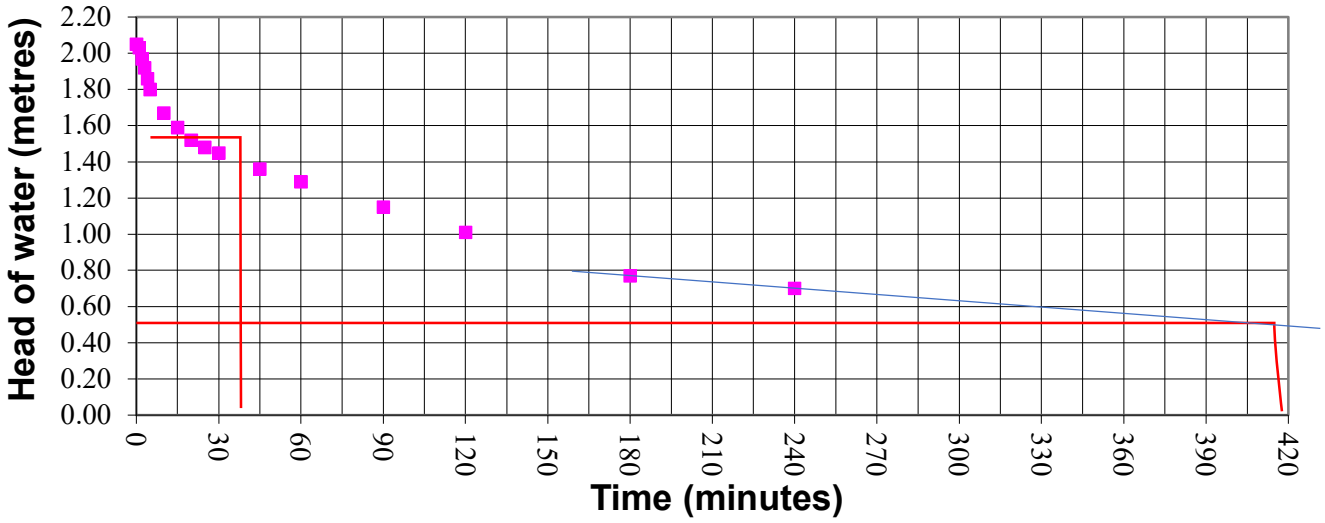
Time (Mins)	Depth of Water	Head of Water
0	0.95	2.05
1	0.97	2.03
2	1.03	1.97
3	1.08	1.92
4	1.14	1.86
5	1.20	1.80
10	1.33	1.67
15	1.41	1.59
20	1.48	1.52
25	1.52	1.48
30	1.55	1.45
45	1.64	1.36
60	1.71	1.29
90	1.85	1.15
120	1.99	1.01
180	2.23	0.77
240	2.30	0.70

GroundSolve Ltd

2386. Blackmorefoot,

SA1 Test 1

14/07/20



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
3.00	2.00	0.70	1.538	0.51	2.05	6.935	1.435	1.00	19	398	9.099E-06

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

:ulated with line of best fit

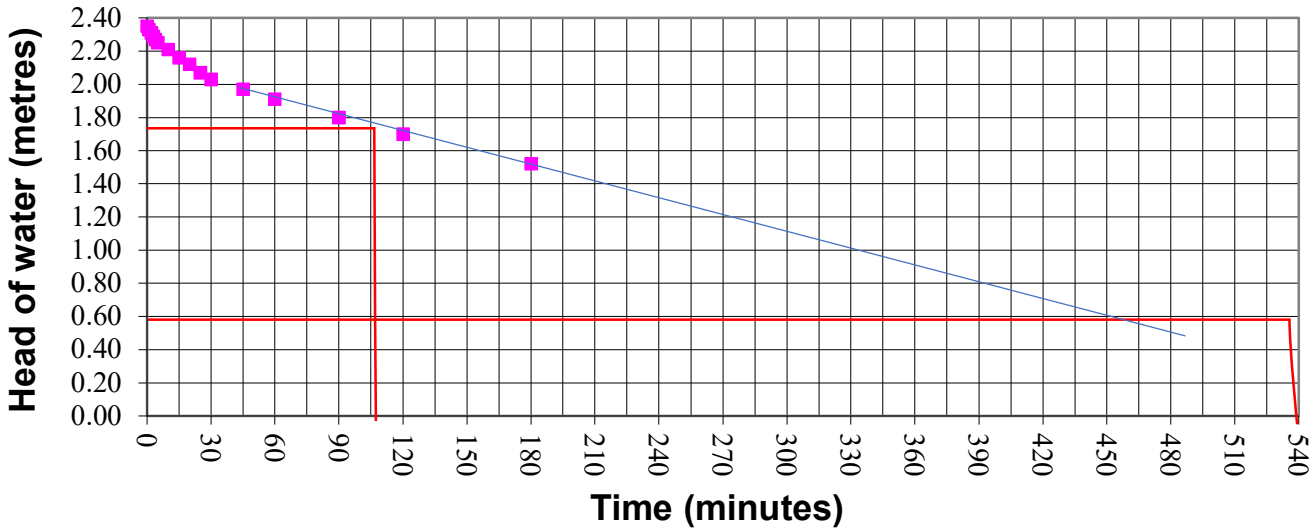
Time (Mins)	Depth of Water	Head of Water
0	0.65	2.35
1	0.67	2.33
2	0.69	2.31
3	0.71	2.29
4	0.73	2.27
5	0.75	2.25
10	0.79	2.21
15	0.84	2.16
20	0.88	2.12
25	0.93	2.07
30	0.97	2.03
45	1.03	1.97
60	1.09	1.91
90	1.20	1.80
120	1.30	1.70
180	1.48	1.52

GroundSolve Ltd

2386. Blackmorefoot

SA4A Test 1

15/07/20



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
3.00	2.00	0.70	1.763	0.59	2.35	7.745	1.645	1.00	106	455	1.014E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

ulated with line of best fit

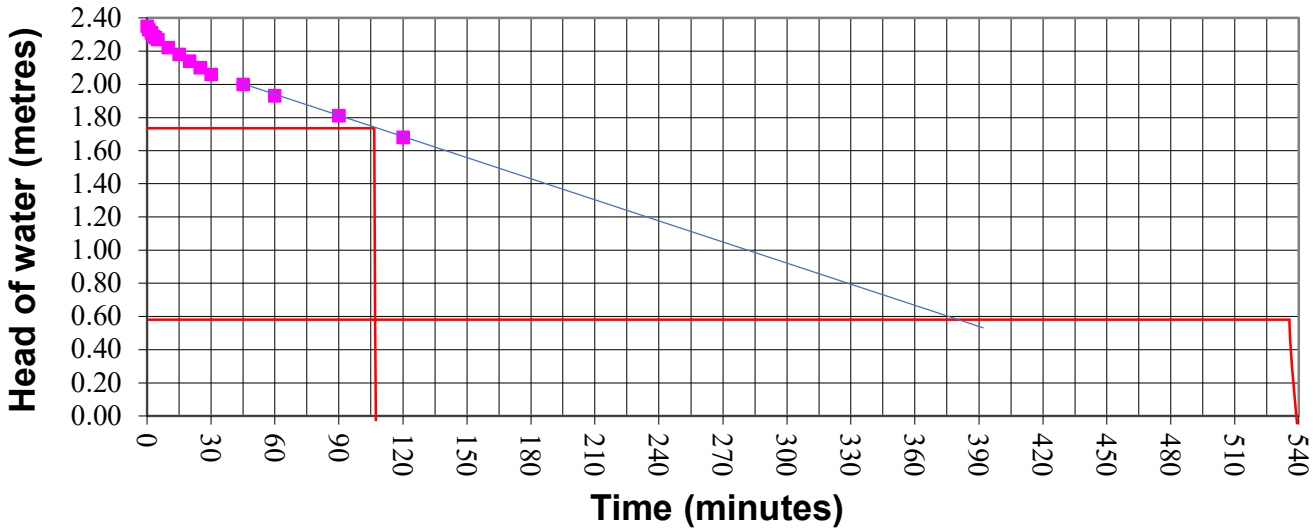
Time (Mins)	Depth of Water	Head of Water
0	0.65	2.35
1	0.67	2.33
2	0.69	2.31
3	0.71	2.29
4	0.72	2.28
5	0.73	2.27
10	0.78	2.22
15	0.82	2.18
20	0.86	2.14
25	0.90	2.10
30	0.94	2.06
45	1.00	2.00
60	1.07	1.93
90	1.19	1.81
120	1.32	1.68

GroundSolve Ltd

2386. Blackmorefoot

SA4A Test 2

15/07/20



Depth	Length	Width	Head at 75% Vol	Head at 25% Vol	Water depth(t=0)	Effective Area	Vp75-Vp25	Adjustment Factor *	t75	t25	Infiltration
(m)	(m)	(m)	(m)	(m)	(m)	Ap50 m2	Volume of water m3		(mins)	(mins)	rate m/s
3.00	2.00	0.70	1.763	0.59	2.35	7.745	1.645	1.00	106	377	1.306E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

ulated with line of best fit

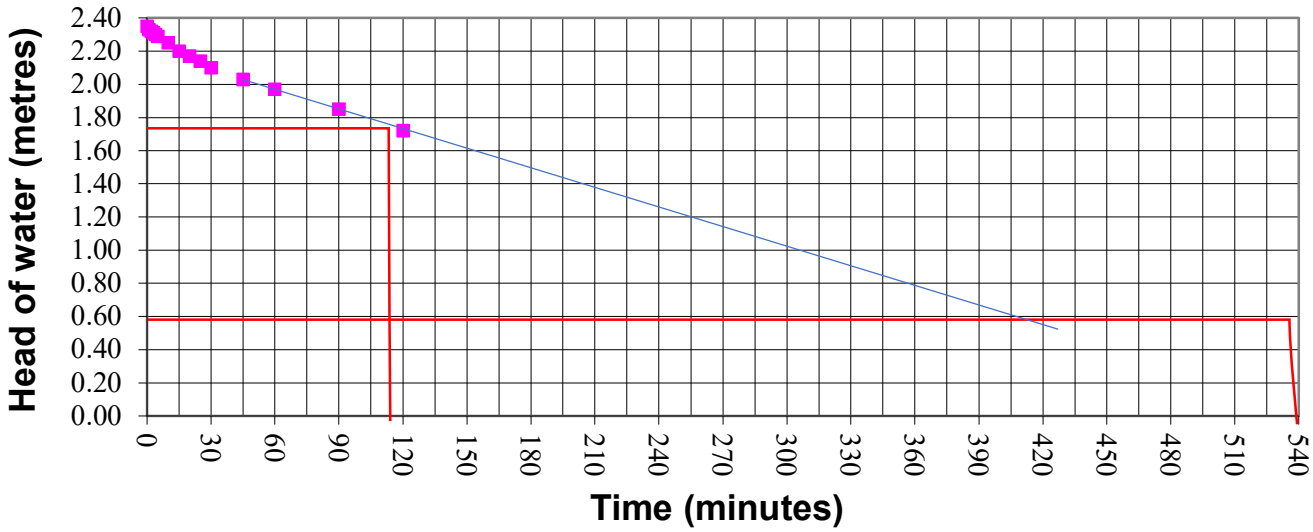
Time (Mins)	Depth of Water	Head of Water
0	0.65	2.35
1	0.67	2.33
2	0.68	2.32
3	0.69	2.31
4	0.70	2.30
5	0.71	2.29
10	0.75	2.25
15	0.80	2.20
20	0.83	2.17
25	0.86	2.14
30	0.90	2.10
45	0.97	2.03
60	1.03	1.97
90	1.15	1.85
120	1.28	1.72

GroundSolve Ltd

2386. Blackmorefoot

SA4A Test 3

15/07/20



Depth (m)	Length (m)	Width (m)	Head at 75% Vol (m)	Head at 25% Vol (m)	Water depth(t=0) (m)	Effective Area Ap50 m2	Vp75-Vp25 Volume of water m3	Adjustment Factor *	t75 (mins)	t25 (mins)	Infiltration rate m/s
3.00	2.00	0.70	1.763	0.59	2.35	7.745	1.645	1.00	116	418	1.172E-05

* with gravel filter adjustment factor = 0.30, with no filter = 1.0

ulated with line of best fit

Appendix 6: Preliminary Drainage Strategy

Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:

   P: Preliminary Evolving drawings for approvals, tenders, billings etc.

   C: Construction Fully developed drawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress

   S0 - Work in progress

   Shared (Non-contractual)

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

   Documentation (For contractors purposes)

   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.

   Construction

   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not the liability of CampbellReith)
8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquires of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of the layout in relation to the survey is given or implied. Masterpan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Foul Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

Rev	Description	Date	By
P2	Surface Water drainage updated	12/02/21	CS
P1	Issued for information	30/07/20	EH

CampbellReith
consulting engineers

London	020 7340 1700 ☐	☒	Manchester	0161 819 3060
Surrey	01737 784 500 ☐	☐	Birmingham	01675 467 484
Bristol	0117 916 1066 ☐	☐	Dubai	00 971 4345 7088

www.campbellreith.com

Job Title
Blackmoorfoot Road, Huddersfield

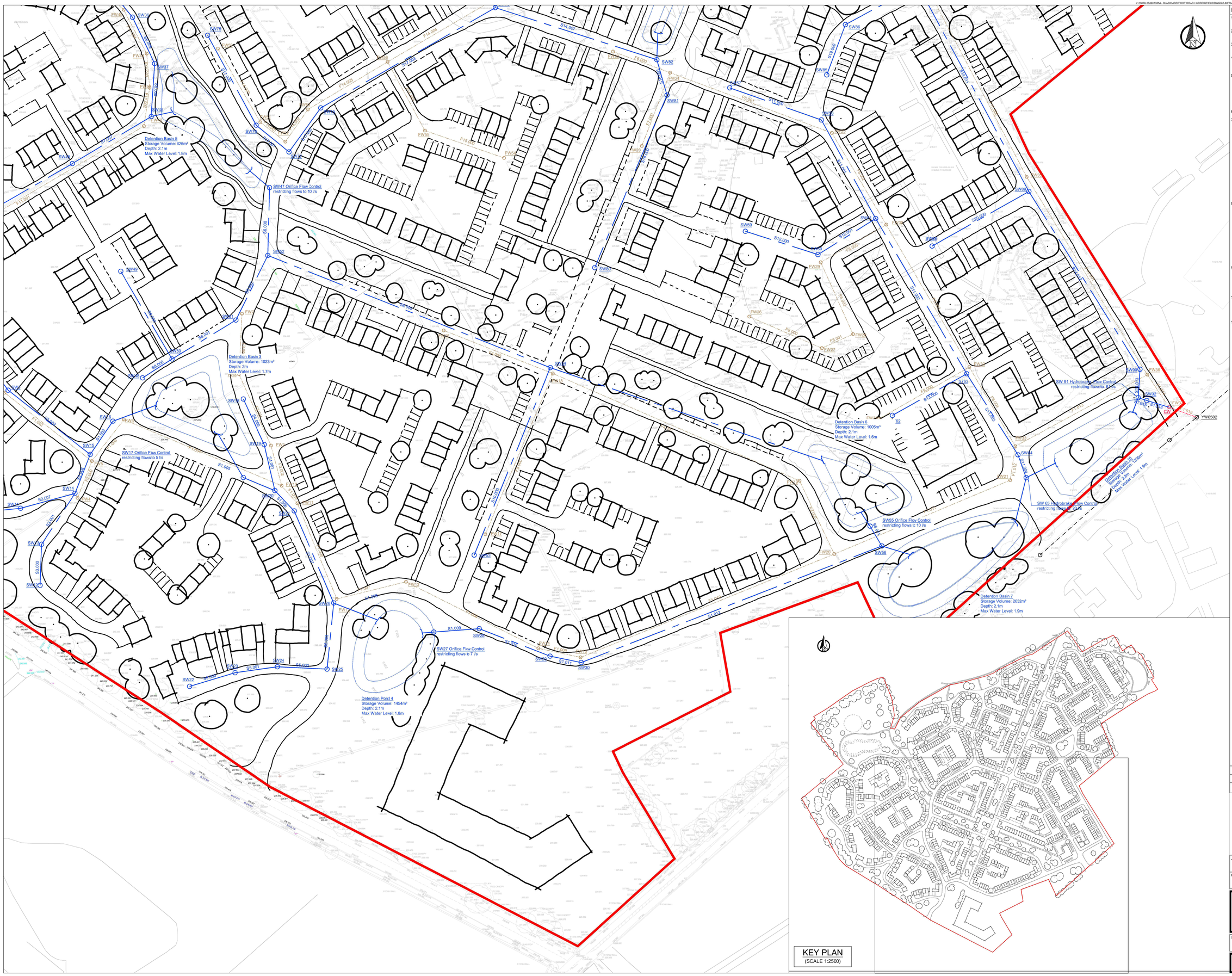
Client
Empire Knight Group Limited

Preliminary
Surface Water & Foul Water
Drainage Strategy Sheet 1 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
EH	13/07/20	1:500	RBG	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5050	P2

J:\13000-13499\13354 - BLACKMOORFOOT ROAD HUDDERSFIELD\DWGS\2-INFRASTRUCTURE\1-AUTOCAD\1-WORKING DRAWINGS\1-SKETCHES\13354-CRH-ZZ-XX-DR-C- 9050-P2_DRAINAGE STRATEGY.DWG



Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this crawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:
   - **P: Preliminary** — Evolving drawings for approvals, tenders, billings etc.
   - **C: Construction** — Fully developed crawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress
   S0 - Work in progress
   Shared (Non-contractual)
   S1 - For coordination, **S2** - For information, **S3** - For internal review and comment, **S4** - For construction approval.
   Documentation (For contractors purposes)
   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.
   Construction
   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not he liability of CampbellReith)
8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquiries of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of the layout in relation to the survey is given or implied. Masterplan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Foul Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

KEY PLAN
(SCALE 1:2500)

Rev	Description	Date	By
P2	Surface Water drainage updated	12/02/21	CS
P1	Issued for information	30/07/20	EH

CampbellReith
consulting engineers

London 020 7340 1700 ☐ ■ Manchester 0161 819 3060
Surrey 01737 784 500 ☐ ☐ Birmingham 01675 467 484
Bristol 0117 916 1066 ☐ ☐ Dubai 00 971 4345 7088
www.campbellreith.com

Job Title
Blackmoorfoot Road, Huddersfield

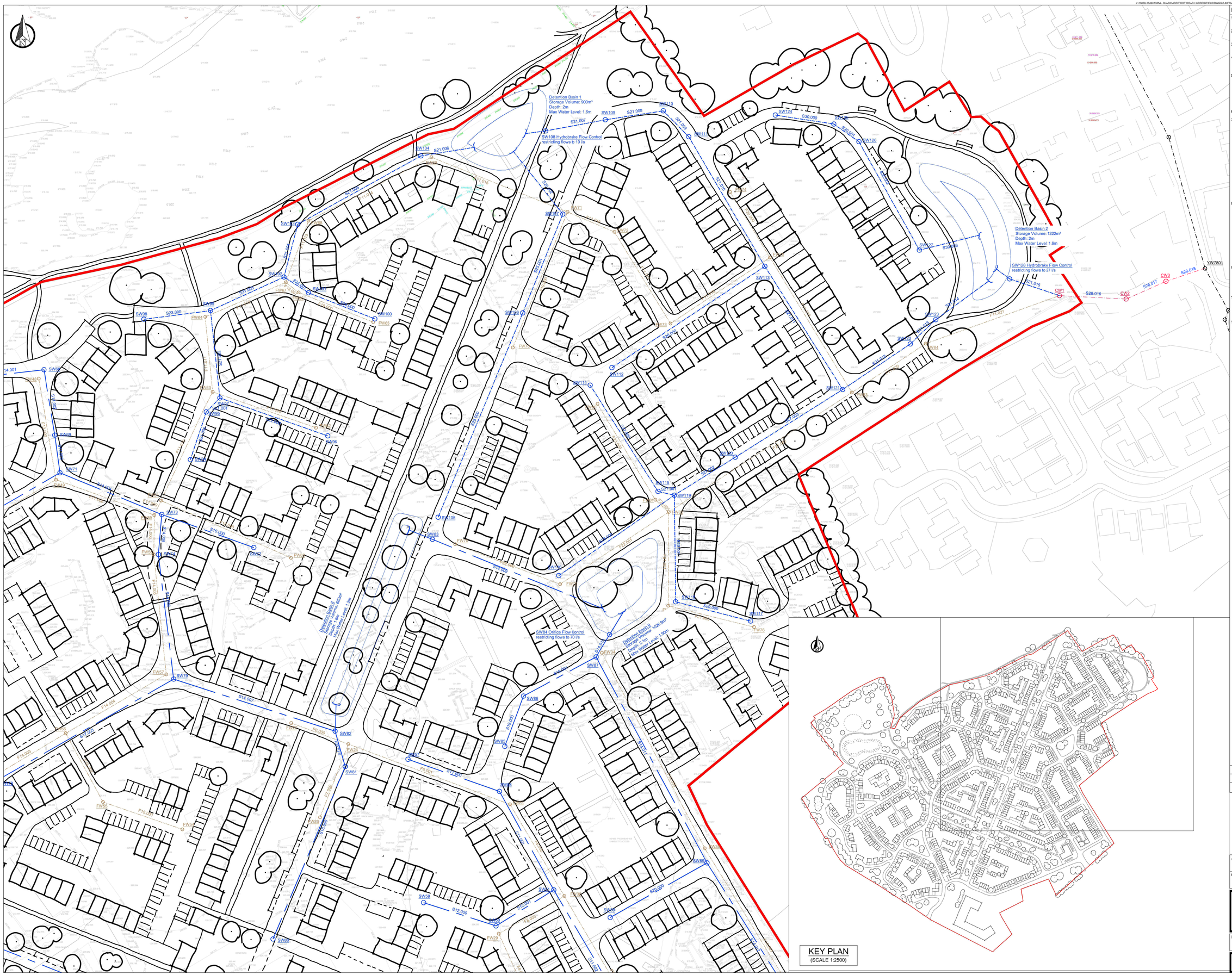
Client
Empire Knight Group Limited

Preliminary
Surface Water & Foul Water
Drainage Strategy Sheet 2 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
EH	13/07/20	1:500	RBG	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5051	P2

J:\13000-13499\13354 - BLACKMOORFOOT ROAD HUDDERSFIELD\DOWGS\2-INFRASTRUCTURE\1-AUTOCAD\1-WORKING DRAWINGS\01-SKETCH\[S1]13354-CRH-ZZ-XX-DR-D- 9265-P2_DRAINAGE STRATEGY.DWG



Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:
   - **P: Preliminary** — Evolving drawings for approvals, tenders, billings etc.
   - **C: Construction** — Fully developed drawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress
   S0 - Work in progress
   Shared (Non-contractual)
   S1 - For coordination, **S2** - For information, **S3** - For internal review and comment, **S4** - For construction approval.
   Documentation (For contractors purposes)
   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.
   Construction
   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not he liability of CampbellReith)
8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquires of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of he layout in relation to the survey is given or implied. Masterplan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Foul Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

Rev	Description	Date	By
P2	Surface Water drainage updated	12/02/21	CS
P1	Issued for information	30/07/20	EH

CampbellReith
consulting engineers

London 020 7340 1700 | Manchester 0161 819 3060
Surrey 01737 784 500 | Birmingham 01675 467 484
Bristol 0117 916 1066 | Dubai 00 971 4345 7088
www.campbellreith.com

Job Title
Blackmoorfoot Road, Huddersfield

Client
Empire Knight Group Limited

Preliminary
Surface Water & Foul Water Drainage Strategy Sheet 3 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
EH	13/07/20	1:500	RBG	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5052	P2

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm s6

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	19.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.295	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	400
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.500		

Designed with Level Soffits

Network Design Table for Storm s6

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S21.000	21.759	0.820	26.5	0.089	5.00	0.0	0.600	o	150	Pipe/Conduit	
S21.001	7.893	0.790	10.0	0.089	0.00	0.0	0.600	o	150	Pipe/Conduit	
S22.000	48.487	0.440	110.2	0.089	5.00	0.0	0.600	o	300	Pipe/Conduit	
S21.002	37.249	0.115	325.0	0.089	0.00	0.0	0.600	o	375	Pipe/Conduit	
S23.000	27.773	2.645	10.5	0.089	5.00	0.0	0.600	o	150	Pipe/Conduit	
S21.003	34.423	0.180	191.2	0.089	0.00	0.0	0.600	o	375	Pipe/Conduit	
S24.000	30.238	0.095	318.3	0.297	5.00	0.0	0.600	o	375	Pipe/Conduit	
S24.001	12.328	0.040	308.2	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S21.004	23.088	0.075	307.8	0.105	0.00	0.0	0.600	o	450	Pipe/Conduit	
S21.005	59.783	1.870	32.0	0.105	0.00	0.0	0.600	o	450	Pipe/Conduit	
S21.006	53.514	1.850	28.9	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
S25.000	93.836	1.760	53.3	0.172	5.00	0.0	0.600	o	225	Pipe/Conduit	
S25.001	45.227	0.340	133.0	0.109	0.00	0.0	0.600	o	300	Pipe/Conduit	
S25.002	36.172	0.520	69.6	0.109	0.00	0.0	0.600	o	300	Pipe/Conduit	
S21.007	26.263	1.705	15.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.008	24.873	0.900	27.6	0.095	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.009	15.391	1.300	11.8	0.095	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.010	63.781	1.600	39.9	0.095	0.00	0.0	0.600	o	300	Pipe/Conduit	
S26.000	77.814	4.830	16.1	0.266	5.00	0.0	0.600	o	225	Pipe/Conduit	
S21.011	61.808	1.825	33.9	0.095	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S21.000	50.00	5.18	222.150	0.089	0.0	0.0	0.0	1.96	34.7	12.1
S21.001	50.00	5.23	221.330	0.178	0.0	0.0	0.0	3.21	56.7	24.1
S22.000	50.00	5.54	219.180	0.089	0.0	0.0	0.0	1.50	105.8	12.1
S21.002	50.00	6.16	218.665	0.356	0.0	0.0	0.0	1.00	110.4	48.2
S23.000	50.00	5.15	221.420	0.089	0.0	0.0	0.0	3.13	55.3	12.1
S21.003	50.00	6.60	218.550	0.534	0.0	0.0	0.0	1.31	144.3	72.3
S24.000	50.00	5.50	218.505	0.297	0.0	0.0	0.0	1.01	111.6	40.2
S24.001	50.00	5.70	218.410	0.297	0.0	0.0	0.0	1.03	113.4	40.2
S21.004	50.00	6.93	218.295	0.936	0.0	0.0	0.0	1.15	183.4	126.7
S21.005	50.00	7.21	218.220	1.041	0.0	0.0	0.0	3.61	573.5	141.0
S21.006	50.00	7.45	216.350	1.041	0.0	0.0	0.0	3.79	603.0	141.0
S25.000	50.00	5.87	217.175	0.172	0.0	0.0	0.0	1.80	71.4	23.3
S25.001	50.00	6.42	215.340	0.281	0.0	0.0	0.0	1.36	96.2	38.1
S25.002	50.00	6.74	215.000	0.390	0.0	0.0	0.0	1.89	133.4	52.8
S21.007	50.00	5.13	214.480	0.000	10.0	0.0	0.0	3.35	133.2	10.0
S21.008	50.00	5.30	212.775	0.095	10.0	0.0	0.0	2.50	99.3	22.9
S21.009	50.00	5.36	211.875	0.190	10.0	0.0	0.0	3.82	152.1	35.7
S21.010	50.00	5.79	210.500	0.285	10.0	0.0	0.0	2.50	176.6	48.6
S26.000	50.00	5.40	213.805	0.266	0.0	0.0	0.0	3.28	130.3	36.0
S21.011	50.00	6.08	208.750	0.646	10.0	0.0	0.0	3.50	557.1	97.5

Network Design Table for Storm s6

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S27.000	53.488	3.755	14.2	0.164	5.00	0.0	0.600	o	225	Pipe/Conduit	
S27.001	7.069	0.710	10.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S28.000	59.657	3.320	18.0	0.108	5.00	0.0	0.600	o	150	Pipe/Conduit	
S29.000	32.835	0.085	386.3	0.238	5.00	0.0	0.600	o	600	Pipe/Conduit	
S29.001	45.195	0.115	393.0	0.238	0.00	0.0	0.600	o	600	Pipe/Conduit	
S27.002	30.499	0.075	406.7	0.108	0.00	0.0	0.600	o	600	Pipe/Conduit	
S27.003	53.697	1.150	46.7	0.108	0.00	0.0	0.600	o	600	Pipe/Conduit	
S21.012	34.727	2.100	16.5	0.108	0.00	0.0	0.600	o	600	Pipe/Conduit	
S21.013	14.922	1.050	14.2	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	
S21.014	31.414	0.080	392.7	0.000	0.00	0.0	0.600	o	675	Pipe/Conduit	
S30.000	25.092	0.255	98.4	0.104	5.00	0.0	0.600	o	225	Pipe/Conduit	
S30.001	12.998	0.345	37.7	0.104	0.00	0.0	0.600	o	225	Pipe/Conduit	
S30.002	52.698	1.900	27.7	0.104	0.00	0.0	0.600	o	225	Pipe/Conduit	
S30.003	31.440	1.605	19.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.015	31.043	2.105	14.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.016	28.372	1.000	28.4	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.017	18.484	1.000	18.5	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S21.018	17.475	1.440	12.1	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S27.000	50.00	5.26	214.565	0.164	0.0	0.0	0.0	3.49	138.6	22.2
S27.001	50.00	5.28	210.810	0.164	0.0	0.0	0.0	4.17	165.9	22.2
S28.000	50.00	5.42	213.420	0.108	0.0	0.0	0.0	2.39	42.2	14.6
S29.000	50.00	5.44	208.200	0.238	0.0	0.0	0.0	1.23	348.6	32.2
S29.001	50.00	6.06	208.115	0.476	0.0	0.0	0.0	1.22	345.6	64.5
S27.002	50.00	6.48	208.000	0.856	0.0	0.0	0.0	1.20	339.7	115.9
S27.003	50.00	6.73	207.925	0.964	0.0	0.0	0.0	3.57	1009.4	130.5
S21.012	50.00	6.83	206.775	1.718	10.0	0.0	0.0	6.01	1698.7	242.6
S21.013	50.00	6.87	204.675	1.718	10.0	0.0	0.0	6.48	1832.7	242.6
S21.014	50.00	7.27	203.550	1.718	10.0	0.0	0.0	1.32	471.1	242.6
S30.000	50.00	5.32	207.575	0.104	0.0	0.0	0.0	1.32	52.4	14.1
S30.001	50.00	5.42	207.320	0.208	0.0	0.0	0.0	2.14	85.0	28.2
S30.002	50.00	5.77	206.975	0.312	0.0	0.0	0.0	2.49	99.2	42.2
S30.003	50.00	5.95	205.075	0.312	0.0	0.0	0.0	2.97	118.1	42.2
S21.015	50.00	5.15	203.470	0.000	27.0	0.0	0.0	3.43	136.2	27.0
S21.016	50.00	5.34	201.365	0.000	27.0	0.0	0.0	2.47	98.0	27.0
S21.017	50.00	5.44	200.365	0.000	27.0	0.0	0.0	3.06	121.6	27.0
S21.018	50.00	5.52	199.365	0.000	27.0	0.0	0.0	3.78	150.2	27.0

Manhole Schedules for Storm s6

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S94	223.500	1.350	Open Manhole	1200	S21.000	222.150	150				
S95	223.980	2.650	Open Manhole	1200	S21.001	221.330	150	S21.000	221.330	150	
S96	220.680	1.500	Open Manhole	1350	S22.000	219.180	300				
S97	222.350	3.685	Open Manhole	1350	S21.002	218.665	375	S21.001	220.540	150	1650
								S22.000	218.740	300	
S98	222.770	1.350	Open Manhole	1200	S23.000	221.420	150				
S99	221.740	3.190	Open Manhole	1350	S21.003	218.550	375	S21.002	218.550	375	
								S23.000	218.775	150	
S100	220.080	1.575	Open Manhole	1350	S24.000	218.505	375				
S101	220.040	1.630	Open Manhole	1350	S24.001	218.410	375	S24.000	218.410	375	
S102	220.090	1.795	Open Manhole	1800	S21.004	218.295	450	S21.003	218.370	375	
								S24.001	218.370	375	
S103	220.120	1.900	Open Manhole	1800	S21.005	218.220	450	S21.004	218.220	450	
S104	218.000	1.650	Open Manhole	1800	S21.006	216.350	450	S21.005	216.350	450	
S105	218.600	1.425	Open Manhole	1200	S25.000	217.175	225				
S106	216.840	1.500	Open Manhole	1350	S25.001	215.340	300	S25.000	215.415	225	
S107	216.500	1.500	Open Manhole	1350	S25.002	215.000	300	S25.001	215.000	300	
S108	216.480	2.000	Open Manhole	1200	S21.007	214.480	225	S21.006	214.500	450	245
								S25.002	214.480	300	
S109	214.200	1.425	Open Manhole	1200	S21.008	212.775	225	S21.007	212.775	225	
S110	213.300	1.425	Open Manhole	1200	S21.009	211.875	225	S21.008	211.875	225	
S111	212.000	1.500	Open Manhole	1350	S21.010	210.500	300	S21.009	210.575	225	
S112	215.230	1.425	Open Manhole	1200	S26.000	213.805	225				
S113	210.400	1.650	Open Manhole	1800	S21.011	208.750	450	S21.010	208.900	300	
								S26.000	208.975	225	
S114	215.990	1.425	Open Manhole	1200	S27.000	214.565	225				
S115	213.000	2.190	Open Manhole	1200	S27.001	210.810	225	S27.000	210.810	225	
S116	215.470	2.050	Open Manhole	1200	S28.000	213.420	150				
S117	212.280	4.080	Open Manhole	1500	S29.000	208.200	600				
S118	213.000	4.885	Open Manhole	1500	S29.001	208.115	600	S29.000	208.115	600	
S119	212.790	4.790	Open Manhole	1500	S27.002	208.000	600	S27.001	210.100	225	1725
								S28.000	210.100	150	1650
								S29.001	208.000	600	
S120	211.320	3.395	Open Manhole	1500	S27.003	207.925	600	S27.002	207.925	600	
S121	208.575	1.800	Open Manhole	2100	S21.012	206.775	600	S21.011	206.925	450	
								S27.003	206.775	600	
S122	206.475	1.800	Open Manhole	2100	S21.013	204.675	600	S21.012	204.675	600	
S123	205.350	1.800	Open Manhole	2100	S21.014	203.550	675	S21.013	203.625	600	
S124	209.000	1.425	Open Manhole	1200	S30.000	207.575	225				
S125	209.000	1.680	Open Manhole	1200	S30.001	207.320	225	S30.000	207.320	225	
S126	208.400	1.425	Open Manhole	1200	S30.002	206.975	225	S30.001	206.975	225	
S127	206.500	1.425	Open Manhole	1200	S30.003	205.075	225	S30.002	205.075	225	
S128	205.500	2.030	Open Manhole	2100	S21.015	203.470	225	S21.014	203.470	675	
								S30.003	203.470	225	
S129	202.790	1.425	Open Manhole	1200	S21.016	201.365	225	S21.015	201.365	225	
S130	201.790	1.425	Open Manhole	1200	S21.017	200.365	225	S21.016	200.365	225	
S131	200.790	1.425	Open Manhole	1200	S21.018	199.365	225	S21.017	199.365	225	
SYW7801	199.780	1.855	Open Manhole	0		OUTFALL		S21.018	197.925	225	

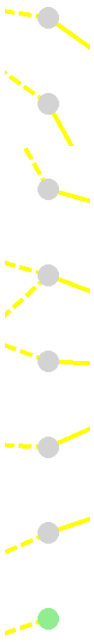
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S94	411334.166	414817.372	411334.166	414817.372	Required	
S95	411341.056	414838.011	411341.056	414838.011	Required	
S96	411392.425	414827.462	411392.425	414827.462	Required	
S97	411346.683	414843.545	411346.683	414843.545	Required	
S98	411315.019	414877.208	411315.019	414877.208	Required	

Manhole Schedules for Storm s6

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S99	411342.588	414880.569	411342.588	414880.569	Required	
S100	411412.393	414877.096	411412.393	414877.096	Required	
S101	411384.256	414888.170	411384.256	414888.170	Required	
S102	411373.903	414894.863	411373.903	414894.863	Required	
S103	411379.709	414917.209	411379.709	414917.209	Required	
S104	411431.975	414946.231	411431.975	414946.231	Required	
S105	411439.253	414792.937	411439.253	414792.937	Required	
S106	411475.236	414879.600	411475.236	414879.600	Required	
S107	411492.215	414921.519	411492.215	414921.519	Required	
S108	411484.426	414956.842	411484.426	414956.842	Required	
S109	411510.263	414961.555	411510.263	414961.555	Required	
S110	411534.844	414965.355	411534.844	414965.355	Required	
S111	411545.628	414954.373	411545.628	414954.373	Required	
S112	411513.052	414856.404	411513.052	414856.404	Required	
S113	411577.925	414899.374	411577.925	414899.374	Required	
S114	411503.802	414848.964	411503.802	414848.964	Required	
S115	411532.623	414803.905	411532.623	414803.905	Required	
S116	411490.537	414768.193	411490.537	414768.193	Required	
S117	411571.860	414748.895	411571.860	414748.895	Required	
S118	411540.062	414757.081	411540.062	414757.081	Required	
S119	411539.501	414802.273	411539.501	414802.273	Required	
S120	411565.384	414818.406	411565.384	414818.406	Required	
S121	411610.809	414847.040	411610.809	414847.040	Required	
S122	411639.603	414866.453	411639.603	414866.453	Required	
S123	411650.399	414876.755	411650.399	414876.755	Required	
S124	411582.372	414963.554	411582.372	414963.554	Required	

Manhole Schedules for Storm s6

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S125	411607.173	414959.751	411607.173	414959.751	Required	
S126	411617.805	414952.273	411617.805	414952.273	Required	
S127	411643.495	414906.262	411643.495	414906.262	Required	
S128	411673.763	414897.754	411673.763	414897.754	Required	
S129	411702.872	414886.969	411702.872	414886.969	Required	
S130	411731.206	414885.506	411731.206	414885.506	Required	
S131	411748.092	414893.024	411748.092	414893.024	Required	
SYW7801	411764.693	414898.480			No Entry	



Free Flowing Outfall Details for Storm s6

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S21.018	SYW7801	199.780	197.925	0.000	0	0

Simulation Criteria for Storm s6

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

Number of Input Hydrographs 0	Number of Offline Controls 0	Number of Time/Area Diagrams 0
Number of Online Controls 2	Number of Storage Structures 2	Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.000	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.295	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm s6

Hydro-Brake® Optimum Manhole: S108, DS/PN: S21.007, Volume (m³): 13.0

Unit Reference	MD-SHE-0137-1000-1600-1000	Sump Available	Yes
Design Head (m)	1.600	Diameter (mm)	137
Design Flow (l/s)	10.0	Invert Level (m)	214.480
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	150
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1200
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	10.0	Kick-Flo®	0.989	8.0
Flush-Flo™	0.472	10.0	Mean Flow over Head Range	-	8.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.9	0.600	9.9	1.600	10.0	2.600	12.5	5.000	17.1	7.500	20.8
0.200	8.8	0.800	9.4	1.800	10.5	3.000	13.4	5.500	17.9	8.000	21.5
0.300	9.6	1.000	8.0	2.000	11.1	3.500	14.5	6.000	18.7	8.500	22.1
0.400	9.9	1.200	8.7	2.200	11.6	4.000	15.4	6.500	19.4	9.000	22.7
0.500	10.0	1.400	9.4	2.400	12.1	4.500	16.3	7.000	20.1	9.500	23.3

Hydro-Brake® Optimum Manhole: S128, DS/PN: S21.015, Volume (m³): 18.7

Unit Reference	MD-SHE-0215-2700-1800-2700	Sump Available	Yes
Design Head (m)	1.800	Diameter (mm)	215
Design Flow (l/s)	27.0	Invert Level (m)	203.470
Flush-Flo™	Calculated	Minimum Outlet Pipe Diameter (mm)	300
Objective	Minimise upstream storage	Suggested Manhole Diameter (mm)	1800
Application	Surface		

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.800	27.0	Kick-Flo®	1.159	21.9
Flush-Flo™	0.534	27.0	Mean Flow over Head Range	-	23.4

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	7.3	0.600	26.9	1.600	25.5	2.600	32.2	5.000	44.1	7.500	53.7
0.200	21.0	0.800	26.3	1.800	27.0	3.000	34.5	5.500	46.2	8.000	55.4
0.300	25.5	1.000	24.7	2.000	28.4	3.500	37.1	6.000	48.2	8.500	57.0
0.400	26.6	1.200	22.2	2.200	29.7	4.000	39.6	6.500	50.1	9.000	58.6
0.500	27.0	1.400	23.9	2.400	31.0	4.500	41.9	7.000	51.9	9.500	60.2

Storage Structures for Storm s6

Tank or Pond Manhole: S108, DS/PN: S21.007

Invert Level (m) 214.480

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	380.0	2.000	907.7

Tank or Pond Manhole: S128, DS/PN: S21.015

Invert Level (m) 203.470

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	500.0	1.600	952.9	2.000	1088.7

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)
S21.000	S94	15 Winter	1	+0%	100/15 Summer				222.209	-0.091	0.000	0.32		
S21.001	S95	15 Winter	1	+0%	30/15 Summer				221.397	-0.083	0.000	0.40		
S22.000	S96	15 Winter	1	+0%	100/15 Summer				219.246	-0.234	0.000	0.11		
S21.002	S97	15 Winter	1	+0%	30/15 Summer				218.829	-0.211	0.000	0.39		
S23.000	S98	15 Winter	1	+0%					221.466	-0.104	0.000	0.20		
S21.003	S99	15 Winter	1	+0%	30/15 Summer				218.725	-0.200	0.000	0.44		
S24.000	S100	15 Winter	1	+0%	30/15 Summer				218.661	-0.219	0.000	0.35		
S24.001	S101	15 Winter	1	+0%	30/15 Summer				218.587	-0.198	0.000	0.38		
S21.004	S102	15 Winter	1	+0%	30/15 Summer				218.559	-0.186	0.000	0.64		
S21.005	S103	15 Winter	1	+0%					218.357	-0.313	0.000	0.20		
S21.006	S104	15 Winter	1	+0%					216.484	-0.316	0.000	0.19		
S25.000	S105	15 Winter	1	+0%	100/15 Summer				217.259	-0.141	0.000	0.29		
S25.001	S106	15 Winter	1	+0%	100/15 Summer				215.461	-0.179	0.000	0.34		
S25.002	S107	15 Winter	1	+0%	30/120 Winter				215.120	-0.180	0.000	0.33		
S21.007	S108	360 Winter	1	+0%	1/30 Winter				214.869	0.164	0.000	0.08		
S21.008	S109	30 Winter	1	+0%					212.836	-0.164	0.000	0.16		
S21.009	S110	30 Winter	1	+0%					211.937	-0.163	0.000	0.17		
S21.010	S111	30 Winter	1	+0%					210.586	-0.214	0.000	0.18		
S26.000	S112	15 Winter	1	+0%	100/15 Winter				213.882	-0.148	0.000	0.25		
S21.011	S113	15 Winter	1	+0%					208.861	-0.339	0.000	0.14		
S27.000	S114	15 Winter	1	+0%					214.623	-0.167	0.000	0.15		
S27.001	S115	15 Winter	1	+0%					210.872	-0.163	0.000	0.16		
S28.000	S116	15 Winter	1	+0%	100/15 Summer				213.478	-0.092	0.000	0.31		
S29.000	S117	15 Winter	1	+0%					208.353	-0.447	0.000	0.10		
S29.001	S118	15 Winter	1	+0%	100/15 Winter				208.307	-0.408	0.000	0.17		
S27.002	S119	15 Winter	1	+0%	100/15 Summer				208.234	-0.366	0.000	0.32		
S27.003	S120	15 Winter	1	+0%					208.057	-0.468	0.000	0.11		
S21.012	S121	15 Winter	1	+0%					206.915	-0.460	0.000	0.12		
S21.013	S122	15 Winter	1	+0%					204.841	-0.434	0.000	0.17		
S21.014	S123	360 Winter	1	+0%	30/15 Summer				203.875	-0.350	0.000	0.13		
S30.000	S124	15 Winter	1	+0%	100/15 Summer				207.653	-0.147	0.000	0.25		
S30.001	S125	15 Winter	1	+0%	100/15 Summer				207.407	-0.138	0.000	0.31		
S30.002	S126	15 Winter	1	+0%	100/15 Summer				207.068	-0.132	0.000	0.35		
S30.003	S127	15 Winter	1	+0%	100/15 Summer				205.160	-0.140	0.000	0.30		
S21.015	S128	360 Winter	1	+0%	1/30 Summer				203.870	0.175	0.000	0.21		
S21.016	S129	360 Winter	1	+0%					201.448	-0.142	0.000	0.29		
S21.017	S130	360 Winter	1	+0%					200.440	-0.150	0.000	0.24		
S21.018	S131	360 Winter	1	+0%					199.433	-0.157	0.000	0.20		

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S94	10.6	OK	
S21.001	S95	19.6	OK	
S22.000	S96	10.5	OK	
S21.002	S97	38.5	OK	
S23.000	S98	10.7	OK	
S21.003	S99	56.7	OK	
S24.000	S100	34.8	OK	
S24.001	S101	32.8	OK	
S21.004	S102	97.7	OK	
S21.005	S103	106.7	OK	
S21.006	S104	107.0	OK	
S25.000	S105	20.0	OK	
S25.001	S106	30.3	OK	
S25.002	S107	40.8	OK	
S21.007	S108	9.9	SURCHARGED	
S21.008	S109	14.7	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.009	S110	22.2	OK	
S21.010	S111	30.3	OK	
S26.000	S112	31.4	OK	
S21.011	S113	71.6	OK	
S27.000	S114	19.6	OK	
S27.001	S115	19.4	OK	
S28.000	S116	12.7	OK	
S29.000	S117	27.8	OK	
S29.001	S118	49.4	OK	
S27.002	S119	89.0	OK	
S27.003	S120	97.7	OK	
S21.012	S121	176.5	OK	
S21.013	S122	176.2	OK	
S21.014	S123	49.1	OK	
S30.000	S124	12.3	OK	
S30.001	S125	22.9	OK	
S30.002	S126	33.5	OK	
S30.003	S127	33.5	OK	
S21.015	S128	26.6	SURCHARGED	
S21.016	S129	26.6	OK	
S21.017	S130	26.6	OK	
S21.018	S131	26.6	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)
S21.000	S94	15 Winter	30	+0%	100/15 Summer				222.253	-0.047	0.000	0.79		
S21.001	S95	15 Winter	30	+0%	30/15 Summer				221.585	0.105	0.000	1.06		
S22.000	S96	15 Winter	30	+0%	100/15 Summer				219.285	-0.195	0.000	0.26		
S21.002	S97	15 Winter	30	+0%	30/15 Summer				219.149	0.109	0.000	0.94		
S23.000	S98	15 Winter	30	+0%					221.495	-0.075	0.000	0.49		
S21.003	S99	15 Winter	30	+0%	30/15 Summer				219.045	0.120	0.000	1.05		
S24.000	S100	15 Winter	30	+0%	30/15 Summer				218.939	0.059	0.000	0.81		
S24.001	S101	15 Winter	30	+0%	30/15 Summer				218.874	0.089	0.000	0.91		
S21.004	S102	15 Winter	30	+0%	30/15 Summer				218.837	0.092	0.000	1.57		
S21.005	S103	15 Winter	30	+0%					218.445	-0.225	0.000	0.49		
S21.006	S104	15 Winter	30	+0%					216.566	-0.234	0.000	0.47		
S25.000	S105	15 Winter	30	+0%	100/15 Summer				217.319	-0.081	0.000	0.70		
S25.001	S106	15 Winter	30	+0%	100/15 Summer				215.565	-0.075	0.000	0.88		
S25.002	S107	480 Winter	30	+0%	30/120 Winter				215.430	0.130	0.000	0.13		
S21.007	S108	480 Winter	30	+0%	1/30 Winter				215.428	0.723	0.000	0.08		
S21.008	S109	15 Winter	30	+0%					212.875	-0.125	0.000	0.39		
S21.009	S110	15 Winter	30	+0%					211.987	-0.113	0.000	0.48		
S21.010	S111	15 Winter	30	+0%					210.662	-0.138	0.000	0.55		
S26.000	S112	15 Winter	30	+0%	100/15 Winter				213.934	-0.096	0.000	0.61		
S21.011	S113	15 Winter	30	+0%					208.946	-0.254	0.000	0.38		
S27.000	S114	15 Winter	30	+0%					214.659	-0.131	0.000	0.36		
S27.001	S115	15 Winter	30	+0%					210.910	-0.125	0.000	0.40		
S28.000	S116	15 Winter	30	+0%	100/15 Summer				213.520	-0.050	0.000	0.76		
S29.000	S117	15 Winter	30	+0%					208.501	-0.299	0.000	0.23		
S29.001	S118	15 Winter	30	+0%	100/15 Winter				208.478	-0.237	0.000	0.43		
S27.002	S119	15 Winter	30	+0%	100/15 Summer				208.424	-0.176	0.000	0.83		
S27.003	S120	15 Winter	30	+0%					208.145	-0.380	0.000	0.29		
S21.012	S121	15 Winter	30	+0%					207.014	-0.361	0.000	0.33		
S21.013	S122	15 Winter	30	+0%					204.961	-0.314	0.000	0.46		
S21.014	S123	360 Winter	30	+0%	30/15 Summer				204.442	0.217	0.000	0.26		
S30.000	S124	15 Winter	30	+0%	100/15 Summer				207.706	-0.094	0.000	0.62		
S30.001	S125	15 Winter	30	+0%	100/15 Summer				207.482	-0.063	0.000	0.85		
S30.002	S126	15 Winter	30	+0%	100/15 Summer				207.157	-0.043	0.000	0.98		
S30.003	S127	15 Winter	30	+0%	100/15 Summer				205.236	-0.064	0.000	0.84		
S21.015	S128	360 Winter	30	+0%	1/30 Summer				204.438	0.743	0.000	0.21		
S21.016	S129	30 Summer	30	+0%					201.448	-0.142	0.000	0.30		
S21.017	S130	30 Summer	30	+0%					200.440	-0.150	0.000	0.25		
S21.018	S131	30 Summer	30	+0%					199.433	-0.157	0.000	0.20		

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S94	26.0	OK	
S21.001	S95	51.9	SURCHARGED	
S22.000	S96	25.6	OK	
S21.002	S97	94.1	SURCHARGED	
S23.000	S98	26.1	OK	
S21.003	S99	136.1	SURCHARGED	
S24.000	S100	79.9	SURCHARGED	
S24.001	S101	78.4	SURCHARGED	
S21.004	S102	237.8	SURCHARGED	
S21.005	S103	258.9	OK	
S21.006	S104	257.9	OK	
S25.000	S105	48.8	OK	
S25.001	S106	79.1	OK	
S25.002	S107	16.0	SURCHARGED	
S21.007	S108	10.0	SURCHARGED	
S21.008	S109	35.5	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.009	S110	64.8	OK	
S21.010	S111	93.1	OK	
S26.000	S112	76.8	OK	
S21.011	S113	197.6	OK	
S27.000	S114	48.1	OK	
S27.001	S115	47.7	OK	
S28.000	S116	31.2	OK	
S29.000	S117	67.6	OK	
S29.001	S118	129.0	OK	
S27.002	S119	230.5	OK	
S27.003	S120	254.8	OK	
S21.012	S121	471.3	OK	
S21.013	S122	467.9	OK	
S21.014	S123	96.3	SURCHARGED	
S30.000	S124	30.1	OK	
S30.001	S125	62.2	OK	
S30.002	S126	93.2	OK	
S30.003	S127	92.6	OK	
S21.015	S128	27.0	SURCHARGED	
S21.016	S129	27.0	OK	
S21.017	S130	27.0	OK	
S21.018	S131	27.0	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 2 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.300 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)
S21.000	S94	15 Winter	100	+30%	100/15 Summer				223.250	0.950	0.000	1.12		
S21.001	S95	15 Winter	100	+30%	30/15 Summer				222.361	0.881	0.000	1.44		
S22.000	S96	15 Winter	100	+30%	100/15 Summer				219.967	0.487	0.000	0.39		
S21.002	S97	15 Winter	100	+30%	30/15 Summer				219.905	0.865	0.000	1.42		
S23.000	S98	15 Winter	100	+30%					221.526	-0.044	0.000	0.83		
S21.003	S99	15 Winter	100	+30%	30/15 Summer				219.664	0.739	0.000	1.65		
S24.000	S100	15 Winter	100	+30%	30/15 Summer				219.440	0.560	0.000	1.34		
S24.001	S101	15 Winter	100	+30%	30/15 Summer				219.262	0.477	0.000	1.53		
S21.004	S102	15 Winter	100	+30%	30/15 Summer				219.147	0.402	0.000	2.54		
S21.005	S103	15 Winter	100	+30%					218.530	-0.140	0.000	0.80		
S21.006	S104	15 Winter	100	+30%					216.648	-0.152	0.000	0.77		
S25.000	S105	15 Winter	100	+30%	100/15 Summer				217.930	0.530	0.000	1.01		
S25.001	S106	15 Winter	100	+30%	100/15 Summer				216.112	0.472	0.000	1.23		
S25.002	S107	720 Winter	100	+30%	30/120 Winter				216.054	0.754	0.000	0.15		
S21.007	S108	720 Winter	100	+30%	1/30 Winter				216.051	1.346	0.000	0.08		
S21.008	S109	15 Winter	100	+30%					212.907	-0.093	0.000	0.64		
S21.009	S110	15 Winter	100	+30%					212.030	-0.070	0.000	0.81		
S21.010	S111	15 Winter	100	+30%					210.730	-0.070	0.000	0.93		
S26.000	S112	15 Winter	100	+30%	100/15 Winter				214.043	0.013	0.000	1.00		
S21.011	S113	15 Winter	100	+30%					209.015	-0.185	0.000	0.63		
S27.000	S114	15 Winter	100	+30%					214.693	-0.097	0.000	0.61		
S27.001	S115	15 Winter	100	+30%					210.948	-0.087	0.000	0.67		
S28.000	S116	15 Winter	100	+30%	100/15 Summer				214.179	0.609	0.000	1.09		
S29.000	S117	15 Winter	100	+30%					208.743	-0.057	0.000	0.39		
S29.001	S118	15 Winter	100	+30%	100/15 Winter				208.716	0.001	0.000	0.72		
S27.002	S119	15 Winter	100	+30%	100/15 Summer				208.645	0.045	0.000	1.36		
S27.003	S120	15 Winter	100	+30%					208.219	-0.306	0.000	0.47		
S21.012	S121	15 Winter	100	+30%					207.096	-0.279	0.000	0.55		
S21.013	S122	600 Winter	100	+30%					205.141	-0.134	0.000	0.11		
S21.014	S123	600 Winter	100	+30%	30/15 Summer				205.137	0.912	0.000	0.29		
S30.000	S124	15 Winter	100	+30%	100/15 Summer				208.713	0.913	0.000	0.87		
S30.001	S125	15 Winter	100	+30%	100/15 Summer				208.545	1.000	0.000	1.05		
S30.002	S126	15 Winter	100	+30%	100/15 Summer				208.164	0.964	0.000	1.19		
S30.003	S127	15 Winter	100	+30%	100/15 Summer				205.524	0.224	0.000	1.00		
S21.015	S128	600 Winter	100	+30%	1/30 Summer				205.133	1.438	0.000	0.21		
S21.016	S129	4320 Winter	100	+30%					201.448	-0.142	0.000	0.30		
S21.017	S130	5760 Winter	100	+30%					200.440	-0.150	0.000	0.25		
S21.018	S131	960 Winter	100	+30%					199.433	-0.157	0.000	0.20		

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.000	S94	36.7	FLOOD RISK	
S21.001	S95	70.8	SURCHARGED	
S22.000	S96	38.9	SURCHARGED	
S21.002	S97	141.6	SURCHARGED	
S23.000	S98	43.8	OK	
S21.003	S99	213.6	SURCHARGED	
S24.000	S100	131.8	SURCHARGED	
S24.001	S101	131.9	SURCHARGED	
S21.004	S102	385.4	SURCHARGED	
S21.005	S103	423.2	OK	
S21.006	S104	423.2	OK	
S25.000	S105	70.2	SURCHARGED	
S25.001	S106	110.5	SURCHARGED	
S25.002	S107	18.6	SURCHARGED	
S21.007	S108	10.0	SURCHARGED	
S21.008	S109	58.6	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm s6

PN	US/MH Name	Pipe Flow (l/s)	Status	Level Exceeded
S21.009	S110	108.4	OK	
S21.010	S111	156.3	OK	
S26.000	S112	126.9	SURCHARGED	
S21.011	S113	326.5	OK	
S27.000	S114	80.8	OK	
S27.001	S115	80.0	OK	
S28.000	S116	44.8	SURCHARGED	
S29.000	S117	113.0	OK	
S29.001	S118	215.7	SURCHARGED	
S27.002	S119	376.4	SURCHARGED	
S27.003	S120	421.0	OK	
S21.012	S121	779.4	OK	
S21.013	S122	109.0	OK	
S21.014	S123	108.2	FLOOD RISK	
S30.000	S124	42.0	FLOOD RISK	
S30.001	S125	76.9	SURCHARGED	
S30.002	S126	113.8	FLOOD RISK	
S30.003	S127	110.2	SURCHARGED	
S21.015	S128	27.0	SURCHARGED	
S21.016	S129	27.0	OK	
S21.017	S130	27.0	OK	
S21.018	S131	27.0	OK	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	19.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.295	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.500		

Designed with Level Soffits

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	40.009	0.100	400.1	0.049	5.00	0.0	0.600	o	450	Pipe/Conduit	
S1.001	28.203	0.075	376.0	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.002	44.179	1.115	39.6	0.093	0.00	0.0	0.600	o	450	Pipe/Conduit	
S2.000	22.859	0.390	58.6	0.047	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	12.738	0.200	63.7	0.047	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.002	17.252	0.175	98.6	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.003	27.285	0.115	237.3	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.004	33.806	0.210	161.0	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.005	34.722	2.000	17.4	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.006	25.431	2.850	8.9	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.007	23.933	1.450	16.5	0.069	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	17.453	0.075	232.7	0.067	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	25.840	0.755	34.2	0.067	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.008	17.732	1.200	14.8	0.067	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	17.056	1.500	11.4	0.093	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.004	26.929	0.385	69.9	0.093	0.00	0.0	0.600	o	675	Pipe/Conduit	
S1.005	47.809	2.885	16.6	0.164	0.00	0.0	0.600	o	225	Pipe/Conduit	
S4.000	21.244	0.685	31.0	0.164	5.00	0.0	0.600	o	300	Pipe/Conduit	
S4.001	20.040	0.200	100.2	0.164	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.006	11.922	0.030	397.4	0.164	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.007	42.455	0.690	61.5	0.164	0.00	0.0	0.600	o	750	Pipe/Conduit	
S5.000	20.141	1.985	10.1	0.050	5.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.66	240.140	0.049	0.0	0.0	0.0	1.01	160.7	6.6
S1.001	50.00	6.11	240.040	0.098	0.0	0.0	0.0	1.04	165.8	13.3
S1.002	50.00	6.34	239.965	0.191	0.0	0.0	0.0	3.24	514.9	25.9
S2.000	50.00	5.22	247.665	0.047	0.0	0.0	0.0	1.71	68.1	6.4
S2.001	50.00	5.35	247.275	0.094	0.0	0.0	0.0	1.64	65.3	12.7
S2.002	50.00	5.57	247.075	0.153	0.0	0.0	0.0	1.32	52.4	20.7
S2.003	50.00	6.02	246.825	0.212	0.0	0.0	0.0	1.02	71.8	28.7
S2.004	50.00	6.47	246.710	0.271	0.0	0.0	0.0	1.24	87.4	36.7
S2.005	50.00	6.63	246.500	0.330	0.0	0.0	0.0	3.79	268.0	44.7
S2.006	50.00	6.71	244.500	0.399	0.0	0.0	0.0	5.29	374.2	54.0
S2.007	50.00	6.81	241.650	0.468	0.0	0.0	0.0	3.89	274.9	63.4
S3.000	50.00	5.28	241.030	0.067	0.0	0.0	0.0	1.03	72.6	9.1
S3.001	50.00	5.44	240.955	0.134	0.0	0.0	0.0	2.70	190.6	18.1
S2.008	50.00	6.88	240.200	0.669	0.0	0.0	0.0	4.11	290.6	90.6
S1.003	50.00	6.92	238.625	0.953	0.0	0.0	0.0	7.80	2790.8	129.0
S1.004	50.00	7.06	237.125	1.046	0.0	0.0	0.0	3.14	1122.4	141.6
S1.005	50.00	7.31	236.740	1.210	0.0	0.0	0.0	3.23	128.4«	163.8
S4.000	50.00	5.12	234.665	0.164	0.0	0.0	0.0	2.83	200.3	22.2
S4.001	50.00	5.34	233.980	0.328	0.0	0.0	0.0	1.57	111.0	44.4
S1.006	50.00	7.45	233.330	1.702	0.0	0.0	0.0	1.40	617.4	230.5
S1.007	50.00	7.65	233.300	1.866	0.0	0.0	0.0	3.57	1577.8	252.7
S5.000	50.00	5.11	237.635	0.050	0.0	0.0	0.0	3.18	56.2	6.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S5.001	18.079	0.260	69.5	0.050	0.00	0.0	0.600	o	150	Pipe/Conduit	
S5.002	21.111	1.900	11.1	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
S5.003	28.179	0.295	95.5	0.050	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.008	30.613	1.780	17.2	0.035	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.009	36.361	1.185	30.7	0.338	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.010	32.279	1.645	19.6	0.338	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.011	13.465	0.885	15.2	0.338	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.012	119.111	10.015	11.9	0.338	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.000	13.860	1.385	10.0	0.041	5.00	0.0	0.600	o	150	Pipe/Conduit	
S6.001	18.330	0.075	244.4	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.002	21.345	0.090	237.2	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.003	18.681	0.080	233.5	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.004	17.898	0.075	238.6	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.005	21.776	0.090	242.0	0.041	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.006	22.493	0.060	374.9	0.178	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.000	23.668	0.060	394.5	0.050	5.00	0.0	0.600	o	450	Pipe/Conduit	
S7.001	19.792	0.050	395.8	0.050	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.002	13.923	0.035	397.8	0.050	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.003	13.958	0.035	398.8	0.211	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.004	46.881	0.120	390.7	0.211	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.005	8.098	0.020	404.9	0.047	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.006	79.523	2.325	34.2	0.049	0.00	0.0	0.600	o	450	Pipe/Conduit	
S7.007	38.956	3.895	10.0	0.064	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.007	58.556	0.150	390.4	0.059	0.00	0.0	0.600	o	450	Pipe/Conduit	
S6.008	28.756	0.170	169.2	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.000	14.830	1.485	10.0	0.059	5.00	0.0	0.600	o	150	Pipe/Conduit	
S9.000	43.099	1.100	39.2	0.059	5.00	0.0	0.600	o	150	Pipe/Conduit	
S8.001	31.751	0.695	45.7	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
S8.002	30.549	2.905	10.5	0.059	0.00	0.0	0.600	o	225	Pipe/Conduit	
S6.009	128.968	7.400	17.4	0.059	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S5.001	50.00	5.36	235.650	0.100	0.0	0.0	0.0	1.21	21.3	13.5
S5.002	50.00	5.44	235.315	0.150	0.0	0.0	0.0	3.95	157.0	20.3
S5.003	50.00	5.80	233.415	0.200	0.0	0.0	0.0	1.34	53.2	27.1
S1.008	50.00	7.72	232.610	2.101	0.0	0.0	0.0	6.77	2989.6	284.5
S1.009	50.00	7.89	230.730	2.439	0.0	0.0	0.0	3.68	585.4	330.3
S1.010	50.00	8.00	229.545	2.777	0.0	0.0	0.0	4.61	732.6	376.0
S1.011	50.00	8.05	227.900	3.115	0.0	0.0	0.0	5.23	832.2	421.8
S1.012	50.00	8.38	225.365	3.453	0.0	0.0	0.0	5.92	941.6	467.6
S6.000	50.00	5.07	235.635	0.041	0.0	0.0	0.0	3.20	56.6	5.6
S6.001	50.00	5.38	234.100	0.082	0.0	0.0	0.0	1.00	70.8	11.1
S6.002	50.00	5.73	234.025	0.123	0.0	0.0	0.0	1.02	71.9	16.7
S6.003	50.00	6.03	233.935	0.164	0.0	0.0	0.0	1.02	72.4	22.2
S6.004	50.00	6.33	233.855	0.205	0.0	0.0	0.0	1.01	71.6	27.8
S6.005	50.00	6.69	233.780	0.246	0.0	0.0	0.0	1.01	71.1	33.3
S6.006	50.00	7.05	233.540	0.424	0.0	0.0	0.0	1.04	166.0	57.4
S7.000	50.00	5.39	240.480	0.050	0.0	0.0	0.0	1.02	161.8	6.8
S7.001	50.00	5.71	240.420	0.100	0.0	0.0	0.0	1.02	161.5	13.5
S7.002	50.00	5.94	240.370	0.150	0.0	0.0	0.0	1.01	161.1	20.3
S7.003	50.00	6.17	240.335	0.361	0.0	0.0	0.0	1.01	160.9	48.9
S7.004	50.00	6.94	240.300	0.572	0.0	0.0	0.0	1.02	162.6	77.5
S7.005	50.00	7.07	240.180	0.619	0.0	0.0	0.0	1.00	159.7	83.8
S7.006	50.00	7.45	240.160	0.668	0.0	0.0	0.0	3.49	554.4	90.5
S7.007	50.00	7.55	237.835	0.732	0.0	0.0	0.0	6.46	1026.9	99.1
S6.007	50.00	8.50	233.480	1.215	0.0	0.0	0.0	1.02	162.7«	164.5
S6.008	50.00	8.90	233.070	1.274	0.0	0.0	0.0	1.21	85.2«	172.5
S8.000	50.00	5.08	238.135	0.059	0.0	0.0	0.0	3.21	56.7	8.0
S9.000	50.00	5.45	237.750	0.059	0.0	0.0	0.0	1.61	28.5	8.0
S8.001	50.00	5.72	236.575	0.177	0.0	0.0	0.0	1.94	77.2	24.0
S8.002	50.00	5.84	235.880	0.236	0.0	0.0	0.0	4.06	161.4	32.0
S6.009	50.00	9.47	232.900	1.569	0.0	0.0	0.0	3.78	267.5	212.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S10.000	85.803	4.500	19.1	0.164	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.010	115.524	9.525	12.1	0.164	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.011	40.092	0.475	84.4	0.133	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.013	85.323	1.500	56.9	0.133	0.00	0.0	0.600	o	675	Pipe/Conduit	
S11.000	41.781	1.500	27.9	0.152	5.00	0.0	0.600	o	150	Pipe/Conduit	
S11.001	47.739	1.870	25.5	0.151	0.00	0.0	0.600	o	675	Pipe/Conduit	
S12.000	32.332	0.635	50.9	0.245	5.00	0.0	0.600	o	300	Pipe/Conduit	
S12.001	28.854	2.835	10.2	0.245	0.00	0.0	0.600	o	300	Pipe/Conduit	
S11.002	76.301	2.430	31.4	0.151	0.00	0.0	0.600	o	675	Pipe/Conduit	
S13.000	39.084	0.875	44.7	0.092	5.00	0.0	0.600	o	150	Pipe/Conduit	
S11.003	40.639	0.100	406.4	0.151	0.00	0.0	0.600	o	750	Pipe/Conduit	
S11.004	10.306	0.025	412.2	0.000	0.00	0.0	0.600	o	750	Pipe/Conduit	
S1.014	58.356	3.680	15.9	0.133	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.000	37.120	0.550	67.5	0.128	5.00	0.0	0.600	o	225	Pipe/Conduit	
S14.001	34.996	0.500	70.0	0.128	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.002	28.119	0.300	93.7	0.128	0.00	0.0	0.600	o	300	Pipe/Conduit	
S14.003	16.123	0.040	400.0	0.046	0.00	0.0	0.600	o	450	Pipe/Conduit	
S15.000	102.928	7.340	14.0	0.357	5.00	0.0	0.600	o	300	Pipe/Conduit	
S14.004	46.691	2.575	18.1	0.046	0.00	0.0	0.600	o	450	Pipe/Conduit	
S16.000	41.436	0.415	99.8	0.318	5.00	0.0	0.600	o	375	Pipe/Conduit	
S14.005	17.033	0.045	378.5	0.046	0.00	0.0	0.600	o	450	Pipe/Conduit	
S14.006	53.254	0.135	394.5	0.174	0.00	0.0	0.600	o	525	Pipe/Conduit	
S17.000	43.341	0.940	46.1	0.160	5.00	0.0	0.600	o	225	Pipe/Conduit	
S17.001	17.946	0.760	23.6	0.160	0.00	0.0	0.600	o	225	Pipe/Conduit	
S17.002	23.003	0.300	76.7	0.160	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S10.000	50.00	5.47	230.075	0.164	0.0	0.0	0.0	3.01	119.7	22.2
S6.010	50.00	9.89	225.500	1.897	0.0	0.0	0.0	4.54	320.8	256.9
S6.011	50.00	10.23	215.900	2.030	0.0	0.0	0.0	1.97	218.0«	274.9
S1.013	50.00	10.64	215.125	5.616	0.0	0.0	0.0	3.48	1245.2	760.5
S11.000	50.00	5.36	220.150	0.152	0.0	0.0	0.0	1.92	33.8	20.6
S11.001	50.00	5.52	218.125	0.303	0.0	0.0	0.0	5.20	1860.9	41.0
S12.000	50.00	5.24	220.100	0.245	0.0	0.0	0.0	2.21	156.1	33.2
S12.001	50.00	5.34	219.465	0.490	0.0	0.0	0.0	4.96	350.3	66.4
S11.002	50.00	5.79	216.255	0.944	0.0	0.0	0.0	4.69	1677.5	127.8
S13.000	50.00	5.43	215.225	0.092	0.0	0.0	0.0	1.51	26.7	12.5
S11.003	50.00	6.28	213.750	1.187	0.0	0.0	0.0	1.38	610.5	160.7
S11.004	50.00	6.40	213.650	1.187	0.0	0.0	0.0	1.37	606.1	160.7
S1.014	50.00	10.89	213.590	6.936	0.0	0.0	0.0	3.97	280.5«	939.2
S14.000	50.00	5.39	226.125	0.128	0.0	0.0	0.0	1.59	63.4	17.3
S14.001	50.00	5.76	225.575	0.256	0.0	0.0	0.0	1.57	62.2	34.7
S14.002	50.00	6.05	225.000	0.384	0.0	0.0	0.0	1.62	114.8	52.0
S14.003	50.00	6.32	224.550	0.430	0.0	0.0	0.0	1.01	160.7	58.2
S15.000	50.00	5.41	232.000	0.357	0.0	0.0	0.0	4.22	298.3	48.3
S14.004	50.00	6.48	224.510	0.833	0.0	0.0	0.0	4.79	762.1	112.8
S16.000	50.00	5.38	222.425	0.318	0.0	0.0	0.0	1.81	200.3	43.1
S14.005	50.00	6.75	221.935	1.197	0.0	0.0	0.0	1.04	165.2	162.1
S14.006	50.00	7.54	221.815	1.371	0.0	0.0	0.0	1.12	242.8	185.7
S17.000	50.00	5.37	232.075	0.160	0.0	0.0	0.0	1.93	76.8	21.7
S17.001	50.00	5.48	231.135	0.320	0.0	0.0	0.0	2.70	107.5	43.3
S17.002	50.00	5.70	230.300	0.480	0.0	0.0	0.0	1.80	127.0	65.0

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S17.003	85.458	8.095	10.6	0.160	0.00	0.0	0.600	o	450	Pipe/Conduit	
S14.007	71.800	2.875	25.0	0.174	0.00	0.0	0.600	o	600	Pipe/Conduit	
S18.000	79.331	2.800	28.3	0.152	5.00	0.0	0.600	o	225	Pipe/Conduit	
S18.001	16.273	1.625	10.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.008	90.627	0.230	394.0	0.156	0.00	0.0	0.600	o	600	Pipe/Conduit	
S14.009	58.114	3.850	15.1	0.159	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.010	32.087	0.080	401.1	0.074	0.00	0.0	0.600	o	375	Pipe/Conduit	
S19.000	22.757	1.300	17.5	0.079	5.00	0.0	0.600	o	150	Pipe/Conduit	
S19.001	34.966	2.065	16.9	0.079	0.00	0.0	0.600	o	225	Pipe/Conduit	
S14.011	99.236	2.540	39.1	0.074	0.00	0.0	0.600	o	375	Pipe/Conduit	
S20.000	47.153	3.645	12.9	0.087	5.00	0.0	0.600	o	150	Pipe/Conduit	
S14.012	88.922	0.355	250.5	0.087	0.00	0.0	0.600	o	450	Pipe/Conduit	
S14.013	12.062	1.005	12.0	0.422	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.015	3.826	0.155	24.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.016	9.915	0.660	15.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.017	12.534	0.420	29.8	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S17.003	50.00	5.92	229.850	0.640	0.0	0.0	0.0	6.28	999.5	86.7
S14.007	50.00	7.79	221.605	2.185	0.0	0.0	0.0	4.89	1381.6	295.9
S18.000	50.00	5.54	224.675	0.152	0.0	0.0	0.0	2.47	98.1	20.6
S18.001	50.00	5.60	221.875	0.152	0.0	0.0	0.0	4.16	165.4	20.6
S14.008	50.00	9.02	218.730	2.493	0.0	0.0	0.0	1.22	345.1	337.6
S14.009	50.00	9.31	218.500	2.652	0.0	0.0	0.0	3.39	134.6«	359.1
S14.010	50.00	9.91	213.900	2.726	0.0	0.0	0.0	0.90	99.2«	369.1
S19.000	50.00	5.16	217.450	0.079	0.0	0.0	0.0	2.42	42.8	10.7
S19.001	50.00	5.34	216.075	0.158	0.0	0.0	0.0	3.20	127.1	21.4
S14.011	50.00	10.47	213.820	2.958	0.0	0.0	0.0	2.91	321.0«	400.6
S20.000	50.00	5.28	215.150	0.087	0.0	0.0	0.0	2.82	49.8	11.8
S14.012	50.00	11.63	211.205	3.132	0.0	0.0	0.0	1.28	203.6«	424.1
S14.013	50.00	11.67	210.850	3.554	0.0	0.0	0.0	5.89	937.3	481.3
S1.015	50.00	11.68	209.745	10.490	0.0	0.0	0.0	3.66	404.2«	1420.5
S1.016	50.00	11.73	209.590	10.490	0.0	0.0	0.0	3.39	134.9«	1420.5
S1.017	50.00	11.82	208.430	10.490	0.0	0.0	0.0	2.40	95.6«	1420.5

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	244.395	4.255	Open Manhole	1800	S1.000	240.140	450				
S2	243.710	3.670	Open Manhole	1800	S1.001	240.040	450	S1.000	240.040	450	
S3	243.000	3.035	Open Manhole	1800	S1.002	239.965	450	S1.001	239.965	450	
S4	249.090	1.425	Open Manhole	1200	S2.000	247.665	225				
S5	248.700	1.425	Open Manhole	1200	S2.001	247.275	225	S2.000	247.275	225	
S6	248.500	1.425	Open Manhole	1200	S2.002	247.075	225	S2.001	247.075	225	
S7	248.800	1.975	Open Manhole	1350	S2.003	246.825	300	S2.002	246.900	225	
S8	248.500	1.790	Open Manhole	1350	S2.004	246.710	300	S2.003	246.710	300	
S9	248.000	1.500	Open Manhole	1350	S2.005	246.500	300	S2.004	246.500	300	
S10	246.000	1.500	Open Manhole	1350	S2.006	244.500	300	S2.005	244.500	300	
S11	243.000	1.350	Open Manhole	1350	S2.007	241.650	300	S2.006	241.650	300	
S12	242.530	1.500	Open Manhole	1350	S3.000	241.030	300				
S13	242.500	1.545	Open Manhole	1350	S3.001	240.955	300	S3.000	240.955	300	
S14	241.700	1.500	Open Manhole	1350	S2.008	240.200	300	S2.007	240.200	300	
								S3.001	240.200	300	
S15	240.500	1.875	Open Manhole	2100	S1.003	238.625	675	S1.002	238.850	450	
								S2.008	239.000	300	
S16	239.000	1.875	Open Manhole	2100	S1.004	237.125	675	S1.003	237.125	675	
S17	238.740	2.000	Open Manhole	2100	S1.005	236.740	225	S1.004	236.740	675	
S18	236.165	1.500	Open Manhole	1350	S4.000	234.665	300				
S19	235.480	1.500	Open Manhole	1350	S4.001	233.980	300	S4.000	233.980	300	
S20	235.420	2.090	Open Manhole	2400	S1.006	233.330	750	S1.005	233.855	225	
								S4.001	233.780	300	
S21	235.523	2.223	Open Manhole	2400	S1.007	233.300	750	S1.006	233.300	750	
S22	238.985	1.350	Open Manhole	1200	S5.000	237.635	150				
S23	237.000	1.350	Open Manhole	1200	S5.001	235.650	150	S5.000	235.650	150	
S24	236.740	1.425	Open Manhole	1200	S5.002	235.315	225	S5.001	235.390	150	
S25	234.840	1.425	Open Manhole	1200	S5.003	233.415	225	S5.002	233.415	225	
S26	234.545	1.935	Open Manhole	2400	S1.008	232.610	750	S1.007	232.610	750	
								S5.003	233.120	225	
S27	232.830	2.100	Open Manhole	1800	S1.009	230.730	450	S1.008	230.830	750	400
S28	231.495	1.950	Open Manhole	1800	S1.010	229.545	450	S1.009	229.545	450	
S29	230.000	2.100	Open Manhole	1800	S1.011	227.900	450	S1.010	227.900	450	
S30	230.000	4.635	Open Manhole	1800	S1.012	225.365	450	S1.011	227.015	450	1650
S31	238.200	2.565	Open Manhole	1200	S6.000	235.635	150				
S32	235.600	1.500	Open Manhole	1350	S6.001	234.100	300	S6.000	234.250	150	
S33	236.150	2.125	Open Manhole	1350	S6.002	234.025	300	S6.001	234.025	300	
S34	237.365	3.430	Open Manhole	1350	S6.003	233.935	300	S6.002	233.935	300	
S35	235.450	1.595	Open Manhole	1350	S6.004	233.855	300	S6.003	233.855	300	
S36	235.400	1.620	Open Manhole	1350	S6.005	233.780	300	S6.004	233.780	300	
S37	235.370	1.830	Open Manhole	1800	S6.006	233.540	450	S6.005	233.690	300	
S38	244.500	4.020	Open Manhole	1800	S7.000	240.480	450				
S39	243.000	2.580	Open Manhole	1800	S7.001	240.420	450	S7.000	240.420	450	
S40	242.275	1.905	Open Manhole	1800	S7.002	240.370	450	S7.001	240.370	450	
S41	242.260	1.925	Open Manhole	1800	S7.003	240.335	450	S7.002	240.335	450	
S42	242.100	1.800	Open Manhole	1800	S7.004	240.300	450	S7.003	240.300	450	
S43	245.200	5.020	Open Manhole	1800	S7.005	240.180	450	S7.004	240.180	450	
S44	245.458	5.298	Open Manhole	1800	S7.006	240.160	450	S7.005	240.160	450	
S45	241.000	3.165	Open Manhole	1800	S7.007	237.835	450	S7.006	237.835	450	
S46	235.590	2.110	Open Manhole	1800	S6.007	233.480	450	S6.006	233.480	450	
								S7.007	233.940	450	460
S47	235.170	2.100	Open Manhole	1350	S6.008	233.070	300	S6.007	233.330	450	410
S48	240.000	1.865	Open Manhole	1200	S8.000	238.135	150				
S49	239.100	1.350	Open Manhole	1200	S9.000	237.750	150				
S50	238.000	1.425	Open Manhole	1200	S8.001	236.575	225	S8.000	236.650	150	
								S9.000	236.650	150	
S51	237.000	1.120	Open Manhole	1200	S8.002	235.880	225	S8.001	235.880	225	
S52	235.000	2.100	Open Manhole	1350	S6.009	232.900	300	S6.008	232.900	300	
								S8.002	232.975	225	
S53	231.500	1.425	Open Manhole	1200	S10.000	230.075	225				
S54	227.000	1.500	Open Manhole	1350	S6.010	225.500	300	S6.009	225.500	300	
								S10.000	225.575	225	
S55	218.000	2.100	Open Manhole	1350	S6.011	215.900	375	S6.010	215.975	300	
S56	219.000	3.875	Open Manhole	2400	S1.013	215.125	675	S1.012	215.350	450	

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								S6.011	215.425	375	
S57	221.500	1.350	Open Manhole	1200	S11.000	220.150	150				
S58	220.000	1.875	Open Manhole	2100	S11.001	218.125	675	S11.000	218.650	150	
S59	221.600	1.500	Open Manhole	1200	S12.000	220.100	300				
S60	222.000	2.535	Open Manhole	1200	S12.001	219.465	300	S12.000	219.465	300	
S61	218.130	1.875	Open Manhole	2100	S11.002	216.255	675	S11.001	216.255	675	
								S12.001	216.630	300	
S62	217.235	2.010	Open Manhole	1200	S13.000	215.225	150				
S63	215.800	2.050	Open Manhole	2400	S11.003	213.750	750	S11.002	213.825	675	
								S13.000	214.350	150	
S64	215.700	2.050	Open Manhole	2400	S11.004	213.650	750	S11.003	213.650	750	
S65	215.690	2.100	Open Manhole	2400	S1.014	213.590	300	S1.013	213.625	675	410
								S11.004	213.625	750	485
S66	227.700	1.575	Open Manhole	1200	S14.000	226.125	225				
S67	227.000	1.425	Open Manhole	1200	S14.001	225.575	225	S14.000	225.575	225	
S68	226.500	1.500	Open Manhole	1200	S14.002	225.000	300	S14.001	225.075	225	
S69	226.200	1.650	Open Manhole	1350	S14.003	224.550	450	S14.002	224.700	300	
S70	233.500	1.500	Open Manhole	1200	S15.000	232.000	300				
S71	226.200	1.690	Open Manhole	1350	S14.004	224.510	450	S14.003	224.510	450	
								S15.000	224.660	300	
S72	224.000	1.575	Open Manhole	1350	S16.000	222.425	375				
S73	224.340	2.405	Open Manhole	1800	S14.005	221.935	450	S14.004	221.935	450	
								S16.000	222.010	375	
S74	225.672	3.857	Open Manhole	1800	S14.006	221.815	525	S14.005	221.890	450	
S75	233.500	1.425	Open Manhole	1200	S17.000	232.075	225				
S76	232.560	1.425	Open Manhole	1200	S17.001	231.135	225	S17.000	231.135	225	
S77	231.800	1.500	Open Manhole	1350	S17.002	230.300	300	S17.001	230.375	225	
S78	231.500	1.650	Open Manhole	1350	S17.003	229.850	450	S17.002	230.000	300	
S79	225.300	3.695	Open Manhole	2100	S14.007	221.605	600	S14.006	221.680	525	
								S17.003	221.755	450	
S80	226.100	1.425	Open Manhole	1200	S18.000	224.675	225				
S81	223.900	2.025	Open Manhole	1200	S18.001	221.875	225	S18.000	221.875	225	
S82	221.700	2.970	Open Manhole	2100	S14.008	218.730	600	S14.007	218.730	600	
								S18.001	220.250	225	1145
S83	220.100	1.600	Open Manhole	1350	S14.009	218.500	225	S14.008	218.500	600	
S84	216.000	2.100	Open Manhole	1350	S14.010	213.900	375	S14.009	214.650	225	600
S85	218.800	1.350	Open Manhole	1200	S19.000	217.450	150				
S86	217.500	1.425	Open Manhole	1200	S19.001	216.075	225	S19.000	216.150	150	
S87	215.435	1.615	Open Manhole	1350	S14.011	213.820	375	S14.010	213.820	375	
								S19.001	214.010	225	40
S88	216.500	1.350	Open Manhole	1200	S20.000	215.150	150				
S89	212.855	1.650	Open Manhole	1800	S14.012	211.205	450	S14.011	211.280	375	
								S20.000	211.505	150	
S90	212.500	1.650	Open Manhole	1800	S14.013	210.850	450	S14.012	210.850	450	
S91	211.845	2.100	Open Manhole	2400	S1.015	209.745	375	S1.014	209.910	300	90
								S14.013	209.845	450	175
S92	210.760	1.170	Open Manhole	1200	S1.016	209.590	225	S1.015	209.590	375	
S93	210.355	1.925	Open Manhole	1200	S1.017	208.430	225	S1.016	208.930	225	500
S	209.781	1.771	Open Manhole	0		OUTFALL		S1.017	208.010	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S1	411082.751	414618.850	411082.751	414618.850	Required	
S2	411103.310	414584.527	411103.310	414584.527	Required	
S3	411120.344	414562.048	411120.344	414562.048	Required	
S4	411013.148	414618.717	411013.148	414618.717	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S5	411027.187	414600.676	411027.187	414600.676	Required	
S6	411038.276	414594.408	411038.276	414594.408	Required	
S7	411047.202	414579.644	411047.202	414579.644	Required	
S8	411054.118	414553.250	411054.118	414553.250	Required	
S9	411068.119	414522.480	411068.119	414522.480	Required	
S10	411100.311	414509.469	411100.311	414509.469	Required	
S11	411125.618	414511.978	411125.618	414511.978	Required	
S12	411133.864	414479.268	411133.864	414479.268	Required	
S13	411134.495	414496.709	411134.495	414496.709	Required	
S14	411148.704	414518.292	411148.704	414518.292	Required	
S15	411155.133	414534.818	411155.133	414534.818	Required	
S16	411164.765	414548.895	411164.765	414548.895	Required	
S17	411189.468	414538.176	411189.468	414538.176	Required	
S18	411220.104	414558.315	411220.104	414558.315	Required	
S19	411228.945	414538.998	411228.945	414538.998	Required	
S20	411233.468	414519.475	411233.468	414519.475	Required	
S21	411241.692	414510.844	411241.692	414510.844	Required	
S22	411197.312	414436.464	411197.312	414436.464	Required	
S23	411216.601	414442.261	411216.601	414442.261	Required	
S24	411234.504	414444.781	411234.504	414444.781	Required	
S25	411255.591	414443.781	411255.591	414443.781	Required	
S26	411258.409	414471.819	411258.409	414471.819	Required	
S27	411288.303	414478.415	411288.303	414478.415	Required	
S28	411320.181	414460.927	411320.181	414460.927	Required	
S29	411350.284	414449.276	411350.284	414449.276	Required	
S30	411363.478	414446.587	411363.478	414446.587	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S31	411094.668	414733.536	411094.668	414733.536	Required	
S32	411106.135	414741.321	411106.135	414741.321	Required	
S33	411124.092	414744.998	411124.092	414744.998	Required	
S34	411145.079	414741.105	411145.079	414741.105	Required	
S35	411162.632	414734.712	411162.632	414734.712	Required	
S36	411173.100	414720.194	411173.100	414720.194	Required	
S37	411182.499	414700.551	411182.499	414700.551	Required	
S38	411012.669	414682.994	411012.669	414682.994	Required	
S39	411031.996	414696.657	411031.996	414696.657	Required	
S40	411051.726	414695.087	411051.726	414695.087	Required	
S41	411062.763	414686.601	411062.763	414686.601	Required	
S42	411070.028	414674.682	411070.028	414674.682	Required	
S43	411070.622	414627.806	411070.622	414627.806	Required	
S44	411076.807	414622.579	411076.807	414622.579	Required	
S45	411148.998	414655.929	411148.998	414655.929	Required	
S46	411181.026	414678.106	411181.026	414678.106	Required	
S47	411231.208	414647.930	411231.208	414647.930	Required	
S48	411177.348	414567.285	411177.348	414567.285	Required	
S49	411168.083	414612.464	411168.083	414612.464	Required	
S50	411189.848	414575.265	411189.848	414575.265	Required	
S51	411216.958	414591.793	411216.958	414591.793	Required	
S52	411230.487	414619.183	411230.487	414619.183	Required	
S53	411318.052	414492.127	411318.052	414492.127	Required	
S54	411350.361	414571.614	411350.361	414571.614	Required	
S55	411456.671	414526.404	411456.671	414526.404	Required	
S56	411474.249	414490.371	411474.249	414490.371	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S57	411429.312	414697.752	411429.312	414697.752	Required	
S58	411465.364	414676.635	411465.364	414676.635	Required	
S59	411433.115	414629.435	411433.115	414629.435	Required	
S60	411463.904	414619.568	411463.904	414619.568	Required	
S61	411488.398	414634.820	411488.398	414634.820	Required	
S62	411493.021	414549.734	411493.021	414549.734	Required	
S63	411527.018	414569.015	411527.018	414569.015	Required	
S64	411548.722	414534.657	411548.722	414534.657	Required	
S65	411552.242	414524.971	411552.242	414524.971	Required	
S66	411201.501	414841.756	411201.501	414841.756	Required	
S67	411237.314	414851.518	411237.314	414851.518	Required	
S68	411272.081	414855.512	411272.081	414855.512	Required	
S69	411276.646	414827.766	411276.646	414827.766	Required	
S70	411189.751	414760.251	411189.751	414760.251	Required	
S71	411278.844	414811.794	411278.844	414811.794	Required	
S72	411361.047	414780.088	411361.047	414780.088	Required	
S73	411322.057	414794.112	411322.057	414794.112	Required	
S74	411320.606	414777.141	411320.606	414777.141	Required	
S75	411204.965	414712.546	411204.965	414712.546	Required	
S76	411225.550	414674.405	411225.550	414674.405	Required	
S77	411239.476	414663.084	411239.476	414663.084	Required	
S78	411252.933	414681.741	411252.933	414681.741	Required	
S79	411327.052	414724.278	411327.052	414724.278	Required	
S80	411369.217	414614.011	411369.217	414614.011	Required	
S81	411399.872	414687.180	411399.872	414687.180	Required	
S82	411395.589	414702.880	411395.589	414702.880	Required	

Manhole Schedules for Storm

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
S83	411436.850	414783.569	411436.850	414783.569	Required	
S84	411490.697	414761.710	411490.697	414761.710	Required	
S85	411467.622	414695.746	411467.622	414695.746	Required	
S86	411475.562	414717.073	411475.562	414717.073	Required	
S87	411506.328	414733.688	411506.328	414733.688	Required	
S88	411512.321	414623.154	411512.321	414623.154	Required	
S89	411553.390	414646.321	411553.390	414646.321	Required	
S90	411600.501	414570.904	411600.501	414570.904	Required	
S91	411599.745	414558.866	411599.745	414558.866	Required	
S92	411603.379	414557.670	411603.379	414557.670	Required	
S93	411612.881	414554.837	411612.881	414554.837	Required	
S	411624.666	414550.571			No Entry	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.017	S	209.781	208.010	0.000	0	0

Simulation Criteria for Storm

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

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	7	Number of Storage Structures	8	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	19.000	Cv (Summer)	0.750
Return Period (years)	100	Ratio R	0.295	Cv (Winter)	0.840
Region	England and Wales	Profile Type	Summer	Storm Duration (mins)	30

Online Controls for Storm

Orifice Manhole: S17, DS/PN: S1.005, Volume (m³): 15.8

Diameter (m) 0.041 Discharge Coefficient 0.600 Invert Level (m) 236.740

Orifice Manhole: S27, DS/PN: S1.009, Volume (m³): 17.9

Diameter (m) 0.048 Discharge Coefficient 0.600 Invert Level (m) 230.830

Orifice Manhole: S47, DS/PN: S6.008, Volume (m³): 12.1

Diameter (m) 0.062 Discharge Coefficient 0.600 Invert Level (m) 233.070

Orifice Manhole: S55, DS/PN: S6.011, Volume (m³): 11.1

Diameter (m) 0.058 Discharge Coefficient 0.600 Invert Level (m) 215.900

Orifice Manhole: S65, DS/PN: S1.014, Volume (m³): 42.7

Diameter (m) 0.082 Discharge Coefficient 0.600 Invert Level (m) 213.590

Orifice Manhole: S84, DS/PN: S14.010, Volume (m³): 5.3

Diameter (m) 0.167 Discharge Coefficient 0.600 Invert Level (m) 213.900

Hydro-Brake® Optimum Manhole: S91, DS/PN: S1.015, Volume (m³): 15.0

Unit Reference	MD-SHE-0296-6100-2800-6100
Design Head (m)	2.800
Design Flow (l/s)	61.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	296
Invert Level (m)	209.745
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.800	60.9	Kick-Flo®	1.748	48.6
Flush-Flo™	0.811	60.9	Mean Flow over Head Range	-	52.9

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	9.1	0.600	60.0	1.600	53.4	2.600	58.8	5.000	80.7	7.500	98.3
0.200	30.4	0.800	60.9	1.800	49.2	3.000	63.0	5.500	84.5	8.000	101.5
0.300	51.1	1.000	60.5	2.000	51.8	3.500	67.9	6.000	88.2	8.500	104.5
0.400	56.1	1.200	59.3	2.200	54.2	4.000	72.4	6.500	91.7	9.000	107.5
0.500	58.5	1.400	57.2	2.400	56.6	4.500	76.7	7.000	95.1	9.500	110.3

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.295 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S1.000	S1	15 Winter	1	+0%					240.201	-0.389	0.000	0.04	
S1.001	S2	15 Winter	1	+0%					240.120	-0.370	0.000	0.07	
S1.002	S3	15 Winter	1	+0%					240.024	-0.391	0.000	0.04	
S2.000	S4	15 Winter	1	+0%	100/15 Winter				247.711	-0.179	0.000	0.09	
S2.001	S5	15 Winter	1	+0%	100/15 Summer				247.341	-0.159	0.000	0.18	
S2.002	S6	15 Winter	1	+0%	100/15 Summer				247.167	-0.133	0.000	0.35	
S2.003	S7	15 Winter	1	+0%	100/15 Summer				246.947	-0.178	0.000	0.34	
S2.004	S8	15 Winter	1	+0%	100/15 Summer				246.832	-0.178	0.000	0.34	
S2.005	S9	15 Winter	1	+0%					246.573	-0.227	0.000	0.13	
S2.006	S10	15 Winter	1	+0%					244.569	-0.231	0.000	0.12	
S2.007	S11	15 Winter	1	+0%					241.738	-0.212	0.000	0.19	
S3.000	S12	15 Winter	1	+0%					241.102	-0.228	0.000	0.13	
S3.001	S13	15 Winter	1	+0%					241.015	-0.240	0.000	0.09	
S2.008	S14	15 Winter	1	+0%	100/15 Summer				240.305	-0.195	0.000	0.26	
S1.003	S15	15 Winter	1	+0%					238.733	-0.567	0.000	0.06	
S1.004	S16	2880 Winter	1	+0%	30/960 Winter				237.324	-0.476	0.000	0.01	
S1.005	S17	2880 Winter	1	+0%	1/60 Summer				237.324	0.359	0.000	0.02	
S4.000	S18	15 Winter	1	+0%					234.732	-0.233	0.000	0.11	
S4.001	S19	15 Winter	1	+0%	100/15 Summer				234.108	-0.172	0.000	0.37	
S1.006	S20	15 Winter	1	+0%					233.533	-0.547	0.000	0.16	
S1.007	S21	15 Winter	1	+0%					233.412	-0.638	0.000	0.05	
S5.000	S22	15 Winter	1	+0%					237.669	-0.116	0.000	0.11	
S5.001	S23	15 Winter	1	+0%	30/15 Summer				235.730	-0.070	0.000	0.55	
S5.002	S24	15 Winter	1	+0%					235.365	-0.175	0.000	0.11	
S5.003	S25	15 Winter	1	+0%	30/15 Summer				233.518	-0.122	0.000	0.43	
S1.008	S26	15 Winter	1	+0%					232.712	-0.648	0.000	0.05	
S1.009	S27	5760 Winter	1	+0%	1/480 Winter				231.478	0.298	0.000	0.01	
S1.010	S28	15 Winter	1	+0%					229.612	-0.383	0.000	0.05	
S1.011	S29	15 Winter	1	+0%					228.008	-0.342	0.000	0.13	
S1.012	S30	15 Winter	1	+0%					225.466	-0.349	0.000	0.11	
S6.000	S31	15 Winter	1	+0%					235.666	-0.119	0.000	0.09	
S6.001	S32	15 Winter	1	+0%	30/15 Winter				234.177	-0.223	0.000	0.15	
S6.002	S33	15 Winter	1	+0%	30/15 Summer				234.118	-0.207	0.000	0.21	
S6.003	S34	15 Winter	1	+0%	30/15 Summer				234.041	-0.194	0.000	0.27	
S6.004	S35	15 Winter	1	+0%	30/15 Summer				233.975	-0.180	0.000	0.34	
S6.005	S36	15 Winter	1	+0%	30/15 Summer				233.909	-0.171	0.000	0.38	
S6.006	S37	15 Winter	1	+0%	30/15 Summer				233.773	-0.217	0.000	0.28	
S7.000	S38	15 Winter	1	+0%	100/15 Summer				240.565	-0.365	0.000	0.04	
S7.001	S39	15 Winter	1	+0%	100/15 Summer				240.547	-0.323	0.000	0.07	
S7.002	S40	15 Winter	1	+0%	100/15 Summer				240.536	-0.284	0.000	0.13	
S7.003	S41	15 Winter	1	+0%	100/15 Summer				240.527	-0.258	0.000	0.30	
S7.004	S42	15 Winter	1	+0%	100/15 Summer				240.498	-0.252	0.000	0.34	
S7.005	S43	15 Winter	1	+0%	100/15 Summer				240.427	-0.203	0.000	0.58	
S7.006	S44	15 Winter	1	+0%					240.258	-0.352	0.000	0.11	
S7.007	S45	15 Winter	1	+0%					237.911	-0.374	0.000	0.07	
S6.007	S46	15 Winter	1	+0%	30/15 Summer				233.754	-0.176	0.000	0.68	
S6.008	S47	720 Winter	1	+0%	1/30 Winter				233.644	0.274	0.000	0.08	
S8.000	S48	15 Winter	1	+0%					238.172	-0.113	0.000	0.13	
S9.000	S49	15 Winter	1	+0%	100/15 Summer				237.801	-0.099	0.000	0.25	
S8.001	S50	15 Winter	1	+0%	100/15 Summer				236.656	-0.144	0.000	0.27	
S8.002	S51	15 Winter	1	+0%					235.943	-0.162	0.000	0.17	
S6.009	S52	15 Winter	1	+0%					232.970	-0.230	0.000	0.12	
S10.000	S53	15 Winter	1	+0%					230.137	-0.163	0.000	0.17	
S6.010	S54	15 Winter	1	+0%					225.594	-0.206	0.000	0.22	
S6.011	S55	2880 Winter	1	+0%	1/240 Winter				216.544	0.269	0.000	0.03	
S1.013	S56	15 Winter	1	+0%					215.269	-0.531	0.000	0.10	
S11.000	S57	15 Winter	1	+0%	30/15 Summer	100/15 Summer			220.230	-0.070	0.000	0.54	
S11.001	S58	15 Winter	1	+0%					218.193	-0.607	0.000	0.02	
S12.000	S59	15 Winter	1	+0%					220.192	-0.208	0.000	0.20	
S12.001	S60	15 Winter	1	+0%					219.548	-0.217	0.000	0.17	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1		5.7	OK	
S1.001	S2		10.3	OK	
S1.002	S3		19.1	OK	
S2.000	S4		5.6	OK	
S2.001	S5		10.3	OK	
S2.002	S6		16.3	OK	
S2.003	S7		22.1	OK	
S2.004	S8		27.5	OK	
S2.005	S9		33.0	OK	
S2.006	S10		39.3	OK	
S2.007	S11		45.7	OK	
S3.000	S12		7.8	OK	
S3.001	S13		14.7	OK	
S2.008	S14		65.9	OK	
S1.003	S15		93.9	OK	
S1.004	S16		6.6	OK	
S1.005	S17		2.6	SURCHARGED	
S4.000	S18		19.5	OK	
S4.001	S19		35.8	OK	
S1.006	S20		53.3	OK	
S1.007	S21		69.8	OK	
S5.000	S22		6.0	OK	
S5.001	S23		10.9	OK	
S5.002	S24		16.0	OK	
S5.003	S25		21.2	OK	
S1.008	S26		94.4	OK	
S1.009	S27		3.8	SURCHARGED	
S1.010	S28		34.2	OK	
S1.011	S29		68.0	OK	
S1.012	S30		102.6	OK	
S6.000	S31		4.9	OK	
S6.001	S32		9.0	OK	
S6.002	S33		13.0	OK	
S6.003	S34		16.8	OK	
S6.004	S35		20.6	OK	
S6.005	S36		24.0	OK	
S6.006	S37		38.1	OK	
S7.000	S38		5.6	OK	
S7.001	S39		9.5	OK	
S7.002	S40		13.7	OK	
S7.003	S41		32.1	OK	
S7.004	S42		49.5	OK	
S7.005	S43		52.3	OK	
S7.006	S44		55.9	OK	
S7.007	S45		60.4	OK	
S6.007	S46		101.6	OK	
S6.008	S47		5.9	SURCHARGED	
S8.000	S48		7.0	OK	
S9.000	S49		7.0	OK	
S8.001	S50		19.9	OK	
S8.002	S51		25.9	OK	
S6.009	S52		31.8	OK	
S10.000	S53		19.4	OK	
S6.010	S54		67.3	OK	
S6.011	S55		5.5	SURCHARGED	
S1.013	S56		116.9	OK	
S11.000	S57		17.9	OK	4
S11.001	S58		33.3	OK	
S12.000	S59		29.2	OK	
S12.001	S60		53.7	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S11.002	S61	15 Winter	1	+0%					216.370	-0.560	0.000	0.07	
S13.000	S62	15 Winter	1	+0%	30/15 Winter				215.294	-0.081	0.000	0.42	
S11.003	S63	5760 Winter	1	+0%	30/480 Winter				214.336	-0.164	0.000	0.01	
S11.004	S64	5760 Winter	1	+0%	30/240 Winter				214.336	-0.064	0.000	0.02	
S1.014	S65	5760 Winter	1	+0%	1/120 Winter				214.336	0.446	0.000	0.04	
S14.000	S66	15 Winter	1	+0%	100/15 Summer				226.202	-0.148	0.000	0.25	
S14.001	S67	15 Winter	1	+0%	30/15 Summer	100/15 Winter			225.685	-0.115	0.000	0.48	
S14.002	S68	15 Winter	1	+0%	100/15 Summer				225.130	-0.170	0.000	0.39	
S14.003	S69	15 Winter	1	+0%	100/15 Summer				224.748	-0.252	0.000	0.40	
S15.000	S70	15 Winter	1	+0%					232.077	-0.223	0.000	0.14	
S14.004	S71	15 Winter	1	+0%					224.618	-0.342	0.000	0.13	
S16.000	S72	15 Winter	1	+0%	30/15 Summer	100/15 Winter			222.541	-0.259	0.000	0.20	
S14.005	S73	15 Winter	1	+0%	30/15 Summer				222.354	-0.031	0.000	1.00	
S14.006	S74	15 Winter	1	+0%	30/15 Summer				222.121	-0.219	0.000	0.63	
S17.000	S75	15 Winter	1	+0%	100/15 Summer				232.153	-0.147	0.000	0.26	
S17.001	S76	15 Winter	1	+0%	30/15 Summer				231.230	-0.130	0.000	0.36	
S17.002	S77	15 Winter	1	+0%	30/15 Summer				230.443	-0.157	0.000	0.46	
S17.003	S78	15 Winter	1	+0%					229.929	-0.371	0.000	0.07	
S14.007	S79	15 Winter	1	+0%					221.771	-0.434	0.000	0.17	
S18.000	S80	15 Winter	1	+0%					224.742	-0.158	0.000	0.19	
S18.001	S81	15 Winter	1	+0%					221.927	-0.173	0.000	0.12	
S14.008	S82	15 Winter	1	+0%	30/15 Summer				219.124	-0.206	0.000	0.73	
S14.009	S83	30 Winter	1	+0%	1/15 Winter				218.758	0.033	0.000	1.01	
S14.010	S84	180 Winter	1	+0%	1/30 Summer				214.555	0.280	0.000	0.41	
S19.000	S85	15 Winter	1	+0%					217.499	-0.101	0.000	0.23	
S19.001	S86	15 Winter	1	+0%					216.132	-0.168	0.000	0.14	
S14.011	S87	180 Winter	1	+0%					213.908	-0.287	0.000	0.13	
S20.000	S88	15 Winter	1	+0%					215.197	-0.103	0.000	0.21	
S14.012	S89	15 Winter	1	+0%	100/600 Winter				211.349	-0.306	0.000	0.21	
S14.013	S90	15 Winter	1	+0%	100/360 Winter				210.964	-0.336	0.000	0.14	
S1.015	S91	360 Winter	1	+0%	30/60 Winter				210.035	-0.085	0.000	0.32	
S1.016	S92	360 Winter	1	+0%					209.694	-0.121	0.000	0.44	
S1.017	S93	360 Winter	1	+0%					208.556	-0.099	0.000	0.60	

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S11.002	S61		102.4	OK	
S13.000	S62		10.8	OK	
S11.003	S63		4.7	OK	
S11.004	S64		4.5	OK	
S1.014	S65		11.8	SURCHARGED	
S14.000	S66		15.0	OK	
S14.001	S67		28.0	OK	1
S14.002	S68		40.6	OK	
S14.003	S69		44.4	OK	
S15.000	S70		41.9	OK	
S14.004	S71		91.0	OK	
S16.000	S72		37.2	OK	1
S14.005	S73		123.1	OK	
S14.006	S74		137.3	OK	
S17.000	S75		18.7	OK	
S17.001	S76		34.9	OK	
S17.002	S77		51.2	OK	
S17.003	S78		67.3	OK	
S14.007	S79		214.4	OK	
S18.000	S80		17.8	OK	
S18.001	S81		17.9	OK	
S14.008	S82		232.9	OK	
S14.009	S83		130.5	SURCHARGED	
S14.010	S84		36.3	SURCHARGED	
S19.000	S85		9.4	OK	
S19.001	S86		17.3	OK	
S14.011	S87		38.9	OK	
S20.000	S88		10.3	OK	
S14.012	S89		41.1	OK	
S14.013	S90		80.1	OK	
S1.015	S91		49.5	OK	
S1.016	S92		49.5	OK	
S1.017	S93		49.5	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.295 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S1.000	S1	15 Winter	30	+0%					240.243	-0.347	0.000	0.10	
S1.001	S2	15 Winter	30	+0%					240.175	-0.315	0.000	0.19	
S1.002	S3	15 Winter	30	+0%					240.068	-0.347	0.000	0.11	
S2.000	S4	15 Winter	30	+0%	100/15 Winter				247.737	-0.153	0.000	0.22	
S2.001	S5	15 Winter	30	+0%	100/15 Summer				247.389	-0.111	0.000	0.50	
S2.002	S6	15 Winter	30	+0%	100/15 Summer				247.256	-0.044	0.000	0.99	
S2.003	S7	15 Winter	30	+0%	100/15 Summer				247.067	-0.058	0.000	0.98	
S2.004	S8	15 Winter	30	+0%	100/15 Summer				246.953	-0.057	0.000	0.99	
S2.005	S9	15 Winter	30	+0%					246.630	-0.170	0.000	0.38	
S2.006	S10	15 Winter	30	+0%					244.622	-0.178	0.000	0.34	
S2.007	S11	15 Winter	30	+0%					241.810	-0.140	0.000	0.54	
S3.000	S12	15 Winter	30	+0%					241.146	-0.184	0.000	0.31	
S3.001	S13	15 Winter	30	+0%					241.054	-0.201	0.000	0.23	
S2.008	S14	15 Winter	30	+0%	100/15 Summer				240.401	-0.099	0.000	0.76	
S1.003	S15	15 Winter	30	+0%					238.816	-0.484	0.000	0.17	
S1.004	S16	2160 Winter	30	+0%	30/960 Winter				237.841	0.041	0.000	0.02	
S1.005	S17	2160 Winter	30	+0%	1/60 Summer				237.840	0.875	0.000	0.03	
S4.000	S18	15 Winter	30	+0%					234.772	-0.193	0.000	0.27	
S4.001	S19	15 Winter	30	+0%	100/15 Summer				234.250	-0.030	0.000	1.00	
S1.006	S20	15 Winter	30	+0%					233.685	-0.395	0.000	0.45	
S1.007	S21	15 Winter	30	+0%					233.495	-0.555	0.000	0.15	
S5.000	S22	15 Winter	30	+0%					237.689	-0.096	0.000	0.28	
S5.001	S23	15 Winter	30	+0%	30/15 Summer				236.067	0.267	0.000	1.42	
S5.002	S24	15 Winter	30	+0%					235.400	-0.140	0.000	0.30	
S5.003	S25	15 Winter	30	+0%	30/15 Summer				233.732	0.092	0.000	1.15	
S1.008	S26	15 Winter	30	+0%					232.788	-0.572	0.000	0.12	
S1.009	S27	5760 Winter	30	+0%	1/480 Winter				231.964	0.784	0.000	0.01	
S1.010	S28	15 Winter	30	+0%					229.668	-0.327	0.000	0.17	
S1.011	S29	15 Summer	30	+0%					228.097	-0.253	0.000	0.40	
S1.012	S30	15 Summer	30	+0%					225.549	-0.266	0.000	0.35	
S6.000	S31	15 Winter	30	+0%					235.684	-0.101	0.000	0.23	
S6.001	S32	15 Winter	30	+0%	30/15 Winter				234.421	0.021	0.000	0.37	
S6.002	S33	15 Winter	30	+0%	30/15 Summer				234.401	0.076	0.000	0.48	
S6.003	S34	15 Winter	30	+0%	30/15 Summer				234.374	0.139	0.000	0.58	
S6.004	S35	15 Winter	30	+0%	30/15 Summer				234.341	0.186	0.000	0.74	
S6.005	S36	15 Winter	30	+0%	30/15 Summer				234.302	0.222	0.000	0.82	
S6.006	S37	15 Winter	30	+0%	30/15 Summer				234.253	0.263	0.000	0.60	
S7.000	S38	15 Winter	30	+0%	100/15 Summer				240.793	-0.137	0.000	0.10	
S7.001	S39	15 Winter	30	+0%	100/15 Summer				240.788	-0.082	0.000	0.20	
S7.002	S40	15 Winter	30	+0%	100/15 Summer				240.779	-0.041	0.000	0.37	
S7.003	S41	15 Winter	30	+0%	100/15 Summer				240.768	-0.017	0.000	0.79	
S7.004	S42	15 Winter	30	+0%	100/15 Summer				240.737	-0.013	0.000	0.89	
S7.005	S43	15 Summer	30	+0%	100/15 Summer				240.630	0.000	0.000	1.46	
S7.006	S44	15 Winter	30	+0%					240.327	-0.283	0.000	0.29	
S7.007	S45	15 Winter	30	+0%					237.966	-0.319	0.000	0.18	
S6.007	S46	15 Winter	30	+0%	30/15 Summer				234.219	0.289	0.000	1.74	
S6.008	S47	720 Winter	30	+0%	1/30 Winter				234.202	0.832	0.000	0.11	
S8.000	S48	15 Winter	30	+0%					238.195	-0.090	0.000	0.33	
S9.000	S49	15 Winter	30	+0%	100/15 Summer				237.836	-0.064	0.000	0.61	
S8.001	S50	15 Winter	30	+0%	100/15 Summer				236.719	-0.081	0.000	0.72	
S8.002	S51	15 Winter	30	+0%					235.989	-0.116	0.000	0.46	
S6.009	S52	15 Winter	30	+0%					233.022	-0.178	0.000	0.34	
S10.000	S53	15 Winter	30	+0%					230.176	-0.124	0.000	0.40	
S6.010	S54	15 Winter	30	+0%					225.668	-0.132	0.000	0.58	
S6.011	S55	2880 Winter	30	+0%	1/240 Winter				217.063	0.788	0.000	0.04	
S1.013	S56	15 Winter	30	+0%					215.386	-0.414	0.000	0.31	
S11.000	S57	15 Winter	30	+0%	30/15 Summer	100/15 Summer			220.668	0.368	0.000	1.12	
S11.001	S58	15 Winter	30	+0%					218.223	-0.577	0.000	0.05	
S12.000	S59	15 Winter	30	+0%					220.251	-0.149	0.000	0.50	
S12.001	S60	15 Winter	30	+0%					219.610	-0.155	0.000	0.46	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1		13.9	OK	
S1.001	S2		27.1	OK	
S1.002	S3		53.1	OK	
S2.000	S4		13.7	OK	
S2.001	S5		28.2	OK	
S2.002	S6		46.4	OK	
S2.003	S7		63.1	OK	
S2.004	S8		79.1	OK	
S2.005	S9		94.8	OK	
S2.006	S10		113.4	OK	
S2.007	S11		132.3	OK	
S3.000	S12		19.2	OK	
S3.001	S13		39.9	OK	
S2.008	S14		189.8	OK	
S1.003	S15		269.7	OK	
S1.004	S16		14.7	SURCHARGED	
S1.005	S17		3.6	SURCHARGED	
S4.000	S18		47.8	OK	
S4.001	S19		96.6	OK	
S1.006	S20		148.7	OK	
S1.007	S21		198.8	OK	
S5.000	S22		14.6	OK	
S5.001	S23		28.3	SURCHARGED	
S5.002	S24		42.2	OK	
S5.003	S25		56.9	SURCHARGED	
S1.008	S26		260.9	OK	
S1.009	S27		5.1	SURCHARGED	
S1.010	S28		105.8	OK	
S1.011	S29		211.5	OK	
S1.012	S30		317.4	OK	
S6.000	S31		12.0	OK	
S6.001	S32		22.8	SURCHARGED	
S6.002	S33		30.1	SURCHARGED	
S6.003	S34		36.1	SURCHARGED	
S6.004	S35		45.3	SURCHARGED	
S6.005	S36		51.6	SURCHARGED	
S6.006	S37		82.6	SURCHARGED	
S7.000	S38		13.0	OK	
S7.001	S39		26.1	OK	
S7.002	S40		39.5	OK	
S7.003	S41		83.5	OK	
S7.004	S42		130.9	OK	
S7.005	S43		132.4	OK	
S7.006	S44		151.7	OK	
S7.007	S45		165.1	OK	
S6.007	S46		260.3	SURCHARGED	
S6.008	S47		8.4	SURCHARGED	
S8.000	S48		17.2	OK	
S9.000	S49		16.9	OK	
S8.001	S50		51.9	OK	
S8.002	S51		69.9	OK	
S6.009	S52		88.3	OK	
S10.000	S53		46.9	OK	
S6.010	S54		181.9	OK	
S6.011	S55		7.5	SURCHARGED	
S1.013	S56		355.4	OK	
S11.000	S57		36.6	SURCHARGED	4
S11.001	S58		81.4	OK	
S12.000	S59		71.3	OK	
S12.001	S60		147.2	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S11.002	S61	15 Winter	30	+0%					216.450	-0.480	0.000	0.18	
S13.000	S62	15 Winter	30	+0%	30/15 Winter				215.379	0.004	0.000	1.00	
S11.003	S63	4320 Winter	30	+0%	30/480 Winter				214.898	0.398	0.000	0.02	
S11.004	S64	4320 Winter	30	+0%	30/240 Winter				214.898	0.498	0.000	0.03	
S1.014	S65	4320 Winter	30	+0%	1/120 Winter				214.898	1.008	0.000	0.06	
S14.000	S66	15 Winter	30	+0%	100/15 Summer				226.255	-0.095	0.000	0.61	
S14.001	S67	15 Winter	30	+0%	30/15 Summer	100/15 Winter			225.998	0.198	0.000	1.18	
S14.002	S68	15 Winter	30	+0%	100/15 Summer				225.260	-0.040	0.000	0.99	
S14.003	S69	15 Winter	30	+0%	100/15 Summer				224.970	-0.030	0.000	1.00	
S15.000	S70	15 Winter	30	+0%					232.125	-0.175	0.000	0.35	
S14.004	S71	15 Winter	30	+0%					224.690	-0.270	0.000	0.33	
S16.000	S72	15 Winter	30	+0%	30/15 Summer	100/15 Winter			222.962	0.162	0.000	0.45	
S14.005	S73	15 Winter	30	+0%	30/15 Summer				222.869	0.484	0.000	2.57	
S14.006	S74	15 Winter	30	+0%	30/15 Summer				222.552	0.212	0.000	1.59	
S17.000	S75	15 Winter	30	+0%	100/15 Summer				232.207	-0.093	0.000	0.63	
S17.001	S76	15 Winter	30	+0%	30/15 Summer				231.417	0.057	0.000	0.95	
S17.002	S77	15 Winter	30	+0%	30/15 Summer				230.741	0.141	0.000	1.21	
S17.003	S78	15 Winter	30	+0%					229.986	-0.314	0.000	0.20	
S14.007	S79	15 Winter	30	+0%					221.886	-0.319	0.000	0.44	
S18.000	S80	15 Winter	30	+0%					224.783	-0.117	0.000	0.46	
S18.001	S81	15 Winter	30	+0%					221.959	-0.141	0.000	0.30	
S14.008	S82	15 Winter	30	+0%	30/15 Summer				219.943	0.613	0.000	1.85	
S14.009	S83	60 Winter	30	+0%	1/15 Winter				219.336	0.611	0.000	1.08	
S14.010	S84	180 Winter	30	+0%	1/30 Summer				215.267	0.992	0.000	0.68	
S19.000	S85	15 Winter	30	+0%					217.532	-0.068	0.000	0.57	
S19.001	S86	15 Winter	30	+0%					216.174	-0.126	0.000	0.40	
S14.011	S87	15 Winter	30	+0%					213.942	-0.253	0.000	0.22	
S20.000	S88	15 Winter	30	+0%					215.228	-0.072	0.000	0.52	
S14.012	S89	15 Winter	30	+0%	100/600 Winter				211.466	-0.189	0.000	0.58	
S14.013	S90	15 Winter	30	+0%	100/360 Winter				211.053	-0.247	0.000	0.40	
S1.015	S91	480 Winter	30	+0%	30/60 Winter				210.571	0.451	0.000	0.40	
S1.016	S92	480 Winter	30	+0%					209.708	-0.107	0.000	0.54	
S1.017	S93	480 Winter	30	+0%					208.575	-0.080	0.000	0.74	

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S11.002	S61		273.6	OK	
S13.000	S62		25.9	SURCHARGED	
S11.003	S63		10.0	SURCHARGED	
S11.004	S64		9.7	SURCHARGED	
S1.014	S65		15.8	SURCHARGED	
S14.000	S66		36.6	OK	
S14.001	S67		69.0	SURCHARGED	1
S14.002	S68		103.1	OK	
S14.003	S69		112.1	OK	
S15.000	S70		102.6	OK	
S14.004	S71		228.3	OK	
S16.000	S72		82.3	SURCHARGED	1
S14.005	S73		316.4	SURCHARGED	
S14.006	S74		347.3	SURCHARGED	
S17.000	S75		45.9	OK	
S17.001	S76		91.1	SURCHARGED	
S17.002	S77		136.6	SURCHARGED	
S17.003	S78		184.3	OK	
S14.007	S79		552.1	OK	
S18.000	S80		43.5	OK	
S18.001	S81		43.7	OK	
S14.008	S82		591.7	SURCHARGED	
S14.009	S83		139.8	SURCHARGED	
S14.010	S84		60.4	SURCHARGED	
S19.000	S85		23.0	OK	
S19.001	S86		47.5	OK	
S14.011	S87		68.5	OK	
S20.000	S88		25.2	OK	
S14.012	S89		110.7	OK	
S14.013	S90		227.3	OK	
S1.015	S91		60.9	SURCHARGED	
S1.016	S92		60.9	OK	
S1.017	S93		60.9	OK	

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 7 Number of Storage Structures 8 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.295 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status ON Inertia Status OFF
Analysis Timestep Fine DVD Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S1.000	S1	15 Winter	100	+30%					240.280	-0.310	0.000	0.16	
S1.001	S2	15 Winter	100	+30%					240.219	-0.271	0.000	0.33	
S1.002	S3	15 Winter	100	+30%					240.102	-0.313	0.000	0.19	
S2.000	S4	15 Winter	100	+30%	100/15 Winter				247.926	0.036	0.000	0.35	
S2.001	S5	15 Winter	100	+30%	100/15 Summer				247.881	0.381	0.000	0.73	
S2.002	S6	15 Winter	100	+30%	100/15 Summer				247.779	0.479	0.000	1.38	
S2.003	S7	15 Winter	100	+30%	100/15 Summer				247.441	0.316	0.000	1.37	
S2.004	S8	15 Winter	100	+30%	100/15 Summer				247.218	0.208	0.000	1.40	
S2.005	S9	15 Winter	100	+30%					246.663	-0.137	0.000	0.56	
S2.006	S10	15 Winter	100	+30%					244.654	-0.146	0.000	0.51	
S2.007	S11	15 Winter	100	+30%					241.893	-0.057	0.000	0.82	
S3.000	S12	15 Winter	100	+30%					241.186	-0.144	0.000	0.52	
S3.001	S13	15 Winter	100	+30%					241.087	-0.168	0.000	0.39	
S2.008	S14	15 Winter	100	+30%	100/15 Summer				240.924	0.424	0.000	1.16	
S1.003	S15	15 Winter	100	+30%					238.864	-0.436	0.000	0.27	
S1.004	S16	2160 Winter	100	+30%	30/960 Winter				238.434	0.634	0.000	0.03	
S1.005	S17	2160 Winter	100	+30%	1/60 Summer				238.433	1.468	0.000	0.04	
S4.000	S18	15 Winter	100	+30%					234.808	-0.157	0.000	0.46	
S4.001	S19	15 Winter	100	+30%	100/15 Summer				234.647	0.367	0.000	1.66	
S1.006	S20	15 Winter	100	+30%					233.825	-0.255	0.000	0.74	
S1.007	S21	15 Winter	100	+30%					233.557	-0.493	0.000	0.25	
S5.000	S22	15 Winter	100	+30%					237.707	-0.078	0.000	0.46	
S5.001	S23	15 Winter	100	+30%	30/15 Summer				236.865	1.065	0.000	2.24	
S5.002	S24	15 Winter	100	+30%					235.426	-0.114	0.000	0.47	
S5.003	S25	15 Winter	100	+30%	30/15 Summer				234.313	0.673	0.000	1.82	
S1.008	S26	15 Winter	100	+30%					232.842	-0.518	0.000	0.21	
S1.009	S27	5760 Winter	100	+30%	1/480 Winter				232.546	1.366	0.000	0.01	
S1.010	S28	15 Winter	100	+30%					229.707	-0.288	0.000	0.28	
S1.011	S29	15 Winter	100	+30%					228.170	-0.180	0.000	0.67	
S1.012	S30	15 Winter	100	+30%					225.614	-0.201	0.000	0.59	
S6.000	S31	15 Winter	100	+30%					235.700	-0.085	0.000	0.39	
S6.001	S32	15 Winter	100	+30%	30/15 Winter				235.436	1.036	0.000	0.46	
S6.002	S33	15 Winter	100	+30%	30/15 Summer				235.407	1.082	0.000	0.64	
S6.003	S34	15 Winter	100	+30%	30/15 Summer				235.364	1.129	0.000	0.84	
S6.004	S35	15 Winter	100	+30%	30/15 Summer				235.307	1.152	0.000	1.09	
S6.005	S36	15 Winter	100	+30%	30/15 Summer				235.224	1.144	0.000	1.28	
S6.006	S37	15 Winter	100	+30%	30/15 Summer				235.089	1.099	0.000	0.94	
S7.000	S38	15 Winter	100	+30%	100/15 Summer				241.218	0.288	0.000	0.18	
S7.001	S39	15 Winter	100	+30%	100/15 Summer				241.209	0.339	0.000	0.34	
S7.002	S40	15 Winter	100	+30%	100/15 Summer				241.193	0.373	0.000	0.62	
S7.003	S41	15 Winter	100	+30%	100/15 Summer				241.173	0.388	0.000	1.40	
S7.004	S42	15 Winter	100	+30%	100/15 Summer				241.118	0.368	0.000	1.58	
S7.005	S43	15 Winter	100	+30%	100/15 Summer				240.792	0.162	0.000	2.76	
S7.006	S44	15 Winter	100	+30%					240.392	-0.218	0.000	0.51	
S7.007	S45	15 Winter	100	+30%					238.011	-0.274	0.000	0.32	
S6.007	S46	15 Winter	100	+30%	30/15 Summer				235.033	1.103	0.000	2.88	
S6.008	S47	720 Winter	100	+30%	1/30 Winter				234.817	1.447	0.000	0.14	
S8.000	S48	15 Winter	100	+30%					238.215	-0.070	0.000	0.55	
S9.000	S49	15 Winter	100	+30%	100/15 Summer				238.010	0.110	0.000	0.97	
S8.001	S50	15 Winter	100	+30%	100/15 Summer				237.017	0.217	0.000	1.14	
S8.002	S51	15 Winter	100	+30%					236.026	-0.079	0.000	0.73	
S6.009	S52	15 Winter	100	+30%					233.060	-0.140	0.000	0.54	
S10.000	S53	15 Winter	100	+30%					230.214	-0.086	0.000	0.67	
S6.010	S54	15 Winter	100	+30%					225.737	-0.063	0.000	0.95	
S6.011	S55	2880 Winter	100	+30%	1/240 Winter				217.627	1.352	0.000	0.05	
S1.013	S56	4320 Winter	100	+30%					215.563	-0.237	0.000	0.02	
S11.000	S57	15 Winter	100	+30%	30/15 Summer	100/15 Summer			221.503	1.203	3.361	1.34	
S11.001	S58	15 Winter	100	+30%					218.249	-0.551	0.000	0.08	
S12.000	S59	15 Winter	100	+30%					220.313	-0.087	0.000	0.84	
S12.001	S60	15 Winter	100	+30%					219.667	-0.098	0.000	0.78	

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

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1		23.3	OK	
S1.001	S2		46.1	OK	
S1.002	S3		90.1	OK	
S2.000	S4		21.5	SURCHARGED	
S2.001	S5		41.3	SURCHARGED	
S2.002	S6		64.5	SURCHARGED	
S2.003	S7		88.4	SURCHARGED	
S2.004	S8		112.5	SURCHARGED	
S2.005	S9		138.7	OK	
S2.006	S10		170.0	OK	
S2.007	S11		200.3	OK	
S3.000	S12		32.3	OK	
S3.001	S13		66.9	OK	
S2.008	S14		288.0	SURCHARGED	
S1.003	S15		419.4	OK	
S1.004	S16		23.6	SURCHARGED	
S1.005	S17		4.5	SURCHARGED	
S4.000	S18		80.3	OK	
S4.001	S19		160.7	SURCHARGED	
S1.006	S20		242.6	OK	
S1.007	S21		324.7	OK	
S5.000	S22		24.5	OK	
S5.001	S23		44.6	FLOOD RISK	
S5.002	S24		67.4	OK	
S5.003	S25		89.8	SURCHARGED	
S1.008	S26		430.1	OK	
S1.009	S27		6.3	FLOOD RISK	
S1.010	S28		178.5	OK	
S1.011	S29		355.9	OK	
S1.012	S30		531.2	OK	
S6.000	S31		20.1	OK	
S6.001	S32		28.4	FLOOD RISK	
S6.002	S33		40.3	SURCHARGED	
S6.003	S34		52.7	SURCHARGED	
S6.004	S35		66.8	FLOOD RISK	
S6.005	S36		80.3	FLOOD RISK	
S6.006	S37		128.8	FLOOD RISK	
S7.000	S38		23.6	SURCHARGED	
S7.001	S39		44.1	SURCHARGED	
S7.002	S40		64.9	SURCHARGED	
S7.003	S41		147.7	SURCHARGED	
S7.004	S42		231.5	SURCHARGED	
S7.005	S43		249.6	SURCHARGED	
S7.006	S44		267.6	OK	
S7.007	S45		289.8	OK	
S6.007	S46		431.2	SURCHARGED	
S6.008	S47		10.5	SURCHARGED	
S8.000	S48		28.9	OK	
S9.000	S49		26.9	SURCHARGED	
S8.001	S50		82.6	SURCHARGED	
S8.002	S51		109.9	OK	
S6.009	S52		141.5	OK	
S10.000	S53		78.6	OK	
S6.010	S54		298.1	OK	
S6.011	S55		9.1	SURCHARGED	
S1.013	S56		27.6	OK	
S11.000	S57		44.1	FLOOD	4
S11.001	S58		120.8	OK	
S12.000	S59		119.7	OK	
S12.001	S60		246.9	OK	

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)
S11.002	S61	15 Winter	100	+30%					216.506	-0.424	0.000	0.29	
S13.000	S62	15 Winter	100	+30%	30/15 Winter				216.360	0.985	0.000	1.44	
S11.003	S63	4320 Winter	100	+30%	30/480 Winter				215.559	1.059	0.000	0.03	
S11.004	S64	4320 Winter	100	+30%	30/240 Winter				215.559	1.159	0.000	0.05	
S1.014	S65	4320 Winter	100	+30%	1/120 Winter				215.559	1.669	0.000	0.07	
S14.000	S66	15 Winter	100	+30%	100/15 Summer				227.416	1.066	0.000	0.87	
S14.001	S67	15 Winter	100	+30%	30/15 Summer	100/15 Winter			227.000	1.200	0.123	1.65	
S14.002	S68	15 Winter	100	+30%	100/15 Summer				225.646	0.346	0.000	1.43	
S14.003	S69	15 Winter	100	+30%	100/15 Summer				225.013	0.013	0.000	1.49	
S15.000	S70	15 Winter	100	+30%					232.170	-0.130	0.000	0.59	
S14.004	S71	15 Winter	100	+30%					224.743	-0.217	0.000	0.52	
S16.000	S72	15 Winter	100	+30%	30/15 Summer	100/15 Winter			224.001	1.201	1.018	0.75	
S14.005	S73	15 Winter	100	+30%	30/15 Summer				223.846	1.461	0.000	3.98	
S14.006	S74	15 Winter	100	+30%	30/15 Summer				223.083	0.743	0.000	2.48	
S17.000	S75	15 Winter	100	+30%	100/15 Summer				233.166	0.866	0.000	0.91	
S17.001	S76	15 Winter	100	+30%	30/15 Summer				232.481	1.121	0.000	1.30	
S17.002	S77	15 Winter	100	+30%	30/15 Summer				231.186	0.586	0.000	1.72	
S17.003	S78	15 Winter	100	+30%					230.016	-0.284	0.000	0.28	
S14.007	S79	15 Winter	100	+30%					222.171	-0.034	0.000	0.65	
S18.000	S80	15 Winter	100	+30%					224.826	-0.074	0.000	0.76	
S18.001	S81	15 Winter	100	+30%					221.989	-0.111	0.000	0.50	
S14.008	S82	30 Winter	100	+30%	30/15 Summer				220.975	1.645	0.000	2.63	
S14.009	S83	60 Winter	100	+30%	1/15 Winter				220.046	1.321	0.000	1.16	
S14.010	S84	360 Winter	100	+30%	1/30 Summer				215.882	1.607	0.000	0.85	
S19.000	S85	15 Winter	100	+30%					217.567	-0.033	0.000	0.95	
S19.001	S86	15 Winter	100	+30%					216.210	-0.090	0.000	0.67	
S14.011	S87	15 Winter	100	+30%					213.982	-0.213	0.000	0.37	
S20.000	S88	15 Winter	100	+30%					215.260	-0.040	0.000	0.87	
S14.012	S89	720 Winter	100	+30%	100/600 Winter				211.704	0.049	0.000	0.44	
S14.013	S90	720 Winter	100	+30%	100/360 Winter				211.680	0.380	0.000	0.18	
S1.015	S91	720 Winter	100	+30%	30/60 Winter				211.670	1.550	0.000	0.40	
S1.016	S92	180 Summer	100	+30%					209.708	-0.107	0.000	0.54	
S1.017	S93	1440 Summer	100	+30%					208.575	-0.080	0.000	0.74	

PN	US/MH Name	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S11.002	S61		442.7	OK	
S13.000	S62		37.2	SURCHARGED	
S11.003	S63		15.7	FLOOD RISK	
S11.004	S64		15.6	FLOOD RISK	
S1.014	S65		19.5	FLOOD RISK	
S14.000	S66		52.1	FLOOD RISK	
S14.001	S67		97.0	FLOOD	1
S14.002	S68		148.1	SURCHARGED	
S14.003	S69		166.7	SURCHARGED	
S15.000	S70		171.7	OK	
S14.004	S71		359.2	OK	
S16.000	S72		136.3	FLOOD	1
S14.005	S73		490.4	SURCHARGED	
S14.006	S74		540.1	SURCHARGED	
S17.000	S75		66.3	SURCHARGED	
S17.001	S76		125.5	FLOOD RISK	
S17.002	S77		193.8	SURCHARGED	
S17.003	S78		267.4	OK	
S14.007	S79		810.3	OK	
S18.000	S80		72.9	OK	
S18.001	S81		73.3	OK	
S14.008	S82		838.8	SURCHARGED	
S14.009	S83		150.5	FLOOD RISK	
S14.010	S84		75.4	FLOOD RISK	
S19.000	S85		38.6	OK	
S19.001	S86		79.6	OK	
S14.011	S87		114.6	OK	
S20.000	S88		42.2	OK	
S14.012	S89		84.5	SURCHARGED	
S14.013	S90		103.8	SURCHARGED	
S1.015	S91		60.9	FLOOD RISK	
S1.016	S92		60.9	OK	
S1.017	S93		60.9	OK	

Manhole Schedules for Foul - BMFR

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F1	243.970	1.350	Open Manhole	1200	F1.000	242.620	150				
F2	244.000	1.585	Open Manhole	1200	F1.001	242.415	150	F1.000	242.415	150	
F3	244.000	1.775	Open Manhole	1200	F1.002	242.225	150	F1.001	242.225	150	
F4	241.380	1.350	Open Manhole	1200	F2.000	240.030	150				
F5	240.500	1.550	Open Manhole	1200	F1.003	238.950	150	F1.002	239.450	150	500
								F2.000	238.950	150	
F6	239.650	1.960	Open Manhole	1200	F1.004	237.690	150	F1.003	237.690	150	
F7	236.000	1.350	Open Manhole	1200	F3.000	234.650	150				
F8	236.770	2.295	Open Manhole	1200	F3.001	234.475	150	F3.000	234.475	150	
F9	234.500	1.350	Open Manhole	1200	F3.002	233.150	150	F3.001	233.150	150	
F10	235.420	2.490	Open Manhole	1200	F1.005	232.930	150	F1.004	232.930	150	
								F3.002	232.930	150	
F11	235.000	2.140	Open Manhole	1200	F1.006	232.860	150	F1.005	232.860	150	
F12	234.000	1.450	Open Manhole	1200	F1.007	232.550	150	F1.006	232.550	150	
F13	233.500	1.350	Open Manhole	1200	F1.008	232.150	150	F1.007	232.150	150	
F14	230.000	1.350	Open Manhole	1200	F1.009	228.650	150	F1.008	228.650	150	
F15	229.740	1.945	Open Manhole	1200	F1.010	227.795	150	F1.009	227.795	150	
F16	229.240	1.350	Open Manhole	1200	F4.000	227.890	150				
F17	231.000	1.350	Open Manhole	1200	F5.000	229.650	150				
F18	227.100	1.350	Open Manhole	1200	F4.001	225.750	150	F4.000	225.750	150	
								F5.000	225.750	150	
F19	222.600	1.350	Open Manhole	1200	F4.002	221.250	150	F4.001	221.250	150	
F20	222.255	2.805	Open Manhole	1200	F1.011	219.450	150	F1.010	220.050	150	600
								F4.002	220.050	150	600
F21	216.000	1.950	Open Manhole	1200	F1.012	214.050	150	F1.011	214.050	150	
F22	221.900	1.350	Open Manhole	1200	F6.000	220.550	150				
F23	224.080	1.560	Open Manhole	1200	F7.000	222.520	150				
F24	222.230	1.905	Open Manhole	1200	F6.001	220.325	150	F6.000	220.325	150	
								F7.000	220.325	150	
F25	222.500	3.150	Open Manhole	1200	F6.002	219.350	150	F6.001	219.350	150	
F26	221.500	1.960	Open Manhole	1200	F8.000	219.540	150				
F27	218.680	1.380	Open Manhole	1200	F8.001	217.300	150	F8.000	217.300	150	
F28	218.120	1.350	Open Manhole	1200	F8.002	216.770	150	F8.001	216.770	150	
F29	220.500	3.955	Open Manhole	1200	F8.003	216.545	150	F8.002	216.545	150	
F30	218.000	2.370	Open Manhole	1200	F6.003	215.630	150	F6.002	216.330	150	700
								F8.003	215.630	150	
F31	217.235	1.350	Open Manhole	1200	F9.000	215.885	150				
F32	215.680	1.050	Open Manhole	1200	F6.004	214.630	150	F6.003	214.630	150	
								F9.000	214.630	150	
F33	215.000	1.920	Open Manhole	1200	F1.013	213.080	150	F1.012	213.080	150	
								F6.004	213.080	150	
F34	215.000	1.350	Open Manhole	1200	F10.000	213.650	150				
F35	212.860	1.350	Open Manhole	1200	F10.001	211.510	150	F10.000	211.510	150	
F36	212.000	1.970	Open Manhole	1200	F1.014	210.030	150	F1.013	210.030	150	
								F10.001	210.030	150	
F37	210.270	1.350	Open Manhole	1200	F1.015	208.920	150	F1.014	208.920	150	
F	209.780	1.350	Open Manhole	0		OUTFALL		F1.015	208.430	150	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F1	411085.556	414608.984	411085.556	414608.984	Required	
F2	411101.759	414583.465	411101.759	414583.465	Required	
F3	411119.307	414561.123	411119.307	414561.123	Required	
F4	411149.792	414516.381	411149.792	414516.381	Required	
F5	411155.831	414531.973	411155.831	414531.973	Required	

Manhole Schedules for Foul - BMFR

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F6	411169.654	414546.925	411169.654	414546.925	Required	
F7	411219.512	414594.496	411219.512	414594.496	Required	
F8	411218.253	414568.795	411218.253	414568.795	Required	
F9	411231.823	414538.587	411231.823	414538.587	Required	
F10	411236.347	414521.530	411236.347	414521.530	Required	
F11	411243.018	414514.091	411243.018	414514.091	Required	
F12	411261.099	414471.180	411261.099	414471.180	Required	
F13	411288.092	414478.926	411288.092	414478.926	Required	
F14	411345.288	414452.605	411345.288	414452.605	Required	
F15	411363.221	414448.764	411363.221	414448.764	Required	
F16	411305.135	414587.388	411305.135	414587.388	Required	
F17	411322.779	414500.976	411322.779	414500.976	Required	
F18	411351.462	414569.123	411351.462	414569.123	Required	
F19	411456.358	414523.900	411456.358	414523.900	Required	
F20	411470.805	414492.562	411470.805	414492.562	Required	
F21	411545.453	414523.899	411545.453	414523.899	Required	
F22	411376.973	414705.628	411376.973	414705.628	Required	
F23	411389.163	414665.612	411389.163	414665.612	Required	
F24	411401.036	414696.325	411401.036	414696.325	Required	
F25	411469.125	414670.763	411469.125	414670.763	Required	
F26	411434.760	414593.258	411434.760	414593.258	Required	
F27	411465.550	414579.867	411465.550	414579.867	Required	
F28	411478.780	414585.818	411478.780	414585.818	Required	
F29	411465.080	414616.279	411465.080	414616.279	Required	
F30	411492.864	414632.236	411492.864	414632.236	Required	
F31	411489.684	414549.846	411489.684	414549.846	Required	

Manhole Schedules for Foul - BMFR

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F32	411528.119	414571.863	411528.119	414571.863	Required	
F33	411547.627	414538.270	411547.627	414538.270	Required	
F34	411507.321	414738.152	411507.321	414738.152	Required	
F35	411552.450	414652.493	411552.450	414652.493	Required	
F36	411603.585	414568.627	411603.585	414568.627	Required	
F37	411612.881	414554.837	411612.881	414554.837	Required	
F	411624.666	414550.571			No Entry	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
F38	247.660	3.570	Open Manhole	1200	F11.000	244.090	150				
F39	242.000	1.350	Open Manhole	1200	F12.000	240.650	150				
F40	245.200	4.815	Open Manhole	1200	F12.001	240.385	150	F12.000	240.385	150	
F41	245.500	5.225	Open Manhole	1200	F11.001	240.275	150	F11.000	241.925	150	1650
								F12.001	240.275	150	
F42	236.300	1.350	Open Manhole	1200	F11.002	234.950	150	F11.001	234.950	150	
F43	235.435	1.350	Open Manhole	1200	F11.003	234.085	150	F11.002	234.085	150	
F44	235.580	1.595	Open Manhole	1200	F11.004	233.985	150	F11.003	233.985	150	
F45	235.530	1.685	Open Manhole	1200	F11.005	233.845	150	F11.004	233.845	150	
F46	235.400	1.825	Open Manhole	1200	F11.006	233.575	150	F11.005	233.575	150	
F47	233.130	1.920	Open Manhole	1200	F11.007	231.210	150	F11.006	231.210	150	
F48	226.050	1.350	Open Manhole	1200	F13.000	224.700	150				
F49	226.000	1.735	Open Manhole	1200	F11.008	224.265	150	F11.007	224.265	150	
								F13.000	224.265	150	
F50	232.850	1.350	Open Manhole	1200	F14.000	231.500	150				
F51	232.540	2.025	Open Manhole	1200	F14.001	230.515	150	F14.000	230.515	150	
F52	232.000	2.385	Open Manhole	1200	F14.002	229.615	150	F14.001	229.615	150	
F53	231.800	3.300	Open Manhole	1200	F14.003	228.500	150	F14.002	228.500	150	
F54	226.040	1.350	Open Manhole	1200	F15.000	224.690	150				
F55	230.310	5.860	Open Manhole	1200	F15.001	224.450	150	F15.000	224.450	150	
F56	230.350	6.125	Open Manhole	1200	F14.004	224.225	150	F14.003	225.875	150	1650
								F15.001	224.225	150	
F57	225.260	1.365	Open Manhole	1200	F14.005	223.895	150	F14.004	223.895	150	
F58	225.000	2.430	Open Manhole	1200	F14.006	222.570	150	F14.005	222.570	150	
F59	224.400	2.945	Open Manhole	1200	F11.009	221.455	150	F11.008	222.905	150	1450
								F14.006	221.455	150	
F60	221.670	1.350	Open Manhole	1200	F16.000	220.320	150				
F61	224.260	4.345	Open Manhole	1200	F11.010	219.915	150	F11.009	221.000	150	1085
								F16.000	219.915	150	
F62	220.850	1.350	Open Manhole	1200	F17.000	219.500	150				
F63	223.000	3.810	Open Manhole	1200	F11.011	219.190	150	F11.010	219.190	150	
								F17.000	219.190	150	
F64	220.050	1.800	Open Manhole	1200	F11.012	218.250	150	F11.011	218.250	150	
F65	220.080	1.350	Open Manhole	1200	F18.000	218.730	150				
F66	220.100	1.630	Open Manhole	1200	F18.001	218.470	150	F18.000	218.470	150	
F67	219.960	1.960	Open Manhole	1200	F11.013	218.000	150	F11.012	218.000	150	
								F18.001	218.000	150	
F68	220.120	2.310	Open Manhole	1200	F11.014	217.810	150	F11.013	217.810	150	
F69	217.880	1.350	Open Manhole	1200	F11.015	216.530	150	F11.014	216.530	150	
F70	216.800	1.350	Open Manhole	1200	F19.000	215.450	150				
F71	216.500	1.800	Open Manhole	1200	F11.016	214.700	150	F11.015	214.700	150	
								F19.000	214.700	150	
F72	216.240	2.010	Open Manhole	1200	F11.017	214.230	150	F11.016	214.230	150	
F73	212.540	1.350	Open Manhole	1200	F11.018	211.190	150	F11.017	211.190	150	
F74	211.000	1.350	Open Manhole	1200	F20.000	209.650	150				
F75	210.455	1.425	Open Manhole	1200	F11.019	209.030	225	F11.018	209.350	150	245
								F20.000	209.105	150	
F76	212.190	3.540	Open Manhole	1200	F21.000	208.650	150				
F77	212.990	4.590	Open Manhole	1200	F21.001	208.400	150	F21.000	208.400	150	
F78	218.630	1.350	Open Manhole	1200	F22.000	217.280	150				
F79	215.440	1.350	Open Manhole	1200	F22.001	214.090	150	F22.000	214.090	150	
F80	215.000	1.350	Open Manhole	1200	F23.000	213.650	150				
F81	215.000	5.125	Open Manhole	1200	F23.001	209.875	150	F23.000	211.525	150	1650
F82	212.850	5.140	Open Manhole	1200	F21.002	207.710	150	F21.001	207.710	150	
								F22.001	208.929	150	1219
								F23.001	209.360	150	1650
F83	208.000	1.600	Open Manhole	1200	F11.020	206.400	225	F11.019	206.400	225	
								F21.002	206.475	150	
F84	205.940	1.425	Open Manhole	1200	F11.021	204.515	225	F11.020	204.515	225	
F	202.790	1.425	Open Manhole	0		OUTFALL		F11.021	201.365	225	

Manhole Schedules for Foul - Main

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F38	411046.574	414594.663	411046.574	414594.663	Required	
F39	411068.561	414667.875	411068.561	414667.875	Required	
F40	411069.069	414628.115	411069.069	414628.115	Required	
F41	411073.695	414612.482	411073.695	414612.482	Required	
F42	411180.161	414674.976	411180.161	414674.976	Required	
F43	411182.118	414690.273	411182.118	414690.273	Required	
F44	411179.089	414704.762	411179.089	414704.762	Required	
F45	411169.353	414723.359	411169.353	414723.359	Required	
F46	411157.195	414735.266	411157.195	414735.266	Required	
F47	411187.269	414756.242	411187.269	414756.242	Required	
F48	411269.856	414851.748	411269.856	414851.748	Required	
F49	411277.175	414808.865	411277.175	414808.865	Required	
F50	411209.306	414706.905	411209.306	414706.905	Required	
F51	411227.321	414675.667	411227.321	414675.667	Required	
F52	411237.956	414667.423	411237.956	414667.423	Required	
F53	411247.506	414681.090	411247.506	414681.090	Required	
F54	411330.794	414660.526	411330.794	414660.526	Required	
F55	411297.145	414672.123	411297.145	414672.123	Required	
F56	411281.298	414701.275	411281.298	414701.275	Required	
F57	411323.817	414726.198	411323.817	414726.198	Required	
F58	411318.677	414777.133	411318.677	414777.133	Required	
F59	411318.900	414793.856	411318.900	414793.856	Required	
F60	411376.844	414775.719	411376.844	414775.719	Required	
F61	411321.800	414799.983	411321.800	414799.983	Required	
F62	411387.461	414830.914	411387.461	414830.914	Required	
F63	411343.635	414846.108	411343.635	414846.108	Required	

Manhole Schedules for Foul - Main

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
F64	411340.471	414877.955	411340.471	414877.955	Required	
F65	411411.729	414875.713	411411.729	414875.713	Required	
F66	411380.092	414888.307	411380.092	414888.307	Required	
F67	411374.513	414892.515	411374.513	414892.515	Required	
F68	411384.272	414918.729	411384.272	414918.729	Required	
F69	411436.401	414945.678	411436.401	414945.678	Required	
F70	411471.012	414864.942	411471.012	414864.942	Required	
F71	411493.815	414922.618	411493.815	414922.618	Required	
F72	411514.111	414913.993	411514.111	414913.993	Required	
F73	411537.895	414875.115	411537.895	414875.115	Required	
F74	411563.225	414930.904	411563.225	414930.904	Required	
F75	411580.092	414903.113	411580.092	414903.113	Required	
F76	411573.270	414746.359	411573.270	414746.359	Required	
F77	411536.907	414755.375	411536.907	414755.375	Required	
F78	411445.179	414778.732	411445.179	414778.732	Required	
F79	411491.083	414764.537	411491.083	414764.537	Required	
F80	411506.952	414841.034	411506.952	414841.034	Required	
F81	411531.476	414800.351	411531.476	414800.351	Required	
F82	411537.144	414795.135	411537.144	414795.135	Required	
F83	411614.833	414845.869	411614.833	414845.869	Required	
F84	411646.144	414866.593	411646.144	414866.593	Required	
F	411703.728	414886.734			No Entry	

Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:

   P: Preliminary Evolving drawings for approvals, tenders, billings etc.

   C: Construction Fully developed drawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress
   S0 - Work in progress
   Shared (Non-contractual)
   S1 - For coordination, **S2** - For information, **S3** - For internal review and comment, **S4** - For construction approval.
   Documentation (For contractors purposes)
   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.
   Construction
   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not the liability of CampbellReith)
8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquires of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of the layout in relation to the survey is given or implied. Masterplan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.
12. In the event of a blockage, runoff to follow natural topography and highways and discharge into proposed watercourse/ponds

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

Rev	Description	Date	By
P1	Issued for information	12/02/21	CS

CampbellReith
consulting engineers

London	020 7340 1700	☐	■ Manchester	0161 819 3060
Surrey	01737 784 500	☐	☐ Birmingham	01675 467 484
Bristol	0117 916 1066	☐	☐ Dubai	00 971 4345 7088

www.campbellreith.com

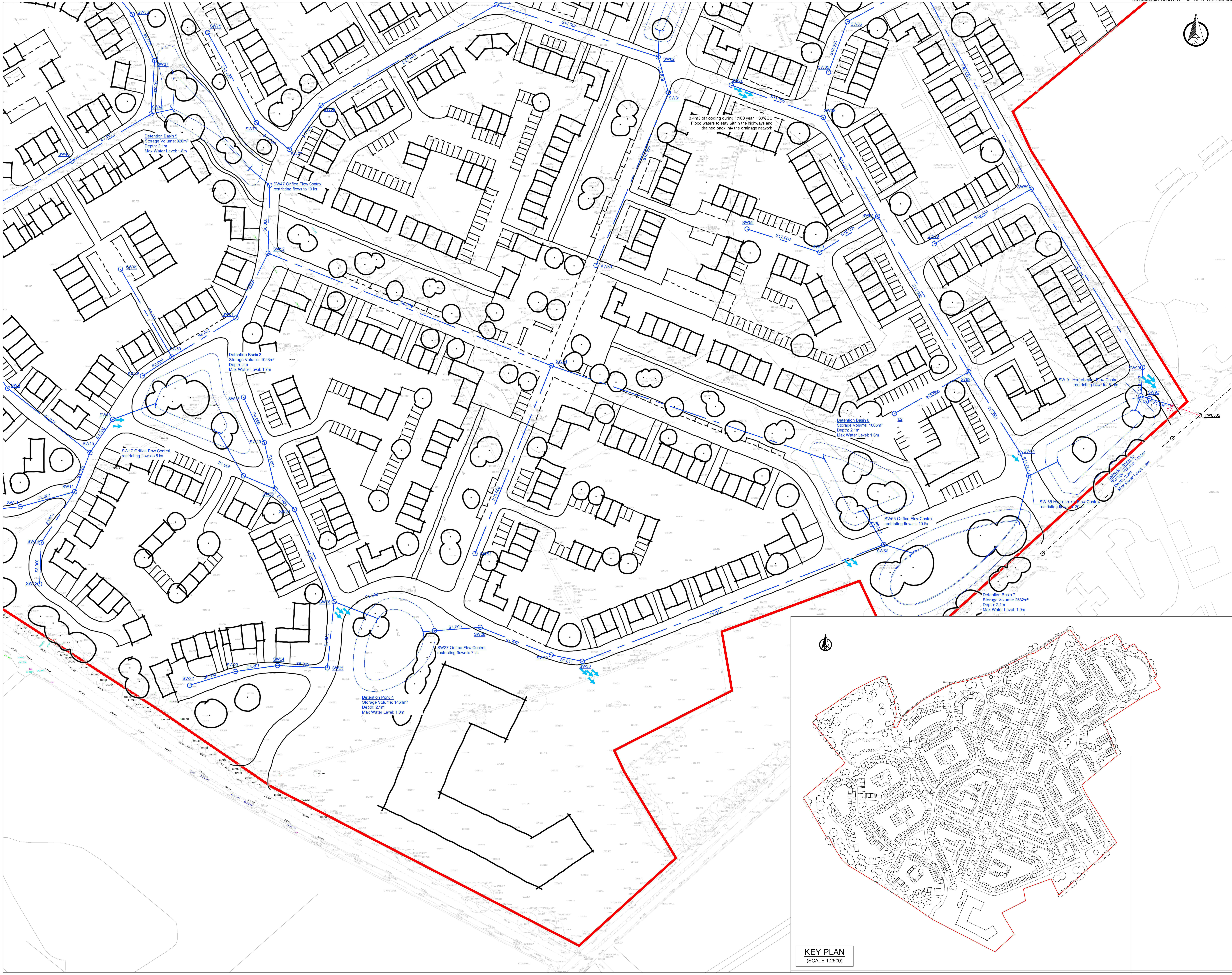
Job Title
Blackmoorfoot Road, Huddersfield

Client
Gerald Eve

Preliminary
Flood Route Exceedenc Plan
Sheet 1 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
CS	04/02/21	1:500	EH	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5100	P1



Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:

   P: Preliminary Evolving drawings for approvals, tenders, billings etc.

   C: Construction Fully developed drawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress
   S0 - Work in progress
   Shared (Non-contractual)
   S1 - For coordination, **S2** - For information, **S3** - For internal review and comment, **S4** - For construction approval.
   Documentation (For contractors purposes)
   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.
   Construction
   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not the liability of CampbellReith)

8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquires of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of the layout in relation to the survey is given or implied. Masterpan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.
12. In the event of a blockage, runoff to follow natural topography and highways and discharge into proposed watercourse/ponds

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

Rev	Description	Date	By
P1	Issued for information	12/02/21	CS

CampbellReith
consulting engineers

London 020 7340 1700 ☐ ■ Manchester 0161 819 3060
Surrey 01737 784 500 ☐ ☐ Birmingham 01675 467 484
Bristol 0117 916 1066 ☐ ☐ Dubai 00 971 4345 7088
www.campbellreith.com

Job Title
Blackmoorfoot Road, Huddersfield

Client
Gerald Eve

Preliminary
Flood Route Exceedence Plan
Sheet 2 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
CS	04/02/21	1:500	EH	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5101	P1

J:\13300-13499\13354 - BLACKMOORFOO' ROAD HUDDERSFIE\DOR\GIS\2-INFRASTRUCTURE\1-AUTOCAD\-WORKING DRAWINGS\1-SKETCHES\13354-CRH-ZZ-XX-DR-C-6100- P1_FLOOD EXCEEDENCE PLAN.DWG

Notes

1. Do not scale from this drawing on print or electronically. Work from figured dimensions only.
2. No deviation from the details on this drawing is allowed without CampbellReith's prior permission in writing.
3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing status:

   P: Preliminary — Evolving drawings for approvals, tenders, billings etc.

   C: Construction — Fully developed drawings issued under instructions for construction.
6. Only status **C** drawings to be used for construction.
7. Suitability code:

   Work in progress
   S0 - Work in progress
   Shared (Non-contractual)
   S1 - For coordination, **S2** - For information, **S3** - For internal review and comment, **S4** - For construction approval.
   Documentation (For contractors purposes)
   D1 - For Costing, **D2** - For Tender, **D3** - For contractor design, **D4** - for manufacture/procurement.
   Construction
   A - For construction, **B** - For construction but with comments (i.e. areas in abeyance), **CR** - Construction Record (Final Construction ONLY. Any deviations to that which is on site is not he liability of CampbellReith)
8. Utilities:
   The positions of Statutory Undertakers mains & services shown on this drawing have been based on information extracted from records obtained from various Utilities Companies. These must regarded as approximate only. The accuracy or completeness of the information or the location of such apparatus as shown on this drawing is not guaranteed and no warranty is given or implied regarding the position, depth, size, gradient thereof. The Contractor must make his own enquires of the Utilities Companies and Public Authorities and satisfy himself as to the exact position of services and depth, sizes, gradient thereof. In the interests of safety, the approximate position of underground cables should be obtained by use of electronic cable locators and this position confirmed by careful trial-holing using hand-dug methods.
9. Proposed Masterplan based on Planit drawing no. PL1713-PLA-XX-XX-DR-U-0010-S1-P03 - Development Layout (received on 24.07.20). This Masterplan has been inserted onto the topographical survey and no guarantee as to the accuracy of he layout in relation to the survey is given or implied. Masterplan shown for information only.
10. All existing survey information shown or referred to is based upon the topographical survey prepared by 'JLP Surveying', dated May 2017 and as supplied to CampbellReith - no warranty as to the accuracy of the information is given or implied.
11. For SW & FW manhole and pipeline information refer to MicroDrainage calculations included within the CampbellReith Flood Risk Assessment (FRA) ref. 13354-CRH-ZZ-XX-RP-C-0001.
12. In the event of a blockage, runoff to follow natural topography and highways and discharge into proposed watercourse/ponds

Legend:

- Site Boundary
- Proposed Surface Water Sewer
- Proposed Combined Water Sewer
- Existing Yorkshire Water Combined Water Sewer

Detention Basin 1
Storage Volume: 900m³
Depth: 2m
Max Water Level: 1.6m

SW108 Hydrobrake Flow Control
restricting flows to 10 l/s

Detention Basin 2
Storage Volume: 1222m³
Depth: 2m
Max Water Level: 1.6m

SW128 Hydrobrake Flow Control
restricting flows to 27 l/s

1.0m3 of flooding during 1:100 year +30%CC
Flood waters to be directed into the car park
and drained back into the drainage network

Detention Basin 8
Storage Volume: 60m³
Depth: 1.4m
Max Water Level: 1.3m

SW84 Orifice Flow Control
restricting flows to 70 l/s

Detention Basin 9
Storage Volume: 1026.5m³
Depth: 1.45m
Max Water Level: 1.40m

3.4m3 of flooding during 1:100 year +30%CC
Flood waters to stay within the highways and
drained back into the drainage network

KEY PLAN
(SCALE 1:2500)

Rev	Description	Date	By
P1	Issued for information	12/02/21	CS

CampbellReith
consulting engineers

London 020 7340 1700 | Manchester 0161 819 3060
Surrey 01737 784 500 | Birmingham 01675 467 484
Bristol 0117 916 1066 | Dubai 00 971 4345 7088
www.campbellreith.com

Job Title
Blackmoorfoot Road, Huddersfield

Client
Gerald Eve

Preliminary
Flood Route Exceedence Plan
Sheet 3 of 3

Drawn by	Date made	Scale @ A0	Checked by	Suitability	CR Project
CS	04/02/21	1:500	EH	S2	13354

Project No.	Originator	Volume	Lvl/Loc	Type	Role	Number	Rev
13354	CRH	ZZ	XX	DR	C	5102	P1

London

15 Bermondsey Square
London
SE1 3UN

T: +44 (0)20 7340 1700
E: london@campbellreith.com

Birmingham

Chantry House
High Street, Coleshill
Birmingham B46 3BP

T: +44 (0)1675 467 484
E: birmingham@campbellreith.com

Surrey

Raven House
29 Linkfield Lane, Redhill
Surrey RH1 1SS

T: +44 (0)1737 784 500
E: surrey@campbellreith.com

Manchester

No. 1 Marsden Street
Manchester
M2 1HW

T: +44 (0)161 819 3060
E: manchester@campbellreith.com

Bristol

Wessex House
Pixash Lane, Keynsham
Bristol BS31 1TP

T: +44 (0)117 916 1066
E: bristol@campbellreith.com