MOTT MACDONALD

The Christie Advanced Scanning and Imagine Centre Development (CASICD)

Outline Drainage Strategy

September 2023

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1 Introduction

1.1 Scope of Report

Mott MacDonald have been commissioned by IHP to provide an outline drainage strategy for the proposed development of The Christie Advanced Scanning and Imaging Centre Development (CASICD).

This report sets out the key principles of taking forward a drainage solution for development, including the requirements of Manchester City Council (MCC) to obtain outline planning approval.

The report includes the following:

- Review of existing information;
- Assessment of existing site drainage;
- Establish drainage design criteria and existing discharge rates;
- Consultation with key stakeholders;
- Drainage Strategy;
- Outline scheme

1.2 Existing Site and Background

1.2.1 Site Location

The proposed location for the Christie Advanced Scanning and Imaging Centre Development (CASICD) is in Withington, Greater Manchester and is bordered by Wilmslow Road to the East and other blocks of the Christie Hospital campus to all other sides. Access into the site is currently provided via Wilmslow Road to the East. The development site consists of existing Blocks 19 and 20 which are to be demolished along with the partial demolition of Block 21 and are to be replaced with a new CT department. The site is surrounded on three sides by existing hospital buildings.

1.2.2 Site Details

The site is located within Flood Zone 1, and therefore has a low risk from flooding from rivers and seas with less than 0.1% annual exceedance probability.

The Manchester City Council Strategic Flood Risk Assessment (SFRA) indicates that the Site is located in the Didsbury Critical Drainage Area. Therefore, there is a need for surface water to be managed to a higher standard than normal to ensure the proposed development will contribute to a reduction in flooding risks in line with NPPF which we have outlined in Section 4.

It should be noted that there are no known records of sewer flooding in the vicinity of the site.

With reference to the site location plan (CASICD-DAY-XX-ZZ-DR-A-090001 - Site Location Plan), the overall area considered as the development site measures approximately 0.315ha

The site is bounded to the north by the Medical Physics & Engineering building, to the east by a pedestrian footway, a cycle path and Wilmslow Road, to the south by the newly constructed Paterson building redevelopment and to the west by the Christie Clinic.

The existing topographical survey (59603-SUR-TOP-(PUBLISHED) (06.01.23) see Appendix A) indicates that the site is generally flat. There is a high spot towards the south-east of the site

(approx. 35.44mAOD). There is a low spot of approximately 34.82mAOD in the north of the site. It should also be noted that the ground undulates slightly by 0.10m in this part of the site.

1.3 Development Proposals

The Christie Advanced Scanning and Imaging Centre Development (CASICD) project involves the demolition of part of the existing two and three storey hospital (Blocks 19 and 20 and part of Block 21) and construction of a new principally three-storey building with a level of plant above and additional plant equipment on the roof and a CT scanner, X-ray facility and associated accommodation at ground floor level. A stair core is also proposed to the north of the site rising to five storeys.

Levels 01 and 02 are to be ward accommodation. Plant will be located on level 03 and the roof. There is an existing basement that is used as a conduit for services to feed the wider site. The basement will be demolished, and services rerouted as part of the proposed development.

The pedestrian area between the new building and Wilmslow Road will be redeveloped and will include new raised planters along the front edge of the building and adjacent to the existing cycle route and improved paving.

An indicative layout is included in Figure 1.1.

Figure 1.1: Proposed landscape scheme plan



Source: CASICD-DAY-XX-00-DR-A-090020-WIP-Proposed Level 00 - Ground Floor Plan received on 22/08/2023

The development proposals will yield the following approximate areas and types:

- Combined Roof Area = 2250m^2
- External Hard Paving = 300m^2
- Raised Planters = 110m^2
- Existing buildings and surrounding hard standing area = 490m^2

2 Existing Drainage

2.1 Existing Infrastructure

With reference to the underground utilities survey (59603 Utility Survey (23-03-23) see Appendix B) the existing drainage system is shown to consist of separate foul and surface water systems.

United Utilities adopted sewer records (see extract in Figure 2.1 and Appendix C) also show that there are no adopted sewers within the site, but adopted sewers surrounding the site. The records show a 450mm combined adopted sewer under Wilmslow Road which runs south to north and then increases to a 1050mm diameter sewer. The records available indicate where the private sewers outfall to the combined sewer on Wilmslow Road.

No main carrier surface water drains are shown in this area. However, there are two main carrier foul water drains in the northeast and southeast of the site that are of 225mm and 300mm diameter respectively. Both foul water sewers run from west to east before connecting into the 1050mm and 450mm combined sewers on Wilmslow Road respectively.

Figure 2.1:Adopted Sewer Records



Source: Safe dig map (unitedutilities.com) received on 10/01/2023

3 Foul Drainage Design

3.1 Design Standards

The foul water drainage systems will be designed with regard to the following documents:

- Building Regulations Approved Document Part H;
- Sewerage Sector Guidance – Design and Construction Guidance Appendix C;
- BS EN 752 – Drain and sewer systems outside buildings;
- BS EN 12056 – Gravity drainage systems inside buildings
- Planning Practice Guidance – Technical Guidance (PPG-TG)

3.1.1 Discharge Rate

Based on the design criteria within Section 3.1, the peak foul discharge rate from the site has been estimated using the Discharge Unit method in BSEN12056 and the current proposed floor plans indicated on drawing 1282-21-DAY-XX-00-DR-A-20-0001-Level 00 - Proposed GA Plan-C and a system type II has been assumed.

System type II is defined as a single discharge stack system with small branch pipes. Sanitary appliances are connected to small bore branch discharge pipes. The small bore branch discharges pipes are designed with a filling degree of 0.7 (70%) and are connected to a single discharge stack.

Based on a varying frequency factor of 0.5 and 0.7, the estimated 106 discharge units give a peak flow rate of between 4.2 and 5.9l/s with a typical average flow of between 2.1 and 3.0l/s.

It should be noted that the proposed scheme is a replacement of existing hospital accommodation and will have modernised facilities, such as a low flush WC's instead of traditional ones, as such this will significantly reduce water demand due to the difference in water usage during each flush.

Discharge Unit take-off tables are included in Appendix D for reference.

3.1.2 Discharge Strategy

The hospital site is part of a new larger development where foul water assets will be provided as part of the main development scheme. It is proposed that the foul water would discharge to the 450mm diameter public combined sewer within Wilmslow Road located to the east of the proposed development at an unrestricted rate, as per the existing scenario.

It is likely that a S106 of the Water Industry Act application will be needed to connect the drainage systems to the proposed adopted sewers. It should be noted that United Utilities responded to a pre-development enquiry that was submitted on the 1st August confirming that it would be possible to connect to the 450mm diameter public combined sewer at an unrestricted rate (UU Reference Number: 04370779 and see appendix E).

4 Surface Water Drainage

4.1 Design Parameters and Assumptions

The below design parameters have been used for the purpose of design.

Table 4.1: Design Parameters

Return Period	Attenuation systems designed up to and including a 1-in-100-year event with no flooding.
Climate Change	40% and tested for 45% exceedance events
Ratio R	0.359
M5-60 (mm)	18.000
Runoff Coefficient Summer Storm (C_v)	1.00
Runoff Coefficient Winter Storm (C_v)	0.84

4.1.1.1 Design Standards

The surface water drainage systems will be designed primarily with regard to the following documents:

- Building Regulations Approved Document Part H;
- Sewerage Sector Guidance – Design and Construction Guidance Appendix C;
- BS EN 752 – Drainage outside buildings;
- CIRIA C753 SuDS Manual.

4.1.1.2 Run-off Rate

Using the Rational Method assessment for direct runoff:

Q = 2.78 $x\ i\ x\ A\ x\ C$v

Where:

Q = peak foul flowrate (l/s)

I = rainfall intensity (mm/hr)

A = Area in hectares

C_v = Routing coefficient ≈ 1.0

The pre-existing impermeable area and the post-development impermeable area are equivalent, totalling around 3,100m², resulting in an approximate discharge rate of 43l/s for a 50mm/hr event.

4.1.1.3 Climate Change

The Environment Agency requires, in accordance with the Government's PPG-TG document, that there should be no increase in the rate of surface water emanating from a newly developed site above that of any previous development. Furthermore, it is the joint aim of the Environment Agency and Local Planning Authorities, to actively encourage a reduction in the discharge of storm water as a condition of approval for new developments.

In addition, all drainage systems should be sized to accommodate the runoff arising from a 1 in 100-year rainfall event and should include a further allowance to account for the future effects of climate change.

Table 4.2 below, shows the anticipated increases in rainfall intensities with time for the Irwell Management Catchment.

Table 4.2: Peak Rainfall Intensity Change Allowance

Type		2050s	2070s
Rainfall	Upper End	40%	45%
	Central	25%	30%

Source: Climate change allowances for peak river flow in England (data.gov.uk)

As the development will have a design lifespan of 50-75 years the 2070's epoch should be used. The drainage systems are assumed to be designed for 30% climate change with a check on the impact of the 45% event. It is noted that critical parts of the drainage systems should be designed to the Upper End allowance.

4.1.2 Site Discharge Options

Part H of Building Regulations 2015 recommends that surface water run-off from developments shall discharge to one of the following, listed in order of priority:

- An adequate soakaway or other adequate infiltration system or where that is not reasonably practicable;
- A watercourse, or where that is no reasonable practicable;
- A surface water sewer or drain, or where that is not reasonably practicable;
- A combined sewer

It is necessary to identify the appropriate methods of controlling and discharging surface water from the site. Where possible, surface water run-off from the developed site will be drained in such a way as to mimic the natural drainage systems and thereby implement a SuDS approach. The design should seek to improve the local run-off profile using systems that can either attenuate run-off and reduce peak flow or positively impact on the existing flood profile.

4.1.2.1 Infiltration Based System

Reference is made to the Geotechnical Desk Study (CASICD-MMD-XX-XX-RP-C-000001-P01 - Geotechnical and Geoenvironmental Desk Study) carried out by Mott MacDonald that indicates the site is underlain by drift deposits of Glacial Till. The solid geology comprises of Chester Formation – Sandstone. Sedimentary bedrock formed approximately in the Triassic Period.

Given that the site has been previously developed this will have an impact on permeability as the presence of made ground suggests potential variations in the soil properties that will affect infiltration rates and water movement, thus making this stratum unsuitable for infiltration. Infiltration could cause many residual risks such as the forming of sink holes or the migration of fine material. In addition, after correspondence with United Utilities infiltration has been ruled out (UU Reference Number: 04370779 and see Appendix E).

4.1.2.2 Watercourses

The nearest watercourse is the Shaw Brook which is approximately 400m north of the site. A connection to this watercourse would require crossing third-party land and adopted carriageway and is therefore not considered feasible. As such this has been discounted as a point of discharge for the site.

4.1.2.3 Public Sewers

With reference to the adopted sewer records (see Appendix C) the nearest adopted sewer is a 450mm diameter combined sewer that runs south to north on Wilmslow Road. It is proposed that the new development drains to this sewer.

It is considered likely that the existing building connects to the 450mm diameter public sewer in Wilmslow Road, and a CCTV survey has been initiated to confirm this connection which would require formal agreement with United Utilities to vary the upstream connection.

4.1.3 Allowable Site Discharge

A pre-development enquiry was submitted to United Utilities (UU) on 19/07/2023, UU have responded to state that a connection to the 450mm diameter combined public sewer will be considered once evidence has been submitted outlining that the hierarchy of drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance has been followed.

As detailed later within this report United Utilities requested that any agreed rate does not exceed 5l/s. This correspondence is included in Appendix E .

4.2 Attenuation on Site

The provision of suitable attenuation on site to mitigate flood risk resulting from the development of the site will be a key factor in the evolution of the site development layout.

The provision of attenuation will be necessary in this case and can be achieved by a number of methods; however, not all systems can be assessed in direct comparison.

One of the aims of PPG is to provide not only flood risk mitigation but also maximise additional gains such as improvements in runoff quality and provision of amenity and biodiversity. Systems incorporating these features are often termed Sustainable Drainage Systems (SuDS) and it is a requirement of PPG that these are considered as the primary means of collection, control and disposal to storm water as close to source as possible.

The volume of attenuation required for the development may be estimated using design software. The proposed impermeable areas taken from the current layout may be used to evaluate the runoff response of the site during varying rainfall events.

The software uses FSR characteristics of M5-60 = 18.0 mm and ratio R = 0.359.

Table 4.3: Summary of Anticipated Volume for Post – Development Scenario

Total Impermeable Contributing Area (ha)	Unrestricted Runoff (l/s)	Flow Restriction (l/s)	Estimated Attenuation Volume (1 in 100 +45%CC) (m^3)
0.315	44	5.0	280

This assessment was undertaken to determine the necessary attenuation volume for the proposed development, aiding in the evaluation of suitable SuDs systems. The conclusion of this section will encompass the choice of SuDs types for the proposed development.

4.3 Runoff Quality

Receiving watercourses are sensitive to water quality in varying degrees. Discharges to ground and watercourses will require more treatment than to a public sewer.

Notwithstanding this, reference to the SuDS manual and the simplified index approach (Chapter 26) classifies the hardstanding runoff thus:

Table 4.4: Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05

Source: Table 26.2, CIRIA SuDS Manual C753

Total SuDS mitigation index = mitigation index n_1 + 0.5 (mitigation index n_2)

Where: mitigation index n = mitigation index for component n

Table 4.5: Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	TSS	Metals	Hydrocarbons
Bioretention	0.8	0.8	0.8
Proprietary systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event for inflow concentrations relevant to the contributing area.		

Source: Table 26.3, CIRIA SuDS Manual C753

The table above shows that the proposed SuDS features (blue roof and bioretention/raised planters) will provide water treatment in excess of the anticipated pollutant load for the hospital site and will meet the requirements of the Simplified Index Approach.

4.4 Specific Pollution Risk

It is currently proposed that on the roof of the building a standby generator will be placed to provide backup power to the building in the event of a mains supply failure.

The generator has its own fuel store with a bund in the roof area, however, the tank will require refuelling for time-to-time from ground level and there is an associated residual risk that during a refuelling operation of the tank there may be a leak of fuel, this could range from a minor spill (less than 1 litre) to up to 7,500 litres.

Given the drainage constraints on the site, it is not viable to provide passive protection to the downstream system by using a forecourt interceptor and so it is proposed that the infrequent operation of refuelling is managed by active systems such as the installation of temporary bunds on the site and the isolation of the site drainage system during refuelling operations.

A suitable risk management strategy should be developed for this activity and be subsequently utilised on the site when in operation.

Table 4.6: SuDS Hierarchy

SuDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Living roofs	√	√	√

	SuDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
Most Sustainable	Basins and Ponds	√	√	√
	-Constructed wetlands			
	-Balancing ponds			
	-Detention basins			
	-Retention ponds			
	Integrated vegetation systems	√	√	√
	-Filter Strips and Swales			
	-Rain Gardens			
	-Tree Pits			
	Infiltration devices	√	√	√
	-Soakaways			
	-Infiltration trenches & basins			
	Permeable surfaces and filter drains	√	√	
	-Gravelled areas			
	-Solid paving blocks			
Less Sustainable	-Porous paviours			
	Tanked systems	√		
	-Over-sized pipes/tanks			
	-Cellular Storage			

4.4.1.1 Living or Green/Blue Roofs

Larger areas of roof may be designed as living or green roofs to provide both point water treatment and significant enhancement of local biodiversity. The assessed gains are such that these systems are the preferred EA option for the provision of SuDS.

If considered at the outset of the design of a unit, a green roof can be integrated within the provision of a roof terrace area to multiply the benefits, alternatively, a maintained roof can be installed that may require specialist access.

There are numerous proprietary systems available on the market to suit various specific applications and it is recommended that if these systems are considered for the design, discussion with several suppliers is instigated as soon as possible.

For this development, there is a significant amount of plant on the roof with designated maintenance access areas and access walkways therefore a blue roof would be more suitable than a green roof as it would be easier to integrate with the access requirements.

4.4.1.2 Ponds and Basins

The nature of these systems is such that the run-off from the development can be treated by biological action and stilling to significantly improve the quality of water discharged from the site.

Basins also provide large areas of open space that can be developed for recreational uses for the students or as new habitat for wildlife.

Ponds are SuDS features with permanent water while basins have a similar structure to ponds, but they drain down completely. Therefore, ponds add biodiversity to the site, however the water

in the structure can act as a hazard for visitors and staff. On the other hand, basins add to the amenity of an area and less maintenance is required for the structure compared to ponds.

Both systems do however take up developable land and have residual maintenance and liability issues attached to their implementation. The current development proposals for the site are not conducive to a pond or basin due to the systems being unsuitable from a health and safety perspective given the sensitive nature of site users and resultant issues created with stagnant water and due to the clear absence of space.

4.4.1.3 Integrated Vegetation systems

These systems refer to sustainable stormwater management approaches that incorporate vegetation, such as plants, trees, shrubs, and grasses, into the design and implementation of drainage and stormwater management systems. These include: strips, swales, tree pits, and rain gardens.

Swales and filter strips are often situated adjacent to roads and footpaths, functioning to directly collect water from linear features, facilitating percolation, attenuation, and subsequent discharge into either conventional drainage systems or secondary SuDS devices.

In contrast, rain gardens emulate natural water retention found in undeveloped land, curbing runoff volume from impermeable surfaces and even addressing low levels of pollution. These localised systems are particularly advantageous for specific catchments. Bioretention, as seen in rain gardens, proves valuable when water quality concerns arise, such as with highway runoff. Notably, tree pits stand as effective solutions in such scenarios and can accommodate larger drainage areas.

However, considering the site's drainage system is not interconnected at the surface, swales and filter strips are harder to integrate and thus less viable options.

Instead, tree pits emerge as more suitable alternatives, capable of integration with the raised planters.

4.4.1.4 Pervious surface and permeable sub-bases

Larger areas of paved hardstanding can easily be converted to provide significant volumes of storage. These systems also encourage biological treatment of flow and extraction of oils and heavy metals from the run-off. They also require less gritting in winter. Land take is reduced as storage is located under car parks, hardstanding and access roads.

This system could reduce the need for a separate collection system such as kerbs and gullies. It could also assist in reducing the flood profile of the site by detaining runoff from the development within the sub-base material. There is no specific amenity provided by the system other than enabling other areas to be utilised for development rather than potentially sterilizing areas with an easement for a sewer or stand-off for a basin.

These systems can also be integrated with basically all other forms of SuDS drainage and even on more steeply sloping sites (up to 1v:20h). A common sub-base level can be provided to link to tree pits, ponds and basins and thus contribute to site wide attenuation.

As rainfall infiltrates directly there is no requirement for gradients on the surface to aid drainage and can be effectively laid flat.

Where infiltration to the ground below is not proposed, then an impermeable membrane will be required at the formation level.

These systems can be incorporated adjacent to the hardstanding areas adjacent to the central raised planters where the new pebble resin and herringbone paving system are proposed to be (see CASICD-DAY-XX-00-DR-A-090037-WIP-Proposed Landscape Scheme Plan (002)).

4.5 Design Summary

While there exist additional SuDS systems to contemplate including soakaways, attenuation tanks etc, the top four out of five more sustainable systems provide the necessary attenuation and pollution criteria. Consequently, the remaining systems will not be taken into consideration. It should also be noted there would be no available space for an attenuation tank at ground level.

For a total drained post-development impermeable area of 3,150m^2, a blue roof is proposed to be located on the roof of the proposed building and a SuDS based integrated vegetation system to drain the external hard surfacing areas.

The blue roof would provide approximately 230m^3 of attenuation.

The raised planters on the proposed landscaping area between the building and Wilmslow Road are to be utilised as integrated vegetation systems collecting runoff in the central tree pit area and discharging it to the tree pit growing media and the drainage layer at the base of the tree pit. This system would provide approximately 50m^3 of attenuation.

The blue roof system incorporates a vortex flow control, limiting the flow to 2.0l/s. Subsequently, both systems' flow will be constrained to 5.0l/s as they exit the site, achieved through a vortex-flow control designed to accommodate a 1 in 100-year event with a 45% climate change event.

The drainage masterplan is shown in Appendix F, with typical details shown in Appendix G

The MicroDrainage calculations are included in Appendix H.

Several catchpits have also been added as and when required in the storm water network model to provide silt capacity between roof drainage connections.

5 Maintenance & Operation Strategy

5.1 Drainage

The whole of the drainage system is to be maintained as part of the existing experienced estates management team of the Christie NHS Foundation Trust.

Specialist services will be required for the maintenance of the small surface water pump station, these will be advised by the chosen supplier.

5.1.1 Typical SuDS Maintenance Strategy

A typical maintenance strategy for the SuDS features is given in Table 5.1 below.

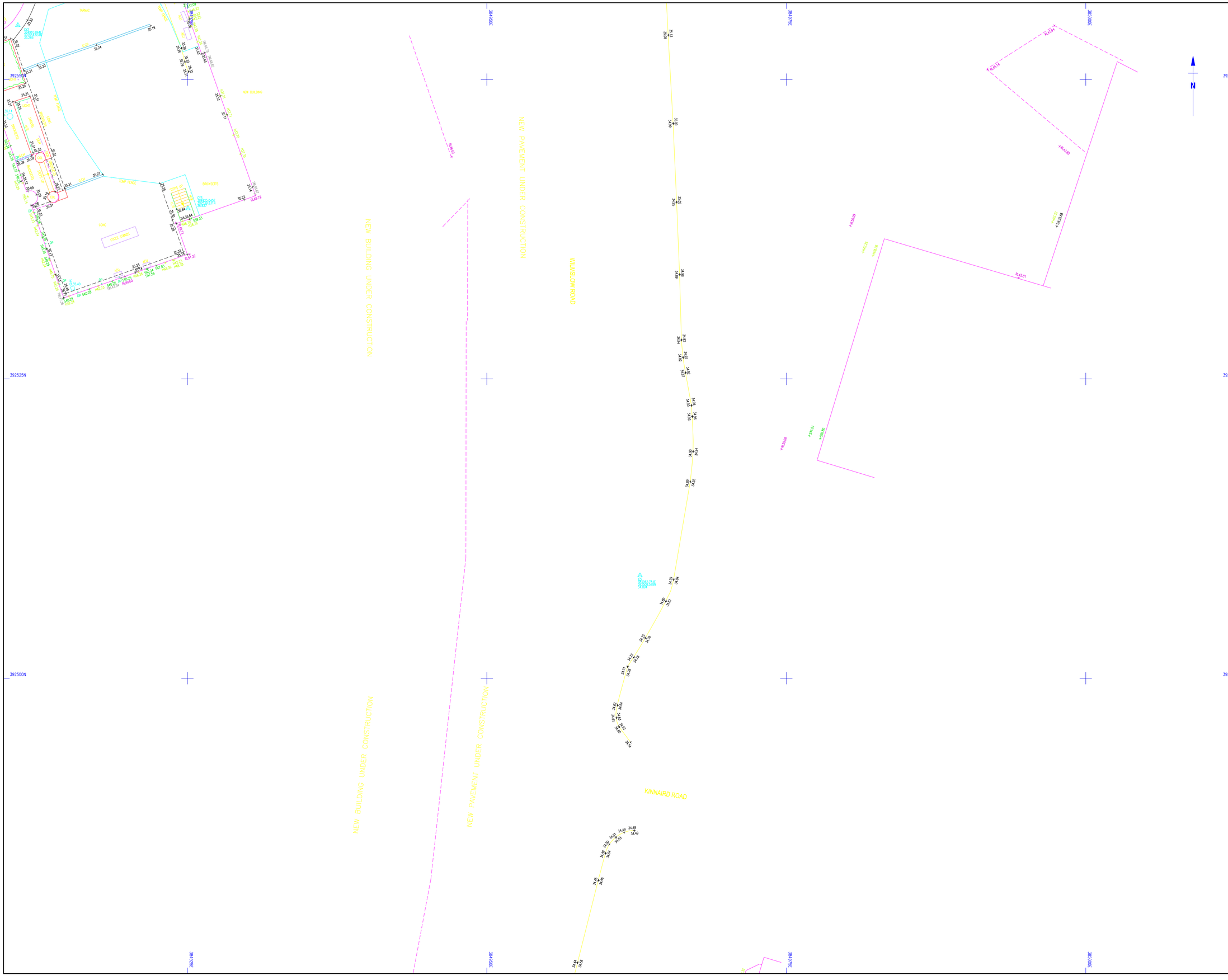
Table 5.1: Typical SuDS Maintenance Strategy

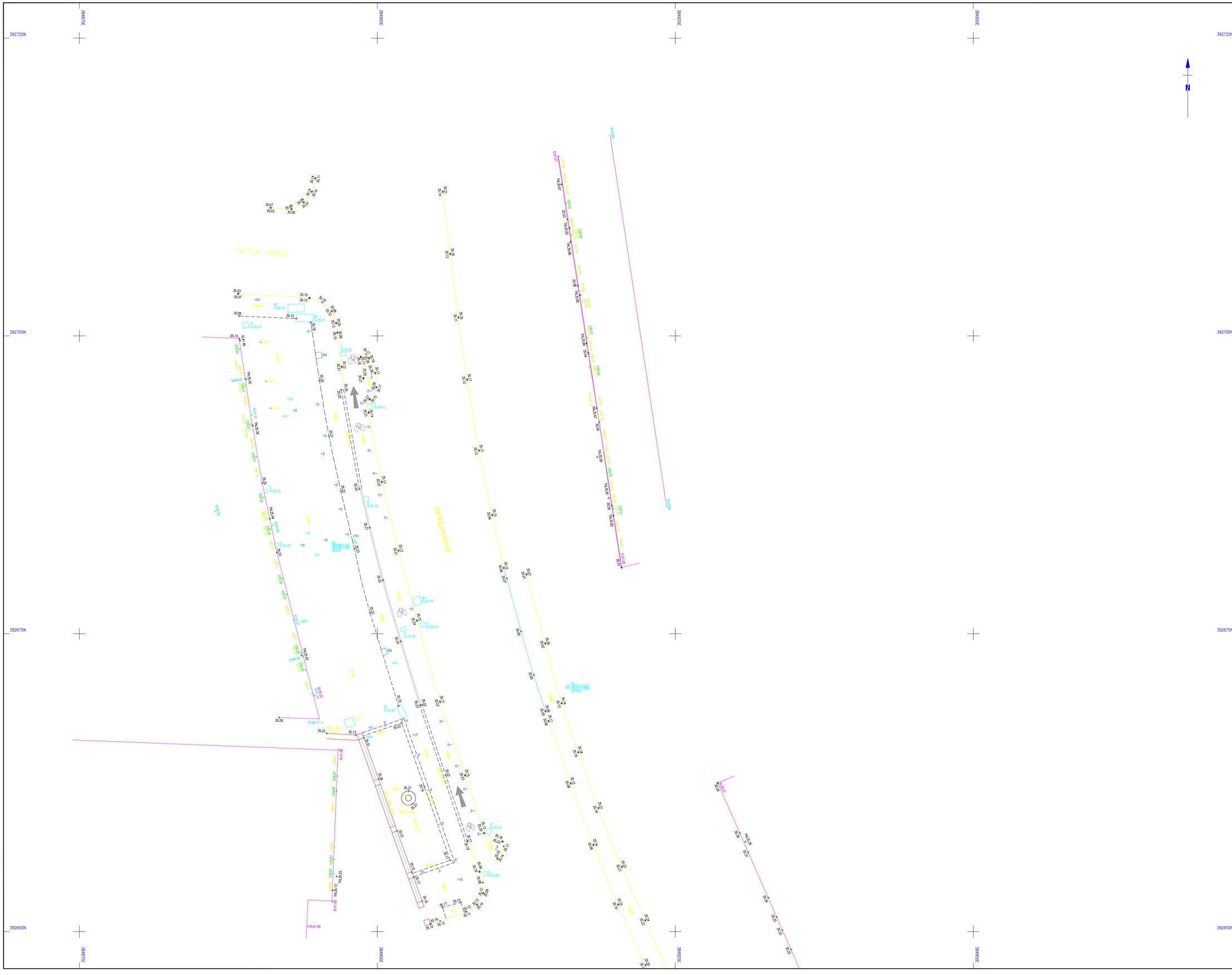
Schedule	Required Action	Collection Systems	Blue Roof	Flow Control	Tree Pits
Regular	Visual Inspection	Monthly	Annually and after severe storms	Monthly	Monthly for three months after installation
	Remove Litter and Debris	Monthly	Annually and after severe storms	Once a year after Autumn leaves fall, or reduced frequency as required	Monthly (or as required)
	Inspect and Identify Any Areas Not Operating Correctly.	Monthly	Annually and after severe storms	-	-
	Manage Other Vegetation and Remove Nuisance Plants	Monthly	Six Months or as required.	-	Monthly (at start, then as required)
	Inspect Inlets, Outlets and Overflows for Blockages/Damage	Monthly	-	-	At end of growing season, leave 50% of cuttings as mulch
	Inspect Water Bodies for Signs of Poor Quality	-	-	Monthly	Monthly
	Inspect Vegetation Coverage	-	Monthly for 1 year, then yearly	-	-
	Inspect Banksides, Pipework and Structures for Physical Damage	-	Annually and after severe storms	-	Monthly for 6 months, quarterly for 2 years, then half yearly

	Inspect Inlets and facility surface for silt accumulation	-	Annually and after severe storms.	-	Monthly
	Tidy All Dead Growth Before Start of Growing Season	-	Annually (in Autumn)	-	Half yearly until appropriate removal frequency is established
	Remove Sediment from Inlets, Outlets and Forebays	Annually	Six monthly or Annually or as required.	Annually	Remove visible dead material
	Check surface of permeable paving for blockages and clear	-	-	-	As required
	Inspect underside of roof for evidence of leakage	-	Annually and after severe storms.	-	-
Occasional	Reseed Areas of Poor Vegetation Growth	-	Annually (in Autumn)	-	-
	Remove Sediment from Main Body	-		-	As required or if bare soil is exposed over 10% or more of treatment
	Remove Sediment from Inlets, Outlets and Forebays	Annually		-	Annually or as required
Remedial Actions	Repair Erosion or other Damage by Reseeding or Re-turfing	-	As required	-	As required
	Repair /Rehabilitation of Inlets, Outlets and Overflows	-	As required	-	-Half Yearly
	Relevel Uneven Surfaces and Reinstate Design Levels	-	-	-	As required
	Rehabilitate of surface and upper substructure by vacuum sweeping	-	-	-	-
	Remove and dispose of oils or petrol residues using safe practices	Annually	-	Annually	As required

A. Topographical Survey

384900E
384925E
384950E
384975E
392475N
392450N
392425N
392400N
NEW BUILDING UNDER CONSTRUCTION
NEW PAVEMENT UNDER CONSTRUCTION
WILMSLOW ROAD
+RL46.97
+RL46.60
+RL46.48
+RL47.92
+EL42.80
+EL42.77
+EL42.19
+EL42.33
+EL42.27
+EL42.74


392550N
392525N
392500N
386425E
386500E
NEW BUILDING UNDER CONSTRUCTION
NEW PAVEMENT UNDER CONSTRUCTION
WILMSLOW ROAD
KINNAIRD ROAD
TARMAC
CONC
TEMP FENCE
BRICKSETS
POST TOP
NEW BUILDING
CONC POST STANDS
R=6.63
R=6.63
R=6.63



Survey Notes

Grid: Local Plane Metric related to National at SC1

Levels: Related to OS Datum from GNSS positioning converted using the National Geoid model OSGM15.

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Upper Storey
Ruin (RUIN)
Passage
Wall with Height
Retaining Wall (Wall 457.0m) R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WAL
Iron Railings I/R
Lattice L/F
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Envelope

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Belisha Beacon BB
Bus Stop BS
Bollard B
Cats Eye CE
Coal Chute CC
Closed Circuit TV CCTV
Drain DR
Electricity Pole EP
Flood Light FL
Flag Staff FS
Lamp Post LP
Letter Box LB
Name Plate (street) NP
Mooring Ring MR
Mile Post or Mooring Post MP
Service Marker MK
Mile Stone MS
Post P
Parking Meter PM
Reflector Post RP
Rodding Eye RE
Road Sign RS
Speed Camera S/CAM
Information Sign SIGN
Stay ST
Traffic Light TL
Telegraph Pole TP
Traffic Light Push Button Post TLP
Traffic Light Control TLC/P
Control Box C/BOX
British Telecom Box BT BOX
Electricity Box EL BOX
Gas Box GAS BOX

INSPECTION CHAMBERS AND PIPES

Inspection Cover IC
Inspection Cover (Elec) IC/EL
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
Cable TV IC/CTV
Inspection Cover Traffic Signals IC/TL
Gully G
Kerb Outlet KO
Vent Pipe VP
Down Pipe DP
Rain Water Pipe RWP
Soil Pipe SVP
Gas Pipe G=PIPE
Unable to lift cover U/L
Stop Tap ST
Stop Valve SV
Lamphole LH
Hydrant HYD
Earth Rod ER
Sea Valve SV
Water Meter WM
Washout WO
Rodding Eye RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pin MON
Probe Hole PH
Window Sample WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Footbridge
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Drain Barrier C/BR
Culvert CUL
Staunton STAN
Car Vacuum VAC
Offset Fill OF
Air Valve AV
Trough T/R
Chimney CHIM
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Lane Drain)
Spring SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

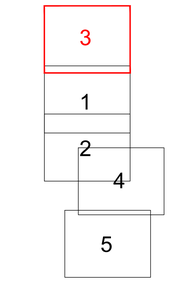
LEVEL AND HEIGHT INFORMATION

Standard Spot Height + 123.45
Precision Spot Height + 123.456
Bed Level + BL23.50
Water Level + WL24.32
Soffit Level + SL25.52
Threshold Level + TH26.98
Cover Level + CL26.45
Invert Level + IL25.15
Pipe Soffit Level + PSL5.00
Floor Level + FL6.00
Finished Floor Level + FFL6.00
Top of Tank Level + TT7.00
Base Level + BL6.00
Sill Level + RL8.00
Roof Hip Level + RHL8.50
Flat Roof Level + FRL7.00
Top of Canopy Level + TOP/C7.00
Underside of Canopy Level + SOF/C6.50
Window Sill Level + WSL8.00
Window Head Level + WHL9.00
Springing Level + SPL8.50
Arch Level + AL7.00
Cable Level + CHT8.55
Top of Wall Level + TWL10.00
Underside of Beam Level + UBL9.55
General Height + HT9.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
61 Cross Street, Sale, Manchester M33 7HF. Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, The Survey Association, RICS, RICS, RICS

Client
DAY ARCHITECTURAL LTD
STUDIO 1, LANCASTER BUILDINGS, 77 DEANSGATE
MANCHESTER, M3 2BW

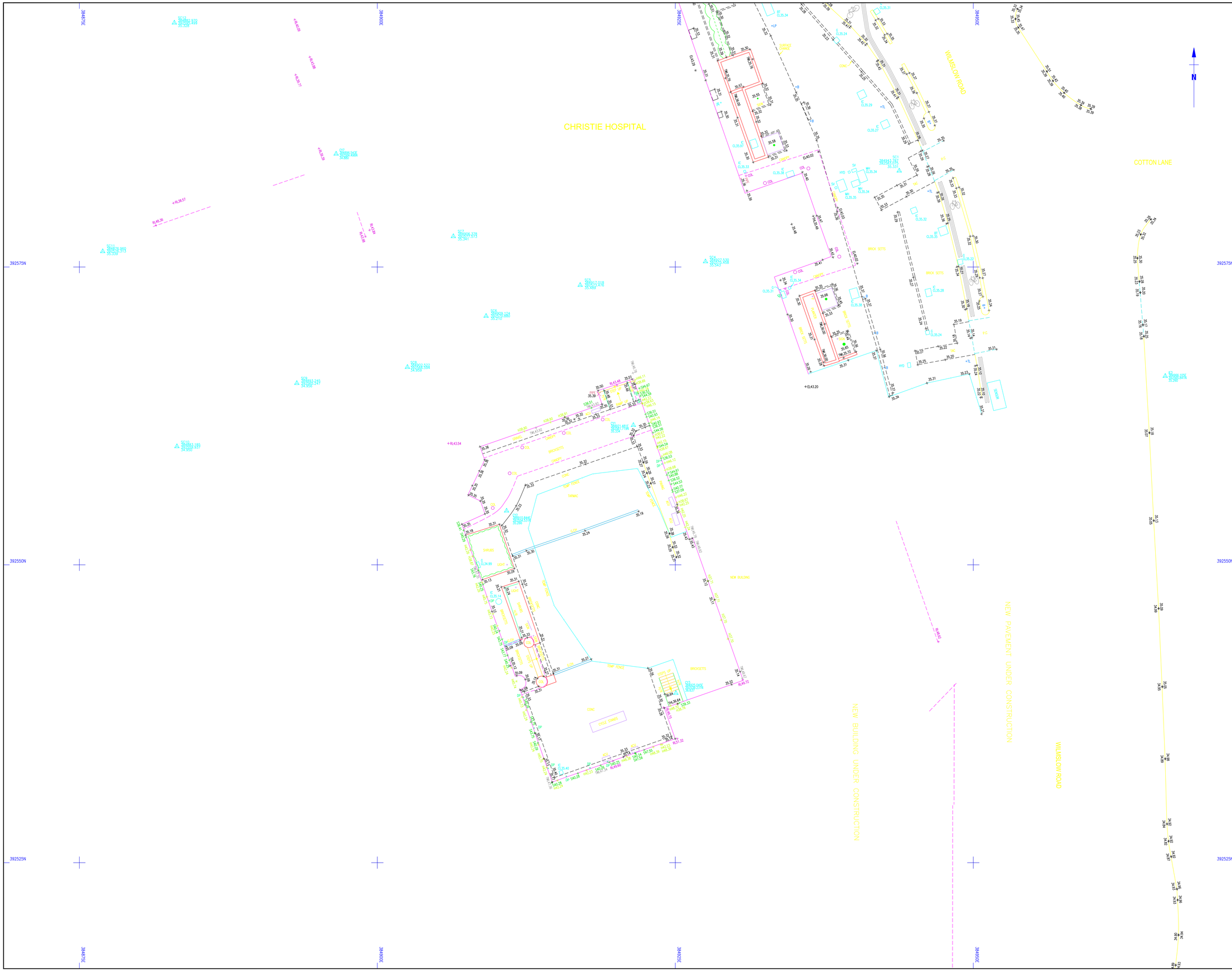
Project
HOLT BUILDING
THE CHRISTIE HOSPITAL, WILMSLOW ROAD
MANCHESTER, M20 4BX

Drawing Title
TOPOGRAPHICAL SURVEY

Drawn By	JW 03/03/23	Survey Date	February 2023
Checked by	EAD 03/03/23	Scale	A0@1:100

Drawing No 59603/TOP3/1

Revision



Survey Notes

Grid: Local Plane Metric related to National at SC1

Levels: Related to OS Datum from GNSS positioning converted using the National Geoid model OSGM15.

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Upper Storey
Ruin (RUIN)
Passage
Wall with Height Retaining Wall (Wall HT) (Ret) R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WK
Iron Railings I/R
Lattice L/F
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Envelope

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

STREET FURNITURE

Belisha Beacon
Bus Stop
Bollard
Cats Eye
Coal Chute
Closed Circuit TV
Drain
Electricity Pole
Flood Light
Flag Staff
Lamp Post
Letter Box
Name Plate (street)
Mooring Ring
Mile Post or Mooring Post
Service Marker
Mile Stone
Post
Parking Meter
Reflector Post
Rodding Eye
Road Sign
Speed Camera
Information Sign
Stay
Traffic Light
Telegraph Pole
Traffic Light Push Button Post
Traffic Light Control
Control Box (C/BOX)
British Telecom Box (BT BOX)
Electricity Box (EL BOX)
Gas Box (GAS BOX)

INSPECTION CHAMBERS AND PIPES

Inspection Cover (IC)
Inspection Cover (Elec) (IC/EL)
Manhole (MH)
British Telecom Cover (BT)
Inspection Cover (Comms) (IC/COM)
Cable TV (CATV)
Inspection Cover Traffic Signals (IC/TL)
Gully (G)
Kerb Outlet (KO)
Vent Pipe (VP)
Down Pipe (DP)
Rain Water Pipe (RWP)
Soil Pipe (SVP)
Gas Pipe (G~PIPE)
Unable to lift cover (UTL)
Stop Tap (ST)
Stop Valve (SV)
Lamphole (LH)
Hydrant (HYD)
Earth Rod (ER)
Sea Valve (SV)
Water Meter (WM)
Washout (WO)
Rodding Eye (RE)

GEOTECHNICAL INFORMATION

Borehole (BH)
Trial Pit (TP)
Monitor Pin (MON)
Probe Hole (PH)
Window Sample (WS)

GENERAL INFORMATION

Petrol Pump (PP)
Basement Light (BL)
Footbridge (FB)
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving (TAC)
Crash Barrier (C/BR)
Bollards (O C/S)
Staunton (O STA)
Car Vacuum (O VAC)
Offset Fill (O OF)
Air Valve (o AV)
Trough (TR)
Chimney (O CHY)
Telephone Call Box (TCB)

OVERHEAD FEATURES

Electricity Pylon (E.PYLON)
Electricity (E)
Telephone (T)

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert (+5.4)
Drip (Land Drain)
Spring (SPR)

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump (STUMP)
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

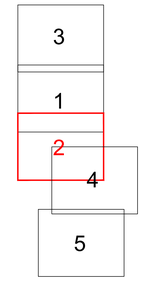
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Pipe Soffit Level (+ PSL5.00)
Floor Level (+ FL6.00)
Finished Floor Level (+ FFL6.00)
Top of Tank Level (+ TT7.00)
Eave Level (+ EL8.00)
Ridge Level (+ RL8.00)
Roof Hip Level (+ RHL8.50)
Flat Roof Level (+ FRL7.00)
Top of Canopy Level (+ TOP/CY.00)
Underside of Canopy Level (+ SOF/CNL8.50)
Window Sill Level (+ WSL8.00)
Window Head Level (+ WHL9.00)
Springing Level (+ SPL8.50)
Arch Level (+ AL7.00)
Cable Level (+ CHT8.55)
Top of Wall Level (+ TWL10.00)
Underside of Beam Level (+ UBL9.55)
General Height (+ HT9.00)

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description
A	03/02/23	Survey extended

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
65 Cross Street, Sale, Manchester
M33 7HF. Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, The Survey Association, ICES, CHAS, Safe Contractor

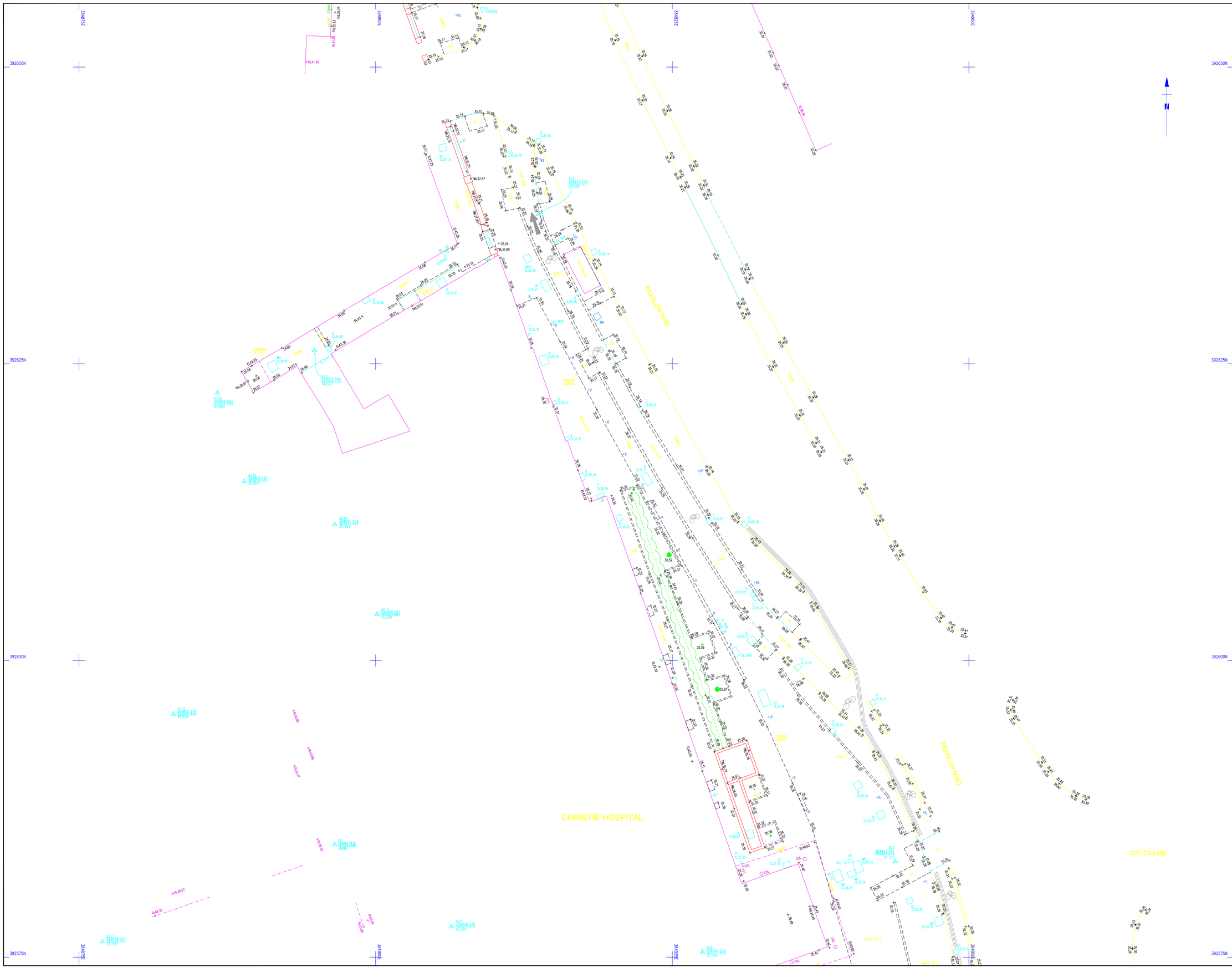
Client
DAY ARCHITECTURAL LTD
STUDIO 1, LANCASTER BUILDINGS, 77 DEANSGATE
MANCHESTER, M3 2BW

Project
HOLT BUILDING
THE CHRISTIE HOSPITAL, WILMSLOW ROAD
MANCHESTER, M20 4BX

Drawing Title
TOPOGRAPHICAL SURVEY

Drawn By	Survey Date
DCL 06/01/23	December 2022
Checked by	Scale
EAD 06/01/23	A0@1:100

Drawing No: 59603/TOP2/1
Revision: A



Survey Notes

Grid: Local Plane Metric related to National at SC1

Levels: Related to OS Datum from GNSS positioning converted using the National Geoid model OSGM15.

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Upper Storey
Ruin (RUIN)
Passage
Wall with Height / Retaining Wall (Wall HT) R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WK
Iron Railings I/R
Lattice L/F
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Envelope

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Belisha Beacon BB
Bus Stop BS
Bollard B
Cats Eye CE
Coal Chute CC
Closed Circuit TV CCTV
Drain DR
Electricity Pole EP
Flood Light FL
Flag Staff FS
Lamp Post LP
Letter Box LB
Name Plate (street) NP
Mooring Ring MR
Mile Post or Mooring Post MP
Service Marker MK
Mile Stone MS
Post P
Parking Meter PM
Reflector Post RP
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Washout WO
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GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pit MON
Probe Hole PH
Window Sample WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Footbridge
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Drain Barrier C/BR
Cleanout CO
Diversion DIV
Car Vacuum VAC
Offset Fill P
Air Valve AV
Trough T/R
Chimney CHIM
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Strip (Lined Drain)
Spring SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

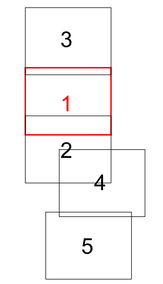
LEVEL AND HEIGHT INFORMATION

Standard Spot Height +123.45
Precision Spot Height +123.456
Bed Level +BL23.50
Water Level +WL24.92
Soffit Level +SL25.52
Threshold Level +THR.98
Cover Level +CL26.45
Invert Level + IL25.15
Pipe Soffit Level + PSL5.00
Floor Level + FL6.00
Finished Floor Level + FFL6.00
Top of Tank Level + TT7.00
Eave Level + EL8.00
Ridge Level + RL8.00
Flat Roof Level + RHL8.50
Top of Canopy Level + TOP/CF.00
Underside of Canopy Level + SOF/CSL9.50
Window Sill Level + WSL9.00
Window Head Level + WHL9.00
Springing Level + SPL8.50
Arch Level + AL7.00
Cable Level + CHTR.55
Top of Wall Level + TWL10.00
Underside of Beam Level + UBL9.55
General Height + HTR.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description
A	03/03/23	Survey extended

MALCOLM HUGHES
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65 Cross Street, Sale, Manchester M33 7HF. Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, The Survey Association, RICS, Property Mark, FS 14126

Client
DAY ARCHITECTURAL LTD
STUDIO 1, LANCASTER BUILDINGS, 77 DEANSGATE
MANCHESTER, M3 2BW

Project
HOLT BUILDING
THE CHRISTIE HOSPITAL, WILMSLOW ROAD
MANCHESTER, M20 4BX

Drawing Title
TOPOGRAPHICAL SURVEY

Drawn By	DCL	06/01/23
Checked by	EAD	06/01/23

Survey Date: December 2022
Scale: A0@1:100

Drawing No: 59603/TOP1/1
Revision: A

B. Utilities Survey

Survey Notes

Grid: Local Plane Metric related to National at SC1

Levels: OS datum from GNSS positioning, converted using the National Geoid model OSGM15

Notes

Survey Legend

STREET FURNITURE

INSPECTION CHAMBERS

OVERHEAD FEATURES

LEVEL AND HEIGHT INFORMATION

Underground Services Survey Legend

British Telecom
Unidentified
Virgin Media
Fibre Optic Optic
CATV Coax
Empty Ducting
Earth Cable
Electricity Cables
Low Voltage
Unidentified
Sewer Combined
Sewer Foul
Sewer Surface Water
Traffic Light Cables
Unidentified GPR or Non Detected
Water Pipe
End of Main
Fuel Pipe
Offset Fill Pipe
Vapour Recovery
Fuel Pipe - Petrol
Fuel Pipe - V-Power Diesel
Fuel Pipe - Diesel
Fuel Pipe - Unleaded
Services survey boundary
Area of No Access
Scar Trace
Multiple Electric Ducts
GPR Detected Rebar
GPR Detected Structural Feature
GPR Detected Structure
Utility Chamber

AR Assumed Route
BC Blocked Cable
BD Blocked Duct
CR Cable Riser
DP Draw Pit
ENC Enclosed Pipe
RS Reducing Slab (Drainage)
SP Sump Pump / Well
UTL Unable To Locate
SIG Signal Lost

GPR Ground Penetrating Radar
ND No Signal Detected
PE Polyethylene Pipe
PVC Polyvinyl Chloride
UR Unable To Rod
UT Unable To Trace
VC Vitrified Clay
WC Vitrified Duct
CO Concrete

DISCLAIMER

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and MHS accept no liability for any excavations that are undertaken to confirm identification, location and depth of features where these are critical to design or site works.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as Taken From Records (TFR) or PAS128 QL-D have not been proven on site.

The diagram below describes the depth information obtained in detail.

The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing.

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION — APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC

GRAVITY DRAIN VISUAL OBSERVATION — APPROX. DEPTH TO INVERT

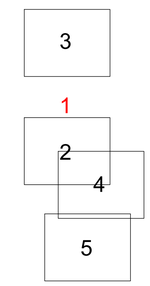
GROUND PENETRATING RADAR — APPROX. DEPTH TO TOP OF CROWN

BSI PAS128:2014 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	DESCRIPTION
D	Desktop Study	QL-D	Location not detected on site, taken from records
C	Site Reconnaissance	QL-C	A utility segment that has not been detected but whose location can be located to existing street furniture visible on site.
B	Detection	QL-B4	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B2	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detector/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B1	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detector/Ground Penetrating Radar). High confidence level for position and depth.
A	Verification	QL-A	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits)
OTHER ANNOTATIONS		(P)	Denotes utility segments that have been detected through the use of GPR Post Processing.

Further information on PAS128 can be found on our resource website: www.pas128.co.uk

Sheet Index



Rev.	Date	Description

Accreditations

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhs.co.uk

Client:

Day Architectural Ltd.
Studio 1, Lancaster Buiildings, 77 Deansgate
Manchester M3 2BW

Project:

Holt Building, The Christie Hospital
Wilmslow Road
Manchester M20 4BX

Drawing Title:

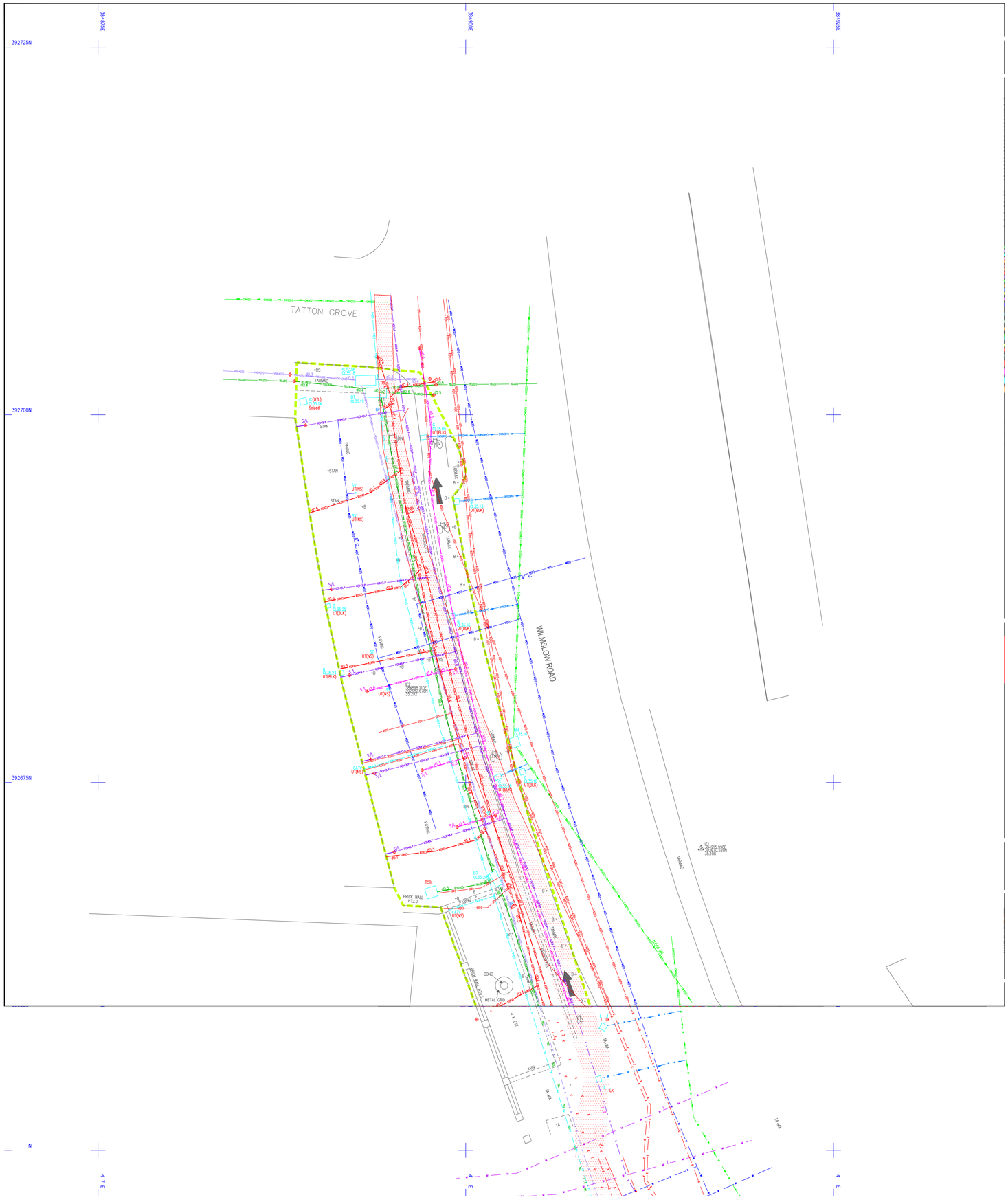
Underground services survey

Drawn By	Date	Survey Date	
PS	23/03/23		February 2023
Checked by	Date	Scale	
DJ	23/03/23		A0@1:100

Drawing No: 59603/UG1

Revision:


392575N
392550N
392525N
392500N
CHRISTIE HOSPITAL
W MS OW ROAD
NEW AVEMENT N E \ N T \ TI N
NEW IL IN NE \ N T \ TI N
W MS OW ROAD
CO ON ANE
N
SC12 384892.970 392585.469 35.328
SC11 384878.960 392579.313 34.720
SC7 384906.378 392567.573 35.341
SC4 384917.018 392547.376 35.469
SC3 384909.124 392527.885 35.310
SC8 384902.522 392523.594 34.909
SC9 384893.245 392523.247 34.906
SC10 384883.185 392522.937 34.950
SC6 384917.018 392547.376 35.469
SC5 384909.124 392527.885 35.310
SC2 384902.522 392523.594 34.909
SC1 384893.245 392523.247 34.906
SC13 384883.185 392522.937 34.950
SC7 384906.378 392567.573 35.341
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Survey Notes

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Notes

Survey Legend

STREET FURNITURE

INSPECTION CHAMBERS

OVERHEAD FEATURES

LEVEL AND HEIGHT INFORMATION

Underground Services Survey Legend

British Telecom
Vodafone
Virgin Media
CATV Fibre Optic
Empty Ducting
Earth Cable
Electricity Cables
Gas Pipe
Gravity Combined
Sewer Foul
Sewer Surface Water
Traffic Light Cables
Water Pipe Supply
Water Pipe
End of trace
Fuel Pipe
Offset Fill Pipe
Vapour Recovery
Fuel Pipe - Diesel
Fuel Pipe - V-Power Diesel
Fuel Pipe - Unleaded
Fuel Pipe - V-Power
Services survey boundary
Area of No Access
Scar Tracks
Multiple Electric Ducts
GPR Detected Rebar
GPR Detected Structural Feature
GPR Detected Structure
Utility Chamber

AR Assumed Route
BC Blocked Cable
BD Blocked Duct
CR Cable Riser
DP Duct Plug
ENC Enclosed Pipe
RS Reducing Slab (Drainage)
SP Suspended Cable
UTL Unable To Locate
SIG Signal Lost

GPR Ground Penetrating Radar
ND No Signal Detected
PE Polyethylene Pipe
PVC Polyvinyl Chloride
UR Unable To Rod
UT Unable To Trace
VC Vitrified Clay
VC Verified Duct
CO Concrete

DISCLAIMER

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and trial excavations and trial pits should always be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

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TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION — APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC

GRAVITY DRAIN VISUAL OBSERVATION — APPROX. DEPTH TO INVERT

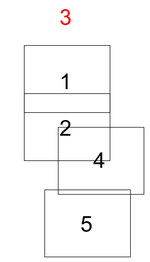
GROUND PENETRATING RADAR — APPROX. DEPTH TO TOP OF CROWN

BSI PAS128:2014 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	DESCRIPTION
D	Desktop Study	QL-D	Location not detected on site, taken from records
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OTHER ANNOTATIONS		(F)	Denotes utility segments that have been detected through the use of GPR Post Processing

Further information on PAS128 can be found on our resource website: www.pas128.co.uk

Sheet Index



Rev.	Date	Description

Accreditations

65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Client

Day Architectural Ltd.
Studio 1, Lancaster Buiildings, 77 Deansgate
Manchester M3 2BW

Project

Holt Building, The Christie Hospital
Wilmslow Road
Manchester M20 4BX

Drawing Title

Underground services
survey

Drawn By	Date	Survey Date
PS	23/03/23	February 2023
Checked by	Date	Scale
DJ	23/03/23	A0@1:100

Drawing No: 59603/UG3

Revision:



Survey Notes

Grid: Local Plane Metric related to National at SC1

Levels: OS datum from GNSS positioning, converted using the National Geoid model OSGM15

Notes

Survey Legend

STREET FURNITURE

INSPECTION CHAMBERS

OVERHEAD FEATURES

LEVEL AND HEIGHT INFORMATION

Underground Services Survey Legend

British Telecom
Vodafone
Virgin Media
Fibre Optic Cable
ZAYO
Empty Ducting
Earth Cable
Electricity Cables
Gas Pipe
Street Furniture
Sewer Foul
Sewer Surface Water
Traffic Light Cables
Water Pipe Supplied by Veolia Water North West
Water Pipe
End of trace
Fuel Pipe
Offset Fill Pipe
Vent Pipe
Vapour Recovery
Fuel Pipe - Diesel
Fuel Pipe - V-Power Diesel
Fuel Pipe - Unleaded
Fuel Pipe - V-Power
Services survey boundary
Area of No Access
Scar Trace
Multiple Electric Ducts
GPR Detected Rebar
GPR Detected Structural Feature
GPR Detected Structure
Utility Chamber

AR Assumed Route
BC Blocked Cable
BP Blocked Pipe
CR Cable Riser
DP Duct Plan
Enc Enclosed Pipe
RS Reducing Slab (Drainage)
TP Terminated Point
UTL Unable To Lift
SIL Signal Lost

GPR Ground Penetrating Radar
NS No Signal Detected
PE Polyethylene Pipe
TR Tracer Wire Polarity
UR Unable To Rod
UT Unable To Trace
VC Vitrified Clay
WC Verified Drain
CO Concrete

DISCLAIMER

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and trial excavations and hand dug inspection pits are undertaken to confirm identification, location and depth of features where these are critical to design or site works.

Please note that not all buried pipes, cables and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

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TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION: APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC

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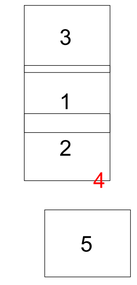
GROUND PENETRATING RADAR: APPROX. DEPTH TO TOP OF CROWN

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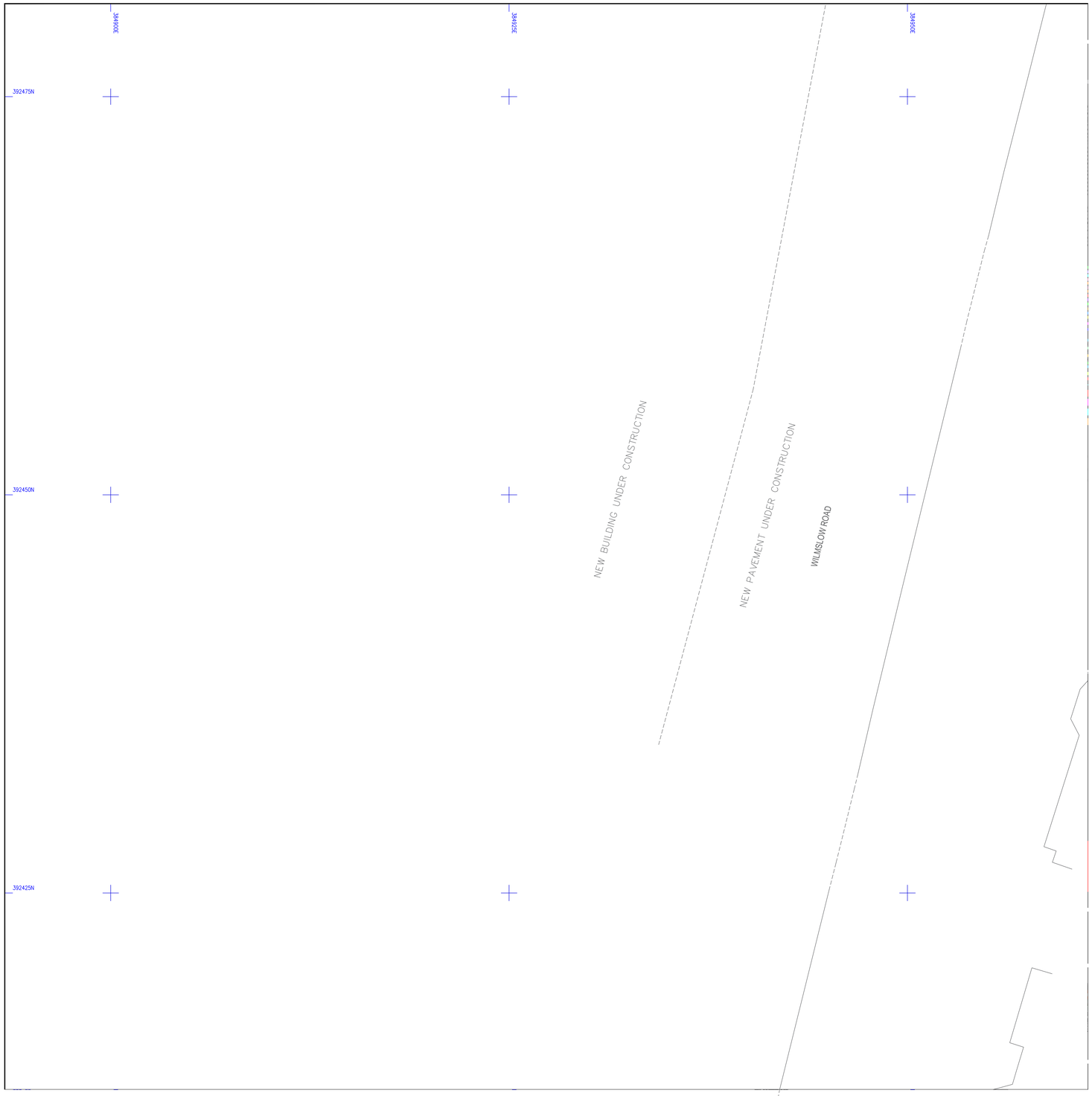
Project

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Wilmslow Road
Manchester M20 4BX

Drawing Title

Underground services
survey

Drawn By	PS	23/03/23	
Checked by	DJ	23/03/23	
Survey Date		February 2023	
Scale		A0@1:100	
Drawing No	59603/UG4		Revision



Survey Notes

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Sewer Foul
Sewer Surface Water
Traffic Light Cables
Water Pipe (Potable)
Water Hydrant Point
Water Pipe
End of Ivace
Foul Pipe
Offset Fill Pipe
Vapour Recovery
Fuel Pipe - Quest
Fuel Pipe - V-Power Diesel
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APPROX. DEPTH TO CENTRE

CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)

APPROX. DEPTH TO INVERT

GROUND PENETRATING RADAR

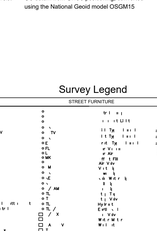
APPROX. DEPTH TO TOP OF CROWN

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Sheet Index



5

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Project

Holt Building, The Christie Hospital
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Drawing Title

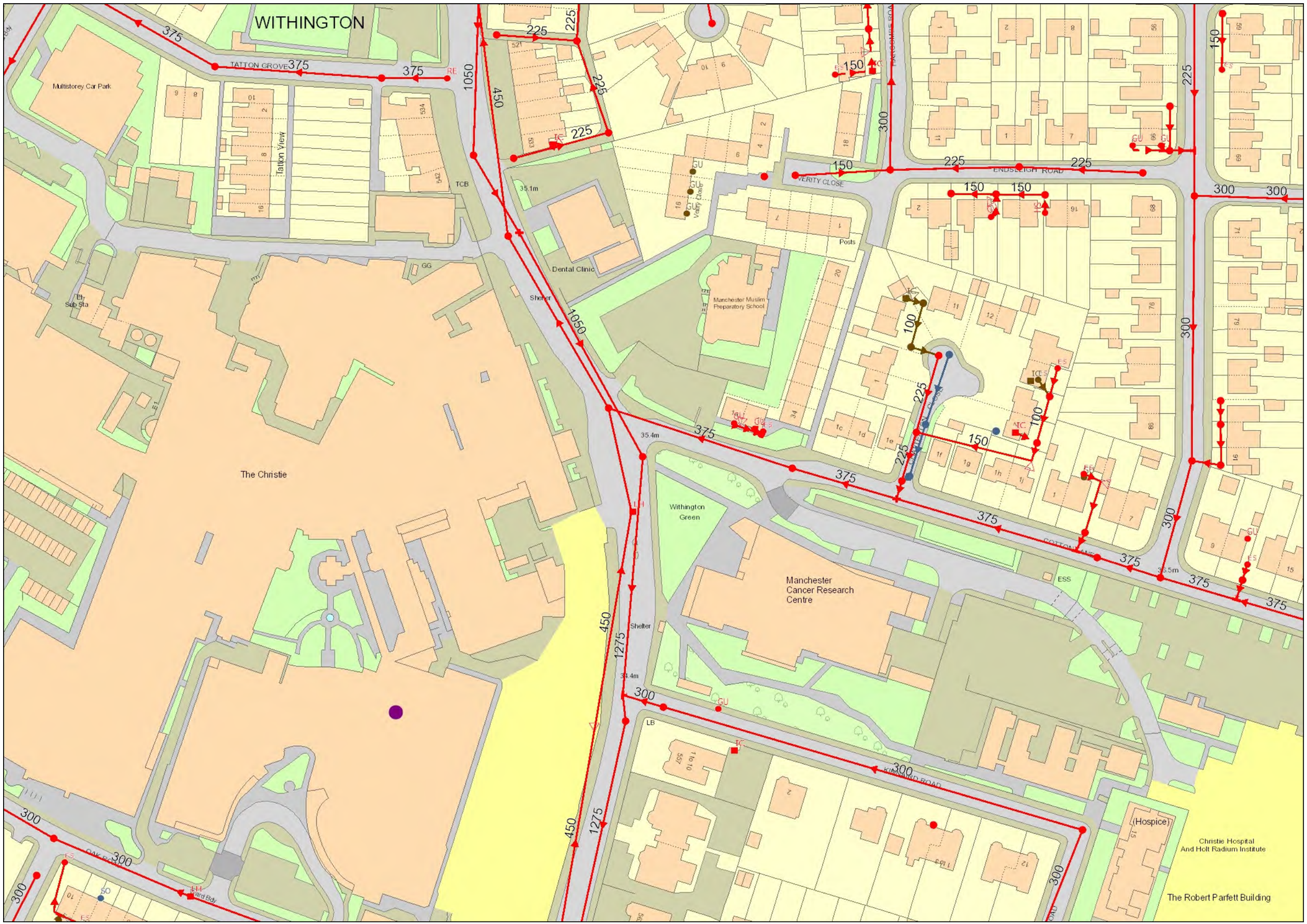
Underground services
survey

Drawn By		Survey Date	
PS	23/03/23	February 2023	
Checked by		Scale	
DJ	23/03/23	A0@1:100	

Drawing No: 59603/UG5

Revision:

C. United Utilities Sewer Records



United Utilities Maps for SafeDig

Date :	10/01/2023 08:59:31
Centre X:	384965
Centre Y:	392572
Scale :	1250
UserName:	MOTTMACNRT

Extract from maps of United Utilities' Underground Assets

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

Crown copyright and database rights 2023.Ordnance Survey 100022432 This plan is based on the Ordnance Survey Map with the sanction of the Controller of H.M. Stationary Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.

D. Discharge Units of Sanitary Appliances

System = System II

Frequency Factor (k) = 0.7

Sum of Discharge Units = 70l/s

Wastewater Flow Rate = 5.86l/s

Table 5.2: Ground Floor

		Sum	53.7l/s
Appliance	**No**	**DU**	**Total**
WC(4L)	14	1.8	25.2
Urinal (single)	0	0.5	0
Wash Basin	63	0.3	18.9
Kitchen Sink	4	0.6	2.4
Washing Machine (12kg)	6	0.6	7.2
Shower without plug	0	0.4	0
Floor Gully	0	0.9	0

Table 5.3: First Floor

		Sum	10.9l/s
Appliance	**No**	**DU**	**Total**
WC(4L)	3	1.8	5.4
Urinal (single)	0	0.5	0
Wash Basin	3	0.3	0.9
Kitchen Sink	1	0.6	0.6
Washing Machine (12kg)	2	1.2	2.40
Shower without plug	4	0.4	1.6
Floor Gully	0	0.9	0

Table 5.4: Second Floor

		Sum	0l/s
Appliance	**No**	**DU**	**Total**
WC(4L)	0	1.8	0
Urinal (single)	0	0.5	0
Wash Basin	0	0.3	0
Kitchen Sink	0	0.6	0
Washing Machine (12kg)	0	0.6	0
Shower without plug	0	0.4	0
Floor Gully	0	0.9	0

Table 5.5: Third Floor

		Sum	5.4l/s
Appliance	**No**	**DU**	**Total**
WC(4L)	0	1.8	0
Urinal (single)	0	0.5	0
Wash Basin	0	0.3	0
Kitchen Sink	0	0.6	0
Washing Machine (12kg)	0	0.6	0
Shower without plug	0	0.4	0
Floor Gully	6	0.9	5.4

E. Email correspondence

From:	**seweradoptions@uuplc.co.uk** <seweradoptions@uuplc.co.uk>	
To:	**Tarisiro Fundira** <Tarisiro.Fundira@mottmac.com>	
Subject:	RE: Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX 04370779	UU Reference Number :
Date:	10.08.2023 15:26:36 (+02:00)	

Hi Tari.

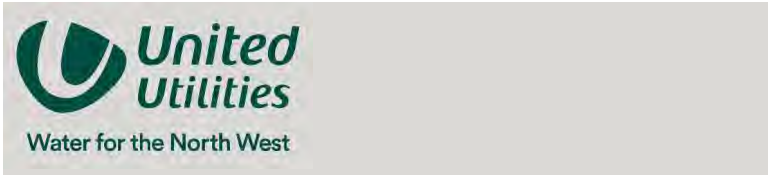
Thanks for your email. Upon assessing the submitted ground investigation report and following our comments in the pre-development enquiry response to investigate the potential for surface water infiltration to ground, it is agreed that the current ground conditions are likely not feasible for infiltration methods for your development site.

We can also confirm a maximum restricted surface water discharge rate of 5l/s to the public combined sewer, as advised in our pre-development response, is acceptable in principle.

Kind regards,

Shoaib.

Shoaib Tauqeer
Developer Engineer
Developer Services & Metering
M: 07876745601
unitedutilities.com



If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

---------- Original Message ----------
From: Tarisiro Fundira [tarisiro.fundira@mottmac.com]
Sent: 10/08/2023 11:38
To: seweradoptions@uuplc.co.uk; shoaib.tauqeer@uuplc.co.uk
Subject: RE: Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX UU Reference Number : 04370779

Hi Shoaib,

Thanks for the call, have you had a chance to review the below and could you confirm you are happy for this site to discharge at 5l/s.

Many thanks,

Tari

Tarisiro Fundira

Pronunciation : 'Please call me Tari or Tarisiro - pronounced Taa-rrrrrr-isirooo'

Pronouns: he, him, his

Graduate Civil Engineer
Sheffield Local Office Champion
BNC Advance Unit Champion

From: Tarisiro Fundira
Sent: 07 August 2023 10:30
To: seweradoptions@uuplc.co.uk; Tauqeer, Shoaib < shoaib.tauqeer@uuplc.co.uk >
Subject: RE: Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX UU Reference Number : 04370779

Hi Shoaib,

I hope you had a lovely weekend. Just checking if you had the time to look at this.

Many thanks,

Tari

Tarisiro Fundira

Pronunciation : 'Please call me Tari or Tarisiro - pronounced Taa-rrrrrr-isirooo'

Graduate Civil Engineer
Sheffield Local Office Champion
BNC Advance Unit Champion

C +441142283767

tarisiro.fundira@mottmac.com

From: Tarisiro Fundira
Sent: 02 August 2023 16:18
To: seweradoptions@uuplc.co.uk ; Tauqeer, Shoaib < shoaib.tauqeer@uuplc.co.uk >
Subject: RE: Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX UU Reference Number : 04370779

Hi Shoaib,

Following our conversation today, could you please review t he Ground Investigation report .

From our review we saw that the site is composed of drift deposits of Glacial Till. Therefore, considering the presence of made ground and the site's history, we concluded that the stratum is unsuitable for infiltration. Could you please confirm this with regards to our pre-development enquiry.

Many thanks,

Tari

Tarisiro Fundira

Pronunciation : 'Please call me Tari or Tarisiro - pronounced Taa-rrrrrr-isirooo'

Graduate Civil Engineer
Sheffield Local Office Champion
BNC Advance Unit Champion

C +441142283767

tarisiro.fundira@mottmac.com

From: seweradoptions@uuplc.co.uk <seweradoptions@uuplc.co.uk >
Sent: 31 July 2023 10:43
To: Tarisiro Fundira < Tarisiro.Fundira@mottmac.com >
Subject: Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX UU Reference Number : 04370779

Good morning Tarisiro,

Pre Development Enquiry for: Wilmslow Road, Manchester, M20 4BX UU Reference Number : 04370779

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 6723 723 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 450mm diameter public combined sewer within Wilmslow Road located to the East of your proposed development at an unrestricted rate.
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.
In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

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.

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 450mm diameter public combined sewer within Wilmslow Road located 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 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

Existing Wastewater Assets Crossing the Site
According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place, in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.
Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.
Please refer to the link below to obtain full details of the processes involved with sewer diversions:
https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

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/wastewater-services/sewer-connections/sewer-connection/
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,

Eireann Thompson
Assistant Developer Engineer
Developer Services & Metering
Customer Services

Mobex: 07553074138
unitedutilities.com

Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at developerserviceswater@uuplc.co.uk

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---------- Original Message ----------
From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 21/07/2023 15:40
To: tarisiro.fundira@mottmac.com
Subject: PDE CA28, The Christie NHS Foundation Trust

Good Afternoon,

PRE DEVELOPMENT APPLICATION AT: The Christie NHS Foundation Trust – UU Ref 04370779

Please accept this email as receipt of your application received on 19/07/2023 for the above development. This has now been logged on our system and the job reference is 04370779 we would ask that you quote this reference in all future correspondence.

I have reviewed your application (and attachments) and can confirm this is suitable to be passed to Ashleigh for technical assessment. You will receive their response on or before 02/08/2023.

Kind regards,

Tonicha Wilde
Customer Advisor Advanced
Developer Services & Metering
Customer Services
Direct Tel: N/A
Tel: 0345 026 8989 (option 4)
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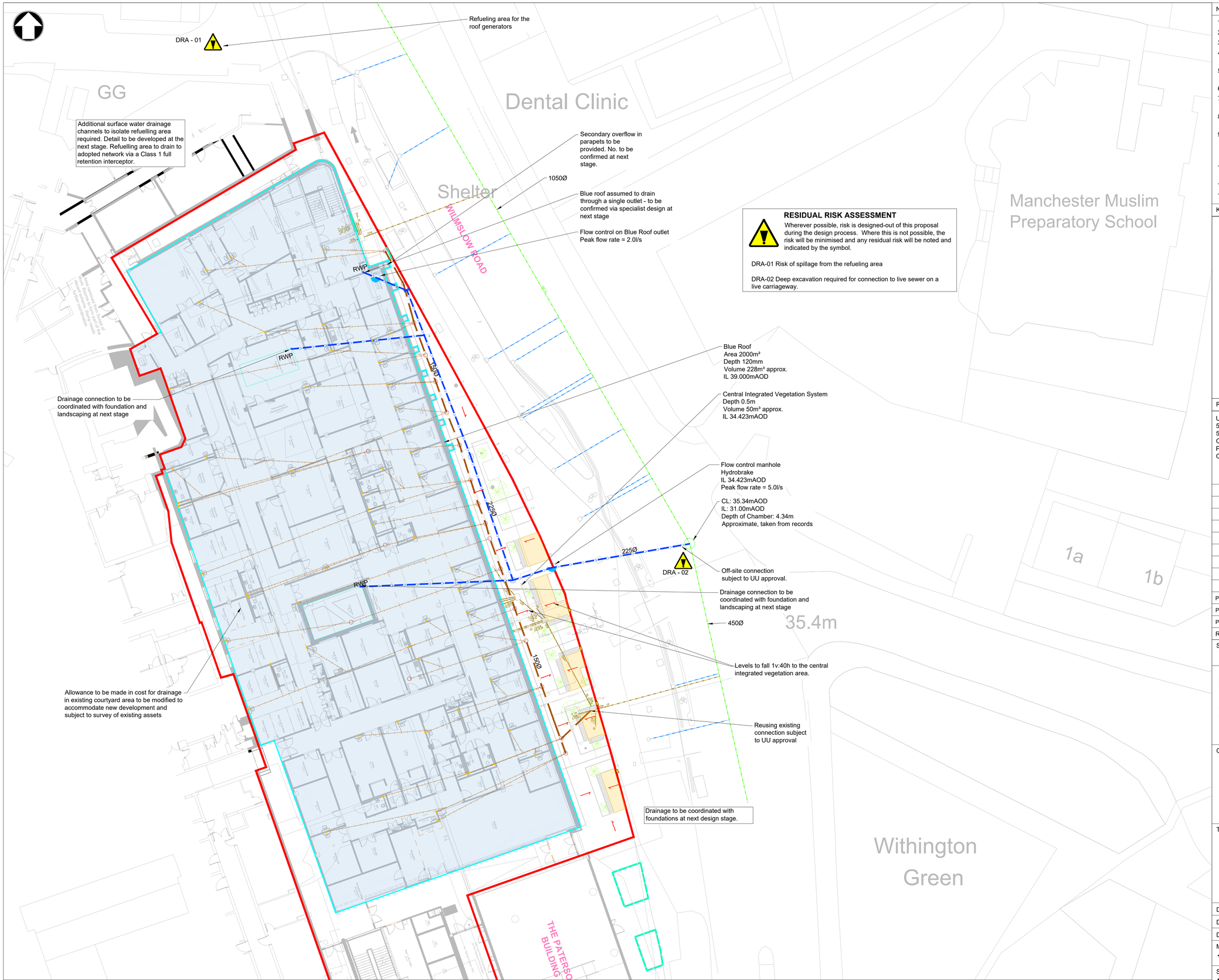
Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm. You just click on the orange live chat box on our webpage and one of our advisors will be ready to chat to you and help you with your enquiry https://www.unitedutilities.com/builders-developers/ or you can email us at WastewaterDeveloperServices@uuplc.co.uk

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F. Drainage Masterplan



Notes

1. This drawing is to be read in conjunction with all relevant drawings.
2. Do not scale from this drawing.
3. All measurement are in metres (m), unless noted otherwise
4. All levels are shown in metres above ordnance datum (mAOD) unless noted otherwise.
5. All layouts are preliminary only and subject to review and are to be printed in colour.
6. Adopted drainage assets taken from sewer records and are shown indicatively.
7. Roof and landscaping drainage strategy to be coordinated with RWP locations to be advised by DAY Architecture and foundation edge details when available.
8. Refueling strategy to be confirmed. At next stage allow for incorporation of required pollution control measures in the design.
9. All foul water pipes are 100mmØ and surface water pipes are 150mmØ unless noted otherwise. All pipe gradients to be compliant with Part H of Building Regulations. Minimum buried under slab foul and surface water gradients to be 1v:40h and 1v:100h respectively.
10. Pipe bedding to be Type 'S' unless pipe cover is less than 1.2m or below slab; whereupon concrete surround shall be used.
11. Offsite connections subject to LLFA/EA and UU approval as required.
12. Blue Roof is based on a Bauder system.

Key to symbols

- Site Boundary
- Blue Roof
- Permeable Paving
- Flow Control Manhole
- Catchpit Manhole
- Proposed Rainwater Outlet
- Proposed SVP
- Existing Surface Water Sewer
- Existing Foul Water Sewer
- Proposed Surface Water Drainage and Manhole
- Proposed Foul Water Drainage and Manhole
- Rodding Eye
- Existing Adopted Combined Drainage and Manhole
- Proposed indicative levels

Reference drawings

United Utilities Adopted Sewer Records
59603-SUR-TOP-(Published)(06.01.23) - Topographical Survey
59603 Utility Survey (23-03-23)
CASICD-DAY-XX-00-DR-A-090037-WIP-Proposed Landscape Scheme
PlanCASICD-DAY-XX-00-DR-A-018202 - Ground Floor - Proposed Revised Layout
CASICD-DAY-XX-ZZ-DR-A-090001 - Site Location Plan

Rev	Date	Drawn	Description	Ch'k'd	App'd
P03	25/08/2023	TAF	Issued for Planning	AJP	JH
P02	14/08/2023	TAF	Draft for Comment	AJP	JH
P01	21/02/2023	TAF	Stage 2 Issue	AJP	JH

Status Stamp

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Title

The Christie CT Redevelopment

Drainage Masterplan

Designed	T Fundira	TAF	Eng check	A Precious	AJP
Drawn	T Fundira	TAF	Coordination	A Simpson	AS
Dwg check	A Precious	AJP	Approved	J Heeds	JH

MMD Project Number	Scale at A1	Security
100110787	1:200	STD

Suitability Description	Suit. Code
Suitable for Stage Approval	S4

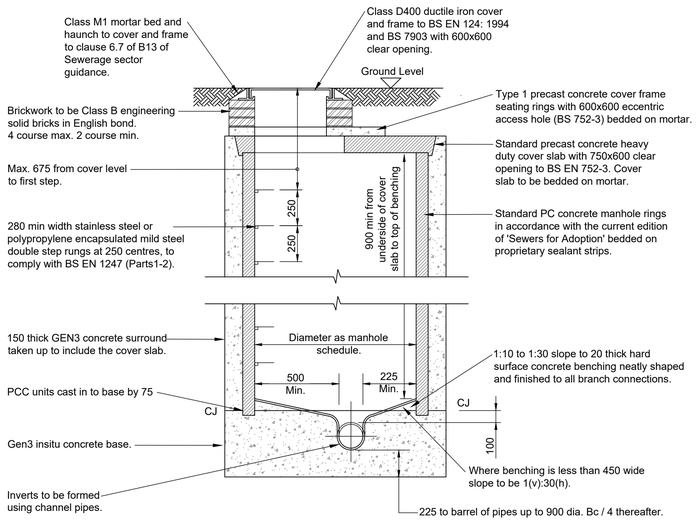
Drawing Number	Revision
CASICD-MMD-XX-ZZ-SK-C-000001	P03

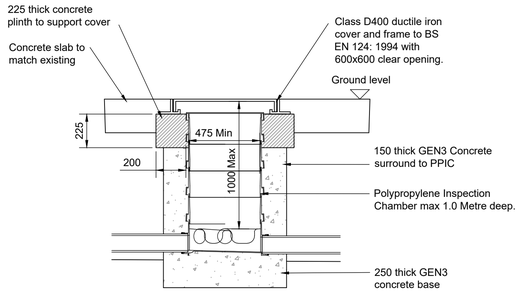
1:200 0 10m 20m

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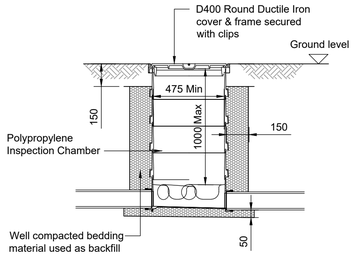
G. Typical Drainage Details





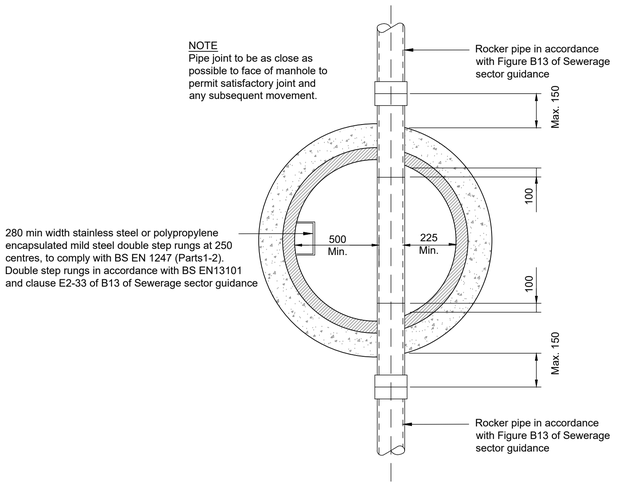
Polypropylene Inspection Chamber

Scale 1:20



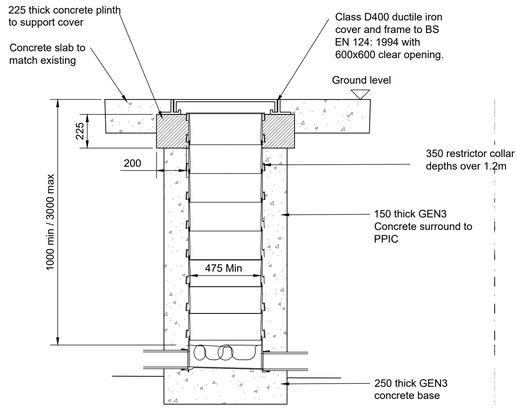
Polypropylene Inspection Chamber

Scale 1:20



Typical Manhole Type B

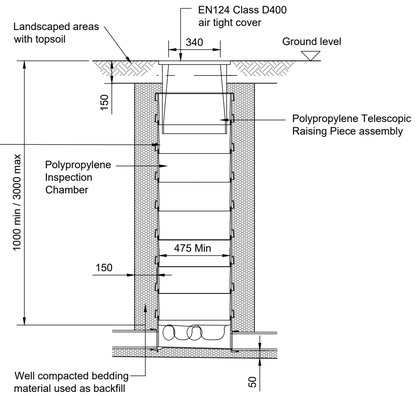
Depth to soffit of pipe up to 3.0m
Scale 1:25



Polypropylene IC and Type 3 >1.0m - 3.0m

Scale 1:20

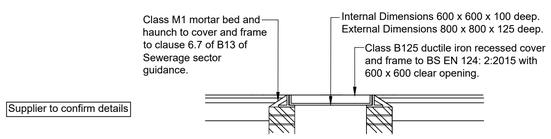
(Hard Landscaped Areas)



Polypropylene IC and Type 3 >1.0m - 3.0m

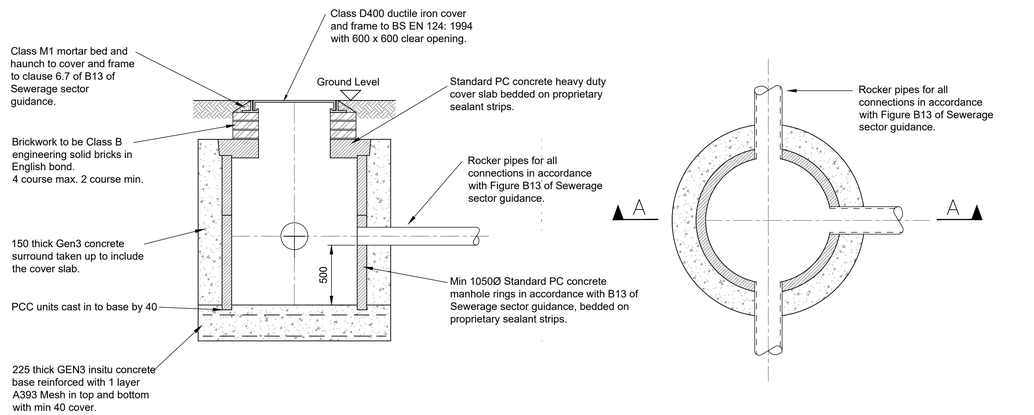
Scale 1:20

(Soft Landscaped Areas)



Typical Recessed Manhole cover

Scale 1:25



Section A-A

Plan

Typical Catchpit Detail

Scale 1:25

1:25 0 1.25m 2.5m

1:20 0 1m 2m

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C:\Users\SHI102581\Mott MacDonald\B The Christie CT Redevelopment - DAY - Detailed Drawings\CASICD-MMD-XX-XX-DR-D-10000-10004 - Detailed Drawings.dwg Aug 24, 2023 - 12:30PM SHI102581

Notes

1. Do not measure from this drawing.
2. Drawing measurements in millimetres unless stated otherwise
3. Levels in metres above ordnance datum (mAOD).
4. Proposed drainage designed in accordance with Building and Sewerage Sector Guidance (SSG) Appendix C.

Key to symbols

Reference drawings

CASICD-MMD-XX-XX-DR-D-00001 - Drainage Masterplan
CASICD-MMD-XX-XX-DR-D-10001 - Typical Drainage Details Sheet 2 of 5
CASICD-MMD-XX-XX-DR-D-10002 - Typical Drainage Details Sheet 3 of 5
CASICD-MMD-XX-XX-DR-D-10003 - Typical Drainage Details Sheet 4 of 5
CASICD-MMD-XX-XX-DR-D-10004 - Typical Drainage Details Sheet 5 of 5

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01	14/08/23	LS	Typical Drainage Details	AJP	JH

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Client

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Watford
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Title

The Christie CT Redevelopment Drainage Masterplan

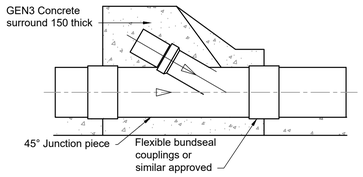
Sheet 1 of 5

Designed	T Fundira	TAF	Eng check	A Precious	AJP
Drawn	L Shipley	LS	Coordination	A Simpson	AS
Dwg check	A Precious	AJP	Approved	J Heeds	JH

MMD Project Number	Scale at A1	Security
100114293	As Shown	STD

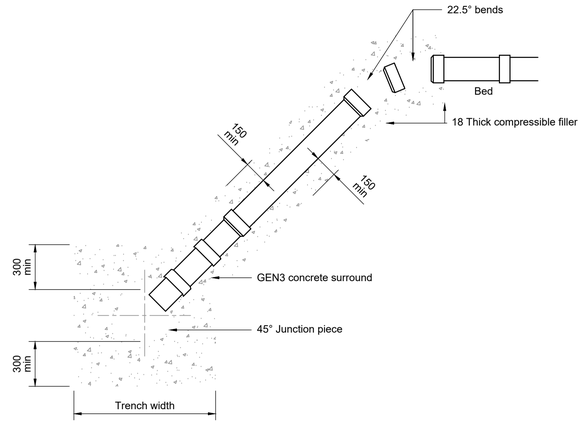
Suitability Description	Suit. Code
Suitable for Stage Approval	S4

Drawing Number	Revision
CASICD-MMD-XX-XX-DR-D-10000	P01



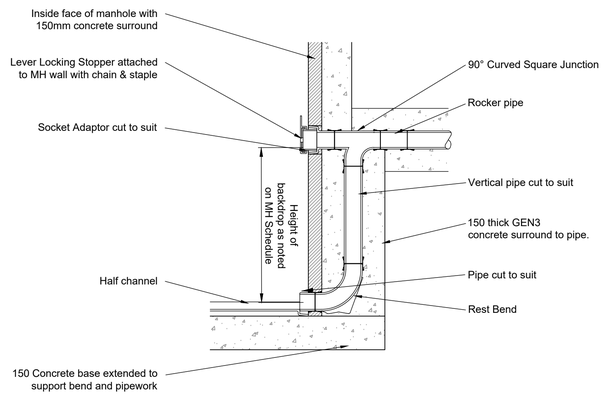
Typical Saddle Connection Plan

Scale 1:20



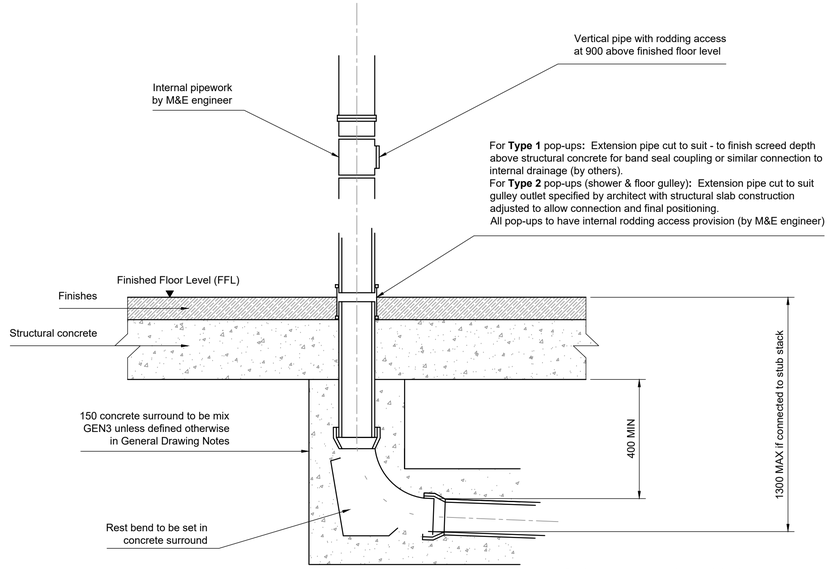
Typical Saddle Connection Section

Scale 1:20



Backdrop Connection

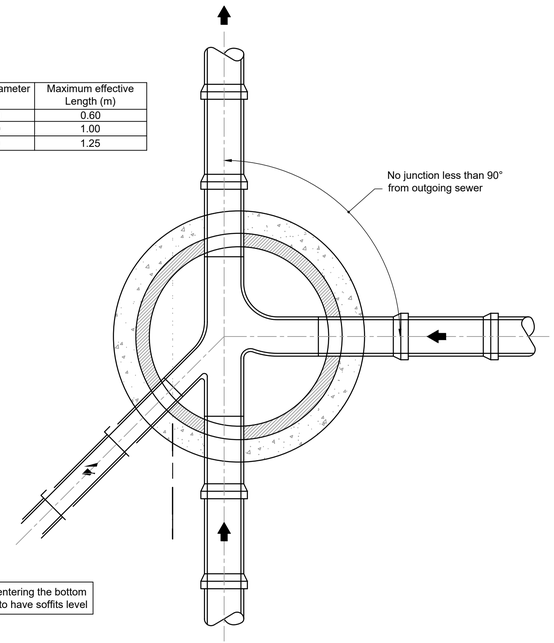
Scale 1:20



Typical pop-up detail

Scale 1:10

Nominal pipe diameter (mm)	Maximum effective Length (m)
150 - 600	0.60
601 - 750	1.00
over 750	1.25



Note: All pipes entering the bottom of the manhole to have soffits level

Typical arrangement of pipe junctions within manholes

(Refer to Figure B13 in Design and Construction Guidance)

Scale 1:20

1:20 0 1m 2m

1:10 0 0.5m 1m

Notes

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2. Drawing measurements in millimetres unless stated otherwise
3. Levels in metres above ordnance datum (mAOD).
4. Proposed drainage designed in accordance with Building and Sewerage Sector Guidance (SSG) Appendix C.

Key to symbols

Reference drawings

CASICD-MMD-XX-XX-DR-D-00001 - Drainage Masterplan
CASICD-MMD-XX-XX-DR-D-10000 - Typical Drainage Details Sheet 1 of 5
CASICD-MMD-XX-XX-DR-D-10002 - Typical Drainage Details Sheet 3 of 5
CASICD-MMD-XX-XX-DR-D-10003 - Typical Drainage Details Sheet 4 of 5
CASICD-MMD-XX-XX-DR-D-10004 - Typical Drainage Details Sheet 5 of 5

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01	14/08/23	LS	Typical Drainage Details	AJP	JH

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Title

The Christie CT Redevelopment
Drainage Masterplan

Sheet 2 of 5

Designed	T Fundira	TAF	Eng check	A Precious	AJP
Drawn	L Shipley	LS	Coordination	A Simpson	AS
Dwg check	A Precious	AJP	Approved	J Heeds	JH

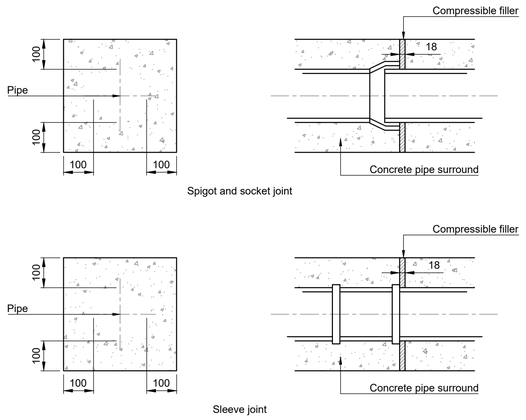
MMD Project Number	Scale at A1	Security
100114293	As Shown	STD

Suitability Description	Suit. Code
Suitable for Stage Approval	S4

Drawing Number	Revision
CASICD-MMD-XX-XX-DR-D-10001	P01

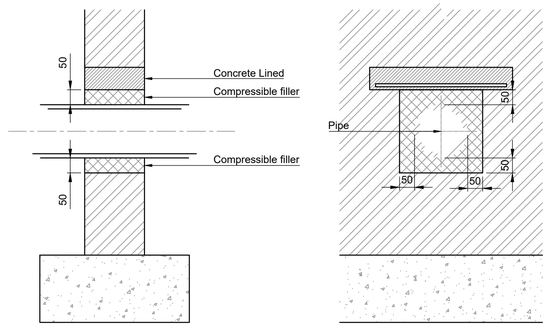
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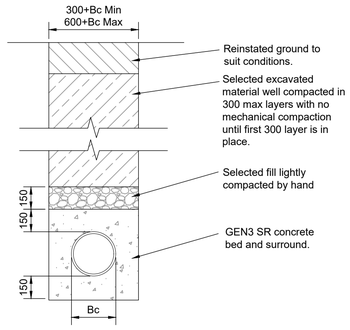
Joints for encased pipes

(Refer to Figure B28 in Design and Construction Guidance)
Scale 1:10



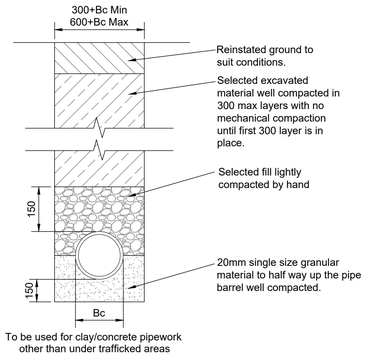
Protection of pipes penetrating single leaf boundary walls

(Refer to Figure B29 in Design and Construction Guidance)
Scale 1:10



Concrete Surround

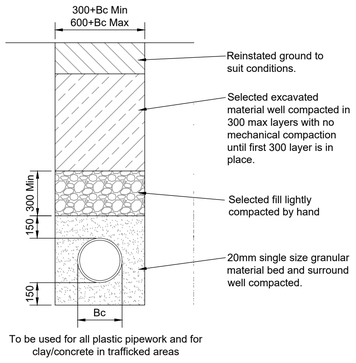
Scale: 1:20



To be used for clay/concrete pipework other than under trafficked areas

Class B Bedding

Scale: 1:20



To be used for all plastic pipework and for clay/concrete in trafficked areas

Class S Bedding

Scale: 1:20

Trench Widths for Poly Pipe		
Pipe Diameter	Min Width	Max Width
100	450	750
150	500	800
225	600	900
300	700	1000
375	750	1050
450	850	1150

Trench Widths for Clay Pipe		
Pipe Diameter	Min Width	Max Width
100	450	750
150	500	800
225	600	875
300	700	1000
400	800	1100
450	850	1150

Nominal Bore of Pipe (mm)	Size of Bedding Material	
	Single Size	Graded
100 - 125	10	-
150 - 200	10 or 14	14 to 5
225 - 300	10, 14 or 20	14 to 5 or 20 to 5
375 - 500	14 or 20	14 to 5 or 20 to 5
Exceeding 500	14, 20 or 40	14 to 5, 20 to 5 or 40 to 5

1:20 0 1m 2m

1:10 0 0.5m 1m

Notes

1. Do not measure from this drawing.
2. Drawing measurements in millimetres unless stated otherwise
3. Levels in metres above ordnance datum (mAOD).
4. Proposed drainage designed in accordance with Building and Sewerage Sector Guidance (SSG) Appendix C.

Key to symbols

Reference drawings

CASICD-MMD-XX-XX-DR-D-00001 - Drainage
MasterplanCASICD-MMD-XX-XX-DR-D-10000 - Typical Drainage Details Sheet 1 of 5
CASICD-MMD-XX-XX-DR-D-10001 - Typical Drainage Details Sheet 2 of 5
CASICD-MMD-XX-XX-DR-D-10003 - Typical Drainage Details Sheet 4 of 5
CASICD-MMD-XX-XX-DR-D-10004 - Typical Drainage Details Sheet 5 of 5

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01	14/08/23	LS	Typical Drainage Details	AJP	JH

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Title

The Christie CT Redevelopment Drainage Masterplan

Sheet 3 of 5

Designed	T Fundira	TAF	Eng check	A Precious	AJP
Drawn	L Shipley	LS	Coordination	A Simpson	AS
Dwg check	A Precious	AJP	Approved	J Heeds	JH

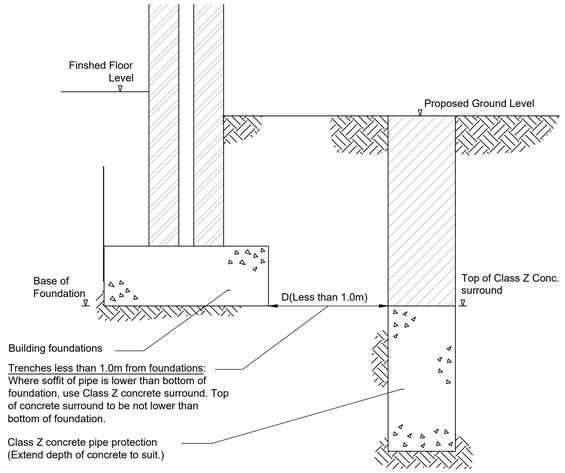
MMD Project Number	Scale at A1	Security
100114293	As Shown	STD

Suitability Description	Suit. Code
Suitable for Stage Approval	S4

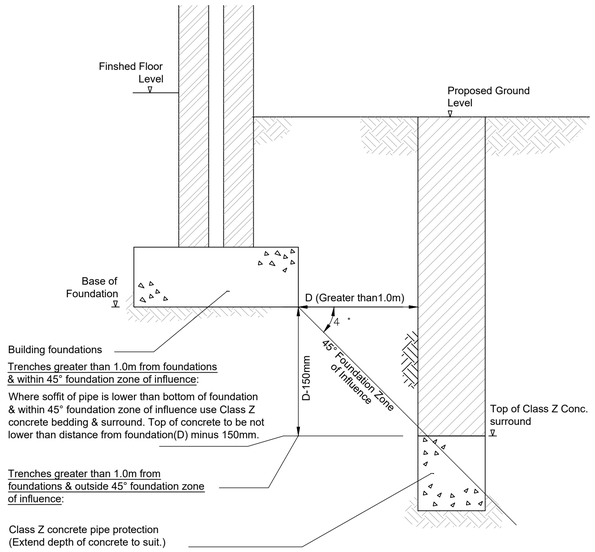
Drawing Number	Revision
CASICD-MMD-XX-XX-DR-D-10002	P01

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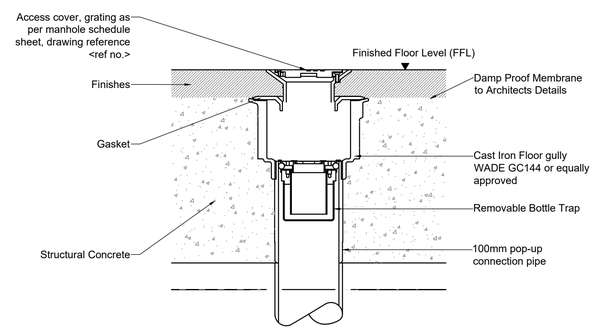
Drainage trench less than 1.0m from foundations



Drainage trench greater than 1.0m from foundations

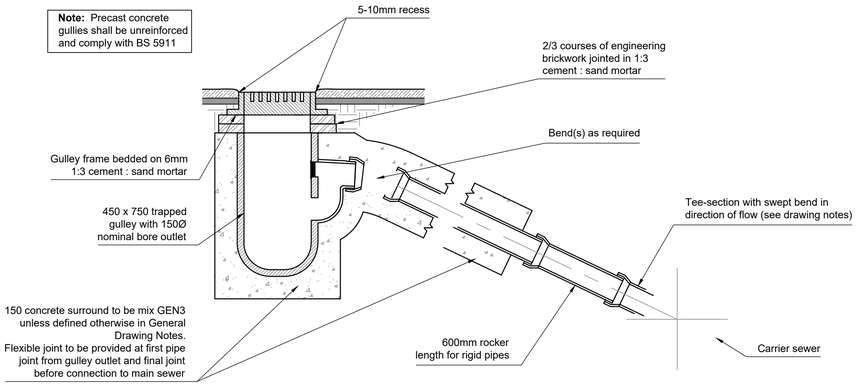
Pipe protection adjacent to existing/proposed foundations

Scale 1:10



Floor Gully Detail

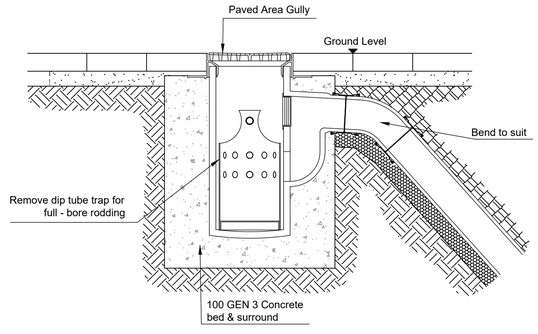
Scale 1:5



Road gully and connections

(Hepworth Drainage or similar approved)

Scale 1:20



External Gully Detail

Scale 1:20

1:20 — 0 — 1m — 2m

1:10 — 0 — 0.5m — 1m

1:5 — 0 — 0.25m — 0.5m

Notes

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Key to symbols

Reference drawings

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CASICD-MMD-XX-XX-DR-D-10000 - Typical Drainage Details Sheet 1 of 5
CASICD-MMD-XX-XX-DR-D-10001 - Typical Drainage Details Sheet 2 of 5
CASICD-MMD-XX-XX-DR-D-10002 - Typical Drainage Details Sheet 3 of 5
CASICD-MMD-XX-XX-DR-D-10004 - Typical Drainage Details Sheet 5 of 5

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01	01/08/23	LS	Typical Drainage Details	AJP	JH

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Sheet 4 of 5

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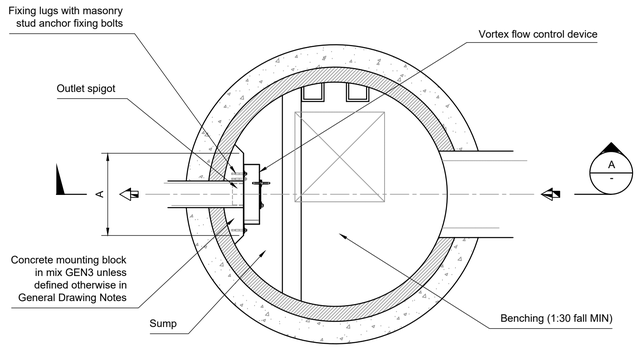
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100114293	As Shown	STD

Suitability Description	Suit. Code
Suitable for Stage Approval	S4

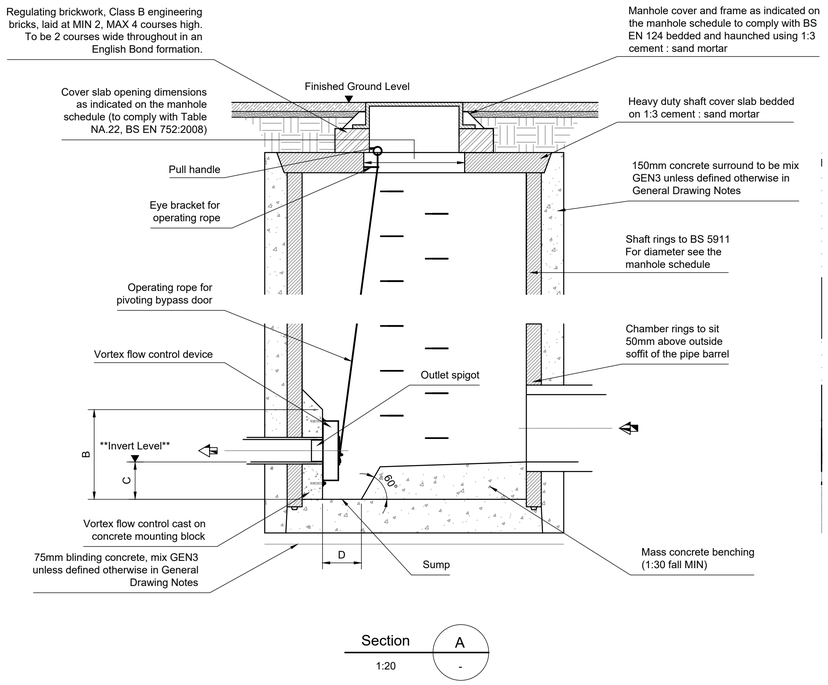
Drawing Number	Revision
CASICD-MMD-XX-XX-DR-D-10003	P01

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Plan
1:20



Section A
1:20

Vortex Flow Control Specifications	
Type	Hydro-Brake MdX or similar approved
Head	0.500mAOD
Flow	5.000l/s
Dimension	Value (mm)
A	580
B	720
C	295
D	240

Vortex flow control chamber: Sump type

(Hydro-Brake or similar approved)

0 1m 2m
1:20

Notes

1. Do not measure from this drawing.
2. Drawing measurements in millimetres unless stated otherwise
3. Levels in metres above ordnance datum (mAOD).
4. Proposed drainage designed in accordance with Building and Sewerage Sector Guidance (SSG) Appendix C.

Key to symbols

Reference drawings

CASICD-MMD-XX-XX-DR-D-00001 - Drainage Masterplan
CASICD-MMD-XX-XX-DR-D-10000 - Typical Drainage Details Sheet 1 of 5
CASICD-MMD-XX-XX-DR-D-10001 - Typical Drainage Details Sheet 2 of 5
CASICD-MMD-XX-XX-DR-D-10002 - Typical Drainage Details Sheet 3 of 5
CASICD-MMD-XX-XX-DR-D-10003 - Typical Drainage Details Sheet 4 of 5

Rev	Date	Drawn	Description	Ch'k'd	App'd
P01	14/08/23	LS	Typical Drainage Details	AJP	JH

Status Stamp
PRELIMINARY

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Title
The Christie CT Redevelopment
Drainage Masterplan

Sheet 5 of 5

Designed	T Fundira	TAF	Eng check	A Precious	AJP
Drawn	L Shipley	LS	Coordination	A Simpson	AS
Dwg check	A Precious	AJP	Approved	J Heeds	JH

MMD Project Number	Scale at A1	Security
100114293	As Shown	STD

Suitability Description	Suit. Code
Suitable for Stage Approval	S4

Drawing Number	Revision
CASICD-MMD-XX-XX-DR-D-10004	P01

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H. MicroDrainage Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.359	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.253	4-8	0.058

Total Area Contributing (ha) = 0.311

Total Pipe Volume (m³) = 5.373

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	-	-	100	0.113	0.113	0.113
1.001	-	-	100	0.112	0.112	0.112
1.002	As Zoned	Default	100	0.035	0.035	0.035
	As Zoned	Default	100	0.006	0.006	0.006
	As Zoned	Default	100	0.041	0.041	0.041
	As Zoned	Default	100	0.004	0.004	0.086
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.311	0.311	0.311

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.359		

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Online Controls for Storm

Depth/Flow Relationship Manhole: S2, DS/PN: S1.001, Volume (m³): 2.1

Invert Level (m) 38.965

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.001	2.0000	2.000	2.0000

Hydro-Brake® Optimum Manhole: S5, DS/PN: S1.004, Volume (m³): 0.8

Unit Reference	MD-SHE-0113-5000-0500-5000
Design Head (m)	0.500
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	113
Invert Level (m)	34.423
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	5.0	Kick-Flo®	0.372	4.4
Flush-Flo™	0.179	5.0	Mean Flow over Head Range	-	4.1

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	7.5	3.000	11.6	7.000	17.4
0.200	5.0	1.400	8.1	3.500	12.5	7.500	18.1
0.300	4.8	1.600	8.6	4.000	13.3	8.000	18.7
0.400	4.5	1.800	9.1	4.500	14.1	8.500	19.2
0.500	5.0	2.000	9.6	5.000	14.8	9.000	19.8
0.600	5.4	2.200	10.0	5.500	15.4	9.500	20.3
0.800	6.2	2.400	10.4	6.000	16.1		
1.000	6.9	2.600	10.8	6.500	16.8		

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Storage Structures for Storm

Cellular Storage Manhole: S2, DS/PN: S1.001

Invert Level (m) 39.880 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	2000.0	0.0	0.121	0.0	0.0
0.120	2000.0	0.0			

Cellular Storage Manhole: S5, DS/PN: S1.004

Invert Level (m) 34.348 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	107.0	0.0	0.501	0.0	0.0
0.500	107.0	0.0			

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.357
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	18.000	Cv (Winter)	0.840

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

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100, 101
Climate Change (%)	0, 0, 45, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	360 Summer	100	+45%	1/15 Summer	1/360 Winter			39.958
S1.001	S2	360 Summer	100	+45%	1/15 Summer				39.957
S1.002	S3	15 Summer	100	+45%	30/15 Summer				35.100
S1.003	S4	240 Summer	100	+45%	30/15 Summer				34.840
S1.004	S5	240 Summer	100	+45%	100/30 Summer				34.837

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	0.508	0.000	0.11			17.1	FLOOD RISK	
S1.001	S2	0.542	0.000	0.00			2.0	FLOOD RISK	
S1.002	S3	0.376	0.000	2.16			61.8	FLOOD RISK	
S1.003	S4	0.174	0.000	0.79			19.2	FLOOD RISK	
S1.004	S5	0.189	0.000	0.17		212	5.0	FLOOD RISK	

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