Heywood Stores

Flood Risk Assessment and Drainage Strategy

for

Trammell Crow Company Logistics (Heywood) Ltd

Ref: 21194-BGL-XX-XX-RP-D-00001

Version 6
14.03.2023

DOCUMENT CONTROL SHEET

Issued by: Burrows Graham Limited
5 Ambassador Place
Stockport Road
Altrincham
WA15 8DB

Tel: +44 (0)161 804 8046

Client: Trammell Crow Company Logistics (Heywood) Ltd

Project: Heywood Stores

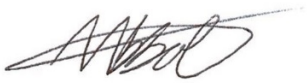
Document No: 21194-BGL-XX-XX-RP-D-00001

Title: Flood Risk Assessment and Drainage Strategy

Status: Final

Date: 14/03/2023

Document Production Record

Version Number:	**6**	**Name**	**Signature**
Prepared		Alexa Abbot MEng – Graduate Engineer	
Checked		Jordan McGlacken MEng – Senior Engineer	
Approved		Jack Williams CEng MICE – Civils Director	

Document Revision Record

Version Number	**Date**	**Revision Details**
2	20.10.2022	Front page added and appendix updated
3	02.12.2022	Contents page updated
4	23.12.2022	Appendices updated and minor amendments to drainage strategy text
5	02.03.2023	Updated following amendments to site masterplan
6	14.03.2023	Updated following further amendments to site masterplan

Burrows Graham Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

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TABLE 1 – SITE CHARACTERISTICS

1.0 - PROJECT BACKGROUND

1.1 - Appointment

Burrows Graham Limited have been commissioned by Trammell Crow Company Logistics (Heywood) Ltd (referred to the as 'the applicant' hereafter) to undertake a flood risk assessment and drainage strategy of suitable scope to support a planning application for a proposed commercial development at Heywood Stores, Heywood.

1.2 - Aim of study

This FRA and Drainage Strategy has been developed in due cognisance of all relevant available policy information. It is anticipated that this report will satisfy the requirements of the National Planning Policy Framework (NPPF) and all relevant flood risk planning policies.

1.3 - Relevant policy and strategy documents

The following documents were reviewed as part of this Flood Risk Assessment:

- Defra Sustainable Drainage Systems Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015)
- Environment Agency Climate Change Guidance (February 2016)
- Flood and Water Management Act (April 2010)
- National Planning Policy Framework (Updated July 2021) and Planning Practice Guidance (March 2014)
- Sustainable Drainage Systems Written Statement HCWS161 (December 2014)
- Bury, Rochdale, and Oldham Strategic Flood Risk Assessment (SFRA) Level 2 (November 2009)
- Rochdale Borough's Strategy for Flood Risk Management 2014-2024 (March 2014)
- Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (PFRA) (May 2011)

1.4 - Proposed development

A summary of the proposed works is as follows:

- Demolition of the 9 existing units totalling circa 31,900 sq m;
- Erection of 3 new units (Use Class B8), totalling 45,437 sqm;
- Provision of parking for approximately 398 spaces in total, including 20 EV charging spaces, 26 accessible spaces and 18 car sharing spaces;
- Provision of cycle parking for approximately 60 spaces;
- New areas of green space, tree planting and habitat creation; and
- SuDS, including surface water attenuation features.

Reference should be made to the 'Proposed Site Plan' included in Appendix A.

The development can be classified as 'less vulnerable' in accordance with guidance set out on the 'gov.uk' website, namely 'Table 2: Flood vulnerability classification'.

1.5 – Statutory consultation

A copy of all correspondence with United Utilities and Rochdale Council Flood Risk Management Team (LLFA) has been included in Appendix B of this report.

2.0 - SITE DETAILS

2.1 – Site description

Figure 1 – Proposed Site Plan

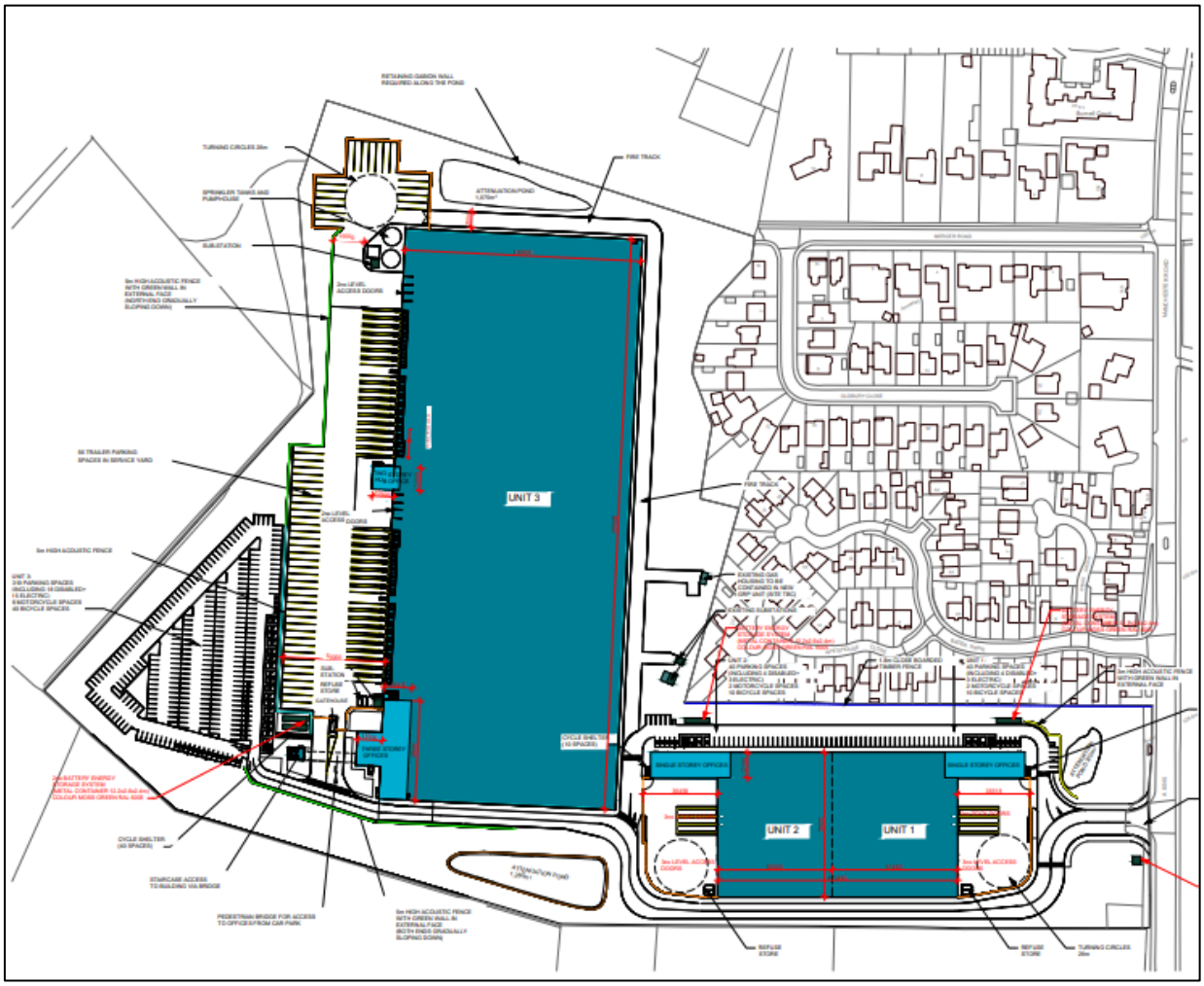


Table 1 - Site characteristics

Site address	Manchester Road, Heywood OL10 2QU
Grid reference	385527, 409246
Area (hectares)	11.1 hectares
Current use	A Lawful Development Certificate was granted on 14 December 2021 (ref: 21/01298/CPE) which confirmed that the site's existing lawful use is Use Class B8 (storage and distribution).
Surroundings	South – The new M62 Link Road is currently being constructed on land south of the site. Further south is Hareshill Road, beyond which lies agricultural land. East – A housing estate and Manchester Road form the eastern site boundary. West – A farmers field delineates the western site boundary. North – A housing estate and school form the northern site boundary.
Topography	Site levels generally fall to the West corner of the site to a low level of approximately 125m AOD. The highest area of the site is located on the North-Eastern edge at a level of around 131m AOD. A copy of the topographical survey has been included in Appendix C of this report.

2.2 - Existing drainage

Public sewers

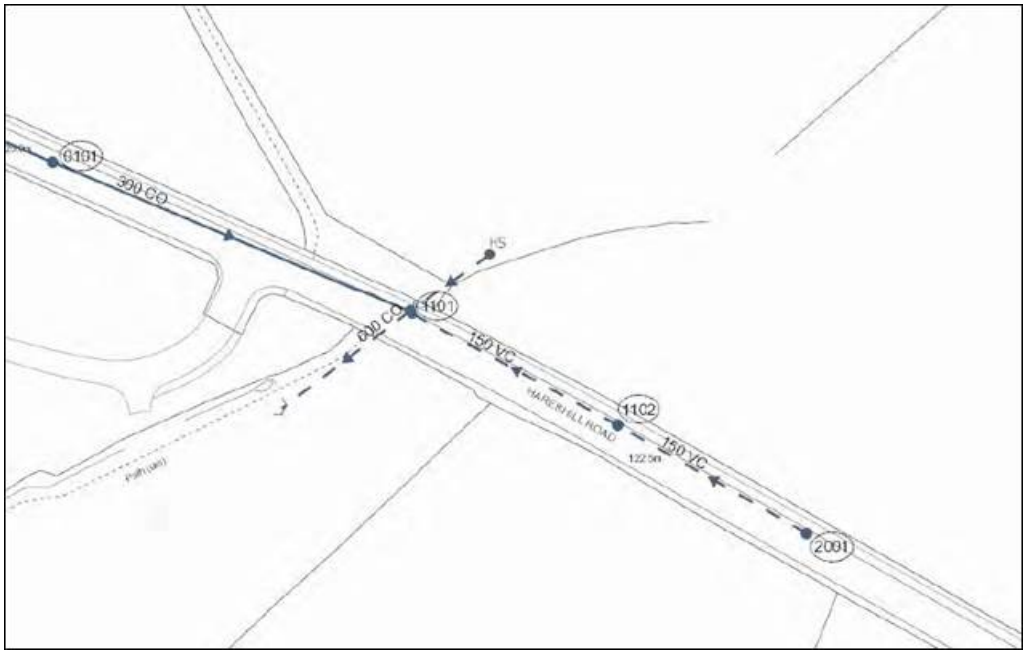
Reference should be made to the UU Public Sewer Records contained in Appendix D of this report.

The Public Sewer Records show there to be no public sewers within the site.

The records show a 300mm diameter public surface water sewer in Hareshill Road, which connects into a 600mm diameter private / highway drain that outfalls to an unnamed watercourse south of Hareshill Road.

The records show a public foul and surface water network serving the housing estate to the north of the site. A public foul pumping station is shown immediately outside the north-easternmost site boundary.

Figure 2 - Public sewer records extract



Private Drainage

Reference should be made to the EDI Surveys Ltd Buried Utilities Survey, which has been included in Appendix D of this report.

With respect to surface water drainage, the Buried Utilities Survey shows 1 no. 225mm diameter surface water pipe, 1 no. 300mm diameter surface water pipe, and 1 no. 675mm diameter surface water pipe, to discharge runoff from the site to an unknown outfall along the north-western site boundary. Based on the lay of the land, this drainage system is anticipated discharge to the ordinary watercourse to the south of Hareshill Road.

The LLFA were consulted and advised that Hareshill Road has been widened, and that a 600mm diameter pipe passes under the road as is shown in figure 2. The LLFA indicated that the private drain serving the site connects into this 600mm diameter pipe that passes under Hareshill Road, as per the drawing they provided which is contained in Appendix B.

Appendix B contains a copy of all correspondence with the Rochdale Flood Risk Management Team to date.

The Buried Utilities Survey also shows a 300mm diameter surface water pipe leaving the site at the south eastern boundary.

A drainage survey is currently being arranged to verify the location and ultimate outfalls of the surface water drain leaving the site.

With respect to foul drainage, the current system discharges via a pumping station to the south-west edge of the site. This picks up all the foul drainage from the nine warehouse buildings on site.

2.3 - Existing watercourses

Whittle Brook is located south of Hareshill Road, circa. 400m south-east of the site at it's on the other side of Manchester Road. There is an unnamed watercourse approximately 150m to the east of the site which becomes Brightley Brook.

2.4 - Geology and hydrogeology

Reference should be made to the Coal Mining Risk Assessment by RSK Geosciences, the key findings of which have been summarised below.

- A review of available geological records was made which found that the site is underlain by superficial deposits of Devensian till which is made up of clay, silt and sand. The bedrock of the site comprises of mudstone of the Pennine Lower Coal Measures which is predominantly Mudstone, Siltstone and Sandstone
- BGS GeoIndex mapping shows the site is located on a moderately productive aquifer which is described as regional, cyclic and multi-layers with moderate yields from sandstones and springs
- The site is in a zone of low groundwater vulnerability.

3.0 – FLOOD RISK STATEMENT

3.1 - Fluvial flood risk

The National Planning Policy Framework (NPPF) categorises flood risk as follows:

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

The EA flood maps for planning show that the of the site to be located within Flood Zone 1, with no Main Rivers in the vicinity.

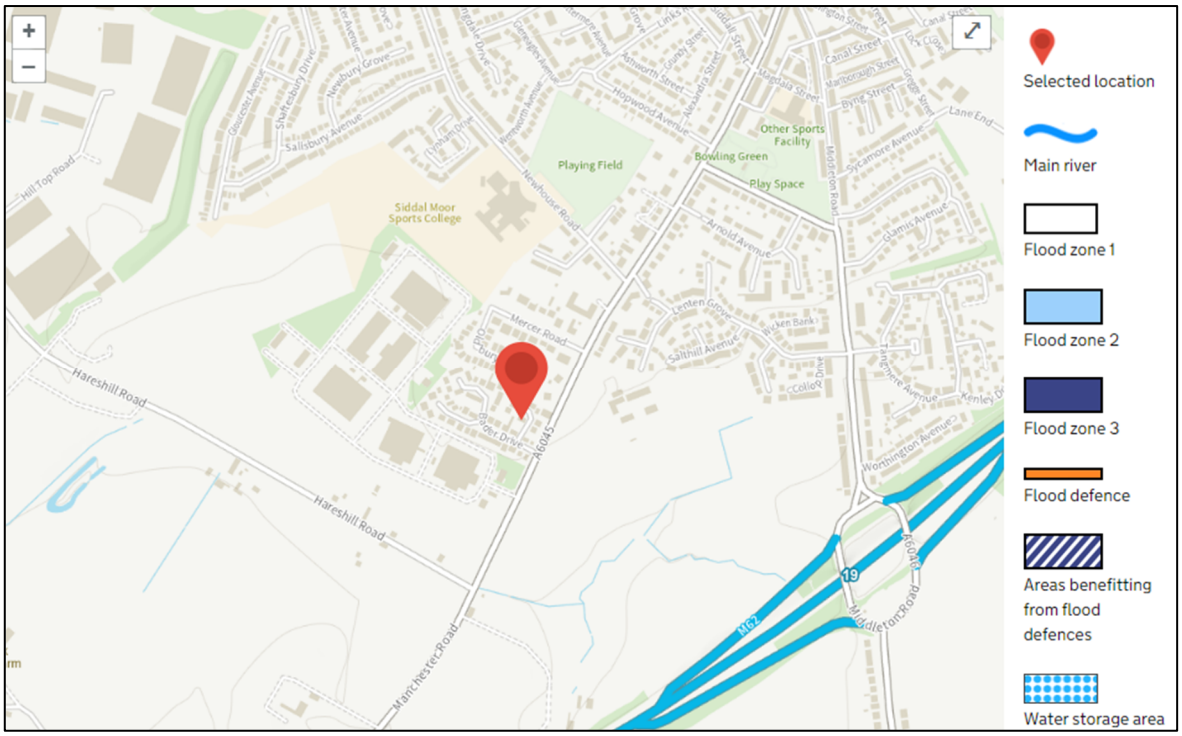


Figure 3 – EA Flood Map for Planning

Based on the above, the site considered to be at low risk of flooding from rivers or sea.

3.2 - Surface water flooding

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

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

The EA Map of long-term flood risk from surface water indicates that the site is mostly at very low risk of flooding. There are some localised areas at low to high risk of surface water flooding associated with low lying parts of the site. The development will include provision of a new site wide drainage system as set out in sections 4 & 5 of this report, which will mitigate against these areas of surface water flooding. As such, the risk is considered to be low.'

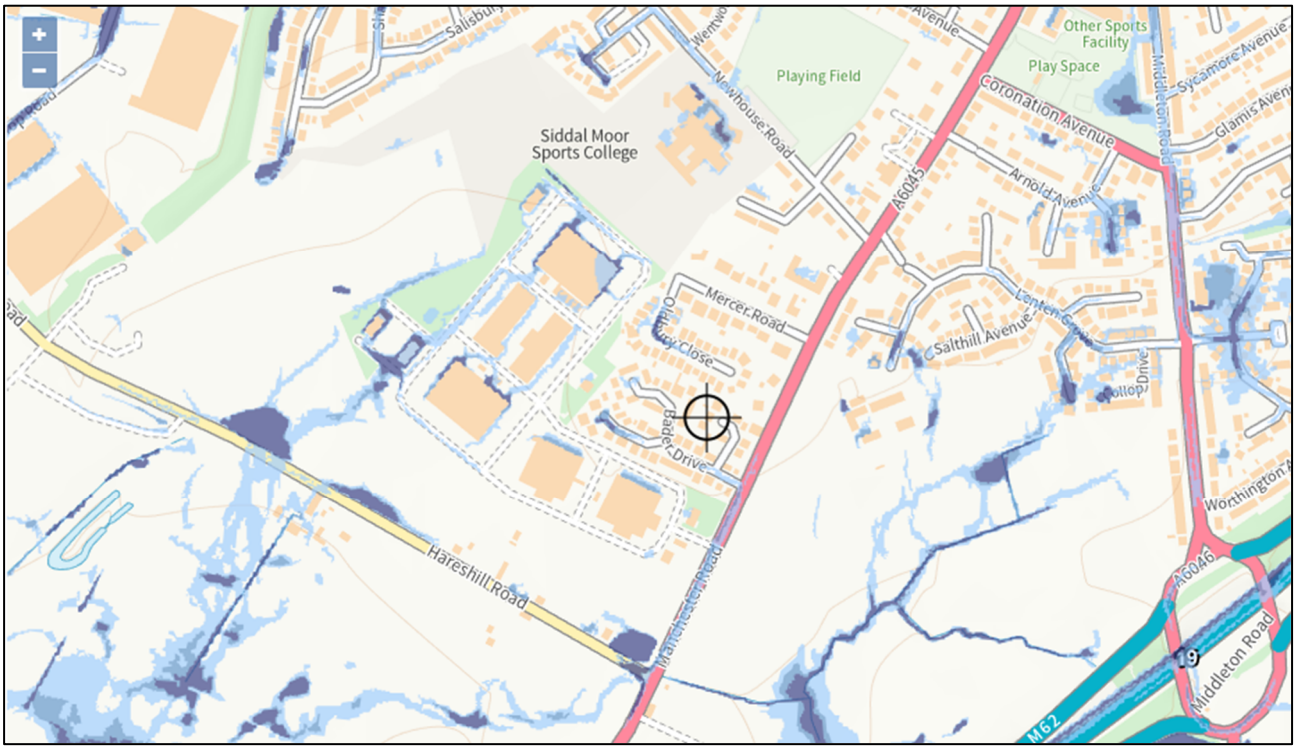


Figure 4 – EA Flood Map for Surface Water

3.3 - Groundwater flood risk

Groundwater flooding occurs when the water table, the level of water below the ground, rises above the ground surface or into cellars and basements. Groundwater flooding is most likely to occur in low lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks.

Based on the ground conditions outlined in Section 2.4, the risk of flooding from groundwater cannot be ruled out.

Based on the SFRA produced by Rochdale Borough Council there is no significant risk of groundwater flooding on the site or in the surrounding areas. Heywood and the wider area consists of geology predominantly made up of sand and gravel which is highly permeable.

Based on the groundwater flood maps contained in the Bury, Rochdale and Oldham SFRA, the presence of deep groundwater and no basements forming part of the development proposals, the risk of groundwater flooding is considered to be low.

3.4 - Sewer flooding

There are no existing public sewers within the vicinity of the site. Therefore, the site is at low of risk of flooding from sewers.

3.5 - Tidal flooding

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

3.6 - Reservoir flooding

Based on the EA Flood Risk from Reservoirs Map, the site is not at risk of flooding from reservoirs.

4.0– SURFACE WATER DRAINAGE STRATEGY

4.1 – Disposal of surface water

The method for removal of surface water from the site has been selected in accordance with the hierarchy outlined in Building Regulations Part H as summarised below:

- Infiltration to the ground
- Discharge to a watercourse
- Connection to a surface water sewer
- Connection to a combined sewer

Based on the ground conditions summarised in section 2.4, and the site investigation report carried out by RSK we consider infiltration to not be feasible due to the presence of made ground underlying clay and areas of high ground water across the site.

Where infiltration is not possible, the next best option is to discharge to a watercourse. As described in section 2.22 of this report. it is anticipated that most of the site currently discharges surface water to the unnamed watercourse to the south of Hareshill Road via 600mm diameter pipe. A small part of the site discharges to an unknown outfall in Manchester Road. This strategy is based on the site draining surface water as existing, with the relevant betterments and climate change allowances applied – see below.

4.2 – Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) will be utilised in line with The SuDS Manual (C753) guidance and aim to minimise the impact a development has on the runoff quantity and quality and maximise amenity and biodiversity opportunities.

The management train approach is a fundamental principle of SuDS, it aims to primarily reduce pollution, flow rates and volume of runoff from the site. The main objective is to treat the runoff as close to the source as possible and it is imperative that at least two of the following should be included within the drainage strategy.

- **Prevention** – The use of good site design and rainwater re-use measures to prevent runoff.
- **Source Control** – Controlling the runoff as close to source as possible by using; green roofs, porous pavements and soakaways.
- **Site Control** – Use of water management techniques within local area, i.e. detention basins and geo-cellular storage.
- **Regional Control** – Management of water from a number of sites in a specific location, i.e. balancing ponds and wetlands.

The drainage strategy for this development will incorporate prevention by using rainwater harvesting systems where appropriate, and site control in the form of flow control and associated attenuation ponds and below ground tanks.

4.3 – General strategy

For details of the outline drainage proposals for the site, reference should be made to drawing ref: 21192-BGL-XX-XX-DR-S-00210, 21192-BGL-XX-XX-DR-S-00211, and 21192-BGL-XX-XX-DR-S-00212, which have been included in Appendix E of this report.

4.4 – Total site area and impermeable areas

The total site area is 11.1 hectares.

The existing impermeable area of the site has been measured to be 5.836 hectares.

The total drained impermeable area of the proposed development has been measured to be 8.200 hectares.

4.5 – Discharge rates

The site is a brownfield development. Rochdale LLFA have been contacted to confirm the approach in terms of discharge rates and betterments.

Using the runoff calculations tool provided by the LLFA, the maximum permitted future discharge from the developed site should be no greater than 220.5 l/s. This is based on providing a 50% betterment for the Qbar (2.3 year return period) for all storm events. This maximum discharge rate will be split across two proposed surface water outfall. The majority of the site will discharge to the watercourse south of Hareshill Road via the 600mm diameter drain at a rate no greater than 215.5 l/s.

A small part of the site is proposed to discharge to an unknown outfall through re-using the existing 300mm connection within the site. Since the ultimate outfall of the 300mm drain is unknown, flows will be restricted to 5 l/s, which meets the requirements of the LLFA and United Utilities, the latter of which have indicated that they *'will consider a surface water connection to the 225mm diameter public surface combined sewer within Manchester Road located South east of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s as this would be new connection for site that currently has a more sustainable point of discharge'*.

All correspondence and calculations have been included in Appendix B and Appendix F of this report respectively.

4.6 – Attenuation storage

In order to achieve the restriction in peak rate of surface water runoff from the developed site as described above, on site surface water attenuation storage will be required in order to temporarily store the residual volume of surface water for rainfall events resulting in a peak runoff rate over those set out in table.

Attenuation will be provided in the form of attenuation ponds and below ground storage (where required).

The attenuation storage will be designed to ensure that there is no surface water flooding on site for rainfall events up to and including the 1 in 30 year storm event. The attenuation storage will be designed to ensure that surface water runoff for storm events up to and including the 100 year storm plus a 30% allowance will not cause a risk of flooding to properties or increase the flood risk outside of the site.

A 30% climate change allowance is proposed in line with the latest DEFRA climate change allowances.

A hydraulic modelling exercise of the proposed drainage system has been undertaken and the results have been included in Appendix F of this report.

4.7 – Water quality

Water quality has been considered and the following measures have been included within the surface water drainage proposals:

- All drainage from car park areas, which are considered low risk, will pass through either a Class 1 by-pass separator.
- All drainage from service yards, which are considered high risk, will pass through a Class 1 full retention separator.
- All drainage from the unit 1, unit 2 and the site road will pass through one of the attenuation ponds, which will provide treatment for runoff from these areas.
- Silt will be prevented from entering the system by the use of channels with silt traps and catch pits where required.

4.8 – Maintenance

Reference should be made to the Drainage Inspection and Maintenance Schedule in Appendix G, which includes required actions and typical frequencies for all drainage infrastructure serving the development.

The drainage will be managed and maintained by an appointed Management Company.

5.0 – Foul water drainage strategy

A pre-development enquiry was submitted to United Utilities who stated the following in their response, a copy of which has been included in Appendix B of this report:

'Our preferred point of discharge would be to the 225mm diameter public combined sewer within Manchester Road located to the South of your proposed development at an unrestricted rate the same as the current brownfield arrangement'.

The public sewer records do not show a 225mm diameter public combined sewer in Manchester Road to the south of the site but does show a 225mm diameter combined sewer in Manchester Road further north. As such, it is currently proposed to discharge foul drainage generated from the development to the 225mm foul sewer (upstream of existing pumping station immediately outside the north-eastern site boundary). It is anticipated that a pumped foul drainage is required.

Where a 225mm combined sewer in Manchester Road to the south of the site is verified, foul drainage from the development will be discharged to it. Based on an anticipated gross internal floor space of 42,985 square metres, it is anticipated that the average foul flow from the development will be 0.5 l/s and the peak flow will be 3 l/s. This has been calculated using the following formula:

6DWF = 6PG + I + 3E

Where:
6DWF = foul drainage design flow (l/d)
P = population= 30 litres per person per day
G = water consumption = 30 l/person/day
I = dry weather infiltration = 10%
E = trade effluent = 0.2 l/s/ha

6.0 MITIGATION / MANAGEMENT OF FLOOD RISK

6.1 – Access and egress

Access to and egress from the site will be provided by a site access road that ties into Manchester Road.

Manchester Road and the proposed site access road are located within flood zone 1. Therefore, a safe means of access / egress is available to the site at all times.

6.2 - Drainage & exceedance flow routes

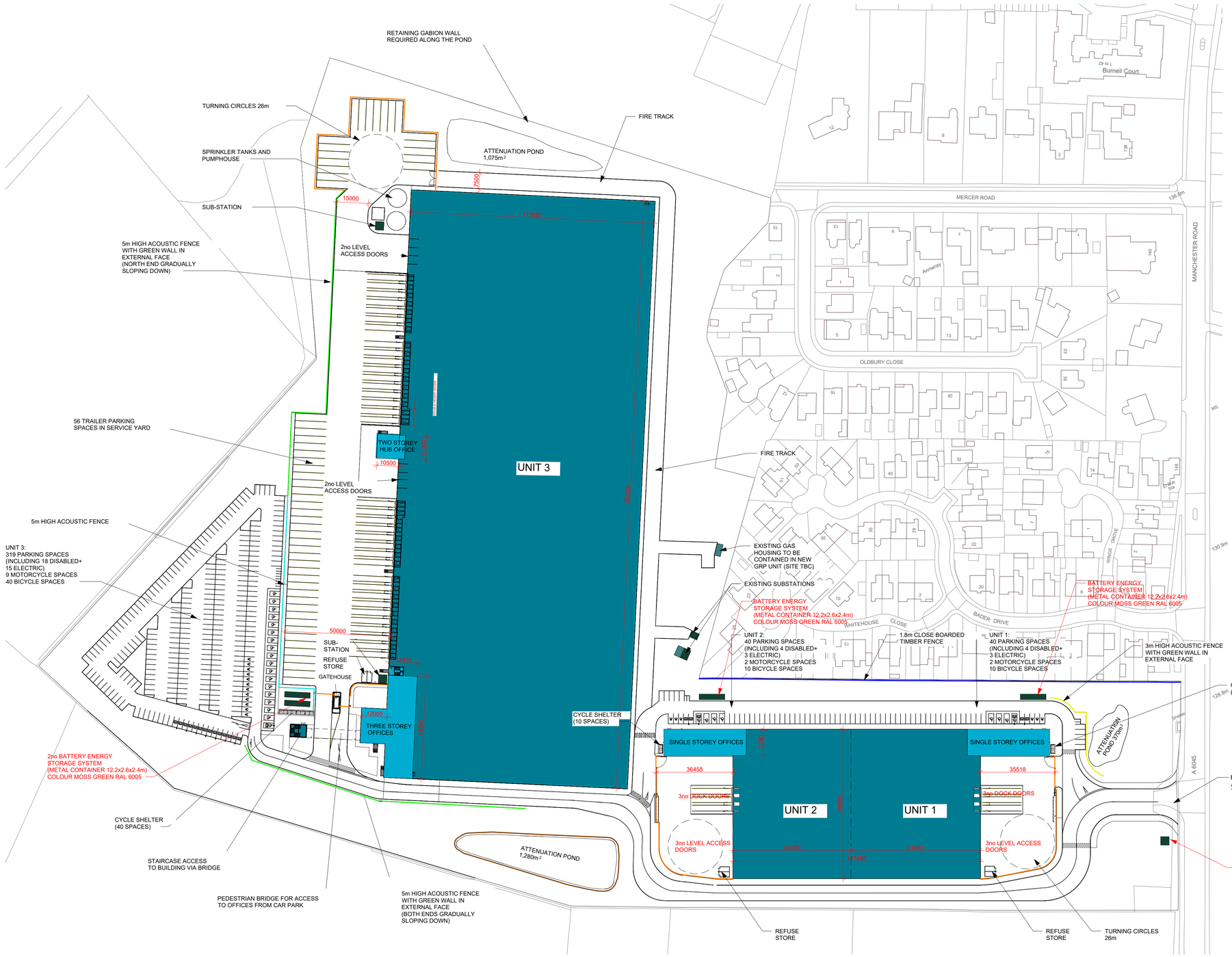
The proposed surface water drainage system will be designed in accordance with the drainage strategy set out in Section 4 of this report. This will ensure that there is no increase in flood risk to the site or elsewhere in the local catchment for all storm events up to and including the 100 year storm plus 30% climate change.

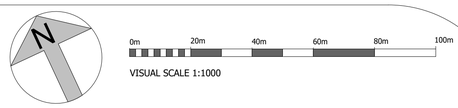
It should be noted that if storm events in excess of the 100 year storm plus 30% climate change or blockages occur, this will result in flood water arising from the site drainage system. If the site drainage system were to flood, it is considered that any surface water arising from the site drainage system would be contained within the area of dock levellers which are below ground.

6.3 - Conclusion

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

APPENDIX A – PROPOSED SITE PLAN





SCHEDULE OF AREAS - GROSS EXTERNAL AREA				SCHEDULE OF AREAS - GROSS INTERNAL AREA		
UNIT 1 GEA				UNIT 1 GIA		
WAREHOUSE	4,378 m²	/ 47,124 sqft		WAREHOUSE	4,305 m²	/ 46,339 sqft
OFFICES+STAIRS	489 m²	/ 5,263 sqft		OFFICES+STAIRS	438 m²	/ 4,714 sqft
PLANT DECK	56 m²	/ 602 sqft		PLANT DECK	53 m²	/ 570 sqft
TOTAL UNIT 1	4,923 m²	/ 52,989 sqft	HAUNCH HEIGHT : 12m	TOTAL UNIT 1	4,796 m²	/ 51,623 sqft
UNIT 2 GEA				UNIT 2 GIA		
WAREHOUSE	3,988 m²	/ 42,926 sqft		WAREHOUSE	3,919 m²	/ 42,184 sqft
OFFICES+STAIRS	489 m²	/ 5,263 sqft		OFFICES+STAIRS	438 m²	/ 4,714 sqft
PLANT DECK	56 m²	/ 602 sqft		PLANT DECK	53 m²	/ 570 sqft
TOTAL UNIT 2	4,533 m²	/ 48,791 sqft	HAUNCH HEIGHT : 12m	TOTAL UNIT 2	4,410 m²	/ 47,468 sqft
UNIT 3 GEA				UNIT 3 GIA		
WAREHOUSE	32,831 m²	/ 353,392 sqft		WAREHOUSE	32,537 m²	/ 350,228 sqft
OFFICES	2,198 m²	/ 23,659 sqft		OFFICES	2,009 m²	/ 21,625 sqft
PLANT DECK+stairs	708 m²	/ 7,621 sqft		PLANT DECK+stairs	681 m²	/ 7,330 sqft
STAIR TOWER/BRIDGE	218 m²	/ 2,346 sqft		STAIR TOWER/BRIDGE	193 m²	/ 2,077 sqft
GATEHOUSE	18 m²	/ 193 sqft		GATEHOUSE	11 m²	/ 118 sqft
TOTAL UNIT 3	35,937 m²	/ 387,211 sqft	HAUNCH HEIGHT : 15m	TOTAL UNIT 3	35,431 m²	/ 381,378 sqft
TOTAL GEA	45,393 m²	/ 488,991 sqft		TOTAL GIA	44,637 m²	/ 480,469 sqft

FINISHES LEGEND

- LANDSCAPING
- CONCRETE
- GRAVEL
- BLOCK PAVIORS
- ASPHALT
- GRASSCRETE
- BUILDINGS (WAREHOUSE+ANCILLARY)
- OFFICES
- 2.4m HIGH PALADIN FENCE
- 3m HIGH ACOUSTIC FENCE + GREEN WALL EXTERNALLY
- 5m HIGH ACOUSTIC FENCE + GREEN WALL EXTERNALLY
- 5m HIGH ACOUSTIC FENCE
- 1m HIGH KNEE RAIL TIMBER FENCE
- 1.8m VERTICAL CLOSE BOARDED TIMBER FENCE

1

PROPOSED SITE LAYOUT

1 : 1000

Do not scale this drawing
ashton smith to be notified of discrepancies in figured dimensions
Contractors must check all dimensions from site
This drawing is copyright and is for use on this site only
This drawing is to be used solely for information as entitled
For other information refer to the latest revision of any cross referenced drawing

LOCATION PLAN:

NOTES:

SITE BOUNDARY: 11.152 Ha / 27.46 Acres

REV	DATE	DESCRIPTION	DRAWN BY	CHECK BY
REVISIONS				

PROJECT TITLE
MANCHESTER ROAD, HEYWOOD

DRAWING TITLE
PROPOSED SITE PLAN

RIBA STAGE	STATUS		DRAWN BY	CHECKED BY
3	PLANNING		JA	RR
SHEET	SCALE	DATE	SUITABILITY	REVISION
A1	As indicated	04/11/22	S3	P12

DRAWING NO.
21157 - ASA - 00 - ZZ.ZZ - D - A - 0003 _ (S3 - P12)

BIM MODEL NUMBER: 21157-ASA-ZZ-ZZ.ZZ-M3-A-0001_(S3-P3)

CLIENT
Trammell Crow Company

AshtonSmith
Beyond Design
Ashton Smith, Belvedere House, 2 Victoria Avenue, Harrogate, North Yorkshire, HG1 1EL
Tel: 01423 522882 Fax: 01423 565104
www.ashtonsmith.co.uk

JOB NO. 21157

APPENDIX B – STATUTORY CONSULTATIONS

Alexa Abbot

From: Graham, Alistair <Alistair.Graham@uuplc.co.uk>
Sent: 10 January 2022 14:40
To: Jordan McGlacken
Cc: Wastewater Developer Services; Sarah Burrows
Subject: Pre Development Enquiry for: Heywood Stores, Heywood, OL10 2QR UU Reference Number : 4200046030

Good afternoon Jordan,

Pre Development Enquiry for: Heywood Stores, Heywood, OL10 2QR UU Reference Number : 4200046030

For future reference we now have a new wastewater pre-development enquiry form designed to be easier and more user friendly which is available on our website via the following link:

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

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

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

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

Foul Water

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

Our preferred point of discharge would be to the 225mm diameter public combined sewer within Manchester Road located to the South of your proposed development at an unrestricted rate the same as the current brownfield arrangement.

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

Surface Water

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

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

1. **into the ground (infiltration);**

2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

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

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

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

Infiltration

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

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

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

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

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

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

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

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse located to the south west of the proposed site. As mentioned in your email our records do show a 600mm pipe in this area, this is recorded as a watercourse so you will need to discuss the discharge to this with the Lead Local Flood Authority

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

Highway Drainage

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

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public surface combined sewer within Manchester Road located South east of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s as this would be new connection for site that currently has a more sustainable point of discharge.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

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

Land drainage / Overland flows / track drainage

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

Sewer Adoptions

If you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

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

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part

of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

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

Section 104 Pre application form (1b)

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

Codes For Adoption

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

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

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

https://www.water.org.uk/wp-content/uploads/2020/03/SSG-App-C-Des-Con-Guide-v-2-100320-C.pdf

Existing Wastewater Assets Crossing the Site

We have reviewed our records and can confirm that there does not appear to be any charted public sewers located within the boundary of proposed development. However, due to the accuracy of the records and the public sewer transfer legislation in 2011, not all public sewers are shown on our records so we would ask that you proceed with caution and carry out your own site investigation works. If any uncharted sewers are identified while carrying out your works we would ask that you contact United Utilities at the earliest opportunity so that we can offer guidance and update our records.

Existing Water Assets Crossing the Site

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

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

Connection Application

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

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

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

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

Kind regards,

United Utilities
Water for the North West

Alistair Graham
Wastewater Developer Engineer
Developer Services & Metering
Customer Services
M: 07765941555
unitedutilities.com

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Jordan McGlacken

From: wastewaterdeveloperservices@uuplc.co.uk
Sent: 20 February 2023 16:46
To: Jordan McGlacken
Cc: jfarnill@geraldeve.com; Sarah Burrows; Jack Williams
Subject: RE: Heywood Stores Planning ref: 22/01410/FUL UU ref: DC/22/3892 [Filed 22 Feb 2023 08:50]

Categories: Filed by Mail Manager

Good afternoon Jordan,
Thanks for your email. I will update my response, and a new formal letter will be sent to the LPA within 2 days to confirm that the proposed drainage strategy is acceptable in principle to United Utilities.

Kind regards,

United Utilities
Water for the North West

Mohammed Aljafarwi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

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---------- Original Message ----------
From: Jordan McGlacken [jordanmcglacken@burrowsgraham.com]
Sent: 16/02/2023 13:15
To: wastewaterdeveloperservices@uuplc.co.uk
Cc: sarahburrows@burrowsgraham.com; jfarnill@geraldeve.com; jackwilliams@burrowsgraham.com
Subject: RE: Heywood Stores Planning ref: 22/01410/FUL UU ref: DC/22/3892

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Hi Mohammed,

See attached latest response from Rochdale LLFA confirming '*a small part of the site on the eastern boundary is proposed to discharge to a Highway Drainage Sewer at a maximum flow rate of 5 l/s. This matter was discussed by the LLFA Officer with J Freeman, the Engineer involved in the Highway Drainage mods and this is deemed acceptable*'.

Please can you provide an updated consultation response now we've addressed your concerns?

Kr,

Jordan McGlacken ***MEng* (*Hons*)**
Senior Civil Engineer

Burrows Graham

5 Ambassador Place, Stockport Road, Altrincham WA15 8DB

E: jordanmcglacken@burrowsgraham.com

M: +44(0)7988 047 401

T: +44 (0)161 804 8046

www.burrowsgraham.com

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From: wastewaterdeveloperservices@uuplc.co.uk <wastewaterdeveloperservices@uuplc.co.uk>
Sent: Wednesday, February 8, 2023 9:47 AM
To: Jordan McGlacken <jordanmcglacken@burrowsgraham.com>
Cc: Sarah Burrows <sarahburrows@burrowsgraham.com>; Jack Williams <jackwilliams@burrowsgraham.com>
Subject: RE: Heywood Stores Planning ref: 22/01410/FUL UU ref: DC/22/3892 [Filed 08 Feb 2023 09:51]

Good morning Jordan,
Thanks for your email.

Surface water drainage
Thanks for the clarification, we want to be sure that no surface water drains into the public network. As you stated that the site will drain surface water at 5l/s to the highway drain which discharges to a nearby watercourse, UU does

not have any objection, the applicant must contact the riparian owner for connection permission.

Foul water drainage
UU accept in principle the provided drainage strategy, our only concern was regarding surface water which was clarified in your email.

United Utilities does not have any information about the private network within the site boundary. The only available information, there is a private rising main starting from the sewage treatment plant No1 to drain into our public combined sewer at UUMH 6301. UU records are indicative.

Kind regards,

Mohammed Aljafarwi (He/Him)
Developer Engineer
Developer Services & Metering
Customer Services
M: 07950474499
unitedutilities.com

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---------- Original Message ----------
From: Jordan McGlacken [jordanmcglacken@burrowsgraham.com]
Sent: 07/02/2023 09:04
To: wastewaterdeveloperservices@uuplc.co.uk
Cc: sarahburrows@burrowsgraham.com; jackwilliams@burrowsgraham.com
Subject: RE: Heywood Stores Planning ref: 22/01410/FUL UU ref: DC/22/3892

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Hi Mohammed,

Please can you come back to me on the below at your earliest opportunity?

Kr,

Jordan McGlacken ***MEng* (*Hons*)**
Senior Civil Engineer

Burrows Graham

5 Ambassador Place, Stockport Road, Altrincham WA15 8DB

E: jordanmcglacken@burrowsgraham.com

M: +44(0)7988 047 401

T: +44 (0)161 804 8046

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From: Jordan McGlacken
Sent: 31 January 2023 13:49
To: wastewaterdeveloperservices@uuplc.co.uk
Cc: Sarah Burrows <sarahburrows@burrowsgraham.com>; Jack Williams <jackwilliams@burrowsgraham.com>
Subject: Heywood Stores Planning ref: 22/01410/FUL UU ref: DC/22/3892 [Filed 31 Jan 2023 13:48]

FOA: Mohammed Aljafarawi

Good afternoon Mohammed,

I am writing with regards to the attached UU response to the planning application ref: 22/01410/FUL for the proposed redevelopment of Heywood Stores, Manchester Road, Heywood OL10 2PZ, and specifically the drainage elements.

Surface water drainage

Comment re. UU not accepting surface water draining to the public network as there are many watercourses around the site noted. The attached public sewer records do not show there to be any public sewers in Manchester Road that are south of the site access, and therefore, it is anticipated the 300mm drain is a highway drain which discharges to a nearby watercourse / ditch. We have contacted the highway authority to request further details and acceptance of discharge from the site at a rate no greater than 5 l/s.

Foul water drainage

The attached correspondence states *'we can confirm that whilst the strategy for the disposal of foul and surface water is acceptable in principle, there are elements of the detailed drainage design that might not be acceptable to United Utilities and will require resolution by the applicant. For this reason, and to avoid any unnecessary delays or costs for the applicant, we request that the proposed drainage strategy is not approved until such time as all concerns are resolved.* ***The applicant should contact our Wastewater Developer Services team regarding this matter'***.

Do UU have any concerns with the foul drainage proposals or was the only concern regarding surface water as per the above?

I also wanted to query whether you have any information regarding the existing foul drainage infrastructure on site. We received the below from another consultant which suggests there are sewerage treatment works on site. Can you confirm whether any foul infrastructure within the site are UU assets?



Kr,

Jordan McGlacken ***MEng* (*Hons*)**
Senior Civil Engineer

Burrows Graham

5 Ambassador Place, Stockport Road, Altrincham WA15 8DB

E: jordanmcglacken@burrowsgraham.com

M: +44(0)7988 047 401

T: +44 (0)161 804 8046

www.burrowsgraham.com

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Alexa Abbot

From: Jordan McGlacken
Sent: 30 May 2022 10:21
To: Alexa Abbot
Subject: FW: Brownfield sites & maximum allowable discharge rates
Attachments: Rational method formula - example.xlsx

Follow Up Flag: Follow up
Flag Status: Completed

Hi,

I think you should need to use the attached to calc max allowable discharge rate from the site. Input into the spreadsheet should be straight forward.

KR,
Jordan

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 04 March 2022 13:50
To: Jordan McGlacken <jordanmcglacken@burrowsgraham.com>
Subject: RE: Brownfield sites & maximum allowable discharge rates [Filed 04 Mar 2022 13:58]

Hello Jordan,

The Council as LLFA & UU look for the developer to provide at least 50% brownfield runoff rate betterment for the Qbar (2.3 yr return period).
I have appended an excel sheet as an example.

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing

ROCHDALE BOROUGH COUNCIL

01706 924606
07552 570262
stephen.mccann@rochdale.gov.uk

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

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

Please consider the environment before printing this email.

From: Jordan McGlacken <jordanmcglacken@burrowsgraham.com>
Sent: 04 March 2022 13:18
To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>

Cc: Jack Williams <jackwilliams@burrowsgraham.com>
Subject: Brownfield sites & maximum allowable discharge rates

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Hi Steven,

I hope you're well.

We are currently carrying out some due diligence work for a brownfield site in Heywood and have been asked to provide estimates of the attenuation requirements for the developed site. The site is brownfield and currently discharges to an existing culverted watercourse. We have a drainage survey proving the existing drainage arrangements on site, which show some large diameter pipes leaving the site and discharging to the culverted watercourse.

My question to you is, for brownfield sites in the Rochdale area, does the LLFA accept a betterment to existing rates (where proven by means of modelling or otherwise) and what % betterment is usually requested? I've looked at the SFRA and couldn't find any advice regarding this matter.

Kind regards,

Jordan McGlacken ***MEng*** **(*Hons*)**
Senior Civil Engineer

Burrows Graham
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
E: jordanmcglacken@burrowsgraham.com
M: +44(0)7988 047 401
T: +44 (0)161 804 8046
www.burrowsgraham.com

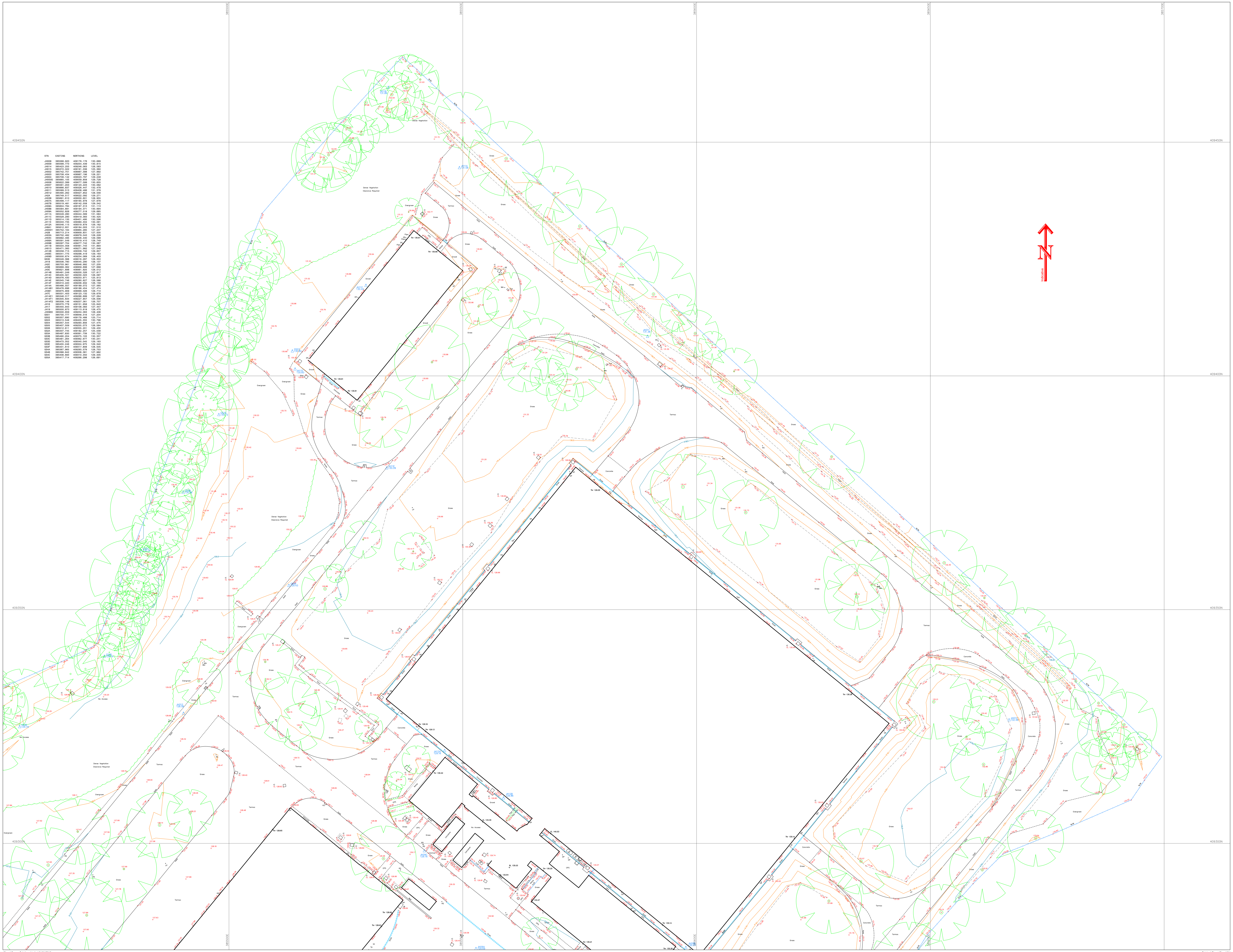
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APPENDIX C – TOPOGRAPHICAL SURVEY



STN	EASTING	NORTHING	LEVEL
JH008	385568.920	409176.176	130.689
JH009	385599.773	409254.439	130.815
JH014	385423.255	409246.063	126.583
JH015	385372.022	409191.336	125.360
JH002	385742.751	408987.398	127.992
JH003	385708.434	408987.196	128.221
JH004	385708.142	409023.797	129.248
JH0005	385685.105	409059.858	129.728
JH006	385622.399	409077.599	130.655
JH007	385561.203	409123.223	130.062
JH010	385666.837	409326.447	132.478
JH011	385589.513	409408.486	131.378
JH012	385490.262	409327.852	128.556
JH2A	385749.517	409022.092	129.271
JH03B	385691.610	409000.601	128.955
JH07A	385499.117	409165.978	127.678
JH07B	385519.481	409142.558	129.342
JH08A	385604.784	409167.313	131.113
JH08B	385584.891	409194.371	130.694
JH09A	385552.826	409277.518	129.685
JH11A	385549.280	409444.569	131.584
JH11C	385529.290	409419.383	130.425
JH11D	385514.135	409401.495	130.596
JH11E	385533.735	409380.334	130.091
JH12A	385546.115	409319.879	129.162
JH8A1	385612.931	409184.003	131.510
JH0001	385752.164	408965.285	127.237
JH2B	385713.214	408959.831	127.505
JH03A	385702.482	408979.043	128.228
JH03C	385682.495	409006.430	129.099
JH06A	385591.549	409019.410	128.749
JH09B	385597.704	409277.742	130.067
JH11B	385534.058	409461.743	131.893
JH013	385471.360	409271.982	127.548
JH12B	385558.715	409309.742	129.857
JH09C	385541.775	409298.419	129.163
JH09D	385500.674	409234.069	128.403
GS3D	385549.388	409016.297	128.353
JH18	385506.780	409045.290	128.137
JH2C	385703.961	408946.992	127.235
JH3B	385669.062	408959.698	127.668
JH3C	385621.698	408981.925	128.012
JH14B	385491.249	409200.326	127.817
JH14C	385405.321	409230.023	126.097
JH14D	385376.430	409253.971	125.913
JH14E	385345.746	409280.627	126.586
JH14F	385310.220	409236.932	126.159
JH14A	385466.557	409189.072	127.565
JH14B1	385476.696	409186.454	127.474
JH3B1	385675.909	408999.026	128.710
JH7C	385531.403	409123.132	129.678
JH14E1	385346.317	409286.699	127.264
JH14F1	385305.634	409227.857	126.006
JH14F2	385308.148	409257.361	126.707
JH16	385370.778	409151.958	125.640
JH17	385455.943	409106.083	127.457
JH19	385500.873	409113.618	128.475
JH09DX	385500.659	409234.063	128.406
GS01	385730.777	408948.316	127.204
GS02	385357.690	409179.488	125.714
GS03	385513.548	409405.355	130.798
GS04	385357.544	409293.856	127.475
GS05	385407.509	409255.073	126.584
GS06	385512.811	409355.201	129.430
GS2A	385337.745	409182.257	125.039
GS3A	385497.830	409391.739	130.722
GS3B	385490.204	409375.103	130.357
GS3C	385481.264	409362.677	130.241
GS3D	385473.352	409340.045	129.163
GS3E	385455.246	409324.975	129.340
GS3F	385431.610	409317.808	128.505
GS4A	385367.965	409293.579	128.753
GS4B	385388.942	409306.381	127.982
GS4C	385408.693	409310.350	129.335
GS5A	385417.714	409266.298	126.691

Topographical Survey Legend

B Bollard; BS Bus Stop; BT Telecommunications IC; CPS Concrete Paving Slabs; CTV Cable Television Cover; DP Downpipe; DR Drain; Elec Electrical IC; EP Elec. Pole; ER Earth Rod; FP Flagpole; FT Floodlight; G Gully; GP Gate Post; GV Gas Valve

h Height; Hyd Hydrant; IC Inspection Cover; JB Junction Box; KO Kerb Outlet; LB Letter Box; LP Lamp Post; Mkr Utility Marker; MP Mile Post; NP Name Plate; P Post; PM Parking Meter; RE Rodding Eye; RS Road Sign; RTW Retaining Wall

RWP Rain Water Pipe; SP Soil Pipe; SPS Stone Paving Slabs; ST Stop Tap; Stoy Cable Stay; SV Stop Valve; TCB Telephone Call Box; TL Traffic Light; TP Telegraph Pole; TPS Tactile Paving Slabs; VP Vent Pipe; WM Water Meter; WO Water Outlet; UTL Unable To Lift

Fence Annotation: B/W Barbed Wire; C/B Closed Boarded; C/I Corrugated Iron; C/L Chain Link; C/P Concrete Panel; H/R Hand Rail; I/R Iron Railings; O/B Open Boarded; P/C Post & Chain; P/R Post & Rail; P/W Post & Wire; W/M Wire Mesh

Level Prefix Descriptions: AL Arch Level; BL Bed Level; CL Cover Level; EL Eaves Level; FL Floor Level; IL Invert Level; OL Overhead Cable Level; PL Parapet Level; RL Roof/ridge Level; SL Soffit Level; Spr Arch Springing Level; TF Top Of Fence Level; TW Top Of Wall Level; Thr Threshold Level; WL Water Level

50.00 Spot Level; SSL1 50.00 Survey Control Station (coordinated point); Tree Multi Trunk; Fence; Safety Barrier; Gate; Stile; Hedge; Limit of Foliage & Tree Canopy

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

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including; sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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Do not scale from this drawing.

Drainage/Services Legend

Foul; Surface; Combined; Drainage (unspecified); British telecom; Telecom; Fibre optics; CATV; Utility Survey Boundary

CCTV; Electric; Street lighting; Traffic management; Gas; Water; Fuel; Unknown / misc; Ducting

d Service depth (m); ⌀ Pipe diameter (mm); EOT End of trace; UTT Unable to trace

Drainage pipe size data has been determined from the surface, in order to comply with confined spaces health and safetylegislation. Please regard this data as approximate.

PAS128 Quality Levels

Please refer to PAS128:2014 Table 1 - "Quality level of survey outputs (normative)" for in anticipated accuracy of quality levels.

All utilities are located to PAS128 QL-B2 unless otherwise stated.

The following table identifies the PAS128 quality level based on the text notes shown on the drawing:

Annotation found on drawing	PAS128 Quality Level
Added from records	PAS128 QL-D
Trench scar, street furniture, visual note/reference to utility	PAS128 QL-C
Assumed route	PAS128 QL-B4
Unable to obtain depth	PAS128 QL-B3
QL-B1	PAS128 QL-B1
QL-B3P	PAS128 QL-B3P
QL-B2P	PAS128 QL-B2P
QL-B1P	PAS128 QL-B1P

Quality levels ending with a "P" refer to a utility that has been located with post processed Ground Penetrating Radar (GPR).

Drawing caveats, please note:

LSS carry out surveys in accordance with site procedures using approved detectors.

Depth data is limited by the accuracy of the detection equipment. Average accuracy is +/- 10% of depth with GPR and +/- 5% of the depth with electromagnetic technologies.

It is LSS procedure to use statutory undertakers plans prior to and during the survey as a guide for the survey team.

In accordance with British Telecom's national policy survey companies are not permitted to raise BT inspection chamber covers.

Drainage routes between manholes, if not able to be traced by LSS survey methodologies, are assumed to be direct lines between manholes.

LSS advise that excavations in the vicinity of services are carried out with due diligence, please refer to HSG47.

Sheet Layout

1 2 3 4 5

Levels are related to **OSGB15**
Value **n/a**

Coordinates are related to **National Grid** (GPS)

Please note:

Any discrepancy found between an Ordnance Survey benchmark and an OSGB15 computed orthometric height is likely to be due to bench mark subsidence or uplift and, assuming precise GPS survey has been carefully carried out, the orthometric height given by OSGB15 should be considered correct in preference to archive benchmark heights. OSGB15 converts GPS ellipsoid heights to orthometric heights above mean sea level.

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS
LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING
0845 040 5969
survey-solutions.co.uk
IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
Heywood Stores, Manchester Road, Heywood OL10 2PZ

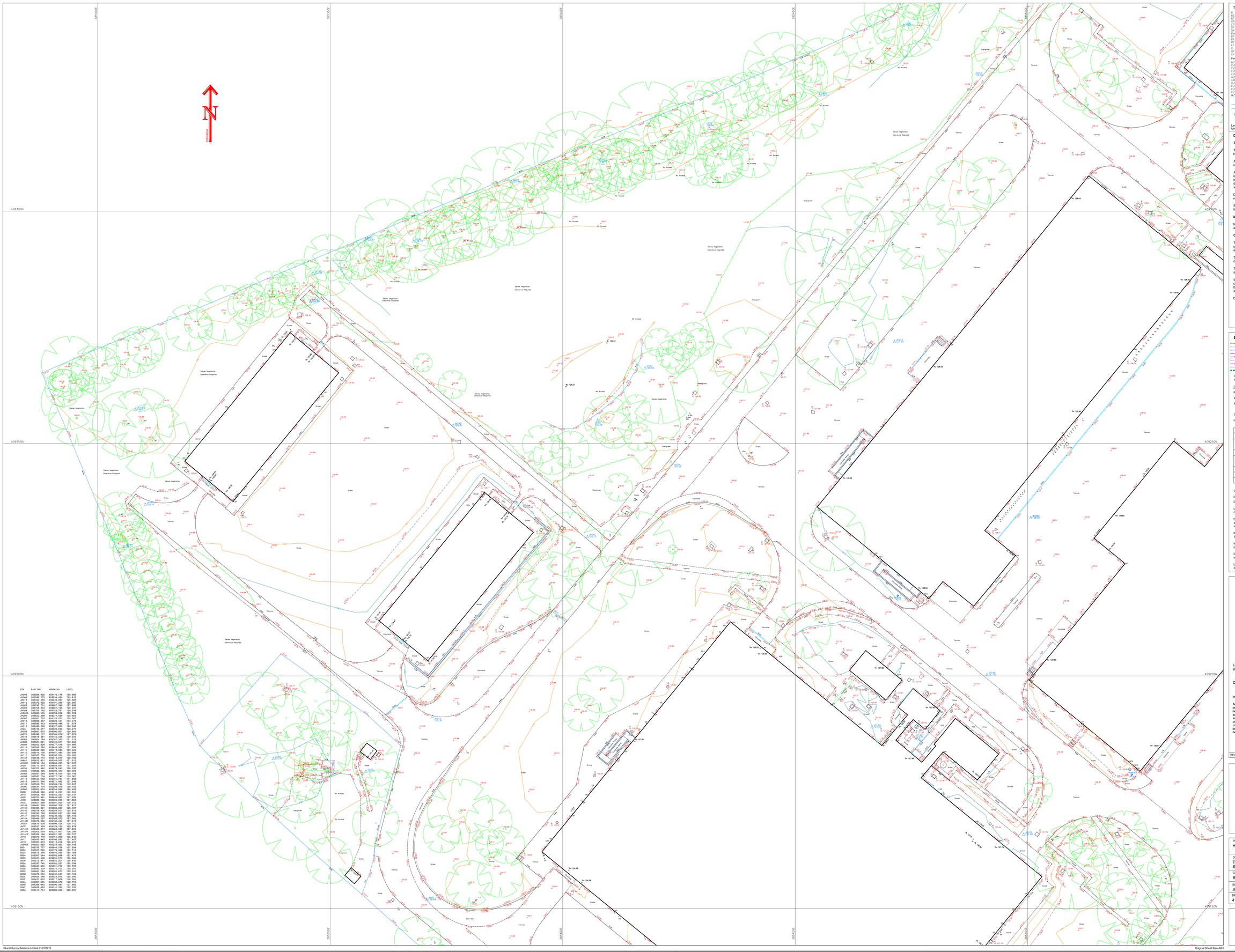
DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 1 of 5

CLIENT				SCALE
Burrows Graham				1:250
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
JB JDS GS	May 2022	AG	AG	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
41869MCLS-01				15/06/22

RICS
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THE SURVEY ASSOCIATION
ISO 9001 REGISTERED FIRM
QMS ISO 14001 : 2015 REGISTERED

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Original Sheet Size A0H



Topographical Survey Legend

B	Bollard	h	Height	RWP	Rain Water Pipe
BT	Tele Box	HYD	Hydrant	SP	Soil Pipe
BTI	Telecommunications IC	IC	Inspection Cover	SPS	Stone Paving Slabs
CPS	Concrete Paving Slabs	JB	Junction Box	ST	Stop Tap
CTV	Cable Television Cover	KO	Kerb Outlet	Stay	Cable Stay
DP	Drainpipe	LP	Lamp Post	TC	Traffic Counter
DR	Drain	LSP	Lamp Pole	TEL	Telephone Cell Box
Elec	Electrical IC	Mkr	Utility Marker	TL	Traffic Light
EP	Elec. Pole	MP	Mile Post	TP	Telegraph Pole
ER	Earth Rod	NP	Name Plate	TPS	Tactile Paving Slabs
FH	Fire Hydrant	P	Post	TV	TV Cover
FT	Floodlight	PM	Parking Meter	WM	Water Meter
G	Gully	RE	Rodding Eye	WO	Water Outlet
GP	Gate Post	RS	Road Sign	UTL	Unable To Lift
GV	Gas Valve	RTW	Retaining Wall		

Fence Annotation

B / B	Barbed Wire	AL	Arch Level	RL	Roofridge Level
C / B	Closed Boarded	BL	Bed Level	SL	Soffit Level
C / I	Corrugated Iron	CL	Cover Level	Spr	Arch Springing Level
C / M	Chain Mesh	EL	Eaves Level	TL	Threshold Level
C / P	Concrete Panel	FL	Flood Level	T/W	Top Of Wall Level
H / R	Hand Rail	IL	Invert Level	Thr	Threshold Level
R / B	Iron Railings	OL	Overhead Cable Level	WL	Water Level
P / B	Open Boarded	PL	Parapet Level		
P / C	Post & Chain				
P / R	Post & Rail	50.00	Spot Level	SSL1 50.00	Survey Control Station (coordinated point)
P / W	Post & Wire				
R / M	Wire Mesh		Tree		Tree Multi Trunk

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

DRAWING NOTES

Topographical Surveys

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Do not scale from this drawing.

Drainage/Services Legend

Foul	CATV	CCTV	
Surface	Elec	Electric	
Combined	Str	Street lighting	
Drainage (unspecified)	TM	Traffic management	
British telecom	GAS	Gas	
Telecom	Wat	Water	d: Service depth (m)
Fibre optics	Fuel	Fuel	p: Pipe diameter (mm)
CATV	Unknown / misc	EOT	End of trace
Utility Survey Boundary	Ducting	UTT	Unable to trace

Drainage pipe size data has been determined from the surface, in order to comply with confined spaces health and safety/regulation. Please regard this data as approximate.

PAS128 Quality Levels

Please refer to PAS128:2014 Table 1 - "Quality level of survey outputs (normative)"

for in anticipated accuracy of quality levels.

All utilities are located to PAS128 QL-B2 unless otherwise stated.

The following table identifies the PAS128 quality level based on the text notes shown on the drawing.

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Added from records	PAS128 QL-D
Trench scar, street furniture, visual note/reference to utility	PAS128 QL-C
Assumed route	PAS128 QL-B4
Unable to obtain depth	PAS128 QL-B3
QL-B1	PAS128 QL-B1
QL-B3P	PAS128 QL-B3P
QL-B2P	PAS128 QL-B2P
QL-B1P	PAS128 QL-B1P

Quality levels ending with a "P" refer to a utility that has been located with post processed Ground Penetrating Radar (GPR).

Drawing caveats, please note:

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Drainage routes between manholes, if not able to be traced by LSS survey methodologies, are assumed to be direct lines between manholes.

LSS advise that excavations in the vicinity of services are carried out with due diligence, please refer to HSG47.

Sheet Layout



Levels are related to OSGB15
Value n/a

Coordinates are related to National Grid (GPS)

Please note:

Any discrepancy found between an Ordnance Survey benchmark and an OSGB15 computed orthometric height is likely to be due to bench mark subsidence or uplift and, assuming precise GPS survey has been carefully carried out, the orthometric height given by OSGB15 should be considered correct in preference to archive benchmark heights. OSGB15 converts GPS ellipsoid heights to orthometric heights above mean sea level.

REV.	DESCRIPTION	DRAWN	APPR	DATE

STN	EASTING	NORTHING	LEVEL
JH008	365566.920	409176.176	130.486
JH009	365599.773	409254.439	130.815
JH010	365599.022	409191.336	129.360
JH013	365577.022	409191.336	129.360
JH002	365742.751	408987.098	127.992
JH003	365729.182	408973.737	127.992
JH004	365706.142	409023.797	129.248
JH005	365685.106	409059.858	129.728
JH006	365671.203	409100.220	130.062
JH007	365651.203	409120.220	130.062
JH010	365566.837	409326.447	130.478
JH011	365566.837	409326.447	130.478
JH012	365480.282	409507.852	126.559
JH2A	365749.517	409022.092	129.271
JH2B	365749.517	409022.092	129.271
JH078	365618.111	409180.551	127.870
JH079	365618.481	409182.558	129.942
JH084	365564.784	409187.313	131.119
JH088	365564.891	409194.371	130.694
JH13A	365544.280	409444.569	131.384
JH114	365544.280	409444.569	131.384
JH11C	365529.290	409419.383	130.425
JH11D	365529.290	409419.383	130.425
JH115	365533.755	409360.334	130.091
JH12A	365548.115	409319.879	129.162
JH12B	365548.115	409319.879	129.162
JH003	365752.164	408985.285	127.237
JH2B	365713.214	408959.831	127.305
JH2C	365713.214	408959.831	127.305
JH050	365662.495	409006.430	129.099
JH064	365591.549	409019.410	126.749
JH065	365591.549	409019.410	126.749
JH118	365534.058	409461.743	131.893
JH013	365471.380	409271.982	127.048
JH014	365471.380	409271.982	127.048
JH080	365592.775	409098.412	126.763
JH060	365500.674	409234.069	126.400
SS30	365549.388	409016.257	128.350
JH18	365506.790	409045.290	128.137
JH19	365506.790	409045.290	128.137
JH20	365669.062	408959.892	127.998
JH2C	365821.698	408981.925	128.012
JH139	365576.430	409253.971	126.997
JH140	365576.430	409253.971	125.913
JH141	365576.430	409253.971	125.913
JH14F	365312.223	409236.832	129.139
JH14A	365466.557	409189.072	127.565
JH14B	365466.557	409189.072	127.565
JH061	365575.909	408986.226	126.710
JH7C	365531.403	409123.132	129.678
JH141	365505.834	409207.857	126.696
JH141	365505.834	409207.857	126.696
JH14F2	365308.148	409257.381	126.797
JH16	365572.778	409151.958	125.640
JH17	365455.943	409105.083	127.401
JH18	365455.943	409105.083	127.401
JH3005	365555.659	409234.063	126.406
SS01	365730.777	408948.316	127.204
SS02	365730.777	408948.316	127.204
SS03	365513.548	409462.355	130.796
SS04	365357.544	409293.858	127.475
SS05	365357.544	409293.858	127.475
SS06	365512.811	409355.227	129.430
SS2A	365337.740	409182.257	125.039
SS2B	365337.740	409182.257	125.039
SS38	365480.204	409075.130	130.357
SS3C	365481.284	409362.877	130.241
SS3D	365481.284	409362.877	130.241
SS3E	365455.246	409324.576	129.340
SS3F	365431.610	409317.908	128.505
SS4A	365367.385	409360.379	128.753
SS4B	365368.942	409356.381	127.982
SS4C	365368.942	409356.381	127.982
SS5A	365417.714	409286.256	126.991

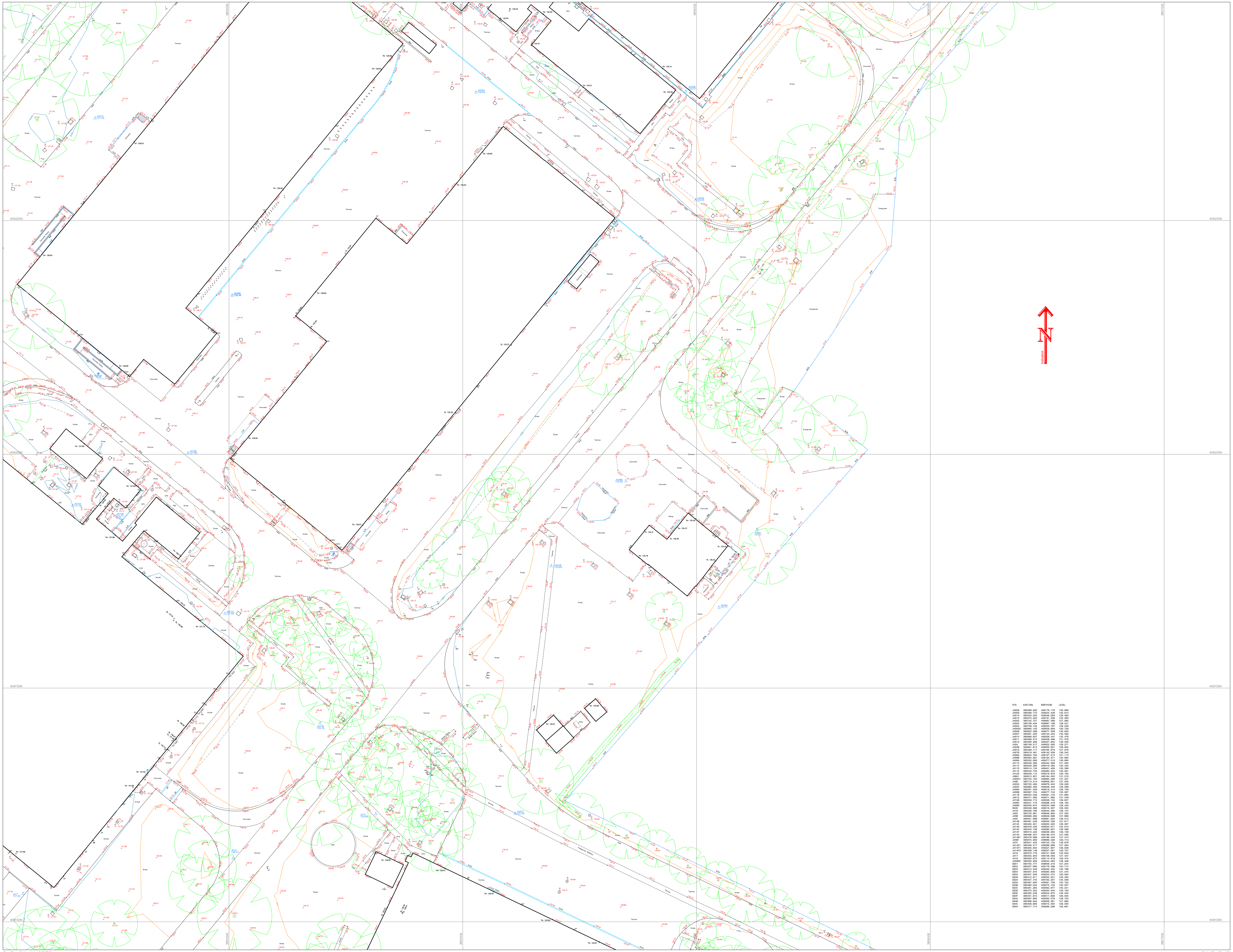
SURVEY SOLUTIONS
LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING
0845 040 5969
survey-solutions.co.uk
IPSWICH REDHOUSE COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
Heywood Stores, Manchester Road, Heywood OL10 2PZ

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 2 of 5

CLIENT			SCALE
Burrows Graham			1:250
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
JB JDS GS	May 2022	AG	AG	FINAL
DRAWING NUMBER		REVISION	ISSUE DATE
41869MCLS-02			15/06/22

RICS Chartered ices THE SURVEY ASSOCIATION
FIRM No. FS 24
QMS ISO 14001 : 2015 REGISTERED



STN	EASTING	NORTHING	LEVEL
JH008	385568.920	409176.176	130.689
JH009	385599.773	409254.439	130.815
JH014	385423.255	409246.063	126.583
JH015	385372.022	409191.336	125.360
JH002	385742.751	408987.398	127.992
JH003	385708.434	408987.196	128.221
JH004	385708.142	409023.797	129.248
JH0005	385685.105	409059.858	129.728
JH006	385622.399	409077.599	130.655
JH007	385561.203	409123.223	130.062
JH010	385666.837	409326.447	132.478
JH011	385589.513	409408.486	131.378
JH012	385490.262	409327.852	128.556
JH2A	385749.517	409022.092	129.271
JH03B	385691.610	409000.601	128.955
JH07A	385499.117	409165.978	127.678
JH07B	385519.481	409142.558	129.342
JH08A	385604.784	409167.313	131.113
JH08B	385584.891	409194.371	130.694
JH09A	385552.826	409277.518	129.685
JH11A	385549.280	409444.569	131.584
JH11C	385529.290	409419.383	130.425
JH11D	385514.135	409401.495	130.596
JH11E	385533.735	409380.334	130.091
JH12A	385546.115	409319.879	129.162
JH8A1	385612.931	409184.003	131.510
JH0001	385752.164	408965.285	127.237
JH2B	385713.214	408959.831	127.505
JH03A	385702.482	408979.043	128.228
JH03C	385682.495	409006.430	129.099
JH06A	385591.549	409019.410	128.749
JH09B	385597.704	409277.742	130.067
JH11B	385534.058	409461.743	131.893
JH013	385471.360	409271.982	127.548
JH12B	385558.715	409309.742	129.857
JH09C	385541.775	409298.419	129.163
JH09D	385500.674	409234.069	128.403
GS3D	385549.388	409016.297	128.353
JH18	385506.780	409045.290	128.137
JH2C	385703.961	408946.992	127.235
JH3B	385669.062	408959.698	127.668
JH3C	385621.698	408981.925	128.012
JH14B	385491.249	409200.326	127.817
JH14C	385405.321	409230.023	126.097
JH14D	385376.430	409253.971	125.913
JH14E	385345.746	409280.627	126.586
JH14F	385310.220	409236.932	126.159
JH14A	385466.557	409189.072	127.565
JH14B1	385476.696	409186.454	127.474
JH3B1	385675.909	408999.026	128.710
JH7C	385531.403	409123.132	129.678
JH14E1	385346.317	409286.699	127.264
JH14F1	385305.634	409227.857	126.006
JH14F2	385308.148	409257.361	126.707
JH16	385370.778	409151.958	125.640
JH17	385455.943	409106.083	127.457
JH19	385500.873	409113.618	128.475
JH09DX	385500.659	409234.063	128.406
GS01	385730.777	408948.316	127.204
GS02	385357.690	409179.488	125.714
GS03	385513.548	409405.355	130.798
GS04	385357.544	409293.856	127.475
GS05	385407.509	409255.073	126.584
GS06	385512.811	409355.201	129.430
GS2A	385337.745	409182.257	125.039
GS3A	385497.830	409391.739	130.722
GS3B	385490.204	409375.103	130.357
GS3C	385481.264	409362.677	130.241
GS3D	385473.352	409340.045	129.163
GS3E	385455.246	409324.975	129.340
GS3F	385431.610	409317.808	128.505
GS4A	385367.965	409293.579	128.753
GS4B	385388.942	409306.381	127.982
GS4C	385408.693	409310.350	129.335
GS5A	385417.714	409266.298	126.691

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Original Sheet Size A0H

Topographical Survey Legend

B Bollard
BS Bus Stop
BT Telecommunications IC
CPS Concrete Paving Slabs
CTV Cable Television Cover
DP Downpipe
DR Drain
Elec Electrical IC
EP Elec. Pole
ER Earth Rod
FP Flagpole
FT Floodlight
G Gully
GP Gate Post
GV Gas Valve
h Height
Hyd Hydrant
IC Inspection Cover
JB Junction Box
KO Kerb Outlet
LB Letter Box
LP Lamp Post
Mkr Utility Marker
MP Mile Post
NP Name Plate
P Post
PM Parking Meter
RE Rodding Eye
RS Road Sign
RTW Retaining Wall
RWP Rain Water Pipe
SP Soil Pipe
SPS Stone Paving Slabs
ST Stop Tap
Stoy Cable Stay
SV Stop Valve
TCB Telephone Call Box
TL Traffic Light
TP Telegraph Pole
TPS Tactile Paving Slabs
VP Vent Pipe
WM Water Meter
WO Water Outlet
UTL Unable To Lift

Fence Annotation

B/W Barbed Wire
C/B Closed Boarded
C/I Corrugated Iron
C/L Chain Link
C/P Concrete Panel
H/R Hand Rail
I/R Iron Railings
O/B Open Boarded
P/C Post & Chain
P/R Post & Rail
P/W Post & Wire
W/M Wire Mesh

Level Prefix Descriptions

AL Arch Level
BL Bed Level
CL Cover Level
EL Eaves Level
FL Floor Level
IL Invert Level
OL Overhead Cable Level
PL Parapet Level
RL Roof/ridge Level
SL Soffit Level
Spr Arch Springing Level
TF Top Of Fence Level
TW Top Of Wall Level
Thr Threshold Level
WL Water Level

50.00 + Spot Level
SSL1 50.00 Survey Control Station (coordinated point)
MT Tree Multi Trunk
C/L Fence
Z Safety Barrier
Gate
Stile
Hedge
Limit of Foliage & Tree Canopy

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

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

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Do not scale from this drawing.

N Indicative

Drainage/Services Legend

Foul
Surface
Combined
Drainage (unspecified)
BT British telecom
T Telecom
FO Fibre optics
CATV CATV
Utility Survey Boundary
CCTV CCTV
E Electric
SL Street lighting
TM Traffic management
GAS Gas
W Water
F Fuel
UK Unknown / misc
Ducting
d Service depth (m)
ø Pipe diameter (mm)
EOT End of trace
UTT Unable to trace

Drainage pipe size data has been determined from the surface, in order to comply with confined spaces health and safetylegislation. Please regard this data as approximate.

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All utilities are located to PAS128 QL-B2 unless otherwise stated.

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Trench scar, street furniture, visual note/reference to utility	PAS128 QL-C
Assumed route	PAS128 QL-B4
Unable to obtain depth	PAS128 QL-B3
QL-B1	PAS128 QL-B1
QL-B3P	PAS128 QL-B3P
QL-B2P	PAS128 QL-B2P
QL-B1P	PAS128 QL-B1P

Quality levels ending with a "P" refer to a utility that has been located with post processed Ground Penetrating Radar (GPR).

Drawing caveats, please note:

LSS carry out surveys in accordance with site procedures using approved detectors.

Depth data is limited by the accuracy of the detection equipment. Average accuracy is +/- 10% of depth with GPR and +/- 5% of the depth with electromagnetic technologies.

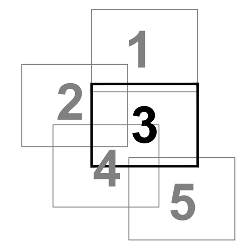
It is LSS procedure to use statutory undertakers plans prior to and during the survey as a guide for the survey team.

In accordance with British Telecom's national policy survey companies are not permitted to raise BT inspection chamber covers.

Drainage routes between manholes, if not able to be traced by LSS survey methodologies, are assumed to be direct lines between manholes.

LSS advise that excavations in the vicinity of services are carried out with due diligence, please refer to HSG47.

Sheet Layout



Levels are related to **OSGB15**
Value **n/a**

Coordinates are related to **National Grid** (GPS)

Please note:

Any discrepancy found between an Ordnance Survey benchmark and an OSGB15 computed orthometric height is likely to be due to bench mark subsidence or uplift and, assuming precise GPS survey has been carefully carried out, the orthometric height given by OSGB15 should be considered correct in preference to archive benchmark heights. OSGB15 converts GPS ellipsoid heights to orthometric heights above mean sea level.

REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE Heywood Stores, Manchester Road, Heywood OL10 2PZ				
DRAWING DETAIL TOPOGRAPHICAL SURVEY Sheet 3 of 5				
CLIENT Burrows Graham				SCALE 1:250
SURVEYOR JB JDS GS	SURVEY DATE May 2022	CHECKED BY AG	APPROVED BY AG	DWG STATUS FINAL
DRAWING NUMBER 41869MCLS-03			REVISION	ISSUE DATE 15/06/22

RICS
chartered ices
THE SURVEY ASSOCIATION
ISO 9001 REGISTERED FIRM
QMS ISO 14001 : 2015 REGISTERED

Topographical Survey Legend

B	Bollard	h	Height	RWP	Rain Water Pipe
BT	Tele Stone	HYd	Hydrant	SP	Soil Pipe
BT	Telecommunications IC	IC	Inspection Cover	SPS	Stone Paving Slabs
CPS	Concrete Paving Slabs	JB	Junction Box	ST	Stop Tap
CTV	Cable Television Cover	KO	Kerb Outlet	Stay	Cable Stay
D	Drainage	LP	Lamp Post	TC	Traffic Count
DP	Drain	LS	Lamp Standard	TEL	Telephone Cell Box
Elec	Electrical IC	Mkr	Utility Marker	TL	Traffic Light
EP	Elec. Pole	MP	Mile Post	TP	Telegraph Pole
ER	Earth Rod	NP	Name Plate	TPS	Tactile Paving Slabs
FH	Fire Hydrant	P	Post	TS	Traffic Sign
FT	Floodlight	PM	Parking Meter	WM	Water Meter
G	Gully	RE	Rodding Eye	WO	Water Outlet
GP	Gate Post	RS	Road Sign	UTL	Unable To Lift
GV	Gas Valve	RTW	Retaining Wall		

Fence Annotation

B/W	Barbed Wire	AL	Arch Level
C/B	Closed Boarded	BL	Bed Level
C/I	Corrugated Iron	CL	Cover Level
C/M	Chain Mesh	EL	Eaves Level
C/P	Concrete Panel	FL	Floor Level
H/R	Hand Rail	IL	Invert Level
I/R	Iron Railings	OL	Overhead Cable Level
P/B	Post & Board	PL	Parapet Level
P/C	Post & Chain		
P/R	Post & Rail		
P/W	Post & Wire		
W/M	Wire Mesh		

Level Profile Descriptions

RL	Roof/ridge Level
SL	Soffit Level
Spr	Arch Springing Level
Sill	Window Sill Level
TW	Top Of Wall Level
Thr	Threshold Level
WL	Water Level

50.00 Spot Level

SSL1 50.00m Survey Control Station (coordinated point)

Tree / Multi Trunk

Fence, Safety Barrier, Gate, Stile

Hedge

Limit of Foliage & Tree Canopy

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

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

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Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

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Do not scale from this drawing.

Drainage/Services Legend

Foul		CATV	CCTV
Surface		Elec	Electric
Combined		Str	Street lighting
Drainage (unspecified)		Traffic	Traffic management
British telecom		GAS	Gas
Telecom		Water	Water
Fibre optics		Fuel	Fuel
CATV		Unknown / misc.	Unknown / misc
Utility Survey Boundary		Ducting	Ducting

d Service depth (m)
p Pipe diameter (mm)
EOT End of trace
UTT Unable to trace

Drainage pipe size data has been determined from the surface, in order to comply with confined spaces health and safety/egislation. Please regard this data as approximate.

PAS128 Quality Levels

Please refer to PAS128:2014 Table 1 - "Quality level of survey outputs (normative)"

for its anticipated accuracy of quality levels.

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The following table identifies the PAS128 quality level based on the text notes shown on the drawing.

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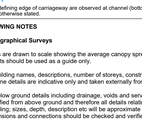
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Levels are related to **OSGB15**
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LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
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IPSWICH BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH
NOTTINGHAM YEOVIL

PROJECT TITLE				
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DRAWING DETAIL				
TOPOGRAPHICAL SURVEY Sheet 4 of 5				
CLIENT				SCALE
Burrows Graham				1:250
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JB JDS GS	May 2022	AG	AG	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
41869MCLS-04				15/06/22

RICS, ices, THE SURVEY ASSOCIATION, ISO 14001 : 2015 REGISTERED

STN	EASTING	NORTHING	LEVEL
JH008	385068.920	409176.176	130.889
JH009	385066.773	409204.439	130.615
JH014	385423.255	409246.063	126.560
JH015	385272.022	409191.336	125.360
JH002	385706.454	409887.196	126.221
JH003	385708.454	409887.196	126.221
JH004	385530.745	409922.797	126.098
JH006	385622.399	409077.599	130.605
JH007	385561.205	409122.223	130.062
JH010	385666.837	409326.447	132.478
JH011	385611.282	409327.852	132.335
JH012	385480.282	409327.852	126.335
JH2A	385749.517	409022.092	129.271
JH076	385519.481	409142.558	129.342
JH078	385519.481	409140.558	129.342
JH079	385519.481	409142.558	129.342
JH087	385584.889	409187.477	130.894
JH088	385584.889	409187.477	130.894
JH09A	385552.826	409077.518	129.685
JH110	385514.135	409401.495	130.425
JH11C	385529.290	409418.383	130.425
JH11D	385514.135	409401.495	130.596
JH11E	385514.135	409401.495	130.596
JH12A	385548.115	409319.879	130.182
JH8A1	385612.931	409184.003	131.310
JH083	385712.284	409880.205	127.557
JH084	385712.284	409880.205	127.557
JH09A	385702.492	409879.043	126.228
JH09C	385682.495	409906.430	129.099
JH08A	385597.349	409079.410	126.749
JH08B	385597.349	409079.410	126.749
JH118	385534.208	409461.743	131.893
JH013	385471.380	409271.982	127.048
JH014	385471.380	409271.982	127.048
JH08C	385541.775	409298.419	126.163
JH08D	385500.674	409234.069	126.403
JH08E	385500.674	409234.069	126.403
JH18	385508.780	409436.290	126.157
JH2C	385703.961	409946.992	127.335
JH2D	385703.961	409946.992	127.335
JH3C	385621.698	409881.925	126.012
JH14B	385491.249	409200.326	127.917
JH14C	385491.249	409200.326	127.917
JH14D	385376.430	409353.571	126.953
JH14E	385345.746	409280.627	126.586
JH14F	385310.225	409236.302	126.159
JH14G	385496.557	409199.372	127.569
JH14H	385496.557	409199.372	127.569
JH081	385675.369	409999.026	126.710
JH7C	385551.403	409123.152	129.878
JH14F1	385305.834	409237.857	126.159
JH14F2	385308.148	409237.361	126.707
JH14F3	385308.148	409237.361	126.707
JH17	385400.343	409106.063	127.457
JH19	385500.872	409113.618	126.475
JH19A	385500.872	409113.618	126.475
SS01	385700.777	409948.316	127.204
SS02	385357.690	409179.488	125.714
SS03	385357.690	409179.488	125.714
SS04	385407.344	409093.856	127.475
SS05	385407.109	409093.073	126.584
SS06	385512.811	409093.251	129.450
SS0A	385357.745	409182.255	125.039
SS0B	385357.745	409182.255	125.039
SS3B	385480.204	409075.103	130.357
SS3C	385481.284	409082.677	130.241
SS3D	385481.284	409082.677	130.241
SS3E	385435.246	409024.975	129.340
SS3F	385431.610	409017.608	129.305
SS3G	385431.610	409017.608	129.305
SS4B	385586.342	409056.351	127.982
SS4C	385408.693	409010.350	129.335
SS5A	385417.714	409096.298	126.991



STN	EASTING	NORTHING	LEVEL
JH008	385568.920	409176.178	130.689
JH009	385577.111	409220.255	129.583
JH014	385425.255	409246.065	129.563
JH015	385372.022	409181.336	125.360
JH016	385417.774	409266.298	126.691
JH020	385758.434	409071.196	129.221
JH054	385708.142	409023.797	129.248
JH055	385677.111	409077.586	130.603
JH056	385622.356	409077.586	130.603
JH057	385581.203	409123.023	130.562
JH058	385581.203	409123.023	130.562
JH011	385688.514	409068.486	131.078
JH012	385490.282	409027.892	128.556
JH024	385749.517	409022.092	129.271
JH036	385681.415	409000.801	129.858
JH037	385637.610	409000.801	129.858
JH078	385519.481	409142.538	129.342
JH084	385824.784	409187.313	131.113
JH085	385824.784	409187.313	131.113
JH094	385552.826	409077.518	129.560
JH114	385549.280	409444.599	131.584
JH115	385514.135	409451.495	130.598
JH115	385514.135	409451.495	130.598
JH132	385533.735	409360.334	130.091
JH133	385512.831	409184.003	131.310
JH841	385512.831	409184.003	131.310
JH0001	385752.184	409965.285	127.237
JH0002	385752.184	409965.285	127.237
JH003A	385702.482	409979.345	128.228
JH03C	385682.495	409008.430	129.099
JH0BB	385687.704	409077.142	130.267
JH0BB	385687.704	409077.142	130.267
JH118	385934.058	409461.743	131.993
JH013	385471.360	409071.382	127.548
JH126	385556.715	409309.742	129.857
JH127	385556.715	409309.742	129.857
JH0BD	385550.674	409284.089	129.403
GS30	385549.388	409016.297	128.553
JH01	385705.961	409945.992	127.220
JH02	385705.961	409945.992	127.220
JH08	385669.062	409959.898	127.668
JH09	385641.248	409959.898	127.668
JH140	385641.248	409930.326	127.817
JH14C	385400.321	409230.023	126.397
JH14D	385400.321	409230.023	126.397
JH146	385545.748	409280.327	129.566
JH14F	385310.220	409256.932	126.159
JH14G	385310.220	409256.932	126.159
JH1B1	385478.996	409185.454	127.474
JH0B1	385675.909	409999.026	128.710
JH70	385531.400	409125.132	129.878
JH1AT	385546.281	409256.889	127.264
JH1AU	385534.334	409237.111	126.504
JH1B2	385508.148	409267.361	126.707
JH16	385370.778	409151.958	125.640
JH17	385370.778	409151.958	125.640
JH18	385530.453	409315.818	128.475
JH06D	385500.659	409234.093	128.406
GS01	385511.548	409405.355	130.798
GS02	385507.690	409775.488	125.714
GS03	385513.548	409405.355	130.798
GS04	385507.690	409775.488	125.714
GS05	385497.509	409259.073	126.544
GS06	385512.811	409593.291	129.430
GS07	385512.811	409593.291	129.430
GS54	385487.830	409591.739	130.702
GS5B	385490.204	409575.103	130.357
GS50	385491.354	409562.977	130.243
GS52	385473.256	409549.945	129.140
GS56	385475.392	409542.975	129.140
GS5F	385491.510	409577.308	128.505
GSA4	385367.965	409293.579	129.753
GSA5	385367.965	409293.579	129.753
GS4C	385498.692	409315.350	129.335
GS5A	385417.774	409266.298	126.691

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B	Bollard	h	Height	RWP	Rain Water Pipe
BT	Box Tomb	HYd	Hydrant	SP	Soil Pipe
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P/W	Post & Wire	50.00	Spot Level		
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Fence
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Gate
Slab
Tree
Multi Trunk
Hedge
Limit of Foliage & Tree Canopy
SSL1 50.00m
Survey Control Station (coordinated point)

Drainage/Services Legend

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Surface	E	Electric	
Combined	EL	Electric lighting	
Drainage (unspecified)	TM	Traffic management	
British telecom	GAS	Gas	
Telecom	W	Water	d Service depth (m)
Fibre optics	F	Fuel	Pipe diameter (mm)
CATV		Unknown / misc.	EOT End of trace
Utility Survey Boundary		Ducting	UTT Unable to trace

Drainage pipe size data has been determined from the surface, in order to comply with confined spaces health and safety legislation. Please regard this data as approximate.

PAS128 Quality Levels

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DRAWING NOTES

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Sheet Layout

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Value n/a

Coordinates are related to National Grid (GPS)

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REV	DESCRIPTION	DRAWN	APPR	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

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PRESTON BEDFORD COVENTRY GLASGOW LONDON MANCHESTER NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE				
Heywood Stores, Manchester Road, Heywood OL10 2PZ				
DRAWING DETAIL				
TOPOGRAPHICAL SURVEY Sheet 5 of 5				
CLIENT				SCALE
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JB JDS GS	May 2022	AG	AG	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
41869MCLS-05				15/06/22

RICS ices THE SURVEY ASSOCIATION
ISO 14001 : 2015 REGISTERED
QMS

APPENDIX D – EXISTING DRAINAGE INFORMATION



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

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7006	130.51	FO	128.65	225			VC	30.52868	1 in 71
7004	129.93	SW	128.17	300			CO	3.605551	1 in 60
7004	129.93	SW	128.17	300			CO	3.605551	1 in 60
7003	129.86	SW	127.99	300			CO	25.07987	
7003	129.86	SW	127.99	300			CO	25.07987	
7010		CO	0	225			VC	2.664354	
7010		CO	0	225			VC	2.664354	
7007	130.48	SW	129.05	225			VC	40.49691	1 in 47
7005	130.04	CO	128.21	225			VC	21.93171	
7005	130.04	CO	128.21	225			VC	21.93171	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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red - combined blue - surface water

brown - foul purple - overflow

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- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Vaive
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

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

SEWER MATERIAL

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CO	Concrete
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CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Site off Manchester Road Heywood OL10 2QR,

OS sheet Number: SD8508NE

Scale: 1:1250 **Date:** 11/08/2021

Nodes: 10

Sheet: 1 of 4

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
8404		CO	0	225			VC	19.77006	
8404		CO	0	225			VC	19.77006	
6103	131.63	FO	129.21	225			VC	17.02939	1 in 131
6503	133.26	CO	131.03	150			VC	10.29563	1 in 69
6503	133.26	CO	131.03	150			VC	10.29563	1 in 69
6108	131.29	SW	129.75	225			VC	27.51363	1 in 183
7002	130.97	SW	129.23	300			VC	18.68154	1 in 187
7101	131.96	FO	130.14	225			VC	17.80449	1 in 39
7104	132.3	SW	130.93	225			VC	13.34166	1 in 26
6110	131.31	SW	130	225			VC	26.07661	1 in 113
7306		FO		150			VC	27.17957	
7502	135.09	CO	132.77	300			VC	18.97367	1 in 0.14632271
7502	135.09	CO	132.77	300			VC	18.97367	1 in 0.14632271
7103	132.34	FO	130.61	225			VC	10.04988	1 in 23
7305		FO		300			VC	67.85754	
9401		FO	0	150			VC	40.48059	
9401		FO	0	150			VC	40.48059	
7008	131.44	FO	129.63	225			VC	30.08322	1 in 32
6106	131.47	SW	129.6	225			VC	18.02776	1 in 300
7507	135.23	SW	131.08	225			VC	20.51828	1 in 0.16181612
7501	134.33	CO	132.88	300			VC	7.211102	1 in 0.05522786
7501	134.33	CO	132.88	300			VC	7.211102	1 in 0.05522786
6114	132.55	SW	130.98	225			VC	27.45906	1 in 250
6109	131.3	FO	129.5	225			VC	27.29469	1 in 341
7119		FO		100			VC	2.974972	
7111		FO		100			VC	13.33667	
7506	135.19	SW	130.87	225			VC	16.49242	1 in 0.13114203
7506	135.19	SW	130.87	225			VC	16.49242	1 in 0.13114203
8202	135.88	SW	134.98	150			VC	134.7474	1 in 33
7106	132.85	SW	131.45	225			VC	17.72005	1 in 35
7006	130.51	FO	128.65	225			VC	30.52868	1 in 71
7304	135.23	CO	132.36	300			VC	17.49286	1 in 43
6301	133.29	CO	132.07	300			VC	89.81091	1 in 408
6510		CO		100			VC	3.03711	
6510		CO		100			VC	3.03711	
6116	132.38	SW	131.09	225			VC	12.80625	1 in 128
7102	131.86	SW	130.39	225			VC	19.20937	1 in 42
6102	131.7	SW	129.45	300			VC	38.28838	1 in 182
7118		FO		100			VC	11.81633	
7105	132.75	FO	131.01	225			VC	15.23155	1 in 40
7109	134.51	CO	133.09	300			VC	96.64885	1 in 268
7303	134.52	CO	131.82	300			CO	62.28965	1 in 107
7003	129.86	SW	127.99	300			CO	25.07987	
7003	129.86	SW	127.99	300			CO	25.07987	
9402		FO	0	150			VC	12.36932	
9402		FO	0	150			VC	12.36932	
6104	131.62	SW	129.51	225			VC	21.09502	1 in 422
8405		FO	0	150			VC	1.675075	
8405		FO	0	150			VC	1.675075	
7004	129.93	SW	128.17	300			CO	3.605551	1 in 60
7004	129.93	SW	128.17	300			CO	3.605551	1 in 60
6101	131.66	FO	129.08	225			VC	40	1 in 211
9408		FO		150			VC	5.143959	
9408		FO		150			VC	5.143959	
7505	134.41	SW	132.6	150			VC	13.0384	1 in 0.10035717
7505	134.41	SW	132.6	150			VC	13.0384	1 in 0.10035717
6113	132.58	FO	130.63	225			VC	29.61419	1 in 247
6508		CO		100			VC	10.71743	
8401	138.33	CO	136.62	300			VC	36.12478	1 in 54
6511		CO		100			VC	15.93034	
6511		CO		100			VC	15.93034	
8201	136.17	SW	135.43	150			VC	22.36068	1 in 80
7001	130.92	FO	128.87	225			VC	38.60052	1 in 184
7201	136.08	CO	134.84	150			VC	90.80198	1 in 32
6107	131.27	FO	129.41	225			VC	27.85678	1 in 253
9403		SW	0	150			VC	37.51554	
9403		SW	0	150			VC	37.51554	
6112	133.02	SW	130.84	225			VC	26.24881	1 in 656
6105	131.5	FO	129.28	225			VC	16.64332	1 in 238
6115	132.4	FO	130.7	225			VC	12.20656	
7503	135.61	CO	130.04	375			CO	82.32861	1 in 206
7503	135.61	CO	130.04	375			CO	82.32861	1 in 206
9404		SW	0	150			VC	14.76946	
9404		SW	0	150			VC	14.76946	
0218		SW		100			VC	13.69838	
6518		CO		100			VC	6.336214	
6518		CO		100			VC	6.336214	
9202	130.8	SW	129.71	225			CO	16.0351	1 in 146
6504	133.07	CO	130.82	225			VC	35.60899	1 in 83
6504	133.07	CO	130.82	225			VC	35.60899	1 in 83
0207	131.13	FO	128.84	150			VC	27.25436	1 in 273
7301	134.27	CO	132.23	300			VC	16.40122	1 in 117
0203	131	SW	129.6	300			VC	26.96281	1 in 69
7009	131.43	SW	129.87	225			VC	26.83282	1 in 36
7302	133.03	CO	132.03	150			VC	5	
0204	131.13	SW	129.21	300			CO	25.9025	1 in 259
7010		CO	0	225			VC	2.664354	
7010		CO	0	225			VC	2.664354	
6118		FO		150			VC	6.713269	
6111	133.03	FO	130.48	225			VC	24.04163	1 in 481
7107	132.82	FO	130.41	225			VC	44.94441	1 in 150
9201	130.81	SW	131.45	150			CO	52.26354	1 in 30
8402	136.96	CO	130.73	375			CO	56.63921	
8402	136.96	CO	130.73	375			CO	56.63921	
0219		SW		100			PVC	9.721329	
8303		CO		150			VC	8.092709	
9302	139.65	CO	0	375			VC	164.5144	
7113		FO		100			VC	6.774242	
8501	136.39	SW	134.72	300			VC	73.59348	1 in 70
8501	136.39	SW	134.72	300			VC	73.59348	1 in 70
9301	139.55	CO	137.93	300			CO	45.34314	1 in 67
7005	130.04	CO	128.21	225			VC	21.93171	
7005	130.04	CO	128.21	225			VC	21.93171	
7007	130.48	SW	129.05	225			VC	40.49691	1 in 47
0208	131.13	FO	129.09	150			VC	24.15479	1 in 97
9204		SW		150			VC	7.983523	
0200	132.87	SW	131.38	150			VC	21.25272	1 in 12
7108	132.85	SW	130.78	225			VC	43.9659	1 in 85
0301	135.48	SW	133.86	150			VC	37.59955	1 in 15
9200	130.81	FO	129.27	150			VC	18.45999	1 in 103
6520		CO		100			VC	12.21053	
6520		CO		100			VC	12.21053	
0300	138.45	SW	136.15	150			VC	31.44434	1 in 47
9203	130.85	SW	129.73	225			CO	5.202311	1 in 260
8301		CO		300			VC	101.69	
6201	133.64	CO	132.7	300			VC	75.27283	1 in 167

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:

red - combined blue - surface water

brown - foul purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
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- Network Storage Tank
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- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

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

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
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SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Site off Manchester Road Heywood OL10 2QR,

OS sheet Number: SD8509SE

Scale: 1:1250 **Date:** 11/08/2021

Nodes: 116

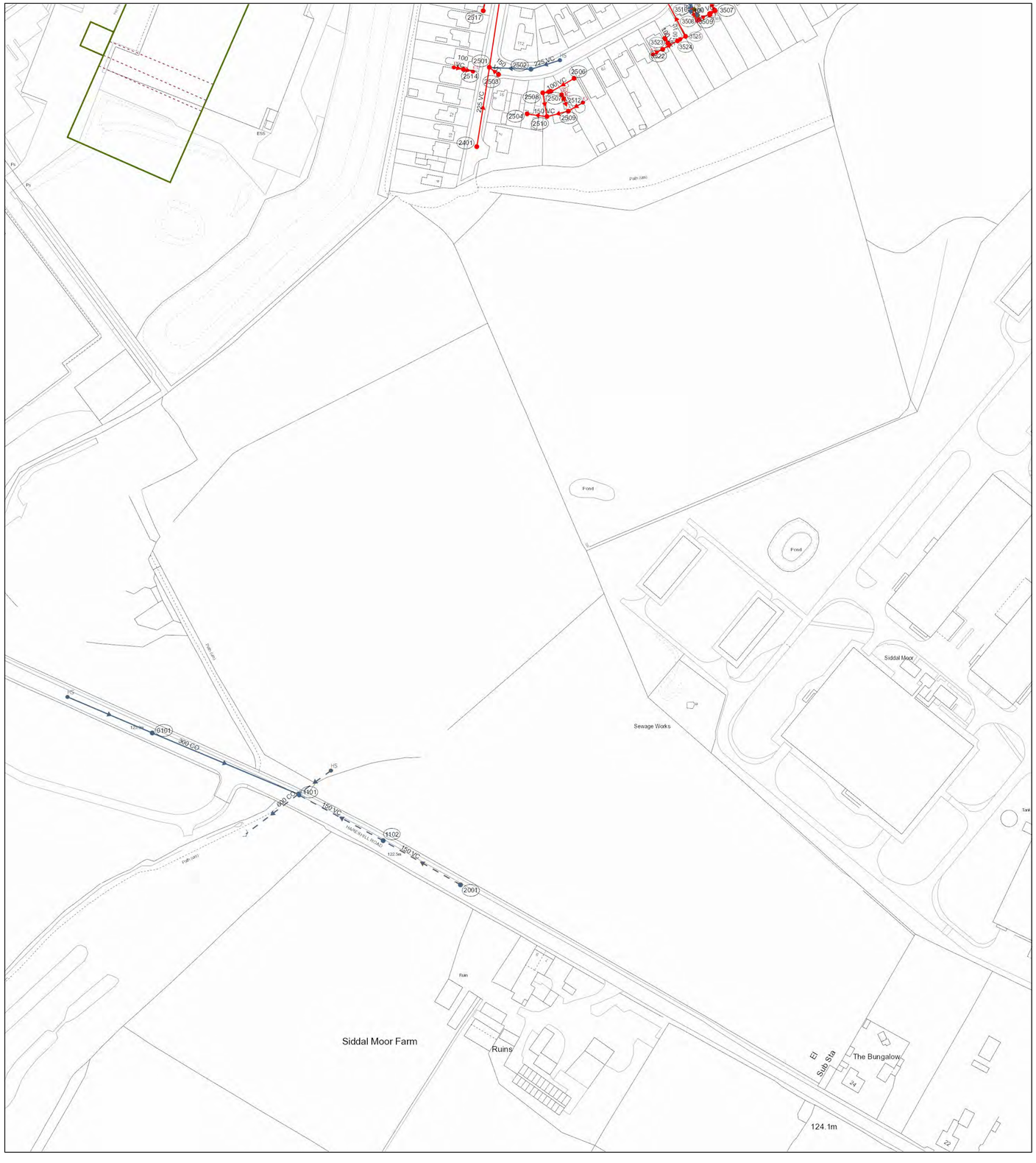
Sheet: 2 of 4

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SEWER RECORDS

United Utilities

Water for the North West



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
2506		CO		100			VC	14.92737	
2001		SW		150			VC	49.24792	
2507		CO		100			VC	4.39773	
2502	130.98	SW	129.09	225			VC	23.03173	1 in 27
2503	130.43	CO	128.62	150			VC	6.403124	1 in 17
2509		CO		150			VC	12.33625	
2510		CO		150			VC	10.97488	
2501	130.37	CO	128.22	225			VC	79.9062	1 in 113
1102		SW		150			VC	53.00475	
2514		CO		100			VC	5.419086	
3507		CO		150			VC	3.515177	
2508		CO		100			VC	13.36781	
0101	125.95	SW	124.24	300			CO	87.84646	1 in 35
3509		CO		100			VC	1.034902	
2517		CO		100			VC	16.41844	
3522		CO		150			VC	9.532157	
1101	123.36	SW	121.32	600			CO	36.40055	1 in 135
3525		CO		150			VC	22.36304	
3508		CO		100			VC	6.617094	
3523		CO		100			VC	1.536818	
2401	130.09	CO	128.77	225			VC	44.55334	1 in 84
3524		CO		150			VC	5.112437	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

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- Extent of Survey
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- Discharge Point
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- Penstock
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- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
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- Orifice Plate
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ST	Steel
VC	Vitrified Clay
PP	Polypropylene
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MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Site off Manchester Road Heywood OL10 2QR,

OS sheet Number: SD8509SW
Scale: 1:1250 **Date:** 11/08/2021
Nodes: 22
Sheet: 3 of 4

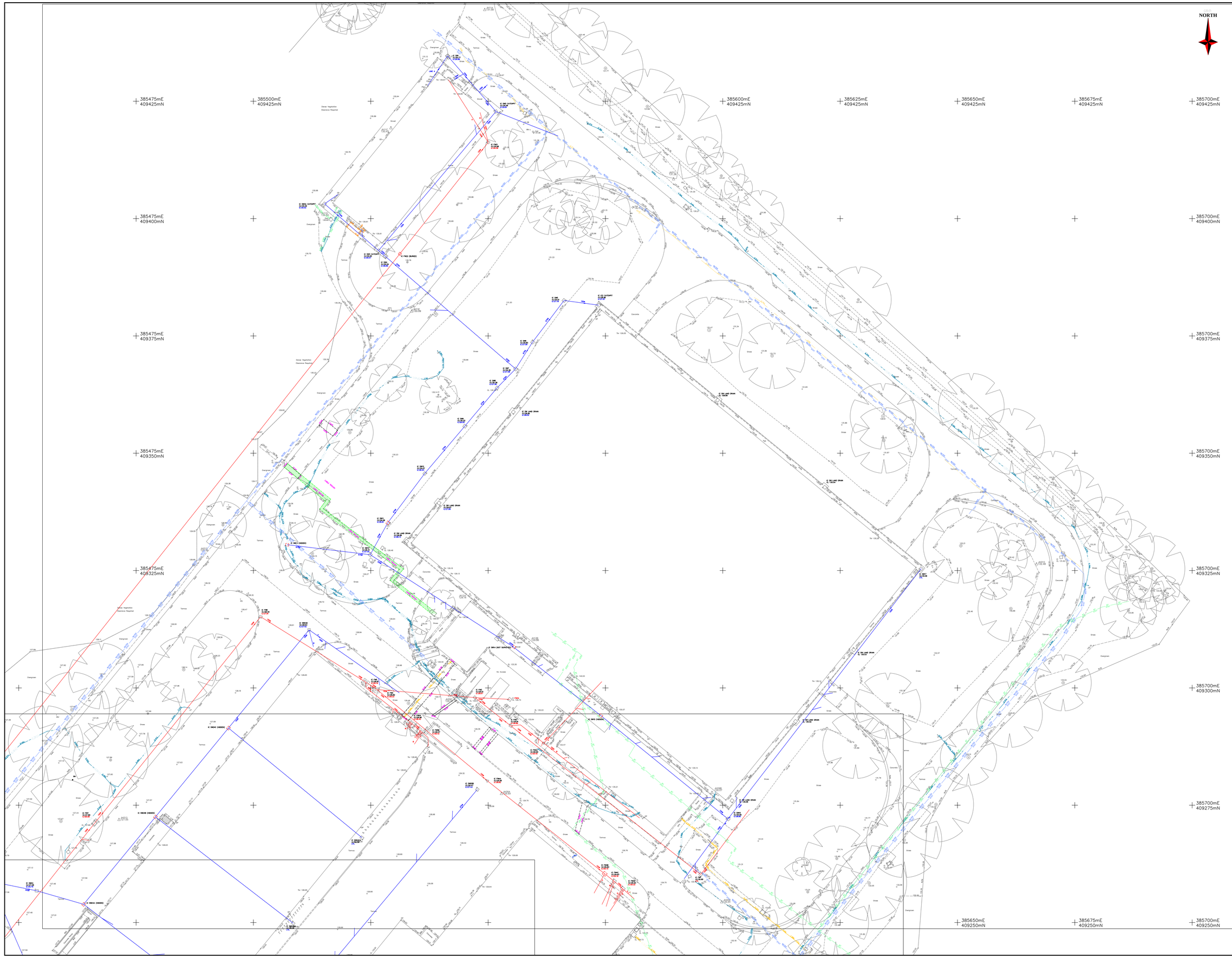
Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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Original Drawing Size: A1

NOTES:-

No reliance may be placed on this drawing for excavation purposes unless it is clearly stated below use in the title.

Where adjacent areas of land have been surveyed by this company, the client for whom this survey was undertaken grants permission for the use of this survey by the professional advisors of any adjacent owner or prospective purchaser of such land, solely for the purpose of advising their client in relation to the adjacent land. This permission is granted on the understanding that neither the surveyor nor his company shall be held liable to any third party in respect of the survey.

All levels are to the Ordnance Datum Newlyn unless otherwise stated.

Any use of a product of this survey which is not in accordance with the terms of the agreement or our Terms and Conditions for the Supply of Surveying Services, or any modification of it, will be at the sole risk of the user and without any liability to us.

All levels are to the Ordnance Datum Newlyn unless otherwise stated.

Features:

- BB Bollard
- BE Bench End
- BH Borehole
- BS Bench Seat
- CP Concrete Post
- DT Direction Arrow
- EB Electricity Box
- EM Electricity Meter
- FB Flower Bed
- FH Fire Hydrant
- GA Gate
- GP Guard Post
- GR Grating
- GT Gate Post
- HH Hand Hole
- HR Hedge
- IC Inspection Cover
- LP Lamp Post
- MH Manhole
- OH Overhead Line
- PC Pedestrian Crossing
- PO Post
- PP Power Pole
- RB Rodding Eye
- RM Road Marking
- RP Reflector Post
- SA Sample Point
- SB Stop Valve
- SC Sign
- SP Soil Pipe
- TB Telephone Box
- TC Traffic Count Point
- TL Traffic Light
- TP Telegraph Pole
- TR Traffic Light Control Box
- TS Traffic Sign
- VC Vent Column
- WA Water Valve
- WC Water Course
- WH Wash Hydrant
- WM Water Meter

Building Level Details:

- BL Basement Level
- FL Floor Level
- FFL First Floor Level
- GL Ground Level
- PL Parapet Level
- SL Slab Level
- TL Top Level
- TOW Top of Wall
- WL Water Level

Boundary Types:

- BW Boundary
- CF Chainlink Fencing
- EF Electric Fence
- HE Hedge
- PA Palisade
- PF Post & Rail
- RF Railings
- WA Wall
- WF Wire Fence
- WW Woven Wire Fence

Surfaces & Finishes:

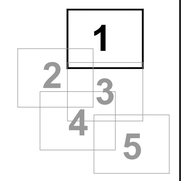
- BR Bricks
- CB Concrete Blocks
- CO Concrete
- FC Fibre Cement
- GL Glass
- MA Marble
- MT Metal
- PA Paving
- PB Pebbles
- PL Plastic
- SL Slate
- ST Stone
- TA Tarmac
- TF Tiles
- TG Timber
- TW Timber Weather Boarding
- WP Wood Panel

Cast Iron
Clay Duct
Concrete Duct
Fibre Optic
Foul Main
Gas Main
Overhead Cable
Pipeline
Rail Track
Surface Water Main
Telecom Duct
Trough
Unknown
Water Main
Wire Guarded / Box
Wire Guard Only

Survey Station
Kerb
Pinned Point Location
Edge of Vegetation
Retaining Wall
Post
Bollard
Building
Overhead Building Cable
Rail

All levels and coordinates are related to the datums described. No reliance is placed on any information shown beyond the boundary of the survey.

Sheet Layout



The services on this survey have been traced using a combination of Radiolocation RD8000 and ITG Tx-Rx equipment. Where possible, the accuracy of the survey has been verified by trenching or opening up chambers. The survey is not to include 100% of services without excavation. GPR works well in most soils which are relatively undisturbed but works less well in very wet or very dry soils and ground which has been generally disturbed or built up, and it also works better with larger diameter cables and pipes - for example it is unlikely to detect small diameter plastic pipes and cables. The RD8000 cannot distinguish between services or tell one apparent cannot always distinguish between services adjacent to large ones and can be swamped by radiation from buildings (when very close to them) or from voltage overhead lines. Inspection covers have been lifted where possible without damage to covers.

This Survey has been carried out to TBS 2B Detail as set out in National specification for measured building surveys (Including Measured Terrain and Island Sites) in Touch and Space.

The Quality of all surveys are indicated as being to be 8% 8% 8% at 95% confidence limits in accordance with the following detailed table, whether by plotted or scaled:

1A vertical and horizontal accuracy ±50mm or better at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

1B vertical and horizontal accuracy ±100mm or better at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

2A vertical and horizontal accuracy ±150mm at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

2B vertical and horizontal accuracy ±200mm at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

3 vertical and horizontal accuracy ±300mm at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

4 vertical and horizontal accuracy ±500mm at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

5 vertical and horizontal accuracy ±1000mm at 95% confidence limits in relation to adjacent detail on hard surfaces and on all levels in all detailed work, whether by plotted or scaled.

It is quite normal for the last quarter inch (6mm) to be illegible and for the last centimetre or so (10mm) to be illegible.

If you are in doubt as to the scale at which this drawing is plotted, or if you require any information, please contact us.

Client:
Telereal Trillium
140 London Wall
London
EC2Y 5DN

Project:
Buried Utilities Survey
Heywood Stores
Manchester Road
Heywood
Lancs, OL10 2PZ

Job No	Surveyed	Checked	Issued	Plotted
19807	K. Allen	LR	Oct. 2021	1:1000

EDI Surveys Ltd
163-165 Rowlands Road, Ipswich, Suffolk IP2 0EH
Telephone: 01473 211222 Fax: 01473 221660
Email: enquiries@edisurveys.co.uk
Our Business Solutions: Topographic Surveys, Measured Building Surveys, GPR Surveying and Buried Utility Surveys, Asset Management Surveys
We Work Like You, as we want to be our client.
www.edisurveys.co.uk

Drawing No: 19807/U/01-05

Rev: -

Original Drawing Size: A1

NOTES:-
The details and extent of the drawing are dictated by the client's instructions and it should not be used as the basis for any other purpose.
Where underground services or assets are recorded from the client's records, their accuracy and completeness cannot be guaranteed. Private pipes and cables are rarely recorded. Before any excavation takes place, the relevant utility companies should be contacted to obtain their records and to arrange for their plant to be located and clearly marked on site by a competent person.
Only those services which are visible at the time of the survey have been plotted. Services may exist which are not shown on this plan.
All manhole cover and inspection chamber levels recorded on this survey are to the nearest 10mm.
Any gully or gratings to be taken as 'dished' 10mm to cover and kerb unless otherwise noted.
Levels shown in metres and chained feet unless stated.

Features:
- Ash Ash
- BT BT Cabinet
- Bol Bollard
- Bou Boundary Post
- Bus Bus Stop
- CB Catch Pit
- CH Chimney
- Con Conifer
- Cov Cover
- CP Cover Plate
- Cro Crossing
- DM Down Pipe
- EB Electric Box
- FB Flower Bed
- GP Gate Post
- GT Grating
- HH Hedge
- HR Hedge Row
- HT Hydrant
- IC Inspection Chamber
- LP Lamp Post
- MH Manhole
- MK Marker
- Mon Monument
- OH Overhead Pipe
- PC Pedestal
- PO Post
- RE Rodding Eye
- RG Road Gully
- SC Service Cover
- SP Soil Pipe
- TC Traffic Control
- TL Traffic Light
- TP Telegraph Pole
- TR Tree
- VC Vent Column
- VP Vent Pipe
- WC Water Course
- WH Wall Hydrant
- WM Water Meter

Building Level Details:
- BL Basement Level
- CL Cellar Level
- FL First Floor Level
- GL Ground Level
- PL Parapet Level
- SL Second Level
- TL Third Level

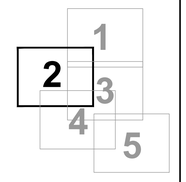
Boundary Types:
- BB Brick Boundary
- BF Brick Fence
- CF Chainlink Fence
- CW Concrete Wall
- EF Estate Fence
- HF Hoarding
- MW Metal Wall
- PF Post & Rail Fence
- RF Railings
- SW Stone Wall
- WF Wooden Fence

Surfaces & Finishes:
- Bri Bricks
- Cob Cobble
- Con Concrete
- Cor Coarse Gravel
- Dir Dirt
- Fin Fine Gravel
- Gra Grass
- Gre Gravel
- Mac Macadam
- Pav Paving
- Tar Tarmac
- Tim Timber Boards
- Tur Turf

Survey Station
Arch
Pictorial Point Detail
Edge of Vegetation
Kerb Dish Kerb
Post
Rodding Eye
Sump
Building
Overhead Nursing Cable
Wall

All levels are approximate and related to the datums described.
No section 50 apparatus search of the survey's boundaries by Survey Solutions.

Sheet Layout



The services on this survey have been traced using a combination of Radiodetection RD8000 and IDS Dual Frequency Multi-Functional Radar. Whilst every effort has been made to locate all services on system or equipment is also possible that some services may have been missed. Particularly where services were very deep, where non-conductive pipes were laid in very wet or very dry soils and ground which has been recently disturbed or built up, and it does prove better with larger diameter cables and pipes - for example in the vicinity of above ground electricity substations and properties. The RD8000 cannot distinguish between services of the same material, cannot detect fibreoptic cables, pipes/cables adjacent to large mass and can be swamped by interference between buildings, very close to metallic or high voltage overhead lines. Inspection covers have been the only detectable defined manhole for covers.

This Survey has been carried out by EDI LTD Detailed Buried Utilities Survey to BS 10101:2018 and PAS 128 Specification for Underground Utility Detection.

The Quality Level carried out complies or exceeds those as set out in BS 10101:2018 Code of Practice for the Investigation of Underground Utility Assets.
- Quality Level A (Accuracy ±40mm) - Trial hole data
- Quality Level B (Accuracy ±150mm) - Detailed application of surface feature surveying and buried utility detection techniques
- Quality Level C (Accuracy ±300mm) - Detailed application of surface feature surveying and buried utility detection techniques
- Quality Level D (Accuracy ±500mm) - Use of existing utility records and general surface feature survey
- Quality Level X - Where utilities are known to exist but their precise location is unknown or they cannot be surveyed

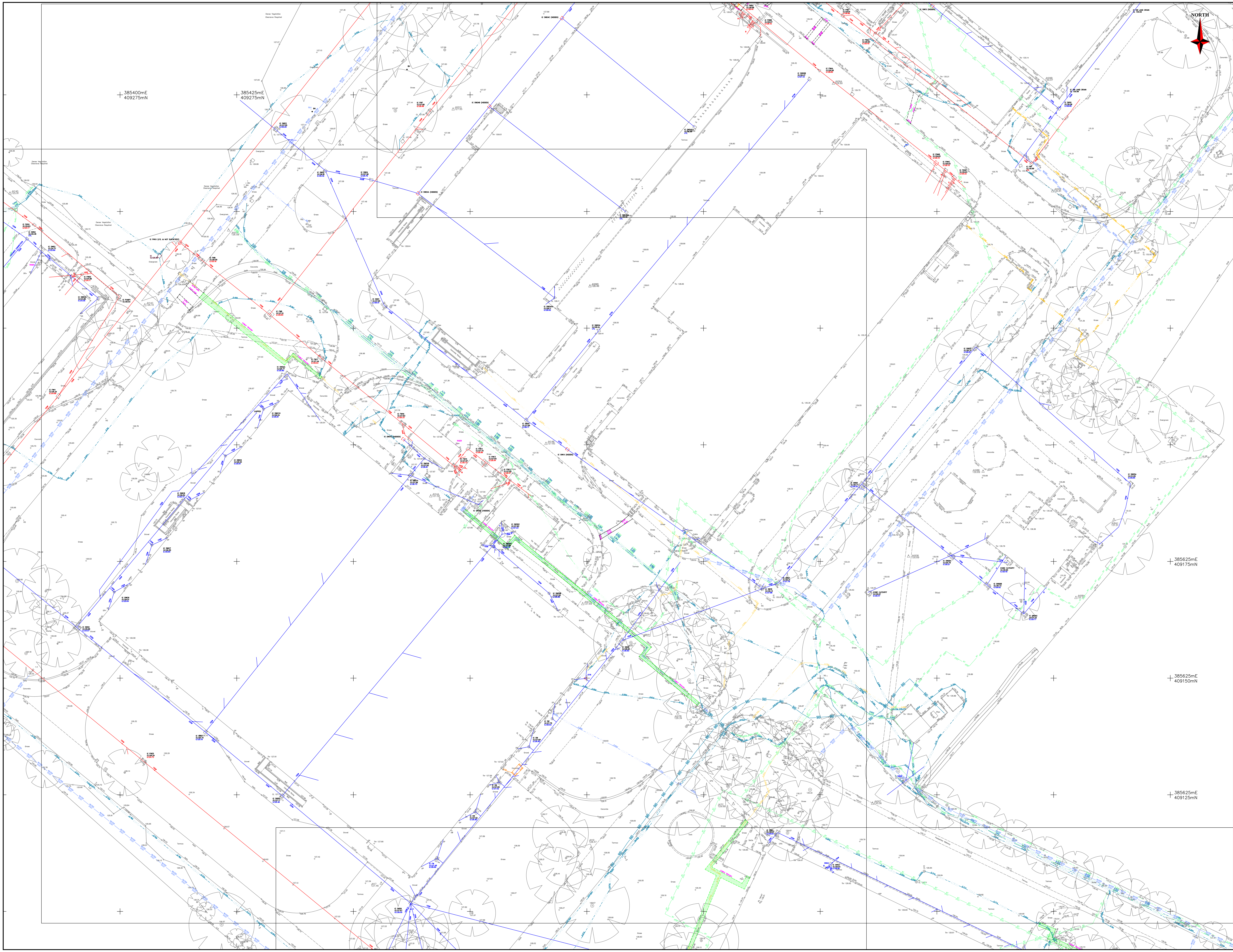
Client: Telereal Trillium
145 London Wall
London
EC2Y 5BN

Project: Buried Utilities Survey
Heywood Stores
Manchester Road
Heywood
Lancs, OL10 2PZ

Job No.	Surveyed	Checked	Issued	Scale
19807	R Allen	LW	Oct. 2021	1:250

EDI Surveys Ltd
143-145 Ranelagh Road, Ipswich, Suffolk, IP2 0AH
Telephone | 01473 211222 , Fax | 01473 221660
Email - | enquiries@edisurveys.co.uk
Our Services Comprise: Utility Measured Building Surveys, GPR Surveys and Geotek 3D Laser Scanning, UAV Surveys and Thermal Imaging.
Offices in Ipswich, Norwich and Peterborough
www.edisurveys.co.uk

Drawing No. 19807/U/02-05
Rev. -



Original Drawing Size: A0

NOTES:–

The accuracy and content of this drawing are dependent on the original specification and EDI should be consulted before use at other scales.

Where underground services are shown, all reasonable care has been taken within the spirit of the original specification and requirement. Before use of this information the user should consult EDI and satisfy themselves of the completeness and accuracy of such detail before undertaking any works. Due to the nature of this work and limitations imposed by ground conditions and the detection equipment no guarantee can be given that all services have been recorded. Trial holes should be dug at critical locations.

All reasonable care has been taken in the survey detail represented on this drawing but any discrepancies must be reported to EDI immediately.

Our aim is to produce the best possible results within the specification and cost constraints of our clients. Any comments are most welcome.

Levels shown at kerbs are channel level unless stated.

LEGEND

Features:

AV Air Valve
AB Air Brick
BD Bollard
BH Borehole
BM Benchmark
BP Boundary Post
BS Bus Stop
BT British Telecom
CL Cover Level
COL Column
CTV Cable TV Cover
DCH Drainage Channel
DF Drinking Fountain
DIS Disused
DK Drop Kerb
DPC Damp proof Course
EIC Electricity IC
EJ Expansion Joint
ER Earth Rod
FH Fire Hydrant
FHR Fire Hose Reel
FS Flagstaff
G Gully
GV Gas Valve
IC Inspection Cover
IL Invert Level
JBX Junction Box
KO Kerb Outlet
LB Letter Box
LBN Litter Bin
LLIP Low Level LP
LP Lamp Post
MP Marker Post
MS Mile Stone
MT Mercury Telecom
OHL Overhead Line
OP Overflow Pipe
PV Parking Meter
PP Power Pole
RAD Radiator
RE Rodding Eye
RNP Road Name Plate
RS Road Sign
RSD Roller Shutter Door
RWP Rain Water Pipe
SD Service Duct
SV Stop Valve
TCB Telephone Call Box
TP Telegraph Pole
TS Traffic Signal
UB Universal Beam
UNK Unknown
UR Urinal
UTL Unable to lift
V Vent
VP Vent Pipe
WM Water Meter
WO Wash Out
WP Waste Pipe

Building Level Details:

D Door
EL Eave Level
FFL Floor Level
FRL Flat Roof Level
HL Head Level
PPL Parapet Level
R Ridge Level
SL Sill Level
SP Springer of Arch
TA Top of Arch
W Window
12.34 Ceiling/Beam Soffit

Boundary Types:

BW Barbed Wire
CB Close Boarded
CH Chainlink
CI Corrugated Iron
CP Chestnut Paling
IR Iron Railing
IW Interwoven
LL Larch Lap
PAL Palisade
PR Post & Rail
PW Post & Wire
TKR Timber Knee Rail
RTW Retaining Wall
VSF Vehicle Safety Fence
WMF Wire Mesh Fence

Surfaces & Finishes:

B Brickwork
BB Breeze Block
C Concrete
CLT Ceiling Tiles
CP Carpet
CPS Concrete Paving Slabs
CP Carpet Tiles
CR Concrete Render
CT Ceramic Tiles
FT Floor Tiles
HBD Hardboard
L Linoleum
P Plaster
PAV Brick Paviors
S Steel work
T Tarmac
TSP Textured Safety Paving
VT Vinyl Tiles

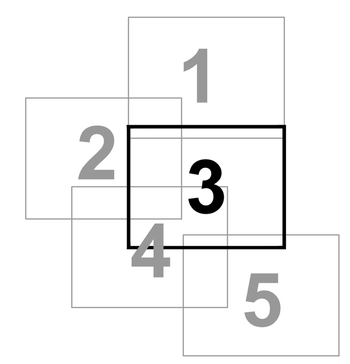
Services:

CATV cables
CCTV cables
Data cables
Electric cables
Foul water
Gas pipes
Heating duct
Service ducts
Storm water
Telecom con.
Unidentified
Water pipes
Pipe Diameter/Flow
Overhead lines

Survey Station
Fence
Gate
Painted Road Markings
Edge of Vegetation
Kerb/Drop Kerb
Tree
Top / Bottom Banks
Building
Overhead Building Detail
Wall

Control: All levels and co-ordinates are related to the datums described.
The horizontal and vertical control of this survey is taken from the survey by Survey Systems

Sheet Layout



The services on this survey have been traced using a combination of Radiodetection RD8000 and IDS Duo Ground Penetrating Radar. Whilst every effort has been made to locate all services no system or equipment is able to locate 100% of services without excavation. GPR works well in moist soils which are relatively undisturbed but works less well in very wet or very dry soils and ground which has been generally disturbed or built up, and it also works better with larger diameter cables and pipes – for example it is difficult to trace small bore connections to individual properties. The RD8000 cannot distinguish between services if they are adjacent, cannot always distinguish small pipes/cables adjacent to large ones and can be swamped by radiation from buildings (when very close to them) or high voltage overhead lines. Inspection covers have been lifted where possible without damage to covers.

This Survey has been carried out to PAS 128 Detection Method M2
Orthogonal search transects at 2m intervals for both Electro Magnetic Location and Ground Penetrating Radar techniques.

The Quality levels achieved are indicated on service lines as B1, B2 B3 or B4.
B1 horizontal location accuracy +150mm or –15% of detected depth whichever is greater.
B1 vertical location accuracy ±15% of detected depth.
B1 is achieved by horizontal and vertical location by multiple geophysical techniques.
B2 horizontal location accuracy ±250mm or ±40% of detected depth whichever is greater.
B2 vertical location accuracy ±40% of detected depth.
B2 is achieved by horizontal and vertical location by one of the geophysical techniques used.
B3 horizontal location accuracy +500mm.
B3 vertical location accuracy undefined (no reliable depth).
B3 is achieved by horizontal location only by one of the geophysical techniques used.
B4 horizontal location accuracy undefined.
B4 vertical location accuracy undefined.
B4 is a utility segment which is suspected to exist but has not been detected
Linetypes labelled "STAT" show utility runs taken from providers records which we haven't been able to locate.

Rev	Job No.	Date	Revision Detail	Surveyor	Chkd

CLIENT

Telereal Trillium
140 London Wall
London
EC2Y 5DN

PROJECT

Buried Utilities Survey
Heywood Stores
Manchester Road
Heywood
Lancs, OL10 2PZ

Job No.	Surveyor	Checked	Date	Scale
19807	R Allen	LW	Oct. 2021	1:250

EDI Surveys Ltd
163–165 Ranelagh Road, Ipswich, Suffolk IP2 0AH
Telephone | 01473 211222 Fax | 01473 221660
Email | enquiries@edisurveys.co.uk
Our Services: Topographic Surveys, Measured Building Surveys, GPS Surveying and Control, 3D laser Scanning, Utility Surveying and Drainage Investigation.
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construction line
THE SURVEY ASSOCIATION
ISO 9001 REGISTERED FIRM

DRAWING No. 19807/U/03–05
REV. –

NORTH

385325mE 409175mN

385325mE 409150mN

385325mE 409125mN

385325mE 409100mN

385325mE 409075mN

385350mE 409075mN

385375mE 409075mN

385400mE 409075mN

385425mE 409075mN

Original Drawing Scale: 1:1

NOTES:-

No warranty as to value of the drawing as discarded as the original specification of it could not be known at the time.

Copyright exists in plans & all records are held with the rights to publish restricted and reserved. Since use of the contents for other than a copy of the plan for the purpose for which it was originally supplied is forbidden without the written consent of EDI Surveys Ltd. Any unauthorised reproduction or publication will be prosecuted.

All records are the best that is held, and is recorded in the survey in the timescale as noted in the report.

EDI Surveys Ltd shall not be liable, or pay out fines, as in S1 B2 B3 or S4 B1 for buried assets caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

B1 for buried assets caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

B2 for buried assets caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

B3 for buried assets caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

S1 for utility strikes caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

S2 for utility strikes caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

S3 for utility strikes caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

S4 for utility strikes caused by inaccurate records, incorrect depth estimates, crushed or damaged assets caused by EDI or anyone acting on EDI's behalf.

Features:

Boundary Types:

Surfaces & Finishes:

Building Level Details:

All levels are approximate and related to the datums described.

No service is warranted to exist unless it has been surveyed.

Sheet Layout

1 2 3 4 5

The services on this survey have been traced using a combination of Radiodetection RD8000 and IDS Dual Ground Penetrating Radar. Whilst every effort has been made to locate all services on system or equipment is also possible that some services may have been missed. Services with no metal content, such as clay pipes, are normally undetectable. Where the ground was wet in very wet or very dry soils and ground which has been recently disturbed or built up, services do not always better with longer diameter cables and pipes - for example a 4 core cable or fibre optic cable is normally detectable in properties. The RD8000 cannot distinguish between services in the same trench, unless physically separated. Where pipes/cables adjacent to large ones and can be swamped by radiation from buildings (when very close to them) or high voltage overhead lines, inspection covers have been lifted where possible without damage to covers.

The Survey has been carried out to BS 10 Detailing Edited for Geophysical accuracy in terms of the Institute of Engineering Surveying and Geospatial Science Publication Buried Assets and Utility Surveys, 2nd Edition, 2013 and the Survey Association Publication Specification for Underground Utility Detection, 2nd Edition, 2013.

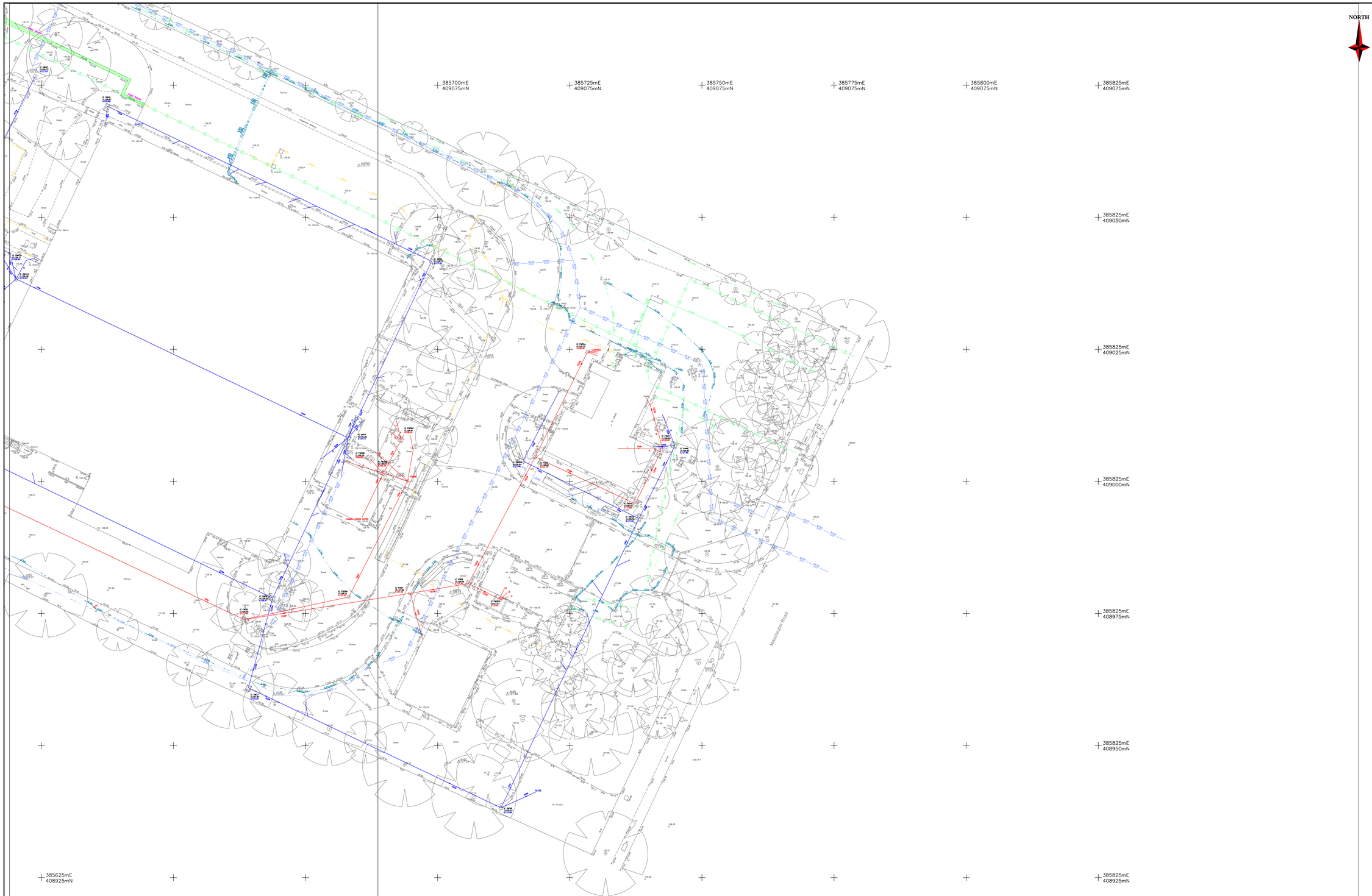
Client: Telereit Trillium
140 London Wall
London
EC2Y 5DN

Project: Buried Utilities Survey
Heywood Stores
Manchester Road
Heywood
Lancs. OL10 2PZ

Drawn: MJH | Date: 15 Feb 2023 | Checked: JA | Date: 15 Feb 2023 | Rev: 0

EDI Surveys Ltd
Unit 1 Old Bloxwich Road, Walsall, Surrey, WS2 0AU
Telephone | 01473 211222 Fax | 01473 221660
Email | enquiries@edisurveys.co.uk
Registered in England & Wales No. 7128213, Surrey, SP7 Terms and Conditions of Use Contained in Our Survey Reports and Invoices
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www.edisurveys.co.uk

Drawing No: 19807/U/04-05 | Rev: -



Original Drawing Size: A1

NOTES:-

The accuracy (or lack) of the drawing are documented on the original particulars and it should not be relied upon in any future dealings.

Where underground services are shown, all reasonable care has been taken with the options to survey particulars and measurement. Some users of the information may have access to other sources of information such as building plans which may be more detailed than the survey information shown. The position of such underground services as shown is approximate only and no guarantee can be given that all such services have been recorded or that others do not exist on or off the site shown.

All reasonable care has been taken in the survey, and all surrounding buildings, boundaries, etc. are shown to the scale of the drawing.

No part of this drawing may be copied, reproduced or transmitted in any form or by any means without the prior written consent of EDI Surveys Ltd.

Levels shown in metres and chained lines unless stated.

Features:

- SP Spot Height
- TC Top of Concrete
- BC Base of Kerb
- TK Top of Kerb
- BW Bottom of Wall
- TW Top of Wall
- BH Bollard
- LP Lamp Post
- TL Traffic Light
- SN Sign
- TP Telegraph Pole
- UP Utility Pole
- CP Control Point
- MH Manhole
- RM Rod Manhole
- CH Chamber
- VC Valve Chamber
- SC Service Chamber
- IC Inspection Chamber
- GU Gully
- CB Catchpit
- SO Soil Pipe
- VP Vent Pipe
- RP Rain Pipe
- DP Down Pipe
- GT Gate
- BO Bollard
- SW Sewer
- WA Water
- GA Gas
- EL Electric
- TE Telecom
- FO Fibre Optic
- CA Cable
- OH Overhead Line
- FL Flood Light
- PO Power Pole
- SD Soil Pipe
- RWP Rain Water Pipe
- RHP Rain Head Pipe
- WG Water Gauge
- WSV Water Stop Valve
- GV Gas Valve
- EV Electric Valve
- SV Service Pit
- TV Television Pit
- MP Marker Post
- LV Level Point
- AP Air Valve
- BP Boundary Post
- CM Cable Marker
- TM Telecom Marker
- FM Fibre Optic Marker

Building Level Details:

- SL Sub Level
- LG Lower Level
- GL Ground Level
- FF1 First Floor Level
- FF2 Second Floor Level
- FL Flood Level
- SL Sill Level
- HL Head Level
- UF Under Floor
- CL Cill Level
- OG Over Sail

Boundary Types:

- FE Fence
- HE Hedge Boundary
- WA Wall
- RA Railings
- CL Chainlink Fencing
- BA Barrier
- BU Bollards
- GA Gate
- TR Tree
- TH Tree & Hedge
- PA Post & Rail
- WW Wattle Hurdle
- VW Vertical Wall
- SW Softwood Fence

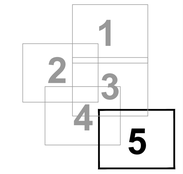
Surfaces & Finishes:

- BR Bricks
- CO Concrete
- GR Gravel
- CB Cobbles
- TA Tarmac
- PA Paving Slabs/Flags
- CT Carpet
- WO Wood
- GR Grass
- SH Shrubs
- TR Trees
- HE Hedge
- SW Soft Verge
- HV Hard Verge
- SG Stone Chippings

Survey Station
Arc
Kerb
Private Road Boundary
Edge of Vegetation
Kerb Drop Point
Pole
Guard
Building
Overhead Running Cable
Rail

All levels and coordinates are related to the datums described. No survey is warranted valid if the future is back fall by survey Tuning Spindle.

Sheet Layout



The services on this survey have been tracked using a combination of Radiodetection RD8000 and IDS Dual Ground Penetrating Radar. Whilst every effort has been made to locate all services on system or equipment is also subject to limitations. Some services may be too deep to detect with or whilst radio which new non-metallic plastic pipe is laid in very wet or very dry soils and ground which has been generally disturbed or built up, and it does work better with larger diameter cables and pipes - for example it is difficult to trace small bore connections to individual properties. The RD8000 cannot distinguish between services if they are adjacent, cannot always distinguish small pipes/cables adjacent to large ones and can be swamped by radiation from buildings (when very close to them) or high voltage overhead lines. Inspection covers have been lifted where possible without damage to covers.

This Survey has been carried out to PAS 128 Detection Method HC Ground Penetrating Radar: Ability to detect buried objects and soil conditions are dependent upon many factors including the composition, density and moisture content of the ground, the presence of other buried objects and the resolution required. Detection depths are estimates only and are not guaranteed. Detection depths may be affected by the presence of other buried objects and soil conditions.

The depths given are estimates only and are not guaranteed. Depths are to the top of the object detected unless otherwise stated.

Where a utility service which is suspected as existing but has not been detected, no liability will be accepted by EDI Surveys Ltd for any loss resulting from reliance upon the absence of such a service.

CLIENT

Tenered Trillium
140 London Wall
London
EC2Y 5DN

PROJECT

Brufied Utilities Survey
Heywood Stores
Manchester Road
Heywood
Lancs, OL10 2PZ

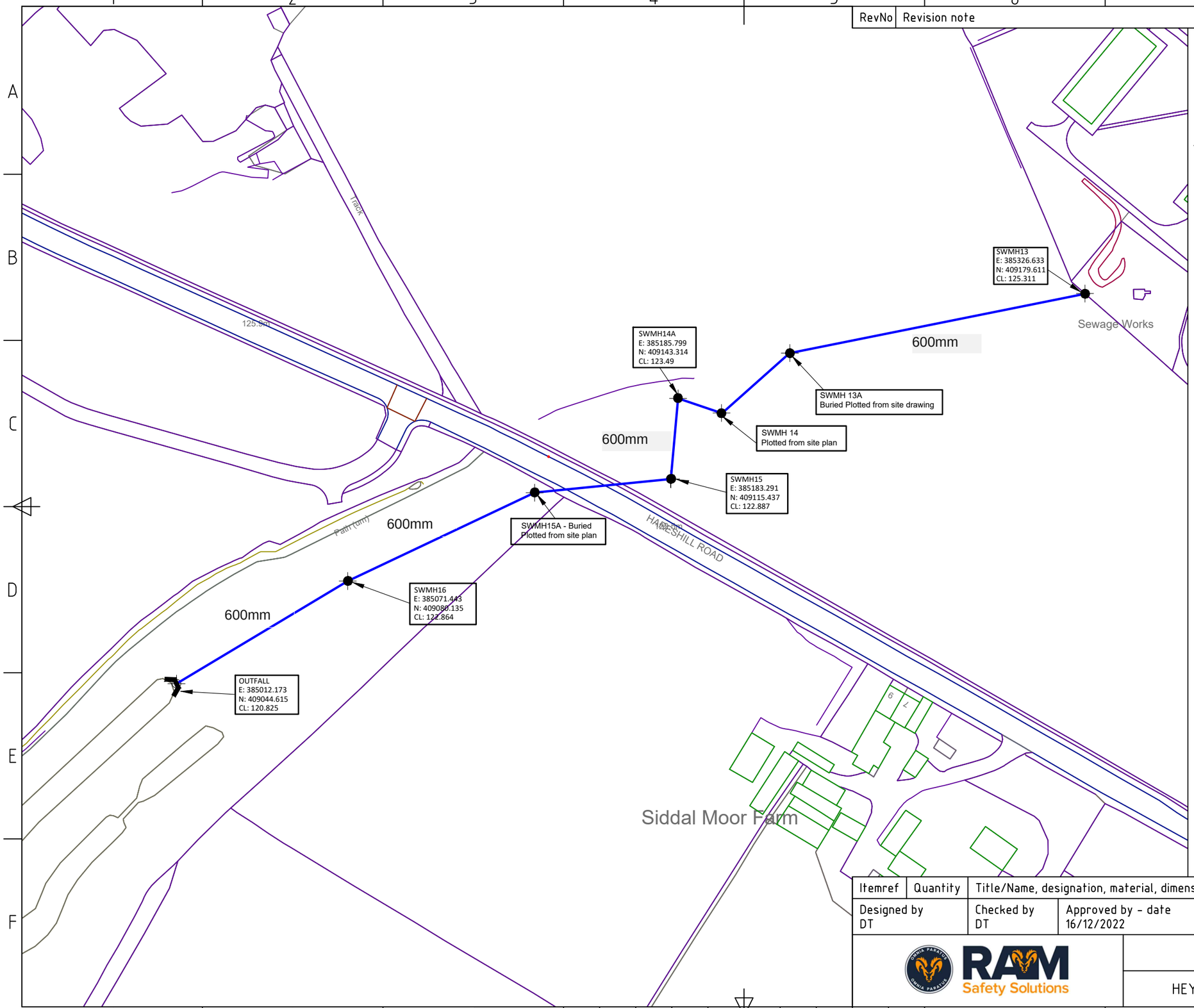
Job No.	Surveyed	Checked	Date	Scale
19807	R Allen	LW	Oct. 2021	1:250

EDI SURVEYS LTD
163-165 Ranelagh Road, Ipswich, Suffolk IP2 0AH
Telephone 01473 211222 Fax 01473 221466
Email enquiries@edisurveys.co.uk
Also at Unit 3, Cornfield Terrace, Eastcliff Parking, Bowes, Co Durham, DL12 9RB Tel/Fax 01833 628782
Mobile 07973 611 621
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Drawing No. 19807/U/05-05

Rev.

RevNo	Revision note	Date	Signature	Checked



RAM Safety Solutions

Surveyed

Unsurveyed

Inlet/Outlet

Manhole

SWMH13 - SD8532609179

SWMH13A - Plotted from site plan - buried

SWMH14 - Plotted from site plan

SWMH14A - SD8518509143

SWMH15 - SD8518309115

SWMH15A - Plotted from site plan - buried

SWMH16 - SD8507109080

OUTFALL - SD8501209044

SWMH38 - SD8571208938

SWMHEX1 - SD8573008927

SWMHCP1 - SD8571508896

TANK OUTLET - SD8572708935

TANK INLET - SD8571608940

Itemref	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference

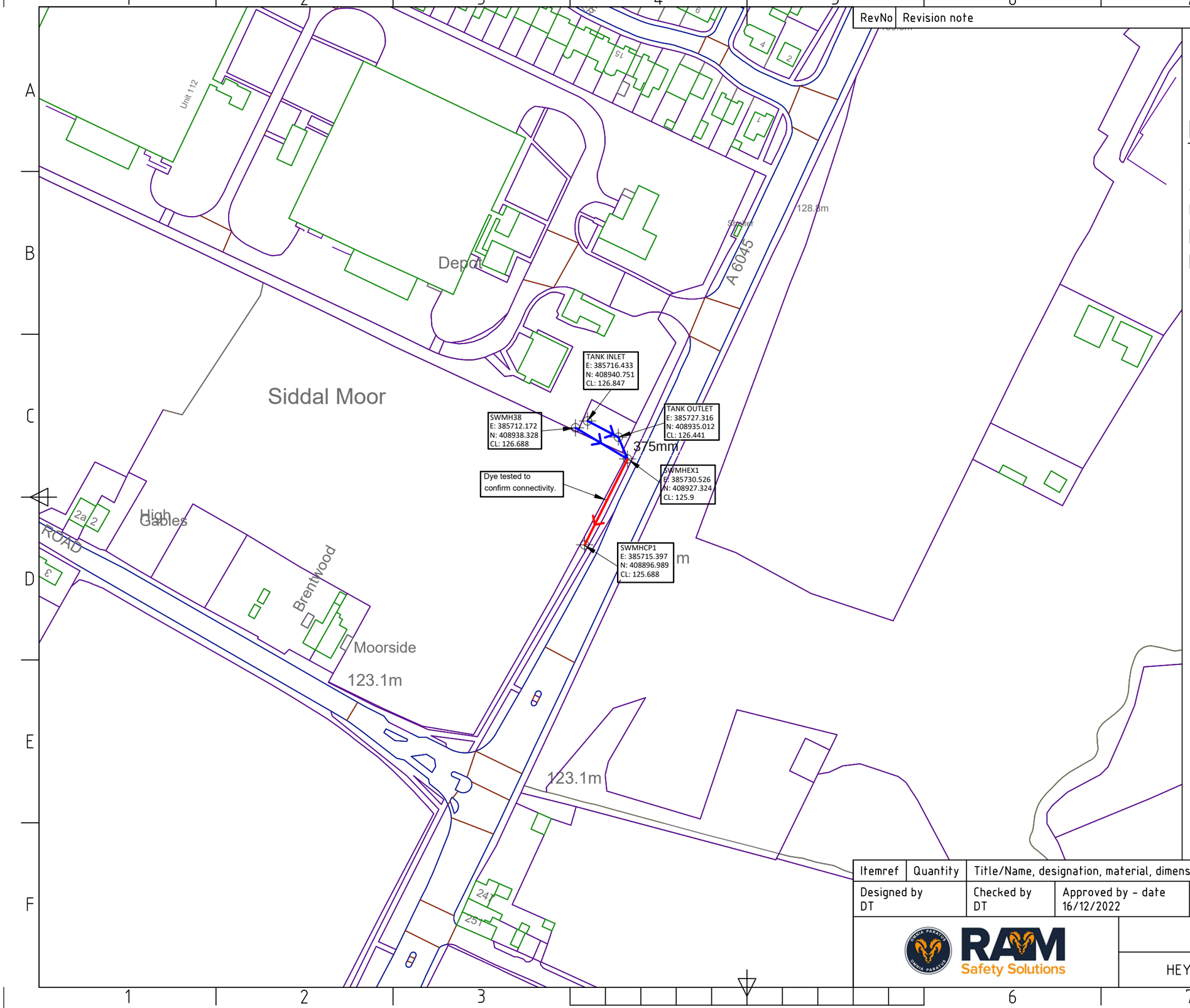
Designed by	Checked by	Approved by – date	File name	Date	Scale
DT	DT	16/12/2022	2859	16/12/2022	1:1250

RAM Safety Solutions

HEYWOOD STORES

HEYWOOD STORES | Edition 0 | Sheet 1/2

RevNo	Revision note	Date	Signature	Checked



RAM Safety Solutions

Surveyed

Unsurveyed

Inlet/Outlet

Manhole

SWMH13 - SD8532609179

SWMH13A - Plotted from site plan - buried

SWMH14 - Plotted from site plan

SWMH14A - SD8518509143

SWMH15 - SD8518309115

SWMH15A - Plotted from site plan - buried

SWMH16 - SD8507109080

OUTFALL - SD8501209044

SWMH38 - SD8571208938

SWMHEX1 - SD8573008927

SWMHCP1 - SD8571508896

TANK OUTLET - SD8572708935

TANK INLET - SD8571608940

Itemref	Quantity	Title/Name, designation, material, dimension etc			Article No./Reference
Designed by DT		Checked by DT	Approved by - date 16/12/2022	File name 2859	Date 16/12/2022	Scale 1:1250

RAM Safety Solutions

HEYWOOD STORES

HEYWOOD STORES	Edition 0	Sheet 2/2

APPENDIX E – DRAINAGE STRATEGY

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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.

Key:

- Surface Water Drainage Pipe
- Surface Water Drainage Manhole
- Kerb Drainage
- Foul Water Rising Main (specialist)
- Surface Water Drainage Channel
- Siphonic Roof Downpipe (specialist design)
- Proposed petrol interceptor / separator
- Surface Water Attenuation Pond
- Surface Water Attenuation Tank
- Foul Water Drainage Pipe
- Foul Water Drainage Manhole
- Existing Drainage
- Precast concrete headwall

SW-U3-07
Hydrobrake flow control
CL: 129.300
IL: 126.500
Q: 170 l/s
Ø: 1800

600Ø @ 1:400

U3-FW-01
CL: 128.970
IL: 127.600
Ø: tbc subject to sprinkler drain down rate

Pond 2
Top of bank level: 129.000
Invert level: 126.900
Capacity: 850 m3

SW-U3-04
(Open grading)
CL: 129.400
IL: 127.245
Ø: 1500

SW-U3-08
CL: 128.925
IL: 126.325
Ø: 1500

SW-U3-05
(Open grading)
CL: 129.390
IL: 127.800
Ø: 1500

SW-U3-06
(Open grading)
CL: 129.410
IL: 127.000
Ø: 1800

SW-U3-03
(Open grading)
CL: 129.430
IL: 127.340
Ø: 1500

SW-U3-09
CL: 128.840
IL: 126.065
Ø: 1500

SW-U3-02
CL: 129.400
IL: 127.580
Ø: 1200

U3-FW-02
CL: 128.900
IL: 127.000
Ø: 1200

SW-U3-19
CL: 128.900
IL: 126.900
Ø: 1200

SW-U3-11
CL: 128.850
IL: 125.890
Ø: 1800

U3-FW-04
CL: 128.900
IL: 126.730
Ø: 1200

SW-U3-18
CL: 128.250
IL: 125.765
Ø: 1500

SW-U3-17
CL: 127.850
IL: 125.850
Ø: 1500

U3-FW-03
CL: 129.250
IL: 127.000
Ø: 1200

SW-U3-10
(Open grading)
CL: 129.100
IL: 127.600
Ø: 1200

SW-U3-20
CL: 128.950
IL: 125.300
Ø: 1800

SW-U3-15
Hydrobrake flow control
CL: 129.050
IL: 125.700
Q: 400 l/s
Ø: 1800

Unit 3 below ground attenuation tank
610 cu m3 of storage
Dims: 20m x 16m (w) x 2m (h)
Min CL: 128.280
IL: 125.000
Additional inspection chambers on tank may be required, manufacturer to confirm.

U3-FW-05
CL: 128.850
IL: 126.200
Ø: 1200

SW-U3-01
CL: 129.520
IL: 127.865
Ø: 1350

All internal drainage and roof drainage is shown indicatively and subject to coordination / detailed design.

FFL 129.500m

SCALE BAR 1:500
0 10 20 30 40 50

REV	DATE	BY	REVISION	CHK'D
P03	14/03/23	JAM	Updated to suit revised planning layout	JW
P02	02/03/23	JAM	Updated to suit revised planning layout	JW
P01	05/01/23	JAM	First issue	JW

Burrows Graham
North Office:
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
Tel: +44 (0)161 804 8046
South Office:
Buckland House, Dower Mews, High Street, Berkhamsted HP4 2BL
Tel: +44 (0)161 804 8046

CLIENT

Trammell Crow Company

PROJECT

MANCHESTER ROAD HEYWOOD

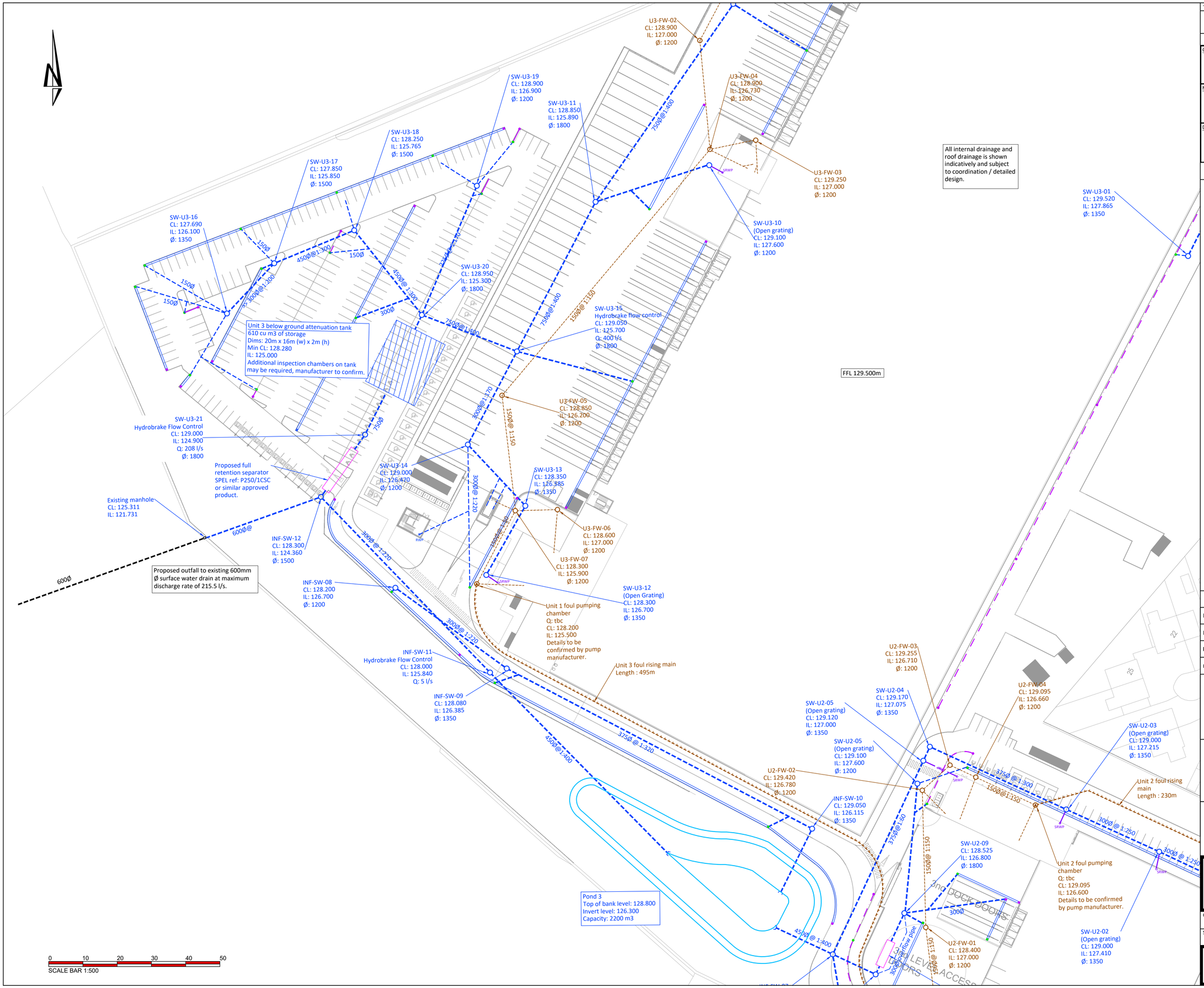
DRAWING TITLE

DRAINAGE LAYOUT
SHEET 1 OF 3

OUR PROJECT NUMBER	DRAWING STATUS	OFFICE	
21194	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:500	04/01/2023	JAM	MG

DRAWING No: 21194-BGL-XX-XX-DR-C-00210

REV: P03



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IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION

MAINTENANCE

DEMOLITION

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

GENERAL NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL THE RELEVANT ARCHITECTS, ENGINEERS' AND SERVICE ENGINEERS DRAWINGS & SPECIFICATIONS.

Key:

- Surface Water Drainage Pipe
- Surface Water Drainage Manhole
- Kerb Drainage
- Foul Water Rising Main (specialist)
- Surface Water Drainage Channel
- Siphonic Roof Downpipe (specialist design)
- Proposed petrol interceptor / separator
- Surface Water Attenuation Pond
- Surface Water Attenuation Tank
- Foul Water Drainage Pipe
- Foul Water Drainage Manhole
- Existing Drainage
- Precast concrete headwall

REV	DATE	BY	REVISION	CHK'D
P03	14/03/23	JAM	Updated to suit revised planning layout	JW
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P01	05/01/23	JAM	First issue	JW

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North Office:
5 Ambassador Place, Stockport Road, Altrincham WA15 8DB
Tel: +44 (0)161 804 8046

South Office:
Buckland House, Dower Mews, High Street, Berkhamsted HP4 2BL
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CLIENT

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PROJECT

MANCHESTER ROAD HEYWOOD

DRAWING TITLE

DRAINAGE LAYOUT
SHEET 2 OF 3

OUR PROJECT NUMBER	DRAWING STATUS	OFFICE	
21194	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:500	04/01/2023	JAM	MG

DRAWING No: 21194-BGL-XX-XX-DR-C-00211

REV: P03

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REV	DATE	BY	REVISION	CHK'D
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PROJECT

MANCHESTER ROAD HEYWOOD

DRAWING TITLE

DRAINAGE LAYOUT
SHEET 3 OF 3

OUR PROJECT NUMBER	DRAWING STATUS	OFFICE	
21194	PRELIMINARY	NORTH	
SCALE @ A1	DATE	DRAWN BY	CHECKED BY
1:500	04/01/2023	JAM	MG

DRAWING No: 21194-BGL-XX-XX-DR-C-00212

REV: P03

SCALE BAR 1:500 (0, 10, 20, 30, 40, 50)

APPENDIX F – RBC RUNOFF CALCS & HYDRAULIC CALCULATIONS

Rational Method - Runoff calcs - SMcCann RBC				
This example uses the Roch St. example which quoted 0.37 existing hardstanding area.				
Assumption is that runoff Cv from tarmac area = 0.9 and from grass is 0.3				
Assumption is that final developed area = 0.37 (brownfield)+ 0.5 (greenfield)				
Total area (Hectares)	11.136			
Greenfield area	5.3			
Brownfield area (existing and will also be part of development)	**4.742**			
Greenfield area to become impermeable	**3.462**			
	Qbar (YR 2.3 mean annual)	**YR 30**	**YR 100**	**YR 100 + 40%**
Rainfall Intensity (mm/hr)	25	44.2	57.7	80.8
Rational Runoff calculation (2.78CiA) from existing Brownfield area (2.78 x C x rainfall rate x area) (l/s)	296.6			
Brownfield area 50% runoff reduction	**148.3**			
Add former greenfield area to become impermeable (l/s). C = 0.3	**72.2**			
Max permitted future discharge to sewer (l/s)	**220.5**			

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
U3-01	0.120	5.00	129.520	1350	2.887	228.265	1.799
SW-U3-01	0.734	5.00	129.430	1500	47.431	318.999	2.090
SW-U3-02	1.057	5.00	129.420	1500	5.738	340.097	2.180
SW-U3-03	0.734	5.00	129.410	1350	-49.796	368.517	1.660
SW-U3-04	1.057	5.00	129.410	1800	-29.494	357.843	2.400
pond 2	0.100	5.00	129.000	1800	-24.898	373.497	2.100
SW-U3-05	0.186	5.00	129.405	1500	-82.503	402.851	2.635
U3DOCK02	0.289	6.00	128.300	1350	-103.868	298.841	1.200
SW-U3-06	0.140	5.00	128.875	1800	-125.706	311.486	2.810
SW-U3-07a	0.015	5.00	129.100	1200	-138.258	245.182	2.100
SW-U3-07	0.199	5.00	128.860	1800	-162.706	247.344	2.970
SW-U3-08	0.080	5.00	128.340	1200	-206.829	120.293	1.500
SW-U3-09	0.100	5.00	128.535	1200	-195.890	141.422	1.806
SW-U3-13	0.057	5.00	128.775	1200	-213.075	167.763	2.154
U3DOCK	0.315	5.00	128.250	1200	-157.750	192.480	1.575
SW-U3-14			128.780	1800	-191.604	209.212	3.113
SW-U3-16a	0.099	6.00	127.700	1200	-281.923	205.804	1.600
SW-U3-16b	0.265	5.00	127.710	1350	-276.071	215.796	1.860
SW-U3-17	0.350	5.00	128.195	1350	-247.968	223.481	2.425
SW-U3-15	0.050	5.00	128.490	1200	-204.855	250.909	2.434
tank u3			128.460		-227.323	206.290	4.163
SW-U3-19			128.515	1800	-247.365	167.513	4.243
INF-SW-04	0.068	5.00	128.285	1200	75.774	-75.841	1.050
INF-SW-05	0.052	5.00	128.675	1200	8.645	-46.954	1.890
INF-SW-06	0.055	5.00	128.670	1200	-61.308	-13.922	2.170
INF-SW-07	0.067	5.00	128.875	1200	-104.971	15.152	2.540
INF-SW-08	0.048	5.00	128.960	1350	-97.614	40.800	2.805
INF-SW-09	0.050	5.00	128.220	1200	-238.918	117.147	1.520
INF-SW-10	0.062	5.00	128.160	1350	-195.658	78.856	1.771
INF-SW-11			129.050	1350	-111.470	51.646	3.005
SW-U2-01	0.050	5.00	129.080	1200	8.300	49.833	1.655
SW-U2-02	0.110	5.00	129.275	1200	-63.271	81.772	2.345
SW-U2-03	0.024	5.00	129.080	1200	-71.037	63.948	2.235
U2DOCK	0.031	5.00	127.900	1200	-52.951	32.146	0.750
SW-U2-04	0.000	5.00	128.390	1200	-70.164	40.479	1.540
SW-U2-05	0.191	5.00	128.875	1200	-63.352	54.858	2.225
SW-U2-06	0.195	5.00	129.015	1500	-2.475	51.605	1.480
SW-U2-07	0.279	5.00	129.110	1350	-31.727	64.741	1.645
SW-U2-08	0.041	5.00	129.170	1350	-66.306	79.572	1.830
SW-U2-09			128.870	1350	-81.500	43.106	2.195
SW-U2-10			128.550	1500	-78.694	33.385	2.200

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Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
Pond 3	0.120	5.00	128.500		-130.121	40.183	2.500
INF-SW-12			128.235	1500	-199.820	87.665	2.725
Outlet 1			125.230	1500	-272.699	153.204	1.060
Outfall_1			125.060	1500	-293.513	144.630	1.010
SW-U1-01	0.050	5.00	129.175	1200	38.948	40.406	1.475
SW-U1-02	0.050	5.00	129.005	1200	115.291	4.637	2.483
U1DOCK	0.099	5.00	127.900	1200	65.169	-19.484	1.125
SW-U1-03	0.103	5.00	128.335	1200	82.940	-28.194	1.655
SW-U1-04			128.690	1200	85.859	-21.250	2.120
SW-U1-05	0.029	5.00	128.810	1350	103.737	-16.584	2.460
SW-U1-06	0.213	5.00	129.025	1200	48.033	28.133	1.405
SW-U1-07	0.258	5.00	129.100	1200	75.562	15.021	1.600
SW-U1-07a	0.042	5.00	129.105	1200	107.219	-0.146	1.815
Pond 1	0.050	5.00	128.100		133.338	-15.612	2.400
INF-SW-01	0.036	5.00	128.000	1200	136.316	-65.299	1.800
Outlet 2	0.070	5.00	128.100	2100	107.993	-50.574	3.060
INF-SW-03			126.790	1200	113.270	-89.805	1.910

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	U3-01	SW-U3-01	98.000	0.600	127.721	127.415	0.306	320.3	375	6.28	50.0
1.001	SW-U3-01	SW-U3-02	40.000	0.600	127.340	127.240	0.100	400.0	600	6.83	50.0
1.002	SW-U3-02	SW-U3-04	40.000	0.600	127.240	127.160	0.080	500.0	600	7.45	50.0
2.000	SW-U3-03	SW-U3-04	22.937	0.600	127.750	127.310	0.440	52.1	450	5.14	50.0
1.003	SW-U3-04	pond 2	13.000	0.600	127.010	126.900	0.110	118.2	750	7.53	50.0
1.004	pond 2	SW-U3-05	52.000	0.600	126.900	126.770	0.130	400.0	600	8.25	50.0
1.005	SW-U3-05	SW-U3-06	100.000	0.600	126.770	126.215	0.555	180.2	600	9.17	50.0
3.000	U3DOCK02	SW-U3-06	31.500	0.600	127.100	126.440	0.660	47.7	375	6.20	50.0
1.006	SW-U3-06	SW-U3-07	70.000	0.600	126.065	125.890	0.175	400.0	750	10.00	50.0
4.000	SW-U3-07a	SW-U3-07	24.543	0.600	127.000	126.340	0.660	37.2	300	5.16	50.0
1.007	SW-U3-07	SW-U3-14	50.000	0.600	125.890	125.723	0.167	300.0	750	10.52	50.0
5.000	SW-U3-08	SW-U3-09	24.500	0.600	126.840	126.729	0.111	220.0	300	5.39	50.0
5.001	SW-U3-09	SW-U3-13	23.700	0.600	126.729	126.621	0.108	220.0	300	5.76	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.007	111.2	16.3	1.424	1.640	0.120	0.0	96	0.725
1.001	1.211	342.4	115.7	1.490	1.580	0.854	0.0	239	1.098
1.002	1.082	305.9	259.0	1.580	1.650	1.911	0.0	426	1.207
2.000	2.820	448.6	99.5	1.210	1.650	0.734	0.0	143	2.283
1.003	2.573	1136.7	501.7	1.650	1.350	3.702	0.0	348	2.496
1.004	1.211	342.4	515.3	1.500	2.035	3.802	0.0	600	1.222
1.005	1.811	512.0	540.5	2.035	2.060	3.988	0.0	538	2.023
3.000	2.628	290.3	39.2	0.825	2.060	0.289	0.0	93	1.858
1.006	1.393	615.3	598.6	2.060	2.220	4.417	0.0	602	1.574
4.000	2.586	182.8	2.0	1.800	2.220	0.015	0.0	22	0.866
1.007	1.610	711.3	627.6	2.220	2.307	4.631	0.0	551	1.805
5.000	1.056	74.6	10.8	1.200	1.506	0.080	0.0	77	0.759
5.001	1.056	74.6	24.4	1.506	1.854	0.180	0.0	117	0.946

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
5.002	SW-U3-13	SW-U3-14	37.000	0.600	126.621	126.117	0.504	73.4	300	6.10	50.0
6.000	U3DOCK	SW-U3-14	37.763	0.600	126.675	126.117	0.558	67.7	300	5.33	50.0
1.008	SW-U3-14	tank u3	30.000	0.600	125.667	125.547	0.120	250.0	750	10.81	50.0
7.000	SW-U3-16a	SW-U3-16b	18.000	0.600	126.100	126.000	0.100	180.0	300	6.26	50.0
7.001	SW-U3-16b	SW-U3-17	24.000	0.600	125.850	125.770	0.080	300.0	450	6.60	50.0
7.002	SW-U3-17	tank u3	27.000	0.600	125.770	125.680	0.090	300.0	450	6.98	50.0
8.000	SW-U3-15	tank u3	39.000	0.600	126.056	125.827	0.229	170.3	150	5.85	50.0
1.009	tank u3	SW-U3-19	10.000	0.600	124.297	124.272	0.025	400.0	750	10.93	50.0
1.010	SW-U3-19	Outlet 1	20.500	0.600	124.272	124.170	0.102	200.0	600	11.12	50.0
9.000_1	INF-SW-04	INF-SW-05	64.000	0.600	127.235	126.860	0.375	170.7	225	6.07	50.0
9.001	INF-SW-05	INF-SW-06	71.000	0.600	126.785	126.500	0.285	249.1	300	7.26	50.0
9.002_1	INF-SW-06	INF-SW-07	43.000	0.600	126.500	126.335	0.165	260.6	300	8.00	50.0
9.003_1	INF-SW-07	INF-SW-08	29.500	0.600	126.335	126.230	0.105	281.0	300	8.53	50.0
9.004	INF-SW-08	INF-SW-11	24.000	0.600	126.155	126.045	0.110	218.2	375	8.86	50.0
10.000	INF-SW-09	INF-SW-10	52.000	0.600	126.700	126.464	0.236	220.0	300	5.82	50.0
10.001	INF-SW-10	INF-SW-11	86.000	0.600	126.389	126.120	0.269	320.0	375	7.24	50.0
9.005	INF-SW-11	Pond 3	10.000	0.600	126.045	126.000	0.045	222.2	450	8.98	50.0
9.000	SW-U2-01	SW-U2-02	72.800	0.600	127.425	127.000	0.425	171.3	225	6.25	50.0
11.001	SW-U2-02	SW-U2-03	20.500	0.600	126.930	126.845	0.085	241.2	300	6.59	50.0
9.002	SW-U2-03	SW-U2-05	11.000	0.600	126.845	126.800	0.045	244.4	300	6.57	50.0
12.000	U2DOCK	SW-U2-04	18.000	0.600	127.150	127.000	0.150	120.0	150	5.33	50.0
12.001	SW-U2-04	SW-U2-05	13.500	0.600	126.850	126.800	0.050	270.0	300	5.56	50.0
9.003	SW-U2-05	SW-U2-10	21.000	0.600	126.650	126.500	0.150	140.0	450	6.82	50.0
13.000	SW-U2-06	SW-U2-07	24.000	0.600	127.535	127.465	0.070	342.9	375	5.41	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
5.002	1.837	129.8	32.1	1.854	2.363	0.237	0.0	101	1.529
6.000	1.914	135.3	42.7	1.275	2.363	0.315	0.0	116	1.704
1.008	1.765	779.8	702.4	2.363	2.163	5.183	0.0	561	1.983
7.000	1.168	82.6	13.4	1.300	1.410	0.099	0.0	81	0.865
7.001	1.168	185.8	49.3	1.410	1.975	0.364	0.0	158	0.994
7.002	1.168	185.8	96.8	1.975	2.330	0.714	0.0	231	1.180
8.000	0.767	13.6	6.8	2.284	2.483	0.050	0.0	75	0.766
1.009	1.393	615.3	806.0	3.413	3.493	5.947	0.0	750	1.405
1.010	1.718	485.8	806.0	3.643	0.460	5.947	0.0	600	1.733
9.000_1	0.998	39.7	9.2	0.825	1.590	0.068	0.0	73	0.814
9.001	0.991	70.1	16.3	1.590	1.870	0.120	0.0	98	0.812
9.002_1	0.969	68.5	23.7	1.870	2.240	0.175	0.0	122	0.883
9.003_1	0.933	65.9	32.8	2.240	2.430	0.242	0.0	150	0.932
9.004	1.222	135.0	39.3	2.430	2.630	0.290	0.0	138	1.064
10.000	1.056	74.6	6.8	1.220	1.396	0.050	0.0	61	0.662
10.001	1.007	111.2	15.2	1.396	2.555	0.112	0.0	93	0.710
9.005	1.359	216.2	54.5	2.555	2.050	0.402	0.0	153	1.140
9.000	0.996	39.6	6.8	1.430	2.050	0.050	0.0	63	0.748
11.001	1.008	71.2	21.7	2.045	1.935	0.160	0.0	113	0.888
9.002	1.001	70.8	24.9	1.935	1.775	0.184	0.0	123	0.916
12.000	0.916	16.2	4.2	0.600	1.240	0.031	0.0	52	0.769
12.001	0.952	67.3	4.2	1.240	1.775	0.031	0.0	51	0.536
9.003	1.716	272.9	55.0	1.775	1.600	0.406	0.0	136	1.352
13.000	0.973	107.4	26.4	1.105	1.270	0.195	0.0	126	0.810

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Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
13.001	SW-U2-07	SW-U2-08	43.000	0.600	127.465	127.340	0.125	344.0	375	6.15	50.0
13.002	SW-U2-08	SW-U2-09	39.505	0.600	127.340	126.675	0.665	59.4	375	6.43	50.0
13.003	SW-U2-09	SW-U2-10	9.000	0.600	126.675	126.650	0.025	360.0	375	6.59	50.0
11.004	SW-U2-10	Pond 3	10.000	0.600	126.350	126.270	0.080	125.0	600	6.90	50.0
9.006	Pond 3	INF-SW-12	49.000	0.600	126.000	125.510	0.490	100.0	600	9.31	50.0
9.007	INF-SW-12	Outlet 1	80.000	0.600	125.510	124.320	1.190	67.2	450	9.85	50.0
1.011	Outlet 1	Outfall_1	24.000	0.600	124.170	124.050	0.120	200.0	600	11.36	50.0
14.000	SW-U1-01	SW-U1-02	75.000	0.600	127.700	126.600	1.100	68.2	225	5.79	50.0
14.001	SW-U1-02	SW-U1-05	23.000	0.600	126.522	126.430	0.092	250.0	300	6.18	50.0
15.000	U1DOCK	SW-U1-03	16.700	0.600	126.775	126.680	0.095	175.8	300	5.24	50.0
15.001	SW-U1-03	SW-U1-04	3.000	0.600	126.680	126.570	0.110	27.3	300	5.25	50.0
15.002	SW-U1-04	SW-U1-05	17.000	0.600	126.570	126.427	0.143	118.9	300	5.45	50.0
14.002	SW-U1-05	Pond 1	16.000	0.600	126.350	126.300	0.050	320.0	375	6.44	50.0
16.000	SW-U1-06	SW-U1-07	30.000	0.600	127.620	127.500	0.120	250.0	300	5.51	50.0
16.001	SW-U1-07	SW-U1-07a	31.500	0.600	127.500	127.290	0.210	150.0	300	5.92	50.0
16.002	SW-U1-07a	Pond 1	25.000	0.600	127.290	126.400	0.890	28.1	300	6.05	50.0
14.003	Pond 1	Outlet 2	31.000	0.600	125.700	125.040	0.660	47.0	450	6.61	50.0
17.000	INF-SW-01	Outlet 2	41.000	0.600	126.200	125.190	1.010	40.6	300	5.28	50.0
12.004	Outlet 2	INF-SW-03	46.000	0.600	125.190	124.880	0.310	148.4	300	7.71	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
13.001	0.971	107.2	64.2	1.270	1.455	0.474	0.0	209	1.012
13.002	2.354	260.0	69.8	1.455	1.820	0.515	0.0	132	2.008
13.003	0.949	104.8	69.8	1.820	1.525	0.515	0.0	224	1.014
11.004	2.176	615.4	124.8	1.600	1.630	0.921	0.0	182	1.723
9.006	2.435	688.5	195.6	1.900	2.125	1.443	0.0	218	2.110
9.007	2.482	394.7	195.6	2.275	0.460	1.443	0.0	224	2.476
1.011	1.718	485.8	1001.5	0.460	0.410	7.390	0.0	600	1.733
14.000	1.586	63.0	6.8	1.250	2.180	0.050	0.0	50	1.044
14.001	0.990	70.0	13.6	2.183	2.080	0.100	0.0	89	0.771
15.000	1.183	83.6	13.4	0.825	1.355	0.099	0.0	81	0.872
15.001	3.022	213.6	27.4	1.355	1.820	0.202	0.0	72	2.094
15.002	1.441	101.8	27.4	1.820	2.083	0.202	0.0	106	1.227
14.002	1.007	111.2	44.9	2.085	1.425	0.331	0.0	165	0.954
16.000	0.990	70.0	28.9	1.105	1.300	0.213	0.0	134	0.943
16.001	1.281	90.6	63.8	1.300	1.515	0.471	0.0	186	1.384
16.002	2.977	210.5	69.5	1.515	1.400	0.513	0.0	119	2.684
14.003	2.972	472.7	121.2	1.950	2.610	0.894	0.0	154	2.502
17.000	2.475	174.9	4.9	1.500	2.610	0.036	0.0	34	1.102
12.004	1.288	91.1	135.5	2.610	1.610	1.000	0.0	300	1.305

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	98.000	320.3	375	Circular	129.520	127.721	1.424	129.430	127.415	1.640
1.001	40.000	400.0	600	Circular	129.430	127.340	1.490	129.420	127.240	1.580
1.002	40.000	500.0	600	Circular	129.420	127.240	1.580	129.410	127.160	1.650
2.000	22.937	52.1	450	Circular	129.410	127.750	1.210	129.410	127.310	1.650
1.003	13.000	118.2	750	Circular	129.410	127.010	1.650	129.000	126.900	1.350
1.004	52.000	400.0	600	Circular	129.000	126.900	1.500	129.405	126.770	2.035
1.005	100.000	180.2	600	Circular	129.405	126.770	2.035	128.875	126.215	2.060
3.000	31.500	47.7	375	Circular	128.300	127.100	0.825	128.875	126.440	2.060
1.006	70.000	400.0	750	Circular	128.875	126.065	2.060	128.860	125.890	2.220
4.000	24.543	37.2	300	Circular	129.100	127.000	1.800	128.860	126.340	2.220
1.007	50.000	300.0	750	Circular	128.860	125.890	2.220	128.780	125.723	2.307
5.000	24.500	220.0	300	Circular	128.340	126.840	1.200	128.535	126.729	1.506
5.001	23.700	220.0	300	Circular	128.535	126.729	1.506	128.775	126.621	1.854
5.002	37.000	73.4	300	Circular	128.775	126.621	1.854	128.780	126.117	2.363
6.000	37.763	67.7	300	Circular	128.250	126.675	1.275	128.780	126.117	2.363
1.008	30.000	250.0	750	Circular	128.780	125.667	2.363	128.460	125.547	2.163
7.000	18.000	180.0	300	Circular	127.700	126.100	1.300	127.710	126.000	1.410
7.001	24.000	300.0	450	Circular	127.710	125.850	1.410	128.195	125.770	1.975
7.002	27.000	300.0	450	Circular	128.195	125.770	1.975	128.460	125.680	2.330
8.000	39.000	170.3	150	Circular	128.490	126.056	2.284	128.460	125.827	2.483
1.009	10.000	400.0	750	Circular	128.460	124.297	3.413	128.515	124.272	3.493
1.010	20.500	200.0	600	Circular	128.515	124.272	3.643	125.230	124.170	0.460
9.000_1	64.000	170.7	225	Circular	128.285	127.235	0.825	128.675	126.860	1.590
9.001	71.000	249.1	300	Circular	128.675	126.785	1.590	128.670	126.500	1.870
9.002_1	43.000	260.6	300	Circular	128.670	126.500	1.870	128.875	126.335	2.240

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	U3-01	1350	Manhole	Adoptable	SW-U3-01	1500	Manhole	Adoptable
1.001	SW-U3-01	1500	Manhole	Adoptable	SW-U3-02	1500	Manhole	Adoptable
1.002	SW-U3-02	1500	Manhole	Adoptable	SW-U3-04	1800	Manhole	Adoptable
2.000	SW-U3-03	1350	Manhole	Adoptable	SW-U3-04	1800	Manhole	Adoptable
1.003	SW-U3-04	1800	Manhole	Adoptable	pond 2	1800	Manhole	Adoptable
1.004	pond 2	1800	Manhole	Adoptable	SW-U3-05	1500	Manhole	Adoptable
1.005	SW-U3-05	1500	Manhole	Adoptable	SW-U3-06	1800	Manhole	Adoptable
3.000	U3DOCK02	1350	Manhole	Adoptable	SW-U3-06	1800	Manhole	Adoptable
1.006	SW-U3-06	1800	Manhole	Adoptable	SW-U3-07	1800	Manhole	Adoptable
4.000	SW-U3-07a	1200	Manhole	Adoptable	SW-U3-07	1800	Manhole	Adoptable
1.007	SW-U3-07	1800	Manhole	Adoptable	SW-U3-14	1800	Manhole	Adoptable
5.000	SW-U3-08	1200	Manhole	Adoptable	SW-U3-09	1200	Manhole	Adoptable
5.001	SW-U3-09	1200	Manhole	Adoptable	SW-U3-13	1200	Manhole	Adoptable
5.002	SW-U3-13	1200	Manhole	Adoptable	SW-U3-14	1800	Manhole	Adoptable
6.000	U3DOCK	1200	Manhole	Adoptable	SW-U3-14	1800	Manhole	Adoptable
1.008	SW-U3-14	1800	Manhole	Adoptable	tank u3		Junction	
7.000	SW-U3-16a	1200	Manhole	Adoptable	SW-U3-16b	1350	Manhole	Adoptable
7.001	SW-U3-16b	1350	Manhole	Adoptable	SW-U3-17	1350	Manhole	Adoptable
7.002	SW-U3-17	1350	Manhole	Adoptable	tank u3		Junction	
8.000	SW-U3-15	1200	Manhole	Adoptable	tank u3		Junction	
1.009	tank u3		Junction		SW-U3-19	1800	Manhole	Adoptable
1.010	SW-U3-19	1800	Manhole	Adoptable	Outlet 1	1500	Manhole	Adoptable
9.000_1	INF-SW-04	1200	Manhole	Adoptable	INF-SW-05	1200	Manhole	Adoptable
9.001	INF-SW-05	1200	Manhole	Adoptable	INF-SW-06	1200	Manhole	Adoptable
9.002_1	INF-SW-06	1200	Manhole	Adoptable	INF-SW-07	1200	Manhole	Adoptable

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
9.003_1	29.500	281.0	300	Circular	128.875	126.335	2.240	128.960	126.230	2.430
9.004	24.000	218.2	375	Circular	128.960	126.155	2.430	129.050	126.045	2.630
10.000	52.000	220.0	300	Circular	128.220	126.700	1.220	128.160	126.464	1.396
10.001	86.000	320.0	375	Circular	128.160	126.389	1.396	129.050	126.120	2.555
9.005	10.000	222.2	450	Circular	129.050	126.045	2.555	128.500	126.000	2.050
9.000	72.800	171.3	225	Circular	129.080	127.425	1.430	129.275	127.000	2.050
11.001	20.500	241.2	300	Circular	129.275	126.930	2.045	129.080	126.845	1.935
9.002	11.000	244.4	300	Circular	129.080	126.845	1.935	128.875	126.800	1.775
12.000	18.000	120.0	150	Circular	127.900	127.150	0.600	128.390	127.000	1.240
12.001	13.500	270.0	300	Circular	128.390	126.850	1.240	128.875	126.800	1.775
9.003	21.000	140.0	450	Circular	128.875	126.650	1.775	128.550	126.500	1.600
13.000	24.000	342.9	375	Circular	129.015	127.535	1.105	129.110	127.465	1.270
13.001	43.000	344.0	375	Circular	129.110	127.465	1.270	129.170	127.340	1.455
13.002	39.505	59.4	375	Circular	129.170	127.340	1.455	128.870	126.675	1.820
13.003	9.000	360.0	375	Circular	128.870	126.675	1.820	128.550	126.650	1.525
11.004	10.000	125.0	600	Circular	128.550	126.350	1.600	128.500	126.270	1.630
9.006	49.000	100.0	600	Circular	128.500	126.000	1.900	128.235	125.510	2.125
9.007	80.000	67.2	450	Circular	128.235	125.510	2.275	125.230	124.320	0.460
1.011	24.000	200.0	600	Circular	125.230	124.170	0.460	125.060	124.050	0.410
14.000	75.000	68.2	225	Circular	129.175	127.700	1.250	129.005	126.600	2.180
14.001	23.000	250.0	300	Circular	129.005	126.522	2.183	128.810	126.430	2.080
15.000	16.700	175.8	300	Circular	127.900	126.775	0.825	128.335	126.680	1.355
15.001	3.000	27.3	300	Circular	128.335	126.680	1.355	128.690	126.570	1.820
15.002	17.000	118.9	300	Circular	128.690	126.570	1.820	128.810	126.427	2.083
14.002	16.000	320.0	375	Circular	128.810	126.350	2.085	128.100	126.300	1.425

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
9.003_1	INF-SW-07	1200	Manhole	Adoptable	INF-SW-08	1350	Manhole	Adoptable
9.004	INF-SW-08	1350	Manhole	Adoptable	INF-SW-11	1350	Manhole	Adoptable
10.000	INF-SW-09	1200	Manhole	Adoptable	INF-SW-10	1350	Manhole	Adoptable
10.001	INF-SW-10	1350	Manhole	Adoptable	INF-SW-11	1350	Manhole	Adoptable
9.005	INF-SW-11	1350	Manhole	Adoptable	Pond 3		Junction	
9.000	SW-U2-01	1200	Manhole	Adoptable	SW-U2-02	1200	Manhole	Adoptable
11.001	SW-U2-02	1200	Manhole	Adoptable	SW-U2-03	1200	Manhole	Adoptable
9.002	SW-U2-03	1200	Manhole	Adoptable	SW-U2-05	1200	Manhole	Adoptable
12.000	U2DOCK	1200	Manhole	Adoptable	SW-U2-04	1200	Manhole	Adoptable
12.001	SW-U2-04	1200	Manhole	Adoptable	SW-U2-05	1200	Manhole	Adoptable
9.003	SW-U2-05	1200	Manhole	Adoptable	SW-U2-10	1500	Manhole	Adoptable
13.000	SW-U2-06	1500	Manhole	Adoptable	SW-U2-07	1350	Manhole	Adoptable
13.001	SW-U2-07	1350	Manhole	Adoptable	SW-U2-08	1350	Manhole	Adoptable
13.002	SW-U2-08	1350	Manhole	Adoptable	SW-U2-09	1350	Manhole	Adoptable
13.003	SW-U2-09	1350	Manhole	Adoptable	SW-U2-10	1500	Manhole	Adoptable
11.004	SW-U2-10	1500	Manhole	Adoptable	Pond 3		Junction	
9.006	Pond 3		Junction		INF-SW-12	1500	Manhole	Adoptable
9.007	INF-SW-12	1500	Manhole	Adoptable	Outlet 1	1500	Manhole	Adoptable
1.011	Outlet 1	1500	Manhole	Adoptable	Outfall_1	1500	Manhole	Adoptable
14.000	SW-U1-01	1200	Manhole	Adoptable	SW-U1-02	1200	Manhole	Adoptable
14.001	SW-U1-02	1200	Manhole	Adoptable	SW-U1-05	1350	Manhole	Adoptable
15.000	U1DOCK	1200	Manhole	Adoptable	SW-U1-03	1200	Manhole	Adoptable
15.001	SW-U1-03	1200	Manhole	Adoptable	SW-U1-04	1200	Manhole	Adoptable
15.002	SW-U1-04	1200	Manhole	Adoptable	SW-U1-05	1350	Manhole	Adoptable
14.002	SW-U1-05	1350	Manhole	Adoptable	Pond 1		Junction	

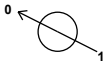
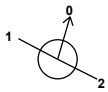
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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
16.000	30.000	250.0	300	Circular	129.025	127.620	1.105	129.100	127.500	1.300
16.001	31.500	150.0	300	Circular	129.100	127.500	1.300	129.105	127.290	1.515
16.002	25.000	28.1	300	Circular	129.105	127.290	1.515	128.100	126.400	1.400
14.003	31.000	47.0	450	Circular	128.100	125.700	1.950	128.100	125.040	2.610
17.000	41.000	40.6	300	Circular	128.000	126.200	1.500	128.100	125.190	2.610
12.004	46.000	148.4	300	Circular	128.100	125.190	2.610	126.790	124.880	1.610

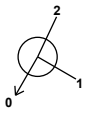
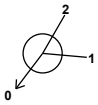
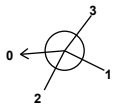
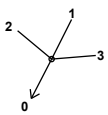
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
16.000	SW-U1-06	1200	Manhole	Adoptable	SW-U1-07	1200	Manhole	Adoptable
16.001	SW-U1-07	1200	Manhole	Adoptable	SW-U1-07a	1200	Manhole	Adoptable
16.002	SW-U1-07a	1200	Manhole	Adoptable	Pond 1		Junction	
14.003	Pond 1		Junction		Outlet 2	2100	Manhole	Adoptable
17.000	INF-SW-01	1200	Manhole	Adoptable	Outlet 2	2100	Manhole	Adoptable
12.004	Outlet 2	2100	Manhole	Adoptable	INF-SW-03	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
U3-01	2.887	228.265	129.520	1.799	1350				
						0	1.000	127.721	375
SW-U3-01	47.431	318.999	129.430	2.090	1500	1	1.000	127.415	375
									
						0	1.001	127.340	600
SW-U3-02	5.738	340.097	129.420	2.180	1500	1	1.001	127.240	600
									
						0	1.002	127.240	600
SW-U3-03	-49.796	368.517	129.410	1.660	1350				
						0	2.000	127.750	450
SW-U3-04	-29.494	357.843	129.410	2.400	1800	1	2.000	127.310	450
							2	1.002	127.160	600
						0	1.003	127.010	750
pond 2	-24.898	373.497	129.000	2.100	1800	1	1.003	126.900	750
									
						0	1.004	126.900	600
SW-U3-05	-82.503	402.851	129.405	2.635	1500	1	1.004	126.770	600
									
						0	1.005	126.770	600
U3DOCK02	-103.868	298.841	128.300	1.200	1350				
						0	3.000	127.100	375

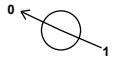
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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW-U3-06	-125.706	311.486	128.875	2.810	1800		1	3.000	126.440	375
							2	1.005	126.215	600
							0	1.006	126.065	750
SW-U3-07a	-138.258	245.182	129.100	2.100	1200		0	4.000	127.000	300
SW-U3-07	-162.706	247.344	128.860	2.970	1800		1	4.000	126.340	300
							2	1.006	125.890	750
							0	1.007	125.890	750
SW-U3-08	-206.829	120.293	128.340	1.500	1200		0	5.000	126.840	300
SW-U3-09	-195.890	141.422	128.535	1.806	1200		1	5.000	126.729	300
							0	5.001	126.729	300
SW-U3-13	-213.075	167.763	128.775	2.154	1200		1	5.001	126.621	300
							0	5.002	126.621	300
U3DOCK	-157.750	192.480	128.250	1.575	1200		0	6.000	126.675	300
SW-U3-14	-191.604	209.212	128.780	3.113	1800		1	6.000	126.117	300
							2	5.002	126.117	300
							3	1.007	125.723	750
							0	1.008	125.667	750
SW-U3-16a	-281.923	205.804	127.700	1.600	1200		0	7.000	126.100	300
SW-U3-16b	-276.071	215.796	127.710	1.860	1350		1	7.000	126.000	300
							0	7.001	125.850	450
SW-U3-17	-247.968	223.481	128.195	2.425	1350		1	7.001	125.770	450
							0	7.002	125.770	450
SW-U3-15	-204.855	250.909	128.490	2.434	1200		0	8.000	126.056	150
tank u3	-227.323	206.290	128.460	4.163			1	8.000	125.827	150
							2	7.002	125.680	450
							3	1.008	125.547	750
							0	1.009	124.297	750

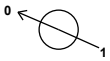
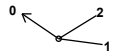
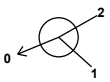
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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW-U3-19	-247.365	167.513	128.515	4.243	1800	 1	1.009	124.272	750
						0	1.010	124.272	600
INF-SW-04	75.774	-75.841	128.285	1.050	1200	 0	9.000_1	127.235	225
INF-SW-05	8.645	-46.954	128.675	1.890	1200	 1	9.000_1	126.860	225
						0	9.001	126.785	300
INF-SW-06	-61.308	-13.922	128.670	2.170	1200	 1	9.001	126.500	300
						0	9.002_1	126.500	300
INF-SW-07	-104.971	15.152	128.875	2.540	1200	 1	9.002_1	126.335	300
						0	9.003_1	126.335	300
INF-SW-08	-97.614	40.800	128.960	2.805	1350	 1	9.003_1	126.230	300
						0	9.004	126.155	375
INF-SW-09	-238.918	117.147	128.220	1.520	1200	 0	10.000	126.700	300
INF-SW-10	-195.658	78.856	128.160	1.771	1350	 1	10.000	126.464	300
						0	10.001	126.389	375
INF-SW-11	-111.470	51.646	129.050	3.005	1350	1	10.001	126.120	375
						 2	9.004	126.045	375
						0	9.005	126.045	450
SW-U2-01	8.300	49.833	129.080	1.655	1200	 0	9.000	127.425	225
SW-U2-02	-63.271	81.772	129.275	2.345	1200	 1	9.000	127.000	225
						0	11.001	126.930	300
SW-U2-03	-71.037	63.948	129.080	2.235	1200	 1	11.001	126.845	300
						0	9.002	126.845	300
U2DOCK	-52.951	32.146	127.900	0.750	1200	 0	12.000	127.150	150

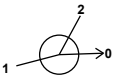
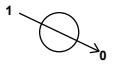
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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW-U2-04	-70.164	40.479	128.390	1.540	1200	 1	12.000	127.000	150
						0	12.001	126.850	300
SW-U2-05	-63.352	54.858	128.875	2.225	1200	 1	12.001	126.800	300
						2	9.002	126.800	300
						0	9.003	126.650	450
SW-U2-06	-2.475	51.605	129.015	1.480	1500				
						0	13.000	127.535	375
SW-U2-07	-31.727	64.741	129.110	1.645	1350	 1	13.000	127.465	375
						0	13.001	127.465	375
SW-U2-08	-66.306	79.572	129.170	1.830	1350	 1	13.001	127.340	375
						0	13.002	127.340	375
SW-U2-09	-81.500	43.106	128.870	2.195	1350	 1	13.002	126.675	375
						0	13.003	126.675	375
SW-U2-10	-78.694	33.385	128.550	2.200	1500	 1	13.003	126.650	375
						2	9.003	126.500	450
						0	11.004	126.350	600
Pond 3	-130.121	40.183	128.500	2.500		 1	11.004	126.270	600
						2	9.005	126.000	450
						0	9.006	126.000	600
INF-SW-12	-199.820	87.665	128.235	2.725	1500	 1	9.006	125.510	600
						0	9.007	125.510	450
Outlet 1	-272.699	153.204	125.230	1.060	1500	 1	9.007	124.320	450
						2	1.010	124.170	600
						0	1.011	124.170	600
Outfall_1	-293.513	144.630	125.060	1.010	1500	 1	1.011	124.050	600
SW-U1-01	38.948	40.406	129.175	1.475	1200				
						0	14.000	127.700	225
SW-U1-02	115.291	4.637	129.005	2.483	1200	 1	14.000	126.600	225
						0	14.001	126.522	300

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
U1DOCK	65.169	-19.484	127.900	1.125	1200		0 15.000	126.775	300
SW-U1-03	82.940	-28.194	128.335	1.655	1200		1 15.000	126.680	300
							0 15.001	126.680	300
SW-U1-04	85.859	-21.250	128.690	2.120	1200		1 15.001	126.570	300
							0 15.002	126.570	300
SW-U1-05	103.737	-16.584	128.810	2.460	1350		1 15.002	126.427	300
							2 14.001	126.430	300
							0 14.002	126.350	375
SW-U1-06	48.033	28.133	129.025	1.405	1200		0 16.000	127.620	300
SW-U1-07	75.562	15.021	129.100	1.600	1200		1 16.000	127.500	300
							0 16.001	127.500	300
SW-U1-07a	107.219	-0.146	129.105	1.815	1200		1 16.001	127.290	300
							0 16.002	127.290	300
Pond 1	133.338	-15.612	128.100	2.400			1 16.002	126.400	300
							2 14.002	126.300	375
							0 14.003	125.700	450
INF-SW-01	136.316	-65.299	128.000	1.800	1200		0 17.000	126.200	300
Outlet 2	107.993	-50.574	128.100	3.060	2100		1 17.000	125.190	300
							2 14.003	125.040	450
							0 12.004	125.190	300
INF-SW-03	113.270	-89.805	126.790	1.910	1200		1 12.004	124.880	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

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Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	30	0	0
100	30	0	0

Node Outlet 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Downstream Link	12.004	Sump Available	✓
Replaces Downstream Link	✓	Product Number	CTL-SHE-0084-5000-2900-5000
Invert Level (m)	125.190	Min Outlet Diameter (m)	0.100
Design Depth (m)	2.900	Min Node Diameter (mm)	1200
Design Flow (l/s)	5.0		

Node SW-U3-14 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	125.667	Product Number	CTL-CHE-0643-4000-2500-4000
Design Depth (m)	2.500	Min Outlet Diameter (m)	
Design Flow (l/s)	400.0	Min Node Diameter (mm)	

Node Pond 3 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	126.000	Product Number	CTL-SHE-0091-5000-2100-5000
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	5.0	Min Node Diameter (mm)	1200

Node SW-U3-19 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	124.272	Product Number	CTL-SHE-0505-2080-3400-2080
Design Depth (m)	3.400	Min Outlet Diameter (m)	
Design Flow (l/s)	208.0	Min Node Diameter (mm)	

Node pond 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	126.900	Product Number	CTL-SHE-0479-1700-2100-1700
Design Depth (m)	2.100	Min Outlet Diameter (m)	0.500
Design Flow (l/s)	170.0	Min Node Diameter (mm)	

Node Pond 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	126.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	320.0	0.0	2.500	1500.0	0.0	2.501	0.0	0.0

Node pond 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	126.900
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	68

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	70.0	0.0	2.100	760.0	0.0

Node Pond 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	125.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	24.0	0.0	2.400	490.0	0.0	2.401	0.0	0.0

Node tank u3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	124.297
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	162

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	320.0	0.0	2.000	320.0	0.0	2.010	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	U3-01	11	127.811	0.090	15.4	0.2482	0.0000	OK
15 minute winter	SW-U3-01	11	127.636	0.296	107.7	2.6000	0.0000	OK
15 minute winter	SW-U3-02	11	127.616	0.376	225.2	4.3059	0.0000	OK
15 minute winter	SW-U3-03	10	127.899	0.149	94.1	1.5274	0.0000	OK
30 minute winter	SW-U3-04	24	127.578	0.568	367.9	6.4433	0.0000	OK
30 minute winter	pond 2	24	127.576	0.676	359.3	124.7802	0.0000	SURCHARGED
30 minute winter	SW-U3-05	20	127.019	0.249	180.2	0.7910	0.0000	OK
15 minute winter	U3DOCK02	11	127.189	0.089	33.8	0.5530	0.0000	OK
30 minute winter	SW-U3-06	20	126.385	0.320	218.4	1.1347	0.0000	OK
15 minute winter	SW-U3-07a	10	127.022	0.022	1.9	0.0274	0.0000	OK
30 minute winter	SW-U3-07	22	126.292	0.402	236.0	1.5611	0.0000	OK
15 minute winter	SW-U3-08	10	126.914	0.074	10.3	0.1622	0.0000	OK
15 minute winter	SW-U3-09	10	126.845	0.116	22.9	0.2599	0.0000	OK
15 minute winter	SW-U3-13	11	126.721	0.100	29.5	0.1657	0.0000	OK
15 minute winter	U3DOCK	10	126.790	0.114	40.4	0.5874	0.0000	OK
30 minute winter	SW-U3-14	22	126.268	0.601	270.4	1.5304	0.0000	OK
15 minute winter	SW-U3-16a	11	126.179	0.078	11.6	0.1859	0.0000	OK
15 minute winter	SW-U3-16b	11	126.017	0.167	45.2	0.7128	0.0000	OK
15 minute winter	SW-U3-17	11	125.989	0.219	88.5	0.9457	0.0000	OK
15 minute winter	SW-U3-15	11	126.127	0.071	6.4	0.1095	0.0000	OK
60 minute winter	tank u3	52	125.003	0.706	297.9	214.6634	0.0000	OK
60 minute winter	SW-U3-19	52	124.999	0.727	193.7	1.8502	0.0000	SURCHARGED
15 minute winter	INF-SW-04	11	127.304	0.069	8.7	0.1683	0.0000	OK
15 minute winter	INF-SW-05	11	126.875	0.090	14.4	0.1516	0.0000	OK
15 minute winter	INF-SW-06	12	126.609	0.109	20.7	0.1783	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	U3-01	1.000	SW-U3-01	14.4	0.451	0.129	4.2953	
15 minute winter	SW-U3-01	1.001	SW-U3-02	98.1	0.618	0.287	6.4783	
15 minute winter	SW-U3-02	1.002	SW-U3-04	220.4	1.332	0.721	6.9107	
15 minute winter	SW-U3-03	2.000	SW-U3-04	92.5	2.147	0.206	1.1799	
30 minute winter	SW-U3-04	1.003	pond 2	349.0	1.744	0.307	5.0405	
30 minute winter	pond 2	Hydro-Brake®	SW-U3-05	166.6				
30 minute winter	SW-U3-05	1.005	SW-U3-06	179.9	1.672	0.351	10.7612	
15 minute winter	U3DOCK02	3.000	SW-U3-06	33.8	1.749	0.116	0.6085	
30 minute winter	SW-U3-06	1.006	SW-U3-07	217.2	1.158	0.353	14.5938	
15 minute winter	SW-U3-07a	4.000	SW-U3-07	1.8	0.835	0.010	0.0542	
30 minute winter	SW-U3-07	1.007	SW-U3-14	225.8	0.925	0.317	14.5784	
15 minute winter	SW-U3-08	5.000	SW-U3-09	10.1	0.527	0.135	0.4728	
15 minute winter	SW-U3-09	5.001	SW-U3-13	22.4	0.987	0.301	0.5398	
15 minute winter	SW-U3-13	5.002	SW-U3-14	29.6	1.478	0.228	0.8247	
15 minute winter	U3DOCK	6.000	SW-U3-14	39.3	1.643	0.290	0.9059	
30 minute winter	SW-U3-14	Hydro-Brake®	tank u3	266.0				
15 minute winter	SW-U3-16a	7.000	SW-U3-16b	11.6	0.815	0.140	0.2560	
15 minute winter	SW-U3-16b	7.001	SW-U3-17	44.2	0.682	0.238	1.5579	
15 minute winter	SW-U3-17	7.002	tank u3	88.0	1.196	0.473	1.9858	
15 minute winter	SW-U3-15	8.000	tank u3	6.1	0.752	0.453	0.3183	
60 minute winter	tank u3	1.009	SW-U3-19	193.7	0.511	0.315	4.3313	
60 minute winter	SW-U3-19	Hydro-Brake®	Outlet 1	193.7				
15 minute winter	INF-SW-04	9.000_1	INF-SW-05	8.1	0.787	0.204	0.6582	
15 minute winter	INF-SW-05	9.001	INF-SW-06	14.1	0.696	0.201	1.4388	
15 minute winter	INF-SW-06	9.002_1	INF-SW-07	19.8	0.727	0.288	1.1737	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	INF-SW-07	1080	126.565	0.230	2.5	0.3814	0.0000	OK
1440 minute winter	INF-SW-08	1080	126.565	0.410	3.0	0.7265	0.0000	SURCHARGED
15 minute winter	INF-SW-09	11	126.758	0.058	6.4	0.1031	0.0000	OK
1440 minute winter	INF-SW-10	1080	126.565	0.176	1.1	0.3749	0.0000	OK
1440 minute winter	INF-SW-11	1080	126.565	0.520	3.9	0.7436	0.0000	SURCHARGED
15 minute winter	SW-U2-01	11	127.483	0.058	6.4	0.1012	0.0000	OK
15 minute winter	SW-U2-02	11	127.041	0.111	19.3	0.2299	0.0000	OK
15 minute winter	SW-U2-03	11	126.969	0.124	22.1	0.1665	0.0000	OK
15 minute winter	U2DOCK	10	127.201	0.051	4.0	0.0999	0.0000	OK
15 minute winter	SW-U2-04	11	126.900	0.050	3.8	0.0565	0.0000	OK
15 minute winter	SW-U2-05	11	126.787	0.137	49.2	0.3894	0.0000	OK
15 minute winter	SW-U2-06	11	127.675	0.140	25.0	0.6160	0.0000	OK
15 minute winter	SW-U2-07	11	127.660	0.195	59.4	0.9397	0.0000	OK
15 minute winter	SW-U2-08	11	127.465	0.125	63.7	0.2345	0.0000	OK
15 minute winter	SW-U2-09	11	126.891	0.216	63.7	0.3090	0.0000	OK
1440 minute winter	SW-U2-10	1080	126.568	0.218	15.4	0.3850	0.0000	OK
1440 minute winter	Pond 3	1080	126.565	0.565	13.8	256.5669	0.0000	OK
180 minute winter	INF-SW-12	252	125.542	0.032	4.0	0.0567	0.0000	OK
60 minute winter	Outlet 1	52	124.458	0.288	197.6	0.5090	0.0000	OK
60 minute winter	Outfall_1	52	124.310	0.260	197.6	0.0000	0.0000	OK
15 minute winter	SW-U1-01	11	127.747	0.047	6.4	0.0851	0.0000	OK
720 minute winter	SW-U1-02	570	126.707	0.185	1.6	0.2839	0.0000	OK
15 minute winter	U1DOCK	10	126.857	0.082	12.7	0.2369	0.0000	OK
15 minute winter	SW-U1-03	10	126.767	0.087	25.7	0.2062	0.0000	OK
480 minute winter	SW-U1-04	408	126.707	0.137	4.1	0.1550	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	INF-SW-07	9.003_1	INF-SW-08	2.5	0.448	0.038	1.8933	
1440 minute winter	INF-SW-08	9.004	INF-SW-11	2.8	0.269	0.021	2.6471	
15 minute winter	INF-SW-09	10.000	INF-SW-10	6.0	0.639	0.080	0.4867	
1440 minute winter	INF-SW-10	10.001	INF-SW-11	1.1	0.281	0.010	6.9234	
1440 minute winter	INF-SW-11	9.005	Pond 3	3.4	0.452	0.016	1.5844	
15 minute winter	SW-U2-01	9.000	SW-U2-02	5.8	0.715	0.146	0.5882	
15 minute winter	SW-U2-02	11.001	SW-U2-03	19.2	0.753	0.270	0.5237	
15 minute winter	SW-U2-03	9.002	SW-U2-05	22.2	0.859	0.314	0.2849	
15 minute winter	U2DOCK	12.000	SW-U2-04	3.8	0.743	0.236	0.0930	
15 minute winter	SW-U2-04	12.001	SW-U2-05	3.9	0.533	0.057	0.0979	
15 minute winter	SW-U2-05	9.003	SW-U2-10	49.5	1.276	0.181	0.8143	
15 minute winter	SW-U2-06	13.000	SW-U2-07	24.0	0.506	0.224	1.1433	
15 minute winter	SW-U2-07	13.001	SW-U2-08	58.8	1.315	0.549	1.9320	
15 minute winter	SW-U2-08	13.002	SW-U2-09	63.7	1.312	0.245	1.9301	
15 minute winter	SW-U2-09	13.003	SW-U2-10	62.6	1.056	0.598	0.5344	
1440 minute winter	SW-U2-10	11.004	Pond 3	9.8	0.795	0.016	1.1505	
1440 minute winter	Pond 3	9.006	INF-SW-12	4.0	0.687	0.006	0.2867	
180 minute winter	INF-SW-12	9.007	Outlet 1	4.0	0.815	0.010	1.6896	
60 minute winter	Outlet 1	1.011	Outfall_1	197.6	1.578	0.407	3.0056	697.3
15 minute winter	SW-U1-01	14.000	SW-U1-02	6.0	1.007	0.095	0.4483	
720 minute winter	SW-U1-02	14.001	SW-U1-05	1.6	0.427	0.023	1.3110	
15 minute winter	U1DOCK	15.000	SW-U1-03	12.5	0.769	0.149	0.2709	
15 minute winter	SW-U1-03	15.001	SW-U1-04	25.4	1.288	0.119	0.0592	
480 minute winter	SW-U1-04	15.002	SW-U1-05	4.1	0.704	0.040	0.8402	

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Results for 1 year Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
720 minute winter	SW-U1-05	555	126.710	0.360	5.3	0.6009	0.0000	OK
15 minute winter	SW-U1-06	10	127.748	0.127	27.3	0.5306	0.0000	OK
15 minute winter	SW-U1-07	11	127.685	0.185	59.6	0.8054	0.0000	OK
15 minute winter	SW-U1-07a	11	127.406	0.116	63.8	0.1851	0.0000	OK
720 minute winter	Pond 1	555	126.708	1.007	14.2	123.1363	0.0000	SURCHARGED
720 minute winter	INF-SW-01	555	126.708	0.507	1.1	0.7769	0.0000	SURCHARGED
720 minute winter	Outlet 2	555	126.708	1.667	7.8	6.5382	0.0000	SURCHARGED
15 minute summer	INF-SW-03	1	124.880	0.000	3.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
720 minute winter	SW-U1-05	14.002	Pond 1	5.3	0.551	0.048	1.7533	
15 minute winter	SW-U1-06	16.000	SW-U1-07	26.5	0.716	0.379	1.1106	
15 minute winter	SW-U1-07	16.001	SW-U1-07a	58.7	1.659	0.648	1.1139	
15 minute winter	SW-U1-07a	16.002	Pond 1	64.2	2.602	0.305	0.6166	
720 minute winter	Pond 1	14.003	Outlet 2	6.9	0.239	0.015	4.9117	
720 minute winter	INF-SW-01	17.000	Outlet 2	-0.6	0.387	-0.003	2.8872	
720 minute winter	Outlet 2	Hydro-Brake®	INF-SW-03	3.7				182.8

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Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	U3-01	11	129.159	1.438	116.6	3.9771	0.0000	SURCHARGED
15 minute winter	SW-U3-01	12	129.034	1.694	364.8	14.8884	0.0000	SURCHARGED
15 minute winter	SW-U3-02	12	128.944	1.704	740.8	19.5336	0.0000	SURCHARGED
60 minute winter	SW-U3-03	54	128.769	1.019	168.3	10.4699	0.0000	SURCHARGED
60 minute winter	SW-U3-04	55	128.766	1.756	806.1	19.9356	0.0000	SURCHARGED
60 minute winter	pond 2	56	128.761	1.861	814.2	705.7764	0.0000	FLOOD RISK
120 minute winter	SW-U3-05	116	128.180	1.410	194.9	4.4821	0.0000	SURCHARGED
30 minute winter	U3DOCK02	22	128.134	1.034	92.9	6.4592	0.0000	FLOOD RISK
120 minute winter	SW-U3-06	116	128.117	2.052	257.9	7.2649	0.0000	SURCHARGED
120 minute winter	SW-U3-07a	116	128.100	1.100	4.6	1.4015	0.0000	SURCHARGED
120 minute winter	SW-U3-07	116	128.100	2.210	294.6	8.5860	0.0000	SURCHARGED
30 minute winter	SW-U3-08	22	128.144	1.304	58.5	2.8669	0.0000	FLOOD RISK
30 minute winter	SW-U3-09	22	128.136	1.407	58.7	3.1492	0.0000	SURCHARGED
30 minute winter	SW-U3-13	22	128.105	1.484	74.3	2.4628	0.0000	SURCHARGED
30 minute winter	U3DOCK	22	128.171	1.496	103.5	7.6752	0.0000	FLOOD RISK
120 minute winter	SW-U3-14	116	128.086	2.419	358.4	6.1567	0.0000	SURCHARGED
120 minute winter	SW-U3-16a	116	127.629	1.529	14.6	3.6209	0.0000	FLOOD RISK
120 minute winter	SW-U3-16b	116	127.629	1.779	53.7	7.6158	0.0000	FLOOD RISK
120 minute winter	SW-U3-17	116	127.629	1.859	105.4	8.0263	0.0000	SURCHARGED
120 minute winter	SW-U3-15	116	127.630	1.574	7.4	2.4264	0.0000	SURCHARGED
120 minute winter	tank u3	116	127.629	3.331	906.0	609.5200	0.0000	SURCHARGED
120 minute winter	SW-U3-19	116	127.623	3.351	209.9	8.5282	0.0000	SURCHARGED
1440 minute winter	INF-SW-04	1410	127.391	0.156	1.7	0.3789	0.0000	OK
1440 minute winter	INF-SW-05	1410	127.391	0.606	3.0	1.0185	0.0000	SURCHARGED
1440 minute winter	INF-SW-06	1410	127.391	0.891	4.3	1.4593	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	U3-01	1.000	SW-U3-01	-70.6	-0.640	-0.635	10.8091	
15 minute winter	SW-U3-01	1.001	SW-U3-02	309.6	1.099	0.904	11.2671	
15 minute winter	SW-U3-02	1.002	SW-U3-04	674.7	2.395	2.205	11.2671	
60 minute winter	SW-U3-03	2.000	SW-U3-04	154.1	1.895	0.344	3.6342	
60 minute winter	SW-U3-04	1.003	pond 2	791.3	1.937	0.696	5.7216	
60 minute winter	pond 2	Hydro-Brake®	SW-U3-05	169.9				
120 minute winter	SW-U3-05	1.005	SW-U3-06	250.1	1.702	0.489	28.1677	
30 minute winter	U3DOCK02	3.000	SW-U3-06	91.0	2.119	0.314	3.4744	
120 minute winter	SW-U3-06	1.006	SW-U3-07	293.4	1.128	0.477	30.8085	
120 minute winter	SW-U3-07a	4.000	SW-U3-07	8.6	0.812	0.047	1.7283	
120 minute winter	SW-U3-07	1.007	SW-U3-14	304.7	0.865	0.428	22.0060	
30 minute winter	SW-U3-08	5.000	SW-U3-09	-32.2	0.656	-0.432	1.7253	
30 minute winter	SW-U3-09	5.001	SW-U3-13	55.6	1.258	0.745	1.6689	
30 minute winter	SW-U3-13	5.002	SW-U3-14	68.8	1.473	0.530	2.6055	
30 minute winter	U3DOCK	6.000	SW-U3-14	91.0	1.683	0.673	2.6592	
120 minute winter	SW-U3-14	Hydro-Brake®	tank u3	357.0				
120 minute winter	SW-U3-16a	7.000	SW-U3-16b	31.2	1.244	0.378	1.2675	
120 minute winter	SW-U3-16b	7.001	SW-U3-17	65.6	0.768	0.353	3.8026	
120 minute winter	SW-U3-17	7.002	tank u3	211.8	1.337	1.140	4.2780	
120 minute winter	SW-U3-15	8.000	tank u3	16.2	0.919	1.193	0.6866	
120 minute winter	tank u3	1.009	SW-U3-19	-373.2	-0.848	-0.607	4.4012	
120 minute winter	SW-U3-19	Hydro-Brake®	Outlet 1	207.8				
1440 minute winter	INF-SW-04	9.000_1	INF-SW-05	1.7	0.502	0.043	2.2139	
1440 minute winter	INF-SW-05	9.001	INF-SW-06	3.0	0.399	0.043	4.9998	
1440 minute winter	INF-SW-06	9.002_1	INF-SW-07	3.7	0.399	0.054	3.0280	

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Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	INF-SW-07	1410	127.391	1.056	5.3	1.7517	0.0000	SURCHARGED
1440 minute winter	INF-SW-08	1410	127.391	1.236	6.4	2.1926	0.0000	SURCHARGED
1440 minute winter	INF-SW-09	1410	127.391	0.690	1.3	1.2353	0.0000	SURCHARGED
1440 minute winter	INF-SW-10	1410	127.391	1.002	2.6	2.1355	0.0000	SURCHARGED
1440 minute winter	INF-SW-11	1410	127.391	1.346	8.7	1.9261	0.0000	SURCHARGED
15 minute winter	SW-U2-01	11	127.536	0.111	20.4	0.1921	0.0000	OK
1440 minute winter	SW-U2-02	1410	127.394	0.464	4.1	0.9592	0.0000	SURCHARGED
1440 minute winter	SW-U2-03	1410	127.393	0.548	4.7	0.7381	0.0000	SURCHARGED
1440 minute winter	U2DOCK	1410	127.393	0.243	0.8	0.4761	0.0000	SURCHARGED
1440 minute winter	SW-U2-04	1410	127.393	0.543	0.8	0.6142	0.0000	SURCHARGED
1440 minute winter	SW-U2-05	1410	127.392	0.742	10.4	2.1140	0.0000	SURCHARGED
15 minute winter	SW-U2-06	11	128.115	0.580	79.6	2.5543	0.0000	SURCHARGED
15 minute winter	SW-U2-07	11	128.068	0.603	185.5	2.9074	0.0000	SURCHARGED
15 minute winter	SW-U2-08	11	127.610	0.270	199.5	0.5067	0.0000	OK
1440 minute winter	SW-U2-09	1410	127.392	0.717	13.1	1.0260	0.0000	SURCHARGED
1440 minute winter	SW-U2-10	1410	127.392	1.042	22.7	1.8410	0.0000	SURCHARGED
1440 minute winter	Pond 3	1410	127.391	1.391	33.8	903.1036	0.0000	SURCHARGED
1440 minute winter	INF-SW-12	1410	125.542	0.032	4.1	0.0571	0.0000	OK
120 minute winter	Outlet 1	62	124.470	0.300	211.8	0.5305	0.0000	OK
120 minute winter	Outfall_1	62	124.320	0.270	211.8	0.0000	0.0000	OK
960 minute winter	SW-U1-01	930	127.854	0.154	1.7	0.2793	0.0000	OK
960 minute winter	SW-U1-02	915	127.855	1.333	3.4	2.0453	0.0000	SURCHARGED
960 minute winter	U1DOCK	915	127.855	1.080	3.4	3.1221	0.0000	FLOOD RISK
960 minute winter	SW-U1-03	915	127.855	1.175	6.7	2.7918	0.0000	SURCHARGED
960 minute winter	SW-U1-04	915	127.854	1.284	6.6	1.4522	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	INF-SW-07	9.003_1	INF-SW-08	5.2	0.432	0.079	2.0774	
1440 minute winter	INF-SW-08	9.004	INF-SW-11	6.3	0.346	0.047	2.6471	
1440 minute winter	INF-SW-09	10.000	INF-SW-10	1.1	0.378	0.015	3.6618	
1440 minute winter	INF-SW-10	10.001	INF-SW-11	2.5	0.280	0.022	9.4855	
1440 minute winter	INF-SW-11	9.005	Pond 3	8.6	0.518	0.040	1.5844	
15 minute winter	SW-U2-01	9.000	SW-U2-02	19.6	0.800	0.495	1.9715	
1440 minute winter	SW-U2-02	11.001	SW-U2-03	4.1	0.512	0.058	1.4436	
1440 minute winter	SW-U2-03	9.002	SW-U2-05	4.7	0.567	0.066	0.7746	
1440 minute winter	U2DOCK	12.000	SW-U2-04	0.8	0.476	0.049	0.3169	
1440 minute winter	SW-U2-04	12.001	SW-U2-05	0.8	0.350	0.012	0.9507	
1440 minute winter	SW-U2-05	9.003	SW-U2-10	10.1	0.763	0.037	3.3273	
15 minute winter	SW-U2-06	13.000	SW-U2-07	75.8	0.688	0.706	2.6471	
15 minute winter	SW-U2-07	13.001	SW-U2-08	183.8	1.745	1.714	4.1952	
15 minute winter	SW-U2-08	13.002	SW-U2-09	197.1	1.871	0.758	3.8543	
1440 minute winter	SW-U2-09	13.003	SW-U2-10	12.7	0.661	0.121	0.9927	
1440 minute winter	SW-U2-10	11.004	Pond 3	22.1	0.825	0.036	2.8168	
1440 minute winter	Pond 3	9.006	INF-SW-12	4.1	0.690	0.006	0.2899	
1440 minute winter	INF-SW-12	9.007	Outlet 1	4.1	0.819	0.010	1.2005	
120 minute winter	Outlet 1	1.011	Outfall_1	211.8	1.606	0.436	3.1661	2495.1
960 minute winter	SW-U1-01	14.000	SW-U1-02	1.7	0.589	0.027	2.5804	
960 minute winter	SW-U1-02	14.001	SW-U1-05	2.9	0.424	0.042	1.6196	
960 minute winter	U1DOCK	15.000	SW-U1-03	3.2	0.565	0.038	1.1760	
960 minute winter	SW-U1-03	15.001	SW-U1-04	6.6	0.882	0.031	0.2113	
960 minute winter	SW-U1-04	15.002	SW-U1-05	6.4	0.659	0.062	1.1971	

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Results for 30 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	SW-U1-05	915	127.854	1.504	10.3	2.5077	0.0000	SURCHARGED
15 minute winter	SW-U1-06	11	128.664	1.044	86.9	4.3477	0.0000	SURCHARGED
15 minute winter	SW-U1-07	11	128.483	0.983	176.2	4.2802	0.0000	SURCHARGED
960 minute winter	SW-U1-07a	915	127.853	0.563	17.5	0.8973	0.0000	SURCHARGED
960 minute winter	Pond 1	915	127.853	2.153	29.3	502.5053	0.0000	FLOOD RISK
960 minute winter	INF-SW-01	930	127.853	1.653	1.2	2.5304	0.0000	FLOOD RISK
960 minute winter	Outlet 2	915	127.853	2.813	7.4	11.0278	0.0000	FLOOD RISK
15 minute summer	INF-SW-03	1	124.880	0.000	3.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	SW-U1-05	14.002	Pond 1	10.1	0.518	0.091	1.7648	
15 minute winter	SW-U1-06	16.000	SW-U1-07	76.7	1.089	1.097	2.1126	
15 minute winter	SW-U1-07	16.001	SW-U1-07a	170.2	2.481	1.879	2.0302	
960 minute winter	SW-U1-07a	16.002	Pond 1	17.5	1.463	0.083	1.7605	
960 minute winter	Pond 1	14.003	Outlet 2	6.7	0.205	0.014	4.9117	
960 minute winter	INF-SW-01	17.000	Outlet 2	1.1	0.387	0.006	2.8872	
960 minute winter	Outlet 2	Hydro-Brake®	INF-SW-03	4.8				289.9

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Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	U3-01	10	129.520	1.799	102.8	4.9742	2.7529	FLOOD
15 minute winter	SW-U3-01	10	129.430	2.090	440.8	18.3732	25.2988	FLOOD
15 minute winter	SW-U3-02	10	129.382	2.142	855.4	24.5534	0.0000	FLOOD RISK
30 minute winter	SW-U3-03	20	129.180	1.430	315.3	14.6970	0.0000	FLOOD RISK
60 minute winter	SW-U3-04	40	129.111	2.101	1061.5	23.8496	0.0000	FLOOD RISK
60 minute winter	pond 2	40	129.000	2.100	1073.5	878.8437	207.5242	FLOOD
120 minute winter	SW-U3-05	74	128.488	1.718	198.3	5.4611	0.0000	SURCHARGED
180 minute winter	U3DOCK02	108	128.300	1.200	107.5	7.4976	55.2348	FLOOD
120 minute winter	SW-U3-06	74	128.370	2.305	276.8	8.1625	0.0000	SURCHARGED
120 minute winter	SW-U3-07a	74	128.326	1.326	5.5	1.6896	0.0000	SURCHARGED
120 minute winter	SW-U3-07	74	128.344	2.454	297.1	9.5341	0.0000	SURCHARGED
30 minute winter	SW-U3-08	19	128.340	1.500	43.7	3.2970	6.3328	FLOOD
30 minute summer	SW-U3-09	19	128.387	1.658	74.8	3.7115	0.0000	FLOOD RISK
30 minute summer	SW-U3-13	19	128.371	1.750	91.4	2.9052	0.0000	SURCHARGED
360 minute winter	U3DOCK	216	128.250	1.575	40.5	8.0813	89.6301	FLOOD
120 minute winter	SW-U3-14	74	128.308	2.641	382.5	6.7217	0.0000	SURCHARGED
180 minute summer	SW-U3-16a	112	127.700	1.600	30.1	3.7888	44.9627	FLOOD
120 minute winter	SW-U3-16b	74	127.710	1.860	133.6	7.9627	90.0274	FLOOD
240 minute winter	SW-U3-17	156	127.751	1.981	223.6	8.5524	0.0000	SURCHARGED
120 minute winter	SW-U3-15	74	127.918	1.862	9.7	2.8705	0.0000	SURCHARGED
120 minute winter	tank u3	100	128.343	4.046	653.4	609.5200	43.8742	FLOOD
180 minute winter	SW-U3-19	140	127.942	3.670	488.3	9.3404	0.0000	SURCHARGED
1440 minute winter	INF-SW-04	1410	127.656	0.421	2.2	1.0219	0.0000	SURCHARGED
1440 minute winter	INF-SW-05	1410	127.656	0.871	3.8	1.4646	0.0000	SURCHARGED
1440 minute winter	INF-SW-06	1410	127.656	1.156	5.3	1.8940	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	U3-01	1.000	SW-U3-01	76.2	0.691	0.685	10.8091	
15 minute winter	SW-U3-01	1.001	SW-U3-02	309.8	1.100	0.905	11.2671	
15 minute winter	SW-U3-02	1.002	SW-U3-04	816.8	2.900	2.670	11.2671	
30 minute winter	SW-U3-03	2.000	SW-U3-04	288.8	2.072	0.644	3.6342	
60 minute winter	SW-U3-04	1.003	pond 2	1043.4	2.371	0.918	5.7216	
60 minute winter	pond 2	Hydro-Brake®	SW-U3-05	169.9				
120 minute winter	SW-U3-05	1.005	SW-U3-06	213.1	1.703	0.416	28.1677	
180 minute winter	U3DOCK02	3.000	SW-U3-06	-69.9	1.831	-0.241	3.4744	
120 minute winter	SW-U3-06	1.006	SW-U3-07	274.9	1.127	0.447	30.8085	
120 minute winter	SW-U3-07a	4.000	SW-U3-07	15.3	0.808	0.084	1.7283	
120 minute winter	SW-U3-07	1.007	SW-U3-14	311.1	0.869	0.437	22.0060	
30 minute winter	SW-U3-08	5.000	SW-U3-09	28.8	0.659	0.386	1.7253	
30 minute summer	SW-U3-09	5.001	SW-U3-13	66.8	1.258	0.895	1.6689	
30 minute summer	SW-U3-13	5.002	SW-U3-14	75.8	1.430	0.584	2.6055	
360 minute winter	U3DOCK	6.000	SW-U3-14	28.1	1.297	0.208	2.6592	
120 minute winter	SW-U3-14	Hydro-Brake®	tank u3	389.2				
180 minute summer	SW-U3-16a	7.000	SW-U3-16b	-22.2	0.928	-0.268	1.2675	
120 minute winter	SW-U3-16b	7.001	SW-U3-17	162.8	1.083	0.876	3.8026	
240 minute winter	SW-U3-17	7.002	tank u3	251.8	1.589	1.355	4.2780	
120 minute winter	SW-U3-15	8.000	tank u3	24.0	1.363	1.771	0.6866	
120 minute winter	tank u3	1.009	SW-U3-19	363.6	0.826	0.591	4.4012	
180 minute winter	SW-U3-19	Hydro-Brake®	Outlet 1	209.0				
1440 minute winter	INF-SW-04	9.000_1	INF-SW-05	2.2	0.518	0.055	2.5453	
1440 minute winter	INF-SW-05	9.001	INF-SW-06	3.6	0.403	0.051	4.9998	
1440 minute winter	INF-SW-06	9.002_1	INF-SW-07	5.2	0.381	0.076	3.0280	

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Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	INF-SW-07	1410	127.656	1.321	7.3	2.1920	0.0000	SURCHARGED
1440 minute winter	INF-SW-08	1410	127.656	1.501	8.7	2.6633	0.0000	SURCHARGED
1440 minute winter	INF-SW-09	1410	127.657	0.957	1.6	1.7116	0.0000	SURCHARGED
1440 minute winter	INF-SW-10	1410	127.657	1.268	3.5	2.7025	0.0000	SURCHARGED
1440 minute winter	INF-SW-11	1410	127.656	1.611	12.0	2.3057	0.0000	SURCHARGED
1440 minute winter	SW-U2-01	1380	127.661	0.236	1.6	0.4097	0.0000	SURCHARGED
1440 minute winter	SW-U2-02	1380	127.656	0.726	5.1	1.5026	0.0000	SURCHARGED
1440 minute winter	SW-U2-03	1410	127.656	0.811	5.7	1.0912	0.0000	SURCHARGED
1440 minute winter	U2DOCK	1440	127.655	0.505	1.0	0.9892	0.0000	FLOOD RISK
1440 minute winter	SW-U2-04	1410	127.656	0.806	1.0	0.9118	0.0000	SURCHARGED
1440 minute winter	SW-U2-05	1410	127.656	1.006	12.3	2.8638	0.0000	SURCHARGED
15 minute winter	SW-U2-06	11	128.609	1.074	102.9	4.7292	0.0000	SURCHARGED
15 minute winter	SW-U2-07	11	128.547	1.082	232.4	5.2161	0.0000	SURCHARGED
15 minute winter	SW-U2-08	11	127.925	0.585	237.5	1.1000	0.0000	SURCHARGED
1440 minute winter	SW-U2-09	1410	127.656	0.981	16.3	1.4038	0.0000	SURCHARGED
1440 minute winter	SW-U2-10	1410	127.659	1.309	27.8	2.3123	0.0000	SURCHARGED
1440 minute winter	Pond 3	1410	127.656	1.656	43.5	1178.9650	0.0000	SURCHARGED
1440 minute winter	INF-SW-12	1410	125.544	0.034	4.4	0.0592	0.0000	OK
360 minute winter	Outlet 1	408	124.470	0.300	211.9	0.5307	0.0000	OK
360 minute winter	Outfall_1	408	124.320	0.270	211.9	0.0000	0.0000	OK
600 minute winter	SW-U1-01	405	127.922	0.222	3.0	0.4011	0.0000	OK
600 minute winter	SW-U1-02	405	127.921	1.399	6.0	2.1464	0.0000	SURCHARGED
960 minute winter	U1DOCK	585	127.900	1.125	23.1	3.2524	178.3127	FLOOD
1440 minute summer	SW-U1-03	1200	127.917	1.237	8.5	2.9393	0.0000	SURCHARGED
720 minute winter	SW-U1-04	735	127.921	1.351	19.2	1.5278	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	INF-SW-07	9.003_1	INF-SW-08	7.2	0.428	0.109	2.0774	
1440 minute winter	INF-SW-08	9.004	INF-SW-11	8.6	0.363	0.064	2.6471	
1440 minute winter	INF-SW-09	10.000	INF-SW-10	1.5	0.368	0.020	3.6618	
1440 minute winter	INF-SW-10	10.001	INF-SW-11	3.4	0.290	0.031	9.4855	
1440 minute winter	INF-SW-11	9.005	Pond 3	12.0	0.565	0.055	1.5844	
1440 minute winter	SW-U2-01	9.000	SW-U2-02	1.6	0.492	0.040	2.8953	
1440 minute winter	SW-U2-02	11.001	SW-U2-03	4.9	0.524	0.069	1.4436	
1440 minute winter	SW-U2-03	9.002	SW-U2-05	5.4	0.582	0.076	0.7746	
1440 minute winter	U2DOCK	12.000	SW-U2-04	1.0	0.507	0.062	0.3169	
1440 minute winter	SW-U2-04	12.001	SW-U2-05	0.9	0.350	0.013	0.9507	
1440 minute winter	SW-U2-05	9.003	SW-U2-10	11.8	0.754	0.043	3.3273	
15 minute winter	SW-U2-06	13.000	SW-U2-07	90.5	0.821	0.843	2.6471	
15 minute winter	SW-U2-07	13.001	SW-U2-08	217.1	1.968	2.024	4.7428	
15 minute winter	SW-U2-08	13.002	SW-U2-09	235.8	2.138	0.907	4.3573	
1440 minute winter	SW-U2-09	13.003	SW-U2-10	16.1	0.669	0.153	0.9927	
1440 minute winter	SW-U2-10	11.004	Pond 3	27.7	0.798	0.045	2.8168	
1440 minute winter	Pond 3	9.006	INF-SW-12	4.4	0.708	0.006	0.3068	
1440 minute winter	INF-SW-12	9.007	Outlet 1	4.4	0.840	0.011	1.7271	
360 minute winter	Outlet 1	1.011	Outfall_1	211.9	1.606	0.436	3.1676	4375.1
600 minute winter	SW-U1-01	14.000	SW-U1-02	3.0	0.662	0.048	2.9774	
600 minute winter	SW-U1-02	14.001	SW-U1-05	9.8	0.453	0.140	1.6196	
960 minute winter	U1DOCK	15.000	SW-U1-03	-20.3	0.552	-0.243	1.1760	
1440 minute summer	SW-U1-03	15.001	SW-U1-04	8.0	0.819	0.037	0.2113	
720 minute winter	SW-U1-04	15.002	SW-U1-05	-19.2	0.697	-0.189	1.1971	

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Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 93.27%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	SW-U1-05	405	127.921	1.571	26.3	2.6188	0.0000	SURCHARGED
15 minute winter	SW-U1-06	10	129.025	1.405	112.3	5.8490	5.0248	FLOOD
15 minute winter	SW-U1-07	11	128.912	1.412	221.5	6.1495	0.0000	FLOOD RISK
480 minute winter	SW-U1-07a	328	127.928	0.638	37.1	1.0168	0.0000	SURCHARGED
600 minute winter	Pond 1	405	127.922	2.222	53.2	533.7081	0.0000	FLOOD RISK
600 minute winter	INF-SW-01	405	127.922	1.722	2.2	2.6368	0.0000	FLOOD RISK
600 minute winter	Outlet 2	405	127.922	2.882	10.2	11.3013	0.0000	FLOOD RISK
15 minute summer	INF-SW-03	1	124.880	0.000	4.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute winter	SW-U1-05	14.002	Pond 1	18.2	0.555	0.164	1.7648	
15 minute winter	SW-U1-06	16.000	SW-U1-07	85.4	1.212	1.220	2.1126	
15 minute winter	SW-U1-07	16.001	SW-U1-07a	200.2	2.843	2.211	2.2182	
480 minute winter	SW-U1-07a	16.002	Pond 1	36.8	1.635	0.175	1.7605	
600 minute winter	Pond 1	14.003	Outlet 2	9.0	0.146	0.019	4.9117	
600 minute winter	INF-SW-01	17.000	Outlet 2	2.0	0.050	0.011	2.8872	
600 minute winter	Outlet 2	Hydro-Brake®	INF-SW-03	4.9				210.3

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APPENDIX G – DRAINAGE INSPECTION & MAINTENANCE SCHEDULE

Heywood Stores – Drainage Inspection and Maintenance Schedule

Maintenance schedule (it is the responsibility of the client/tenant or nominated management company to carry out the maintenance outlined in this table)	Required action	Typical frequency
Below Ground Drainage Pipes, Manholes, etc		
Regular maintenance	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages (standing water). Carry out CCTV survey if required	Quarterly
Remedial actions	High pressure jetting and/or remove minor blockages and silt build up	As required – 20% loss of pipe cross-section
	Replace broken access covers, remove major blockages, repair structurally defective pipework	As required
Flow control chamber		
Regular maintenance	Lift covers and inspect chamber fore evidence of debris and silt deposits and evidence of blockages. Test bypass door operating correctly.	Quarterly
Remedial actions	High pressure jetting and or remove minor blockages and silt build up	As required
	Replace broken access covers, remove major blockages, repair/replace defective flow control devices	As required
Linear channel drains and gullies		
Regular maintenance	Lift access covers and inspect for silt/debris accumulation	Quarterly
Remedial actions	Replace broken access covers, gratings	Annually
	High pressure jetting and/or remove minor blockages and silt build up	As required
Rainwater pipes		
Regular maintenance	Inspect rainwater goods for evidence of leaking pipework	Monthly (or as required)
Occasional maintenance	Remove rodding eyes and carry out high pressure jetting to remove any debris	Quarterly
Remedial actions	Replace cracked / leaking pipework	As required
Pond		
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at the start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, e.g. penstocks	Half yearly Annually
		Annually

	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Every 1 to 5 years, or as required
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Every 5 years, or as required
	Remove sediment from any forebay.	
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows	As required
Attenuation tank - maintenance activities recommended by the manufacturer should be added to this schedule where not included		
Regular maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Six monthly
	Change the filter media	As recommended by manufacturer
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor performance	Six monthly
	Inspect sediment accumulation rates and filter media, and establish appropriate replacement frequencies.	Monthly during first half of the year, then every six months
Pumps - maintenance activities recommended by the manufacturer should be added to this schedule where not included		
Regular maintenance	Ensure sumps and floats are clean - quarterly	
	Assess the condition of the pipework for wear or damage - quarterly	
	Lift covers and inspect manholes for evidence of debris and silt deposits and evidence of blockages - quarterly	
Remedial actions	Examine the condition of pump including impeller, seals, valves and pipework – as recommended by manufacturer – quarterly	
	Consult pump specialist – where required	
	Service and replace and elements of the system – six monthly	