

The logo for Ramboll, featuring the word "RAMBOLL" in a bold, sans-serif font. The letter "O" is stylized with a blue checkmark-like shape inside it.

Bright ideas.  
Sustainable change.

# The George Hotel

## Drainage Strategy Note

December 2022



# Document Revision History

**Document Title** The George Hotel - Drainage Note

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Revision Number	Date	Engineer	Checked by	Approved by	Comments
P01	12/12/2022	Ben Goodfellow	-	-	Work in Progress - Draft Release

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# Introduction

## Objective

The objective of this document is to provide a high level description of the foul and surface water drainage systems for the proposed Hotel re-development at The George Hotel, St. George Square, Huddersfield, HD1 1JA, Grid Reference (NGR): N: 414418, E: 416956.

It should be noted that this document is not a drainage strategy document, as further investigations are required to inform a comprehensive drainage strategy and design.

The document can be presented to key project stakeholders to confirm that they understand the current proposals and are in agreement with the general philosophy that will be adopted during future design stages.

## Site Information

### Records Review

The key reports and websites reviewed as part of this study are listed below.

- Site Topographical Survey, Mobile CAD, July 2022
- Utility Sewerage Asset Details, YW, 27/07/2022
- Plans & Associated Details, Bowman Riley, November 2022
- Archive Records, -, -
- CCTV Survey, MetGeo, November 2022

### Consultations

It is proposed to retain and repurpose, where possible, the site foul and storm water outfall systems to the local Yorkshire Water networks within Railway Street and John William Street. Please refer to Appendix A for Yorkshire Water asset plan. At the time of writing 2 new primary sewerage connections for drainage are anticipated to serve the proposed re-development.

Foul discharge rates have been calculated on the basis of the Discharge Unit methodology, as defined within BS EN 12056:2, together with an alternative approach utilising the Sewers for Adoption analysis, which is preferred by National Utility Providers.

Site storm water management and discharge flows from the new build blocks B & C, and the Atrium, are to be attenuated to targeted 30% betterment in run-off rates. The Grade II listed block A is to remain as-is.

### Site Topography



Figure 1 - Site Location

The site is in an area of complicated topography with several raised roads and railway structures in the vicinity, refer to Figure 1 above for details. The topographical survey data for the site itself shows the station entrance level to the West of the building to be located at elevations of around 88.80 mAOD (above ordnance datum), and John William Street to the East between 84.8 mAOD at the southern end of the building and 83.6 mAOD at the northern end of the building.

Topography data has been acquired for the site and is presented in Appendix B. Above ground elevations within the development to the south of the site are shown in the data to slope downwards in an easterly direction from 86.2 mAOD adjacent to the site boundary to 84.8 mAOD 90m east.

### Surface Water Features

The nearest surface water feature is The Huddersfield Broad Canal 450m to the east. Refer to Figure 2 below for details. The canal network in the UK is managed by the Canal and River Trust (C&RT). The River Colne is the nearest above ground watercourse and is located approximately 850m to the east of the site.

Refer to the Flood Risk Assessment for further details.

### Ground Conditions and Groundwater

The published geological information indicates Head drift deposits covering the site and indicates that it is underlain by bedrock geology of Pennine Lower Coal Measures.

The EA flood mapping states that the risk of pluvial flooding in the locality is of a Very Low designation.

Please refer to Ramboll draft Flood Risk Assessment dated November 2022 for specific of the details.

### Existing Site Foul and Surface Water Drainage

There are live combined/foul and storm water drainage and sewerage systems serving the site, running directly adjacent to the development site. The Yorkshire Water assets are located in Railway Street and John William Street. Refer to extract of Yorkshire Water asset plan in Appendix A of this report document.

The combined foul/surfacewater sewerage system within John William Street represents a relatively significant trunk sewer and is annotated on the Yorkshire Water asset plans as being of 675mm and assumed to be of PU construction and of a circular profile. The Yorkshire Water sewer network is noted at a varying depth of between 3.4m and up to 3.6m in depth to invert along John William Street.

The site-wide drainage assessments and recommendations of this report are based on the information provided below;

- Historic drainage layouts, -
- Yorkshire Water Asset information June 2022.
- Metgeo Survey Results dated December 2022.

MetGeo Survey results note two live drainage runs to the north of the site, crossing through the site boundaries. It is assumed that these runs serve the Huddersfield Network Rail Station, and also the adjacent car park. Survey access could not be gained, so the exact position and details of any assumed manholes are unknown pending further investigation.

### Existing Drainage Consideration

The historic drawings available and those produced by MetGeo dated December 2022 details the drainage arrangements serving the George Hotel Site as shown in Appendix C, indicate that the existing drainage infrastructure is a combined foul and surfacewater system, which connects into the sewer in John William Street, these systems are routed below the basement level and natural ground levels below/under The George Hotel. A site investigation and associated CCTV Survey works have been undertaken by MetGeo to assess the existing utility sewerage drainage infrastructure on and adjacent to site, particularly to identify the location of connection points for both foul and surface water systems.

The existing drainage information provided in MetGeo drawings (refer to Appendix C for details), advise that the site surface water run-off and catchment is currently unmanaged and connects to the combined system, having multiple lateral connections to the sewer in John William Street.

From the Bowman Riley architectural model and it's associated layouts, the total peak discharge rate for foul water network from the hotel is calculated to be 9 l/second, however this will need to be clarified and agreed with Yorkshire Water during the next design stage.

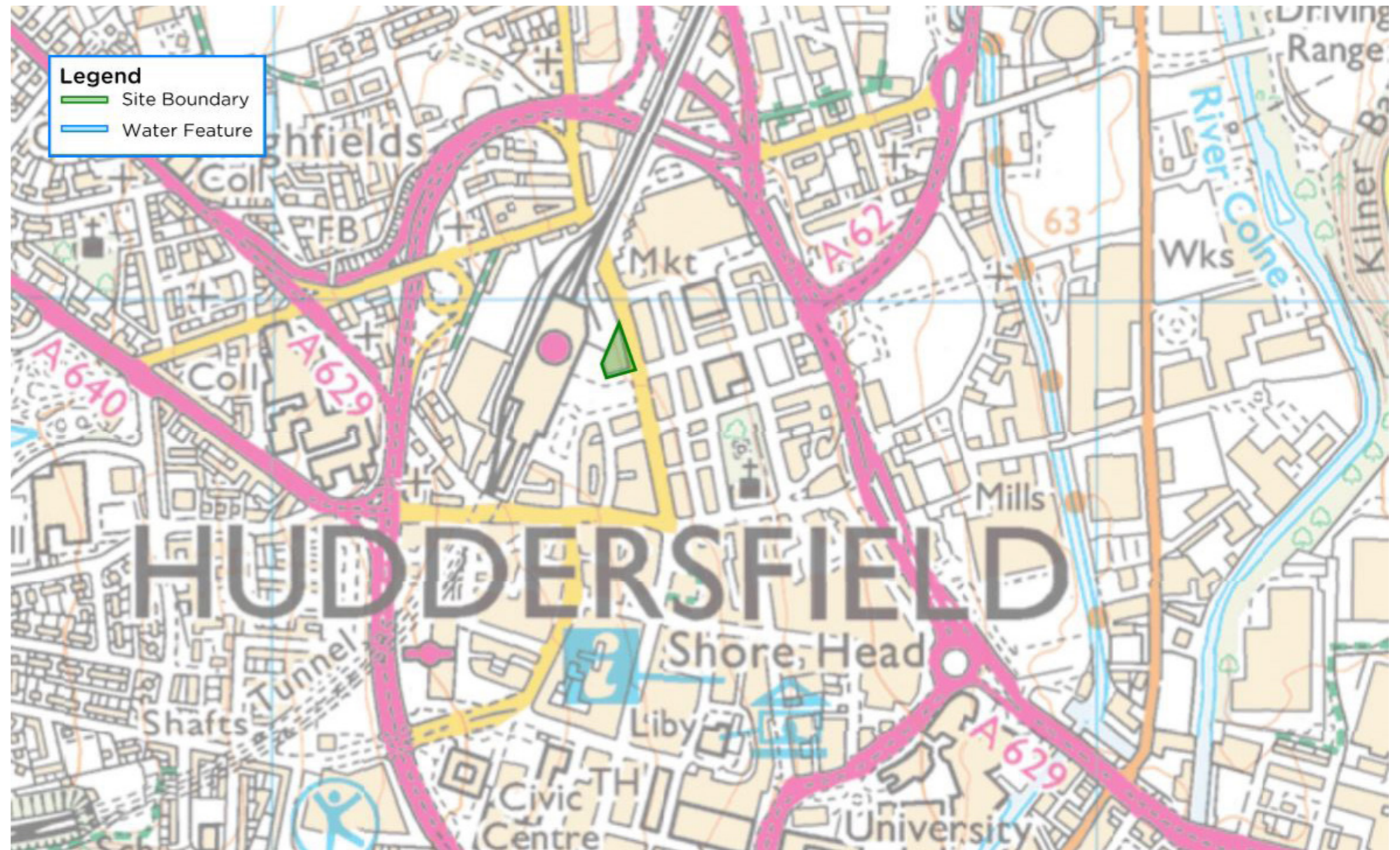


Figure 2 - Site Features

## Existing Site Constraints with Public Sewers

It is assumed that existing drainage connections with existing manholes from Block A, as mentioned in previous sections, will be retained and utilised where possible to avoid the need for any additional break-out works and or excavation near existing utility services. The precise size, location and levels stated in the historical drawings are subject to full analysis and confirmation from the intrusive CCTV camera survey investigations. New connections from Blocks B & C are proposed and the locations verified during the next design stage. Figure 3 shows the relationship of the site.

There are a number of restrictions in the ability and suitability for on-site infiltration of surface water to implement suitable SuDS measures, the nature of geology of the site and lack of enough space which prohibits the drainage strategy for considering such arrangements. This approach is validated by the details within the Phase 1 Environmental Assessment.

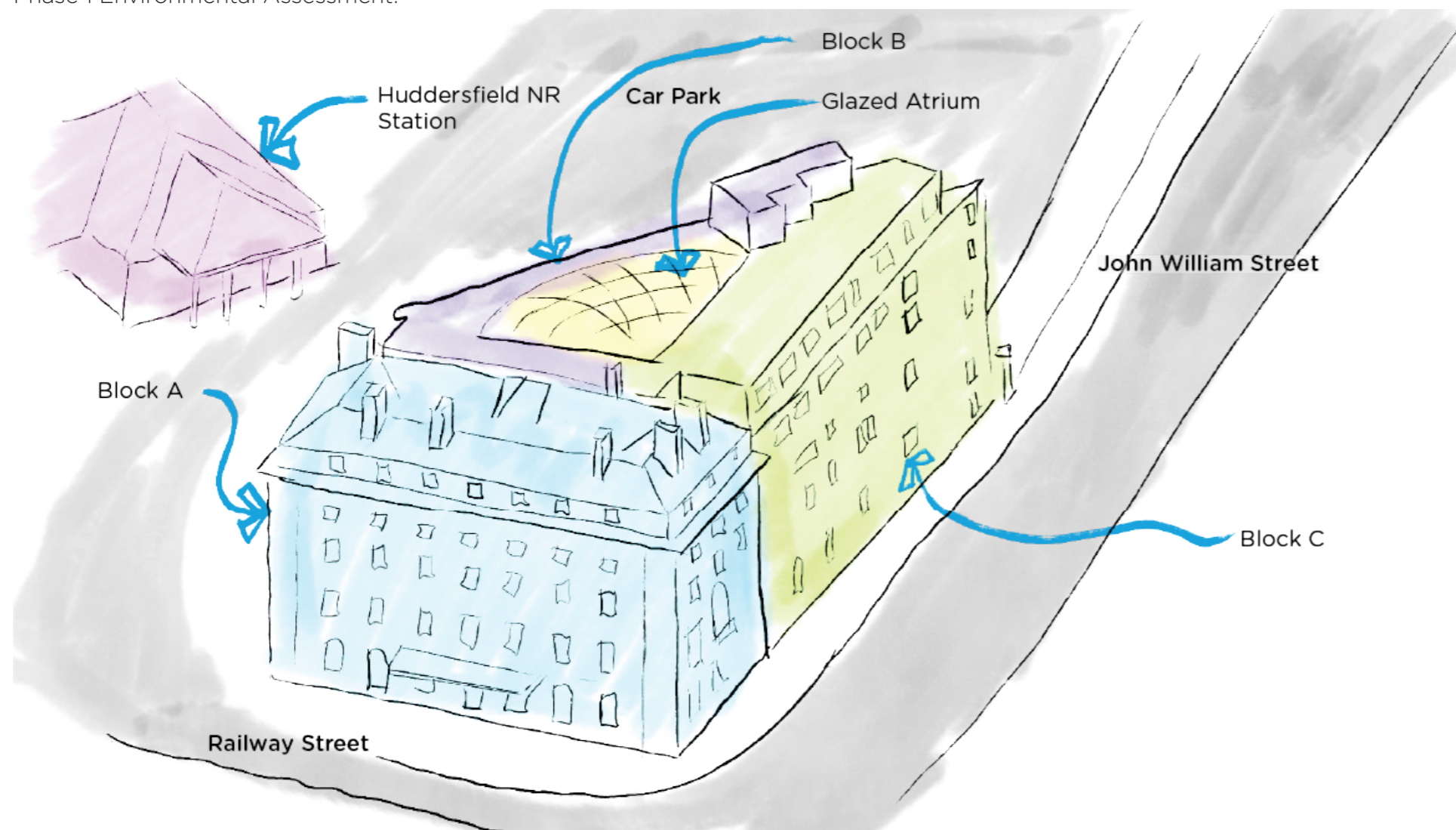


Figure 3 - Site Relationship

## Proposed Surface Water Drainage

The proposed surface water drainage strategy is based on the existing design information and assumptions that the existing network has sufficient inherent capacity and already serves the existing site catchment and therefore can be utilised.

It is assumed that the proposed surface water from the proposed re-development of The George Hotel can be discharged to the existing, live drainage system.

The surface water from the existing block A of The George Hotel will continue to discharge as is to its existing site outfall systems.

It is proposed that as part of the drainage design surface water shall be attenuated prior to connection to the external sewer system within John William Street. At present, confirmation is

being sought regarding inverts of the sewer in John William Street, which will determine the exact strategy, however flows from Blocks B, C and the Atrium are targeted to ensure that a 30% betterment of run-off rate is achieved as required by current Planning guidelines.

The Industry Standard 'Windes' Micro-Drainage software will be used to model the site in its geographical location.

Please refer to below table for the existing (using the Modified Rational Method) & proposed surface water flow rates from Blocks B, C and the Atrium.

Storm Event	Q <sub>Existing MRM</sub>	Q <sub>30% Betterment</sub>
Discharge Rates (l/ second)	12.4	8.7
<b>Proposed Storage Volume = 18 m<sup>3</sup></b>		

The initial hydraulic analysis advises that 18m<sup>3</sup> of attenuation will be required for the catchment area of 0.06h.

Due to the levels of the site, it is proposed that basement attenuation tanks with hydrobrake flow control devices are utilised. In the event of the resultant inverts too low, pumped options and blue roofs are to be investigated.

The finalised hydraulic modelling will be provided at the later stage of the design after the location of the RW down points and levels are finalised.

At present no external pedestrian open areas, hard-standing areas and access routes are proposed. Equally no open vehicle servicing access, servicing and parking areas are proposed on site, however any areas deemed to be a risk are to be drained via an approved Class 1 light liquid separator prior to discharge into the common surface water drainage systems.

## Proposed Foul Water Drainage

The foul water drainage strategy for Blocks B & C is to connect to the existing combined sewer within John William Street

It is highlighted that where site sewerage levels restrict gravity connections and waste water pumping is required, such pumping systems will comprise duty and standby pumps, with duplicate power supply provisions to ensure continuity of supply. Also, all pumping systems will be fully-monitored with warning alarms linked to the building BMS systems for fault and pump failure events. All waste water holding chambers will be designed in accordance with Building Regulation Part H: 2.36-2.39 requirements regards capacity in event of pump failure.

The Public Health Engineering design details for the internal foul water layouts are subject to confirmation, and shall be clarified during the next design stage. After finalising the location of all down points, the peak foul water discharge rates will be calculated in accordance with BS EN 12056:2 for the office sanitary facilities. The final site outfalls and discharge rate will require confirmation and agreed with Thames Water under Section 106 of the Water Act.

## SuDS Analysis

Surface water drainage systems need to be developed in line with Sustainable Drainage Systems (SuDS). The objective of SuDS is to minimise the impact of the development on the quantity and quality of site run off and maximise amenity and biodiversity opportunities. Surface water sustainable drainage systems will be designed and installed in accordance with current National Planning Policy Frameworks (NPPF) 2019 requirements and Planning Policy Statement 25 (Note- Retracted but still referenced PPS 25), The SuDS Manual and associated CIRIA 521, 522, 523, 625, 626, 609, 697 and 753 and associated reference documents.

It has been estimated that the proposed attenuation system will require a supplementary volume of 18m<sup>3</sup> of attenuation storage designed to contain a 1 in 100-year storm event without causing any flooding on site. The attenuation volume of 18m<sup>3</sup> is based on the proposed impermeable areas being drained at a targeted 30% betterment run off rate in line with current Kirklees Council Water Management Policy.

The storage is to be provided by means of a concrete or sectional attenuation tank located at Basement level, however this is dependent on levels of the site, buried drainage and

the relationship to the sewer. As such alternative options are being investigated concurrently. In the event of a system failure and an overflow being required, it is currently intended that a either a seperate pumped overflow be implemented, whereby overflow pipes from the tank shall discharge over a bunded area, discharging into a dedicated overflow sump and pumped into the sewer network, or a gravity overflow be implemented above ground routing to the outfall. The precise surface water network routes, levels and arrangement and connections will need to be confirmed at Developed Design stage.

It is assumed that the total impermeable area for Blocks B, C & the atrium identified in the SuDS analysis report is 0.06 ha. This is subject to clarification. Further hydraulic modelling is required to identify the precise network capacity and surface water attenuation volumes, upon further design development. The hydraulic analysis and modelling criteria for further drainage design is as follows:

- FSR Rainfall DataM5-60(mm) – 21.5.
- Ratio R – 0.273.
- 30% Betterment
- Area: 0.06 Impermeable ha.
- Maximum Allowable Discharge – 8.7 litres/second

## Maintenance Strategy

The foul water drainage for the Office shall be maintained in accordance with Building regulations, British Standards including BS EN 12056 & BS EN 752 and as directed by manufacturers.

Maintenance shall be carried out by the Hotel Facilities Management team or appointed specialist.

## Maintenance overview

Activity	Indicative frequency	Typical Tasks
Routine/regular maintenance	Monthly to annually (for normal care of SuDS)	Litter picking Inspection of inlets, outlets, and control structures
Occasional maintenance	Annually	Silt control around components. Vegetation management around components. Silt removal from catchpits, gullies and cellular storage. Service of Pumps.
Remedial maintenance	As required (tasks to repair problems due to damage or vandalism)	Inlet/outlet repair Erosion repairs Reinstatement of edgings Removal of silt build up

## Maintenance for SuDS Components

Component	Operation	6-Monthly	Annually
Storage Tank	Check of water levels in chambers drop following rainfall events	Keep clear of debris such as leaves	End of any major storm event and End of Winter to collect winter debris, Mid-Summer to collect any flower grass type deposits.
Catchpits, Manholes, Inspection Chambers	These elements should be inspected regularly as part of this preventative routine.	Catch pits and other manholes to be emptied to avoid becoming full.	Frequency to be determined on the basis of the 6 monthly inspections
Chambers generally			Remove chamber covers and check for evidence of siltation or blockage. If there is evidence, remove and investigate cause.  Visual check following heavy rainfall that there is no restriction to flow from the chamber, as evidenced by a channel which is slow to drain following end of rainfall. Clear blockage if necessary.
Trapped gullies		Clean grating and remove litter/debris as necessary	Remove cover on sump outlets and inspect for silt. Clear silt deeper than 50mm by gully sucker if required
Pumps		Visual inspection of pumps	Specialist servicing to be undertaken by manufacturer (or authorised service partner).

# Surface Water Drainage Options

The use of sustainable urban drainage systems (SUDS) is mandatory for most new surface water drainage systems within the UK. SUDS can be used as source control (interception of surface water), conveyance, storage and discharge dependent on various site conditions. The section below describes many of the SUDS approaches that are available and explains their advantages, disadvantages and appropriateness for use on the proposed development site.

## Retention

### Balancing Pond

Provides both storm water attenuation and treatment. Runoff from each rain event is detained and treated in the pool. The retention time promotes pollutant removal through sedimentation.



Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.



No reduction in runoff volume, land take may limit use in high density sites.

Not suitable for use in this site due to space constraints.



## Retention

### Subsurface Storage

Oversized pipes, tank systems and modular geocellular systems that can be used to create a below ground storage structure. Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.



Modular and flexible, dual usage (infiltration/storage, high void ratios, can be installed beneath trafficked and soft landscaped areas.



No water quality treatment.

Suitable for use in this site.



## Retention

- **Blue Roofs**

Blue roofs provide stormwater attenuation and controlled release to the sewerage system. They comprise of a cellular/modular construction at roof level and a series of restricted roof outlets, providing a controlled release of surfacewater into the sewer network over a long period of time.



Modular and flexible, can be installed beneath heavy plant laden areas and trafficked areas. Can provide some thermal benefits. Does not require large volumes of space within the basement or valuable NIA.



Requires a sizeable roof area without increasing roof height considerably. Waterproofing details must be considered. Not suitable for pitched roofs.

Suitable for use in this site, but considerations must be made architecturally, structurally and from an MEP perspective



## Infiltration

- **Infiltration trench**
- **Infiltration basin**
- **Soakaway**

Surface water runoff can be discharged directly to ground for infiltration by soakaways, basins, or trenches. A prerequisite is that both groundwater and ground conditions are appropriate to receive the quality and quantity of water generated.



Reduces the volume of runoff, effective at pollutant removal, contributes to groundwater recharge, simple and cost-effective, easy performance observation.



Requires appropriate pre-treatment, basins require a large flat area, offset from foundations.



Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries



## Filtration

- **Surface sand filter**
- **Sub-surface sand filter**
- **Perimeter sand filter**

Structures designed to treat surface water runoff through filtration using a sand bed filter medium. The filters can be designed with or without infiltration. Temporary storage of runoff is achieved through ponding above the filter layer. They are used where particularly high pollutant removal is required. Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.



Flexibility of design, efficient in removing pollutants, suitable for retrofits and in tightly constrained urban locations.



Not for high sediment content, detention times can support algae growth, minimum hydraulic head of 1.2m required, possible odour problems, high capital and maintenance cost.

Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries



## Filtration

### Bioretention/filter swale

Vegetated strips of land designed to accept runoff as overland sheet flow between a hard-surfaced area and a receiving system.



Landscaping features, effective in removing pollutants, flexible layout to fit into landscape, suited for highly impervious areas, good retrofit capability, effective pre-treatment option.



Requires landscaping and management, large land requirement, not suitable for steep sites, no significant attenuation or reduction of flows.

Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries



## Filtration

### Filter trench/drain

Shallow excavations filled with rubble or stone that create temporary subsurface storage for filtration of storm water runoff. Receive lateral inflow from an adjacent impermeable surface.



Hydraulic benefits achieved with filter trenches. Trenches can be incorporated into site landscaping and fit well adjacent to roads and car parks.



High clogging potential without effective pre-treatment, limited to small catchments, high cost of replacing filter material.



Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries



## Detention

### Detention Basin

Surface storage basins that provide flow control through attenuation. Normally dry and in certain situations the land may also function as a recreational facility.



Cater for a wide range of rainfall events, can be used where groundwater is vulnerable, potential for dual land use, easy to maintain.



Land take, little reduction in runoff volume, detention depths constrained by levels.

Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries



## Detention

- **Enhanced Dry Swale**
- **Enhanced Wet Swale**

Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate.



Incorporate into landscaping, good removal of pollutants, reduces runoff rates and volumes, low cost.



Not suitable for steep areas, significant land take, not suitable in areas with roadside parking.

Not suitable for use in this site due to water table levels, ground condition, site levels and site boundaries.



## Conveyance

- **Conveyance swales**
- **Rills**

Formal linear drainage features in which surface water can be stored or conveyed. They can be incorporated with water features such as ponds or waterfalls where appropriate.



Negate the need for underground pipework. Can provide some attenuation. Possible reduction in runoff volume via plant uptake and infiltration.



Potential trip/wheel hazard, disabled access issues.

Not suitable for use in this site due to space constraints.



## Source Control

### Green/Brown Roof

Multi-layered system that covers the roof of a building with vegetation cover/landscaping over a drainage layer. Designed to intercept and retain precipitation, reducing the volume of runoff and attenuating peak flows.



Mimics greenfield state of building footprint for high density developments, good removal of pollutants, ecological benefits, insulates buildings, sound absorption.



Additional weight, not appropriate for steep roofs, maintenance of roof vegetation required.

Possibly suitable for use in this site, but considerations must be made architecturally, structurally and from an MEP perspective



## Source Control

### Rainwater harvesting

Uses rainwater coming from roofs to supply toilets, wash-down and irrigation systems. Harvested rainwater is stored underground and is substituted for potable water mains supply, reducing both site discharge and water consumption.



Can provide source control of storm water runoff, reduces demand on mains water.



Use is dependent on demand requirements, contributing surface area, and seasonal rainfall characteristics. The addition of filtration plant, distribution pumps & associated pipework increases the embodied carbon within the building.

Not suitable for use in this site due to the site's spatial limitations



## Wetland

- Shallow wetland
- Extended detention wetland
- Pond wetland
- Pocket wetland
- Submerged gravel wetland
- Wetland channel

Wetlands provide stormwater attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation. Wetlands detain flows for an extended period to allow sediments to settle and to remove contaminants. They can provide significant ecological benefits.



Good pollutant removal and if lined can be used where groundwater is vulnerable. Good community acceptability, ecological and amenity benefits.



















Land take is high, requires baseflow, little reduction in runoff volume, not suitable for steep sites.

Not suitable for use in this site due to space constraints and inherent site levels.























# Site and Project Constraints

The table below details the site-specific constraints which have been evaluated in order to determine the most appropriate drainage solution. Where elements have yet to be fully considered, this is noted alongside any additional comments. If the constraint leads to a specific risk, this has been highlighted and transferred onto the risk register.

Constraint	Potential Impact on Development	Considered in Current Drainage Strategy	Comments	Linked to Risk Register
<b>Environmental</b>				
Sensitive environmental receptors	Restrictions on foul and surface water discharge location and quality; inclusion of additional polishing techniques such as separators, reed beds etc.		Discharge is to local utility sewerage systems.	
Presence of contamination	Restricts the use of infiltration for surface water disposal		Limitations of permeability plus hydrocarbon contamination restricts infiltration.	
Presence of shallow aquifers	N/A however, soil conditions prevents appropriate infiltration.		Limitations of permeability plus hydrocarbon contamination restricts infiltration.	
Presence of nearby watercourses	Restrictions on discharging water quality		Local available watercourse (Paddington Basin) in close proximity of the site does not provide suitable discharge arrangements).	
Flood zone/flood relief areas	Limitations on SUDS systems that can be used (retention of attenuation capacity during flood events)		Local primary rail and road/highway infrastructure provides high sensitivity requiring significant storm water management and control.	
<b>Ground Conditions</b>				
Infiltrations rates (at required location/depth)	Applicability of infiltration devices for surface water disposal; size of infiltration devices		Water table levels and limitations of permeability plus site constraints limiting infiltration.	
Groundwater level	Restricts infiltration potential; authorities may prevent discharge from potential sources of pollution, i.e. paved areas. Pumping in excavations.		Water table levels and limitations of permeability plus hydrocarbon contamination restricts infiltration.	
Buried obstructions	May require localised removal within drainage locations or drainage to be re-routed around obstruction		Existing obstructions to be surveyed and where applicable grubbed out and removed.	

Constraint	Potential Impact on Development	Considered in Current Drainage Strategy	Comments	Linked to Risk Register
<b>Existing Infrastructure</b>				
Foul water discharge point locations and invert levels	May require pumping; restrictions on pipe routing (shortest length); additional protection to shallow drains		Levels subject to routing of pipework, with drain points to be defined during detailed design for the drainage systems.	
Surface water discharge point locations and invert levels	May require pumping; restrictions on pipe routing (shortest length); additional protection to shallow drains		Levels subject to routing of pipework, with drain points to be defined during detailed design for the drainage systems.	
Availability/capacity of foul water infrastructure nearby	May require 'self-sufficiency' i.e. packaged treatment units, reed beds etc.		Existing drainage outfall systems to be utilised where possible, for disposal to utility sewerage systems. No significant increase in flow rates from site anticipated.	
Off-site drainage infrastructure capacity	Upgrading of water company assets; use of flow restrictors; additional storage/attenuation		Existing utility sewerage systems to be utilised. No significant increase in foul flows anticipated.	

<b>Authority Requirements</b>				
Allowable discharging flow rates	Impacts on volume of attenuation required		30% betterment of discharge proposed for storm water flows and attenuation capacity (for Blocks B, C & Atrium)	
Allowable discharging flow volumes	Allowable impermeable area/volume of long-term attenuation		30% betterment of discharge proposed for storm water flows and attenuation capacity (for Blocks B, C & Atrium)	
Specific authority requirements	Limits SUDS systems/materials specifications that can be used		Not advised as any specific requirements from Local Authority on the site.	
Easements for services, rivers, critical infrastructure	Reduces available space; restricts drainage element locations		Most service routes and existing infrastructure does not affect the drainage systems. Live drainage from crossing the site (assumed from Huddersfield station) to be validated. Easements/diversions may be required.	
BREEAM credit requirement	Enhanced restriction of surface water discharge requiring additional controls and increased attenuation		Attenuation and surface water management targeted for BREEAM Pol credits.	

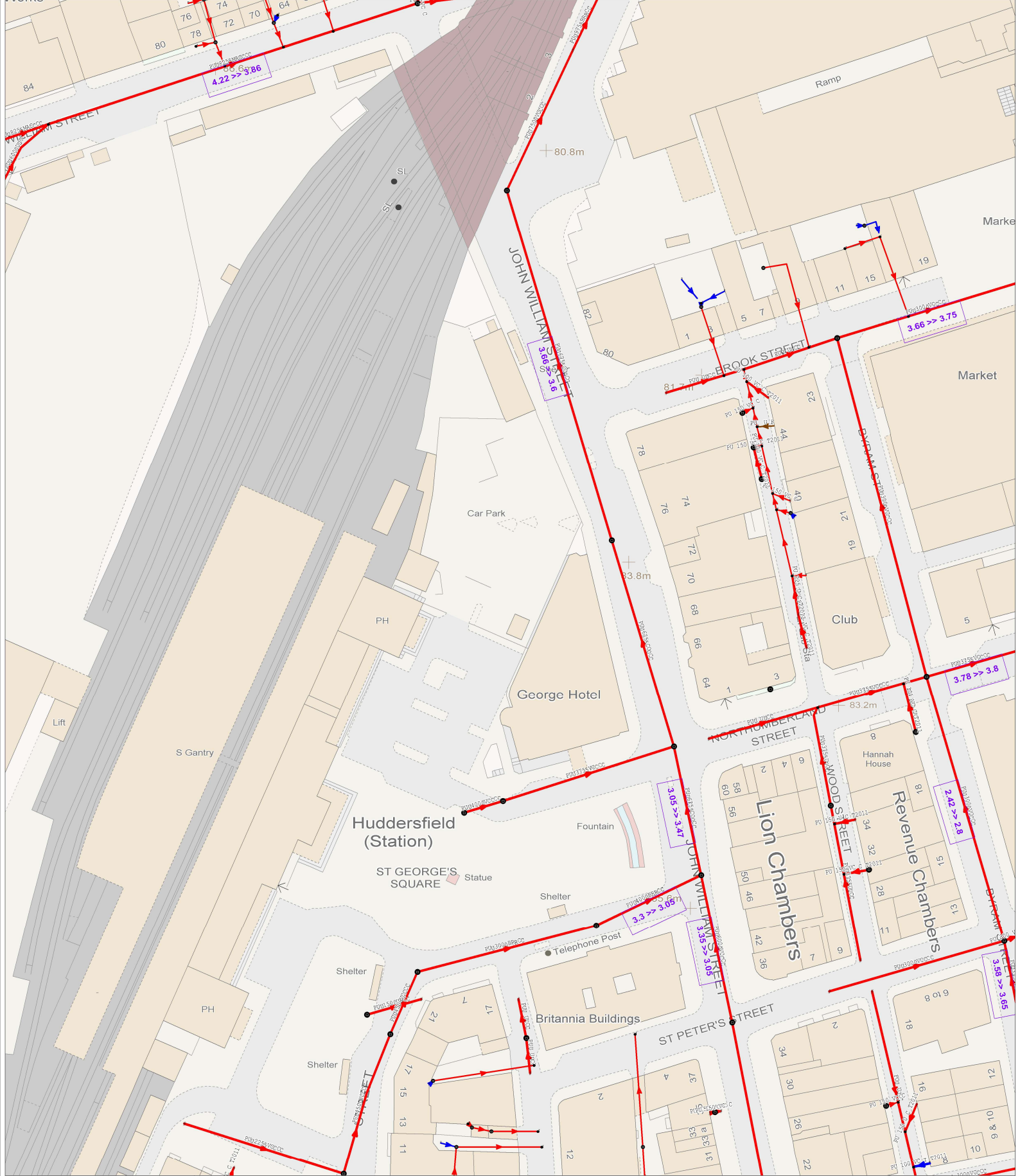
Constraint	Potential Impact on Development	Considered in Current Drainage Strategy	Comments	Linked to Risk Register
<b>Site Requirements</b>				
Available external area (space for SuDS)	Limits SuDS systems that can be used (low land take)		Attenuation tanks located below and as part of the proposed building and development.	
Land use (appropriateness for open water)	Limits SuDS systems that can be used (health and safety)		Not applicable, open water bodies not proposed on the site.	
Traffic level type/volume	Pervious paving foundation thickness		HGV usage and loading for access and manoeuvring requires suitable surface and sub-grade arrangements.	
Construction phasing	Position of attenuation; pipe routing; temporary oversizing of elements due to temporary retention of buildings		Not anticipated as required. Works contractor to programme drainage installations as required.	
Construction hoarding lines/access routes	Position of attenuation; pipe routing		Not anticipated as required. Works contractor to programme drainage installations as required.	
Future development (i.e. extensions)	Oversizing of elements to provide additional capacity		Proposed development occupies the total site available.	
Need for new outlets/headwalls to watercourses	Additional correspondence (fees) with authorities; construction of headwall to approved standards; issues relating to banks/bed (scour)		Not applicable no new primary outfalls nor headwalls required on the site.	
Abnormal foul water discharge requirements (i.e. laboratories)	Separate laboratory waste; chemically and temperature resistant pipework; inclusion of sample chambers; inclusion of grease separators.		Not applicable, domestic foul waste water discharge only. Any grease separation is to be dealt with above ground prior to discharge.	
Retained trees	Limitation in excavation location/depth to prevent root damage		Not applicable no existing retained trees on the site.	
Maintenance requirements	Required maintenance regime is not acceptable to client requiring amendments to proposed drainage scheme		Maintenance of drainage and pumping systems and storm water attenuation/holding tanks required.	


# Appendix A

## Yorkshire Water Asset Plans

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414256 : 416787	Map Name : SE1416NW	Title	
 <p>Yorkshire Water, PO Box 500, Halifax Road, Bradford BD6 2LZ Contact Name : F Sorsby Contact Tel :</p>		<p>Notes</p> <p>Partial Key</p> <p>Foul Sewer = F</p> <p>Combined Sewer = C</p> <p>Surface Water Sewer = SW</p> <p>Trade Sewer = TD</p> <p>Partially Separate = PS</p>	<p>This plan is furnished as a general guide only and no warranty as to its correctness is given or implied. This plan must not be relied upon in the event of excavations or other works made in the vicinity of public sewers. No house or property connections are shown.</p>
<p>(Ody) COPYRIGHT STATEMENTS: Reproduced by permission of Ordnance Survey on behalf of HMSO © Crown copyright and database 2014. All rights reserved Ordnance Survey Licence number 100022432</p>		Date Req : 27/07/2022, 12:32:46	Date Gen : 27/07/2022, 12:33:34
		Source : Sewer Network Enquiry	

# Appendix B

## Topographical Survey Plan

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# Appendix C

## MetGeo CCTV Survey Plans

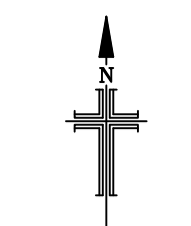
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SCHEDULES FOR DRAINAGE CHAMBERS

<p>MH1 SURFACE CL 88.53 PIPE X: 100ø IL 86.78 PIPE A: 100ø IL 86.80 CHAMBER: 0.95X0.60</p>	<p>MH2 FOUL CL 88.41 PIPE X: 150ø IL 84.60 PIPE A: 150ø IL 87.12 PIPE B: 150ø IL 84.61 CHAMBER: 1.20ø</p>	<p>MH3 SURFACE CL 86.51 PIPE X: 300ø IL 84.18 PIPE A: 225ø IL 84.43 PIPE B: 150ø IL 84.37 CHAMBER: 0.80X0.80</p>
<p>MH4 FOUL CL 82.31 PIPE X: 225ø IL 80.89 PIPE A: 100ø IL 81.05 PIPE B: 225ø IL 80.90 CHAMBER: 0.70X0.70</p>	<p>MH5 COMBINED CL 82.65 PIPE X: 225ø IL 80.76 PIPES A&amp;B: 100ø IL 80.94 PIPE C: 225ø IL 80.77 CHAMBER: 1.0X0.75</p>	<p>MH6 FOUL CL 82.32* UTR - COVER RUSTED/IRONBOUND</p>
<p>MH7 FOUL CL 82.34 PIPE X: 150ø IL 81.24 PIPE A: 100ø IL 81.27 PIPE B: 150ø IL 81.25 CHAMBER: 0.85X0.75</p>	<p>MH8 FOUL CL 81.94* PIPE X: 100ø IL 81.53 PIPES A,B,C: 100ø IL 81.57 PIPE D: 100ø IL 81.54 CHAMBER: 0.70X0.45</p>	<p>MH9 COMBINED CL 83.90 PIPE X: 225ø IL 80.54 PIPES A,B,D,E: 100ø IL 80.72 PIPE C: 225ø IL 80.56 CHAMBER: 0.95X0.75</p>
<p>MH10 FOUL CL 82.31* PIPE X: 225ø IL 81.49 PIPES A,B: 150ø IL 81.66 PIPE C: 225ø IL 81.51 CHAMBER: 1.25X0.80</p>	<p>MH11 FOUL CL NOT AVAILABLE UTR COVER BURIED</p>	<p>MH12 FOUL CL NOT AVAILABLE UTR COVER BURIED</p>
<p>MH13 FOUL CL 82.31* PIPE X: 225ø IL 81.49 PIPES A,B: 150ø IL 81.66 PIPE C: 225ø IL 81.51 CHAMBER: 1.25X0.80</p>	<p>MH14 SURFACE CL 85.10 PIPE X: 150ø IL 82.97 PIPE A: 100ø IL 83.12 PIPE B: 150ø IL 82.98 CHAMBER: 0.80X0.70</p>	<p>MH15 SURFACE CL 84.97 PIPE X: 150ø IL 81.95 PIPE A: 150ø IL 81.97 PIPE B: 100ø IL 82.14 CHAMBER: 0.85X0.85</p>
<p>MH16 FOUL CL NOT AVAILABLE UTR COVER BURIED</p>	<p>MH17 FOUL CL 87.40 UTR - UNDER SCAFFOLD BASE</p>	<p>MH18 FOUL CL 87.86 UTR - COVER RUSTED/IRONBOUND</p>

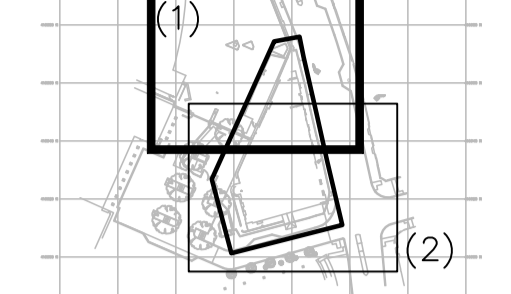
Direction of North



SUB-SURFACE KEY

—> FD FOUL DRAINAGE  
—> CD COMBINED DRAINAGE  
—> SD SURFACE DRAINAGE  
—> UD UNIDENTIFIED DRAINAGE  
—> (AR) SERVICE NOT PROVEN - ASSUMED ROUTE LOCATED THROUGH SERVICE RECORDS AND/OR ONSITE INFORMATION.  
—> (NL) SERVICE NOT PROVEN - ROUTE LOCATED THROUGH SERVICE RECORD INFORMATION.  
 IL: 4.71, 100ø INVERT LEVEL OF DRAINAGE (METRES), PIPE DIAMETER (MM)  
 UTR UNABLE TO RAISE  
 UTM UNABLE TO MEASURE  
 OS SERVICE EXTENDS OFF SITE  
 Ø DIAMETER OF PIPE OR DUCT  
 MBL METRES BELOW GROUND LEVEL  
 CL COVER LEVEL  
 \* MEASUREMENT ESTIMATED  
 SL SOFFIT LEVEL OF PIPE/DUCT  
 IL INVERT LEVEL OF PIPE/DUCT  
 SITE BOUNDARY  
 WINSOR TRAP/INTERCEPTOR ON CHAMBER OUTFLOW  
 BACKDROP (INTERNAL/EXTERNAL) ON CHAMBER INFLOW  
 INFORMATION FROM CCTV INSPECTION (ALL POSITIONS ESTIMATED FROM CCTV METRAGE)  
—> INCOMING PIPE - ORIGIN UNCERTAIN  
—> END OF SURVEY - PIPE UNSURVEYED BEYOND THIS POINT  
 CCTV INSPECTION - PIPE IDENTIFICATION  
 THE PRIMARY OUTFLOW PIPE IS LABELED (NUMBER) X, WITH ADDITIONAL OUTFLOWS AS Y OR Z. INCOMING PIPES ARE LABELED STARTING (NUMBER) A FROM THE FIRST PIPE CLOCKWISE FROM X, PROCEEDING TO B FOR THE NEXT PIPE CLOCKWISE.

LAYOUT KEY

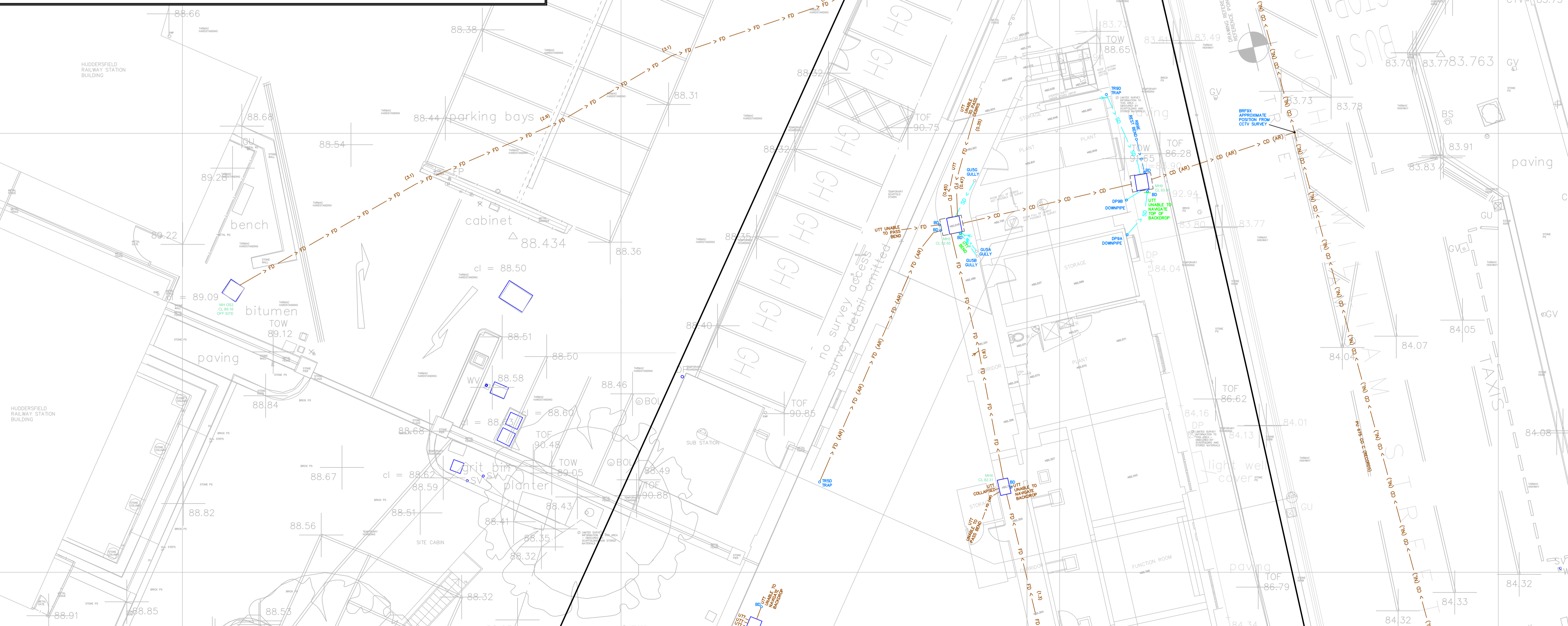


NOTES

- This drawing is based upon drawing '3518 - St. George Hotel, HD1 1JA (Issue) Rev C.dwg' and '210112 2D Topographical.dwg' provided by the client.
- All cover levels and invert levels are in metres and relate to the '3518 - St. George Hotel, HD1 1JA (Issue) Rev C.dwg' or '210112 2D Topographical.dwg' drawing levels.
- This drawing does not represent a full utility survey, only accessible drainage routes have been traced where possible. Additional buried utilities are expected beyond those shown on this drawing. A full utility mapping survey must be carried out, alongside up-to-date record information prior to any intrusive works.
- This drawing must be used in conjunction with the accompanying report "P22-01248-MET-EXT-CTV-RPT-GC" which includes full observations of the routes surveyed.
- Unless otherwise stated, all services shown on this plan have been surveyed using approved detectors and the connections between manholes, if not traced, are assumed to be direct.
- Should the background or topographical information for the survey area be based on an Ordnance Survey file or a survey undertaken by a third party we are not liable for any loss that may arise due to a lack of accuracy in that digital data.
- Locational accuracy is determined by referring to manufacturer's guidelines for the detectors used. In ideal conditions the vertical accuracy for the underground utilities located and mapped are ±10% of the depth. The horizontal accuracy is ±20 cm, although the majority of traced utilities will be much more accurate than this.
- Depths shown on the drawing are in metres below ground level to the centre of the conductor and do not necessarily indicate the depth to a duct or pipe.
- The results of electro-detection techniques are not infallible - although all reasonable effort is made during site detection the completeness of the underground services information cannot be guaranteed.
- It should be noted that the technique is limited to detecting features into which a conductor can be inserted, and it cannot therefore be guaranteed to reveal the full routes of all drainage services or to detect their presence.
- This drawing and the information contained therein is issued in confidence and is the copyright of Met Geo Environmental Ltd. Disclosure of this information to third parties and unauthorised copying or replication of this data without approval is forbidden.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

THIS DRAWING DOES NOT REPRESENT A FULL UTILITY MAPPING SURVEY. ADDITIONAL UTILITIES ARE EXPECTED TO EXIST BEYOND THOSE SHOWN ON THIS DRAWING. BE AWARE THAT SERVICES SHOWN MAY MASK OTHER UTILITIES BURIED BENEATH THEM. ALWAYS USE THIS INFORMATION ALONGSIDE UP-TO-DATE SERVICE RECORDS AND EMPLOY SAFE DIGGING PRACTICES IN ACCORDANCE WITH H547.



Rev	Date	Drawn	Description	Check
-	-	-	-	-



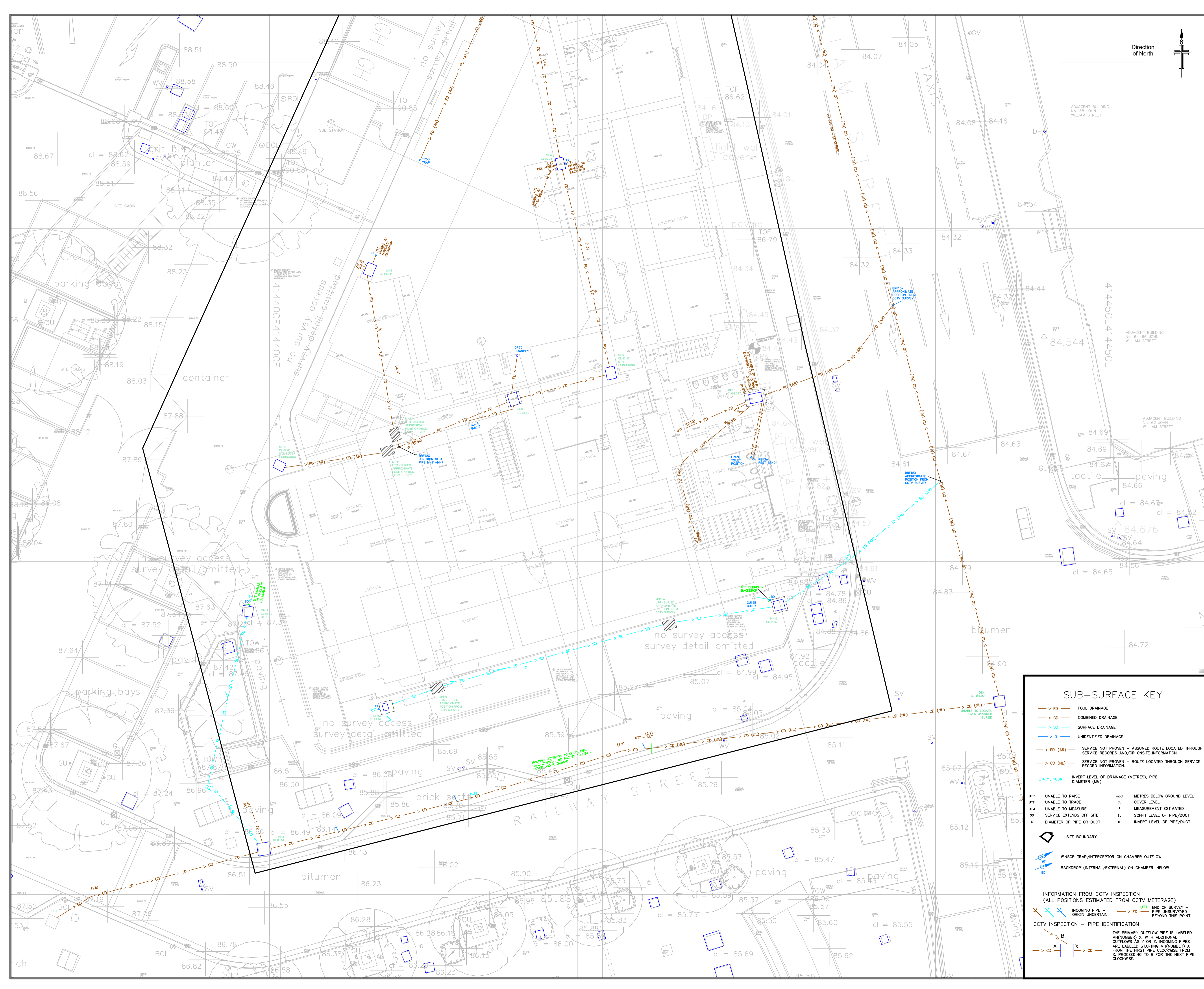
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 Stourton F: +44 [0] 1132 008 901  
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 West Yorkshire W: www.metgeoenvironmental.com  
 LS10 1SW

Client  
 WILLIAM BIRCH & SONS LTD

Site  
 GEORGE HOTEL, ST GEORGE SQUARE  
 HUDDERSFIELD, HD1 1JA

Title  
 DRAINAGE SURVEY

Surveyed	HD, AH	Drawn	HD
Chk.	AP	Date	29/11/2022
Scale	1:100	Job No	P22-01248
		Sheet Size	A1
		Revision	01
DWG Ref	Year	Number	Originator
P22	2022	01248	MET
		Zone	ID
		Type	Role
		Sheet	001



**LAYOUT KEY**

- NOTES**
- This drawing is based upon drawing '3518 - St. George Hotel, HD1 1JA (Issue) Rev C.dwg' and '210112 2D Topographical.dwg' provided by the client.
  - All cover levels and invert levels are in metres and relate to the '3518 - St. George Hotel, HD1 1JA (Issue) Rev C.dwg' or '210112 2D Topographical.dwg' drawing levels.
  - This drawing does not represent a full utility survey, only accessible drainage routes have been traced where possible. Additional buried utilities are expected beyond those shown on this drawing. A full utility mapping survey must be carried out, alongside up-to-date record information prior to any intrusive works.
  - This drawing must be used in conjunction with the accompanying report 'P22-01248-MET-EXT-CTV-RPT-GC' which includes full observations of the routes surveyed.
  - Unless otherwise stated, all services shown on this plan have been surveyed using approved detectors and the connections between manholes, if not traced, are assumed to be direct.
  - Should the background or topographical information for the survey area be based on an Ordnance Survey file or a survey undertaken by a third party we are not liable for any loss that may arise due to a lack of accuracy in that digital data.
  - Locational accuracy is determined by referring to manufacturer's guidelines for the detectors used. In ideal conditions the vertical accuracy for the underground utilities located and mapped are ±10% of the depth. The horizontal accuracy is ±20 cm, although the majority of traced utilities will be much more accurate than this.
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Rev	Date	Drawn	Description	Check
-	-	-	-	-

**SUB-SURFACE KEY**

- FD FOUL DRAINAGE
- CD COMBINED DRAINAGE
- SD SURFACE DRAINAGE
- D UNIDENTIFIED DRAINAGE
- FD (AR) SERVICE NOT PROVEN - ASSUMED ROUTE LOCATED THROUGH SERVICE RECORDS AND/OR ON-SITE INFORMATION.
- CD (NL) SERVICE NOT PROVEN - ROUTE LOCATED THROUGH SERVICE RECORD INFORMATION.
- IL 4.71, 1006 INVERT LEVEL OF DRAINAGE (METRES), PIPE DIAMETER (MM)

**INFORMATION FROM CCTV INSPECTION (ALL POSITIONS ESTIMATED FROM CCTV METRAGE)**

- INCOMING PIPE - ORIGIN UNCERTAIN
- FD UTI PIPE UNSURVEYED BEYOND THIS POINT
- CTV INSPECTION - PIPE IDENTIFICATION

THE PRIMARY OUTFLOW PIPE IS LABELED WITH (NUMBER) X, WITH ADDITIONAL OUTFLOWS A, B OR Z. INCOMING PIPES ARE LABELED STARTING WITH (NUMBER) A FROM THE FIRST PIPE CLOCKWISE FROM X, PROCEEDING TO B FOR THE NEXT PIPE CLOCKWISE.

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Client  
**WILLIAM BIRCH & SONS LTD**

Site  
**GEORGE HOTEL, ST GEORGE SQUARE  
HUDDERSFIELD, HD1 1JA**

Title  
**DRAINAGE SURVEY**

Surveyed	HD, AH	Drawn	HD
Chk.	AP	Date	29/11/2022
Scale	1:100	Job No	P22-01248
		Sheet Size	A1
		Revision	01
DWG Ref	Year	Number	Originator
P22	2022	01248	MET EXT CTV M2 GC 002