

Drainage Strategy Report

Roundways – Homeless Home

Issued to Discharge Planning Condition 11

Issue P02 – 06 January 2023

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Prepared For:



DRAINAGE STRATEGY REPORT

ROUNDWAYS – HOMELESS HOME

ISSUED TO DISCHARGE PLANNING CONDITION 11

Quality Assurance Page

Issue	Date	Prepared By	Checked By	Approved By	Remarks
P01	10/11/2022	Mr. L. Hornblow	Mr. C. Marchant	Mr. G. Bansal	Preliminary Issue for comment
P02	06/01/2023	Mr. L. Hornblow	Mr. C. Marchant	Mr. G. Bansal	Site Area Corrected.

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Executive Summary

Meinhardt have undertaken this Drainage Strategy on behalf of Hill to discharge the planning conditions for the construction of 5 'move-on' modular build units for temporary homeless accommodation with associated cycle and refuse storage.

Planning condition 11 on the application reference: HGY/2022/0238 states the following.

“11. Prior to above ground works, Section + (Sustainable Drainage Maintenance Strategy) & Appendix B (Proposed Drainage Strategy Drawings) Design Note Drainage & Flood Risk 16/12/2020 and the SuDS options it proposes (namely Below Ground Cellular Attenuation & Permeable Paving) shall be provided, maintained in accordance with the associated Maintenance Schedules, and retained for the lifetime of the development except where conditions attached to this planning permission indicate otherwise or where alternative details have been subsequently approved following an application for a nonmaterial amendment. For the avoidance of doubt, all hardstanding areas shall be permeable. Reason: In order to ensure a satisfactory provision for drainage on site and ensure suitable drainage provision for the development and comply with Policies DM24, 5 & 6 of the Haringey Development Management DPD (2017), policy SP5 of the Local Plan.”

The site located to the rear of 163-173 The Roundway, Scotch Estate, Tottenham, in the London Borough of Haringey. Site comprises an area of 0.171 hectares (ha) or 1,708m². The OS Grid Reference for the approximate centre of the Site is National Grid Reference 532524 , 191117.

The Site is located in Flood Zone 1 where the probability of river or sea flooding is less than 0.1% (1 in 1000) chance in any given year. Therefore, the probability of tidal or fluvial flooding is assessed as negligible.

The surface water drainage strategy considers surface water runoff management: the solutions proposed ensure that for the 100 year plus 40% climate change allowance event, surface water will be accommodated within the Site and therefore prevent potential exceedance flows off-site.

The proposed drainage strategy incorporates sustainable drainage systems (SuDS) features in the form of Permeable paving. The Site's surface water will be attenuated within the paving's Sub-base and reduced to greenfield runoff rates in accordance with the London Borough of Haringey guidance. Surface water is proposed to discharge to The Mossle Brook that crosses through the site.

Foul water is proposed to be conveyed by a traditional gravity run system to the existing Thames Water foul water sewer that crosses the site to the South where a manhole is proposed to be constructed over the line of the existing for connection.

1 Introduction

1.1 Project Brief

Meinhardt have been appointed by Hill Group to undertake this Drainage Strategy report to discharge planning condition 11 on the planning application reference HGY/2022/0238, for the construction of 5 'move-on' modular build units for temporary homeless accommodation with associated cycle and refuse storage (hereafter referred to as the 'Proposed Development') located at Land to the Rear of 163-173 The Roundway, N17 7HE This report relates solely to the above Site and should not be used for any other reasons other than for which the report was originally prepared.

2 Planning Policy and Guidance

The below policy and guidance are considered relevant to this Drainage Strategy and have been used to inform this assessment.

2.1 National and Regional Policy

The London Plan

The London Plan: Spatial Development Strategy for Greater London (March 2021):

The London Plan sets out the new spatial development strategy for Greater London and it sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The following policies are considered relevant to this assessment:

Policy SI 5 Water Infrastructure - "Development proposals should seek to improve the water environment and ensure that adequate water infrastructure capacity is provided. Development plans should promote the protection and improvement of the water environment in line with the Thames River Basin Management Plan, and should take account of Catchment Plans whilst supporting wastewater treatment infrastructure investment to accommodate London's growth and climate change impacts. Development proposals should minimise the use of mains incorporating measures such as smart metering, water saving and recycling measures, including retrofitting, to help to achieve a maximum mains consumption of 105 litres or less per head per day "

Policy SI 12 Flood Risk Management - "Development proposals must comply with the flood risk assessment and management requirements set out in the NPPF and the associated technical Guidance on flood risk"; and

Policy SI 13 Sustainable Drainage - "Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates whilst ensuring that surface water run-off is managed as close to its source as possible in line with the below drainage hierarchy:

- 1) rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- 2) rainwater infiltration to ground at or close to source
- 3) rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- 4) rainwater discharge direct to a watercourse (unless not appropriate)
- 5) controlled rainwater discharge to a surface water sewer or drain
- 6) controlled rainwater discharge to a combined sewer".

Development proposals for impermeable paving should be refused where deemed inappropriate such as in small areas of front gardens and driveways.

Drainage should be designed and implemented to address water use efficiency, water quality, biodiversity, amenity and recreation.

Haringey Development Management DPD (2017)

The Development Management Development Plan Document (DPD) gives effect to Haringey's spatial strategy and the key objectives of the Strategic Policies Local Plan by supporting proposals that contribute to the delivery of sustainable development in accordance with the strategy. The following policies are relevant to this drainage strategy report and have been assessed in producing the drainage strategy.

- Policy DM24: Managing and Reducing Flood Risk
- Policy DM25: Sustainable Drainage System
- Policy DM26: Critical Drainage Areas

2.2 Climate Change Guidance

The EA guidance "Flood risk assessments: climate change allowances" was issued in 2016 (last updated 27th May 2022) and provides the most recent information on expected changes in rainfall, river flows and sea levels as a consequence of climate change.

Sea level allowances by river basin district for each epoch is provided in Table 2 of the guidance document.

The guidance provides peak river flow allowances by management catchments, the sub-catchments of the river basin districts. The peak flows are based on percentiles, a percentile is a measure used to describe the proportion of possible scenarios that fall below an allowance level (e.g. a 50% percentile means that the allowance has 50% chances of not being exceeded).

The most recent update to the guidance, updates the Peak Rainfall Allowances, which takes into account UKCP Local 2.2km projections and supporting research FUTURE-DRAINAGE. These are also now provided by management catchments instead of at a national scale and an online "Peak Rainfall Allowances Map" is now provided. Peak rainfall allowances are provided for 1% annual exceedance probability (AEP) events and for 3.3% AEP events.

The guidance states how to apply peak rainfall allowances has changed, using the central allowance for development with a lifetime up to 2100 and the upper end allowance for development with a lifetime from 2100 to 2125. Residential development to have a minimum lifetime of a 100 years, whilst commercial a minimum of 60 years.

The following approach should be used for drainage design:

- Development with a lifetime beyond 2100 - Design your development so that for the upper end allowance in the 1% annual exceedance probability event:
 - There is no increase in flood risk elsewhere
 - Your development will be safe from surface water flooding
- Development with a lifetime of between 2061 and 2100 - For development with a lifetime between 2061 and 2100 take the same approach but use the central allowance for the 2070s epoch (2061 to 2125).
- Development with a lifetime up to 2060 - For development with a lifetime up to 2060, take the same approach but use the central allowance for the 2050s epoch (2022 to 2060).

Exceptions:

In some locations the allowance for the 2050s epoch is higher than that for the 2070s epoch. If so, and development has a lifetime beyond 2061, use the higher of the two allowances.

3 Existing Site

3.1 Site Location and Description

The Site is located to the rear of 163-173 The Roundway, Scotch Estate, Tottenham, in the London Borough of Haringey. The Site is bound by The Moselle Brook to the North and rear gardens of houses off Rivulet Road. To the East the site is bound by rear gardens of houses off the A10. To the South is the sites access off The Roundway road (A1080). Finally, to the West the site is further bound by the rear gardens from a row of houses off Courtman Road. The OS Grid Reference for the approximate centre of the Site is National Grid Reference 532524 , 191117.

The Site comprises an area of 0.171 hectares (ha) or 1,708m². The Site is currently used as access to the Moselle Brook, with a small Y-shaped plastic geogrid turning head. The entire existing site is soft landscaped. Refer to Figure 1 for an indicative Site location plan.



Figure 1: Indicative Site Location Plan

3.2 Topography

Based on the topographical survey that was carried out by Terrain Surveys in September 2021 levels across the site typically fall from the South-West to the North-East. These falls are directed to the Moselle Brook that runs along the North-Easterly boundary, the lowest levels of the site within the Brook vary between 13.50m AOD and 12.50m AOD. Levels at the Sites entrance are higher at 14.50m AOD these level are seen to fall down the existing turning head towards the Brook where levels at the end of the turning head, furthest north, fall to around 13.20m AOD. This gives an approximate gradient of the existing entrance and turning head of 1:25. Levels beyond the end of the turning head steeply fall to the Brook with the steepest gradient seen at 1:6. Refer to **Appendix A** for the Topographical Survey.

3.3 Existing Drainage

A CCTV drainage survey was carried out by Drain Technology in September 2022. The survey shows no private drainage is within the site however clarifies the Thames Water Asset records. The Thames Water asset records and the CCTV survey both can be found in **Appendix B** have been reviewed and are summarised below:

3.3.1 Public Sewers

- The TW asset records show that in the Southern part of the site there is 150mmØ public foul water sewer crossing the site's access. The sewer runs offsite and heads East to the rear garden of 169 where the 150mm Ø foul sewer is seen to divert South.
- The foul water sewer that crosses the site is seen to discharge into the main 838mm Ø foul water sewer that runs West to East along The Roundway Road (A1080)
- The Moselle Brook that crosses through the site to the North-East is shown on the Thames Water asset records as being a water course discharging from the West to the East.
- The CCTV survey undertaken by Drain Technology further confirms the Thames Water asset records showing the 150mm foul water sewer crossing the site and back of neighbouring properties to the West. The CCTV survey does however indicate that there is an existing manhole within the sites access that is built over the Thames Water foul water sewer crossing the site. This was within a fenced area so was not able to be surveyed.
- No Thames Water combined water sewers are shown within the vicinity of the site.
- Thames Water surface water sewers run within the highways bounding the site however are not noted as necessary outfall locations due to The Moselle Brook.

3.3.2 Private On Site Drainage

The CCTV survey has picked up no private drainage within the site, however, due to the noted manhole FMH2 on the CCTV survey not being able to be accessed private drainage could be present within the site.

3.4 Existing Watercourses, Waterbodies and Flood Defences

As aforementioned, The Moselle Brook crosses through the site. Levels within the site are largely higher than the Brook and the site is noted to be within Flood Zone 1 from the Gov.uk flood map for planning.

Lockwood, Banbury & William Griling Reservoirs are located approximately 3km to the East, the Gov.uk map for maximum extent of flooding from reservoirs shows the site to be slightly within an area of flooding from reservoirs when there is also flooding from rivers. The risk of such an event is deemed as low.

3.5 Geological and Hydrogeological Setting

Table 1 provides a summary of British Geological Survey (BGS) Geological Map Sheet No. 256, North London, 1:50,000, Solid and Drift (1998), BGS 'Geology of Britain' online maps. In addition to Listers GEO ground investigation report completed November 2021 was reviewed and the information included in Table 1 below.

Geological Unit/Stratum	Aquifer Designation	Typical Depth To Bottom Of Stata (m bgl)	Typical Strata Description
London Clay Formation (Bedrock)	Unproductive Aquifer	Up to 20m	poorly laminated, blue-grey or grey-brown, slightly calcareous, silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

Table 1: Geological Distribution

As per the British Geological Survey (BGS) mapped data, the sites underlain Bedrock geology is the London Clay formation. This formation is anticipated to be 20m thick in the area of the site and underlain by the Lambeth group and the Thanet formation which extends to 45mbgl.

A historic Borehole from BGS records located approximately 370m to the North-West of the site dated in 1999 showed the following. Made ground was encountered between 0.6m to 1.0m overlying generally stiff medium brown mottled grey silty clay. Such deposits are considered to be of the London Clay and extended down to beyond the base of the boreholes at 5m bgl where the borehole ended.

Based on the EA's online Groundwater Vulnerability Zones Map the Site is located within an "Unproductive Aquifer" due to the London Clay Bedrock.

According to the DEFRA's online Magic Map for Source Protection Zones the site is outside of any source protection zones (SPZ). There is also no recorded current groundwater abstraction licences located within 1,000m of the site.

Within to Listers GEO ground investigation report completed November 2021 the following is noted. "Whilst the London Clay is generally of low permeability, given the proximity to the river, shallow groundwater, or perched groundwater in Made Ground/Topsoil, should be anticipated. Such ground conditions are also likely to mean that the site is not amenable to sustainable drainage systems (SuDS)."

4 Drainage Strategy

4.1.1 Planning Condition 11

Planning Condition 11 imposed onto the site by the London Borough of Haringey states:

“Prior to above ground works, Section 4 (Sustainable Drainage Maintenance Strategy) & Appendix B (Proposed Drainage Strategy Drawings) of 'Design Note - Drainage & Flood Risk 16/12/2020' and the SuDS options it proposes (namely Below Ground Cellular Attenuation & Permeable Paving) shall be provided, maintained in accordance with the associated Maintenance Schedules, and retained for the lifetime of the development except where conditions attached to this planning permission indicate otherwise or where alternative details have been subsequently approved following an application for a nonmaterial amendment. For the avoidance of doubt, all hardstanding areas shall be permeable.

Reason: In order to ensure a satisfactory provision for drainage on site and ensure suitable drainage provision for the development and comply with Policies DM24, 5, & 6 of the Haringey Development Management DPD (2017), policy SP5 of the Local Plan.”

4.2 Sustainable Surface Water Drainage Strategy

The proposed surface water has been designed in accordance with best practise and guidance to ensure that surface water is managed effectively to limit the risk off-site as well as on site.

The drainage strategy has been produced to discharge planning conditions 11 and is based on Policies DM24, 5, & 6 of the Haringey Development Management DPD (2017) and policy SP5 of the Local Plan.

This strategy also follows the London Plan policy SI 13 which states that surface water runoff from a Site shall discharge to one of the following in order of priority:

- rainwater use as a resource (for example rainwater harvesting, blue roofs for irrigation)
- rainwater infiltration to ground at or close to source
- rainwater attenuation in green infrastructure features for gradual release (for example green roofs, rain gardens)
- rainwater discharge direct to a watercourse (unless not appropriate)
- controlled rainwater discharge to a surface water sewer or drain
- controlled rainwater discharge to a combined sewer”.

As aforementioned within section 3.5 of this report due to the ground conditions at the site including, made ground, London Clay formation and anticipated high groundwater levels. Infiltration techniques are assessed as not being viable. The site is therefore proposed to discharge to The Moselle Brook as in accordance with the disposal hierarchy.

From the planning decision notice condition 11 it is noted that all hardstanding areas within the site shall be permeable. This has been provided in our strategy in the form of permeable block paving and Grasscrete. These systems will provide attenuation within their sub-base offering a method of water quality improvement as well as slowing the time of concentration into the Brook limiting the risk of flooding. These systems will have a lined Sub-base due to infiltration techniques at the site not being viable.

Surface water collected from the 5 ‘move on’ modular build units shall be conveyed down Rain Water Pipes (RWP) into the below ground drainage network. These pipes are connected to a PPIC that discharges to a Formpave distribution crate within the sub-base of the permeable paving. Surface water stored within the permeable paving sub-base is to be collected through a perforated pipe that runs along the North-Easterly extent of the proposed hardstanding areas. This perforated pipe then conveys flows to the proposed ORIFLO OFCC 500/1.5 flow control chamber by Turtle Enviro. This chamber has a silt block barrier and flows are restricted using an orifice plate. From this flow control, surface water will be conveyed to The Moselle Brook to be discharged through a headwall.

The sites proposed to discharge at Greenfield run-off rate as in accordance with the Haringey Development Management DPD (2017) and policy SP5 of the Local Plan. This rate is proposed to be reduced to Q_{bar} which is calculated at 0.70l/s. Reference should be made to **Appendix D** for calculations.

4.2.1 Surface Water Modelling

When undertaking the modelling for the surface water drainage strategy the following assumptions were made:

- Micro-Drainage software has been used for all hydraulic design;
- FEH rainfall data has been used when determining existing runoff rates;
- HR Wallingford Greenfield Runoff Rate Estimation Tool (www.uksuds.com) was used to determine the proposed greenfield runoff rates;
- CV values are set at 1.0 (100%) for hardstanding areas (roads/roofs) within MicroDrainage, for conservative measures at this stage, at the detailed design this figure will be reviewed in consultation with the LLFA;
- The Site area is 0.171ha
- The existing Site has been considered to be 100% permeable; and
- The proposed drainage area of the site is considered to be 0.047ha.
- The proposed drainage network has been designed for the 1 in 100 year plus 40% climate change event.

In accordance with best practise as well as guidance from the Environment Agency guidance and Sewers for Adoption 8th Edition the proposed drainage strategy has been designed to ensure that:

- There will be no surcharging of the drainage system for a 1 in 2-year storm;
- The drainage can be surcharged with no flooding for a 1 in 30-year storm; and
- The drainage can flood on site for a 1 in a 100-year storm with a 40% climate change allowance provided the flood water remains on site and does not flood habitable areas or affect safe ingress and egress to the site for occupiers.

All surface water drainage options outlined in this report adhere to these principles.

Modelling results are available in **Appendix D**.

4.2.2 Proposed Surface Water Network Results

The proposed surface water discharge rates will be limited to greenfield discharge rates in accordance with the requirements of the London Plan policy SI 13.

The proposed surface water discharge rates are shown in **Table 3** below.

Table 2: Proposed Surface Water Discharge Rates

Return Period (years)	Proposed Surface Water Discharge Rates (l/s)
Q_{bar}	0.73
1 in 1	0.30
1 in 30	0.40
1 in 100	0.60
1 in 100 + 40%	0.60

Proposed Development has been modelled using Micro-Drainage to determine the required amount of attenuation to accommodate the 1:100 year + 40%cc storm event and to ensure that as a whole the Site's discharge rate does not exceed greenfield runoff rates for each storm event.

The results of this modelling are provided within **Appendix D**, and attenuation requirements summarised in **Table 4** below.

Table 3: Proposed Attenuation Requirements

Catchment Area	Attenuation Device	Total Drainage Area (Ha)	Max Allowable Discharge Rate (l/s)	Effective Attenuation Required for 1:100yr+40% CC (m ³)	Plan Area Required (m ²)
1	Permeable Paving	0.047	0.73	45	250
Total		0.047	0.73	45	250

Although the above strategy identifies the general principles of surface water drainage management at the Site, assumptions and design solutions proposed will need to be re-assessed at the detailed design stage and any necessary approvals sought.

4.3 Offsite Effects

The surface water drainage strategy demonstrates that the drainage network at the Site is designed to accommodate runoff during all events up to and including the 100 year plus 40% climate change allowance and therefore prevents potential exceedance flows off-site, refer to **Appendix C** for the exceedance flow routes plan.

The development will not cause effects elsewhere in terms of fluvial and tidal flood risk due to its location within Flood Zone 1.

4.4 Residual Flood Risk

The proposed drainage strategy demonstrates that the drainage network at the Site is designed to accommodate runoff during all events up to and including the 100 year plus a climate change allowance preventing potential exceedance flows off-site. Drainage exceedance routes have also been considered and allowed for as part of the development of parameters to ensure that any surface water runoff exceeding the drainage network capacity would naturally flow away.

Refer to **Appendix C** for exceedance flow routes plan. The proposed permeable paving surrounding the units will protect from flooding and therefore means raised thresholds are not required.

4.5 Foul Water Drainage Strategy

The proposed connection point is a 150mm Thame Water foul sewer that crosses the access to the south of the site. Refer to Drainage Strategy Drawing in **Appendix C** for an indicative connection location.

The private on plot foul drainage network will be further developed during detailed design stages. The proposed foul water drainage strategy for the site involves the MEP engineer's coordination of the superstructure drainage up until it enters the below-ground drainage network.

Foul water flows from the proposed development will be collected at a high level and conveyed to the boundaries of the units, before connecting to a PPIC or branching into a main run.

Foul water is proposed to be conveyed by a traditional gravity run system to the existing Thames Water foul water sewer that crosses the site to the South where a manhole is proposed to be constructed over the line of the existing for connection.

5 Sustainable Urban Drainage Solutions

5.1 Permeable Paving

Porous pavement is an alternative to conventional paving in which water permeates through the paved structure rather than draining off it. The surface water will be held in a reservoir structure (high void content sub-base) under the pavement for subsequent delayed discharge or infiltration into the sub-strata below.

The porous paving can be materials such as gravel, reinforced grass, porous concrete, concrete blocks or porous asphalt. Pollutant removal rates have been shown to be high, as the majority of the removal occurs as a result of the filtration of the water through the aggregate sub-base.

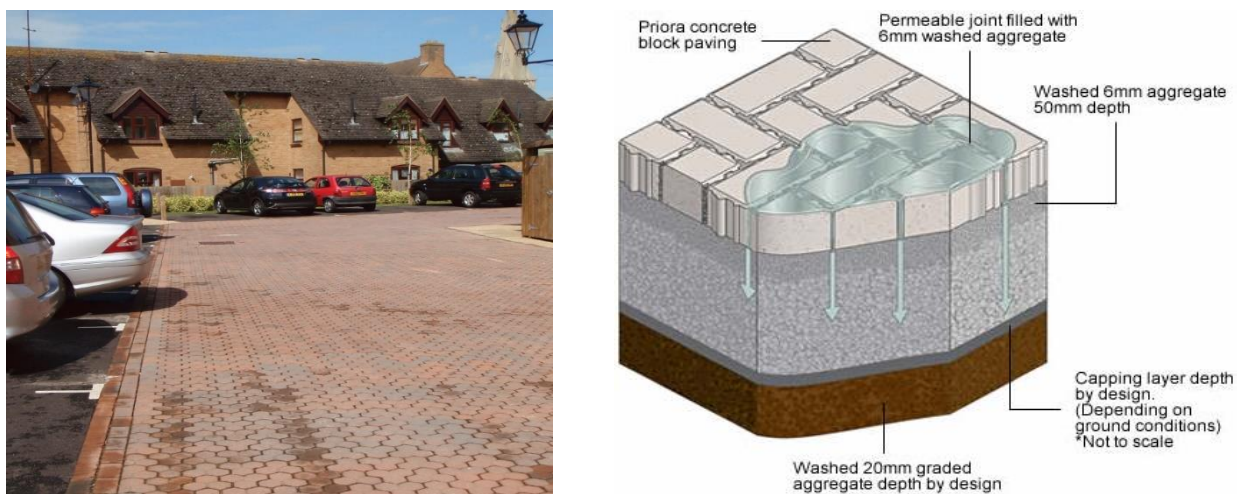


Figure 2: Typical permeable paving details

Advantages:	Effective in removing pollutants, lined systems can be used to avoid infiltration, reduce attenuation volume and rate of surface water runoff, suitable for high density developments, reduces amount of gravity drainage required.
Disadvantages	Costs, used for low traffic volumes, low axel loads and speeds, risk of long term clogging due to poor maintenance.
Maintenance:	• Brushing and vacuuming • Removal of weeds etc • Inspection and repair to any depressions, damaged blocks, jointing etc • Ongoing review of operational efficiency

6 Sustainable Drainage Maintenance Strategy

6.1 On-going Maintenance Responsibility

It is proposed that there will be a building management company who will operate and maintain the buildings, and it will be within their remit to undertake regular maintenance of the sustainable drainage features on site.

6.2 Maintenance Strategy

The maintenance strategy will be in line with the SuDS Manual and also in line with the manufacturer's requirements for the products. An overview of the necessary maintenance activities is detailed below.

The full maintenance regime for each of the below SuDS devices is to be outlined in the Operation and Maintenance Manual and overseen by the Building Management team. The manufacturer's maintenance guidance shall be placed in the Operation and Maintenance Manual.

6.2.1 Permeable Paving

Permeable pavements will be used for some hardstanding/paved areas within the development. Surface water is temporarily stored beneath the surface prior to controlled discharge downstream, or infiltration in to the ground. The permeable paving construction will be in accordance with the Landscape Architect and Meinhardt's specifications.

A guideline maintenance regime is outlined in the table below.

Maintenance Schedule	Required action	Recommended Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observation of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this is the most likely to collect sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, are replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)

Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 4: Operation and maintenance requirements for pervious pavements

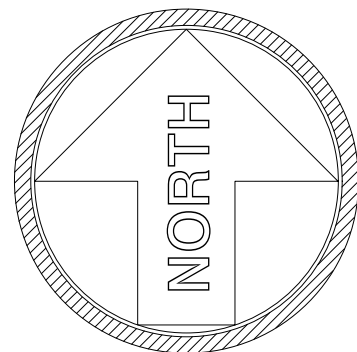
Appendix A – Topographical Survey

191070.01

Note —

Significant overgrowth present on site, as a result topographical survey information is limited.

Tree positions and sizes within areas of overgrowth are to be treated as approximate



ABBREVIATIONS

AC	ASBESTOS CEMENT	LP	LAMP POST
AR	ARMED ROAD	MA	MANHOLE
BB	BASE BEDDING	MW	MOUNTING WELL
BD	BACKDROP	OH	OVERHEAD
BS	BEST	OSA	OFF SURVEY AREA
BR	BROCK	PE	POLYETHYLENE
BT	BIT INSPECTION CHAMBER	PL	PLASTIC
CB	CAT CATCH INSPECTION CHAMBER	PR	PIPE RISER
CX	CONTROL BOX	PVC	POLYVINYL CHLORIDE
CI	CAST IRON	RE	RODDING EYE
CL	CAST LEVEL	RWP	RAIN WATER PIPE
CO	COAT	SKAWA	SKAWA
CP	CATCHPIT	SP	SPUN IRON
D	DEPTH	ST	STOP TAP
DI	DRAIN IRON	ST	STEEL
DP	DOWN PIPE	SV	SUICIDE VALVE
ED	EMPTY DUCT	SVP	SOIL VENT PIPE
EO	END OF TRENCH SCAR	TR	TRAPPED EXIT
ER	END OF TRACE	TFR	TAKEN FROM RECORD
ET	EARTHING ROD	TL	TRAFFIC LIGHT
FE	FIRE EXTINGUISHER	TE	TELEGRAPH POLE
FH	FIRE HYDRANT	UTCTV	UNABLE TO CCTV
FL	FLOOD LIGHT	UTF	UNABLE TO FIND
GV	GRASS VALVE	UTL	UNABLE TO FIND
GR	GROUND PENETRATING RADAR	US	UNABLE TO SURVEY
GRP	GLASS REINFORCED PLASTIC	W	WITRIFIED CLAY
GV	GRASS VALVE	VP	VENT PIPE
H	HIGH LEVEL	VR	VAPOUR RECOVERY
HL	HEAD OF RUN	W	WATER LEVEL
IC	INSPECTION CHAMBER	WM	WATER METER
IL	INVERT LEVEL	WO	WASH OUT VALVE
SWS	SURFACE WATER SEWER		
CSWS	COMBINED SURFACE WATER SEWER		
FWS	FOUL WATER SEWER		
CWS	COMBINED WATER SEWER		

Client
INGLETON WOOD LLP (LONDON)

LAND AT R/O 163-173 THE
ROUNDWAY, LONDON, N17 7HE

UNDERGROUND SURVEY

TS21-441-2

Scale	1:200@A0	Sheet	1 of 1
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Accreditations






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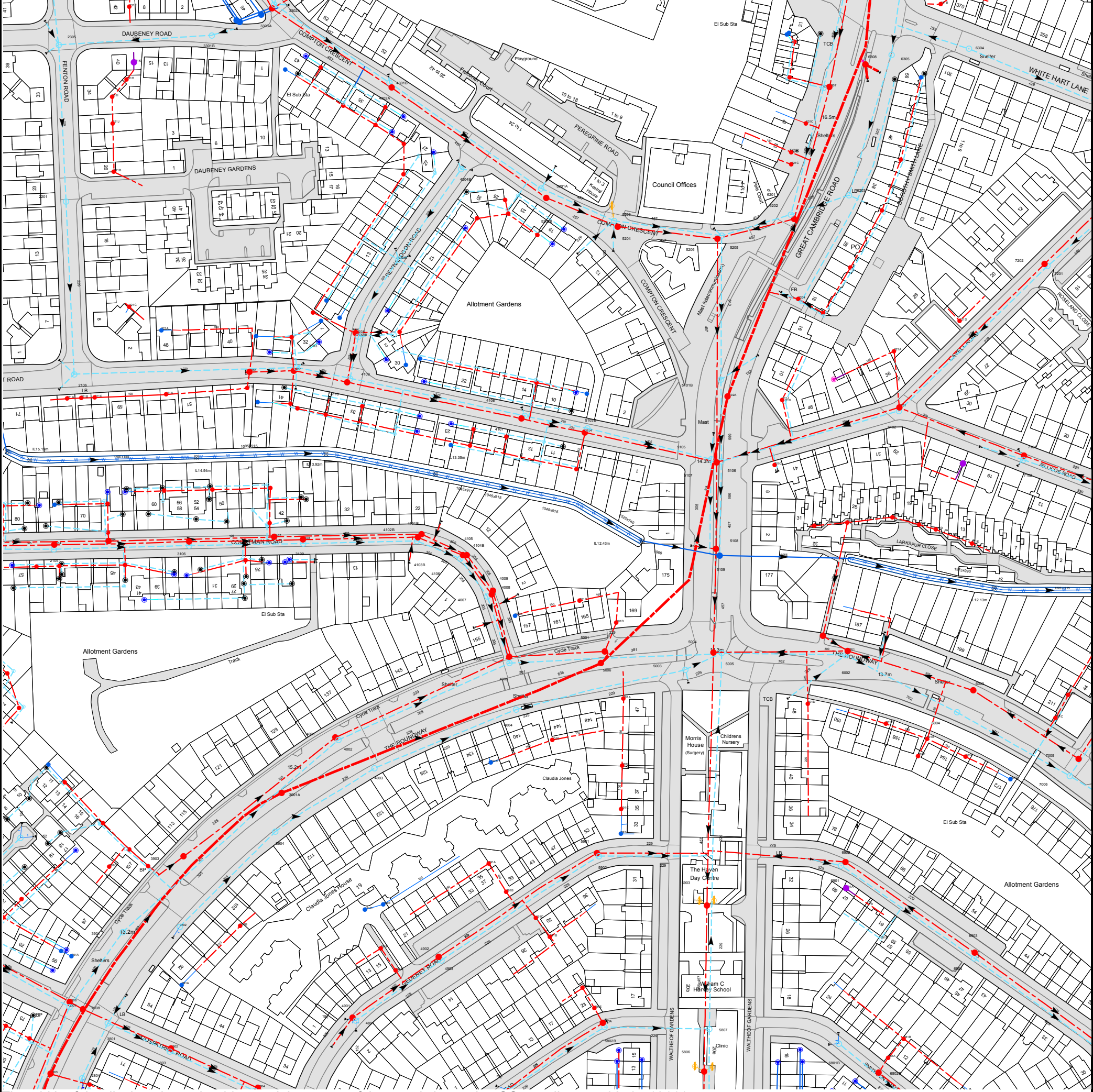



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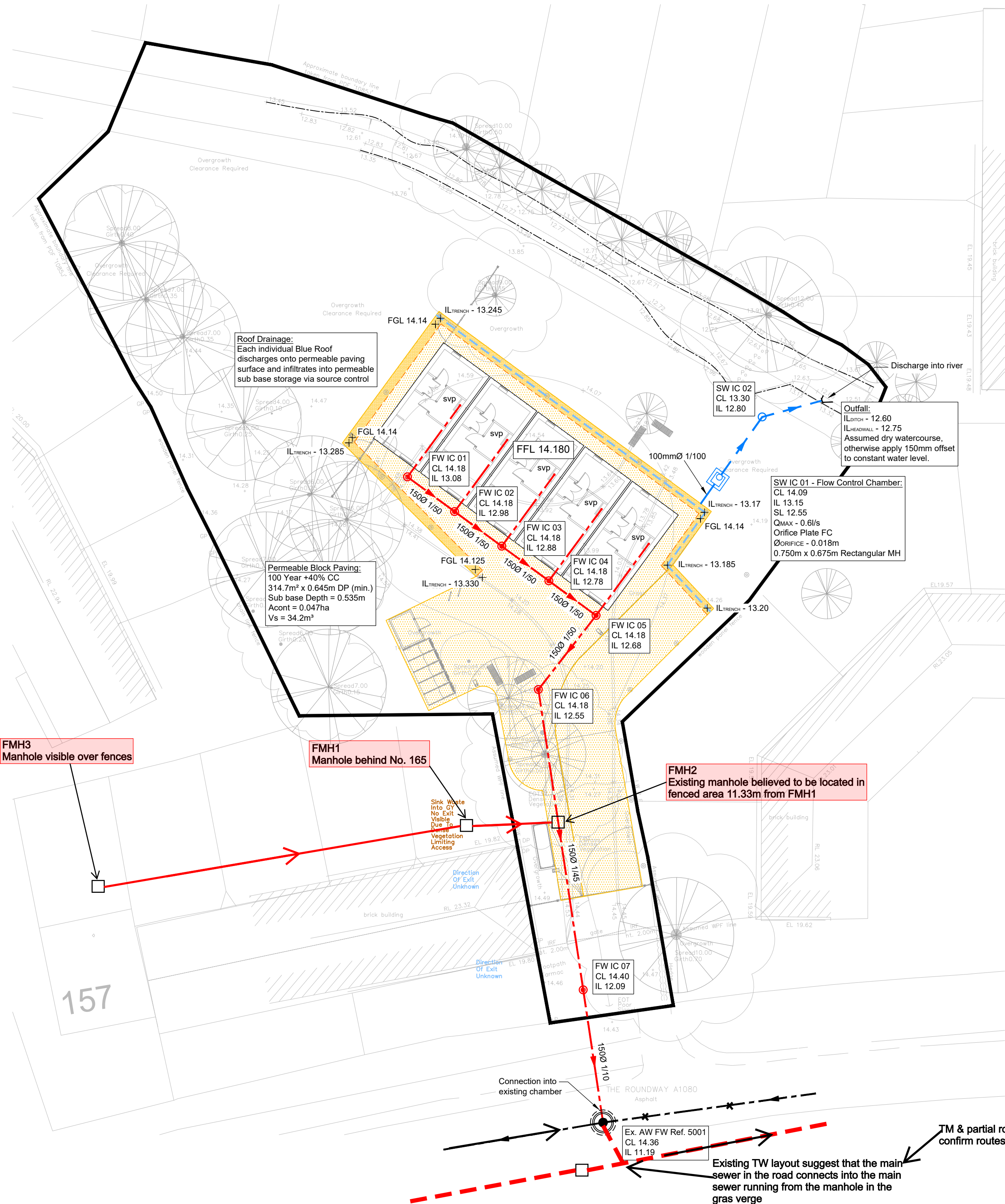
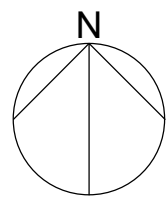
Appendix B – Drainage Authority Asset Records & CCTV Survey

Asset Location Search Sewer Map - ALS/ALS Standard/2021_4489946



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 532505,191117
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map with the Sanction of the controller of H.M. Stationery Office, License no. 100019345 Crown Copyright Reserved.



LEGEND:

- Existing public foul water sewer
- Existing public foul water chamber
- Site Boundary
- Proposed surface water drain
- Proposed surface water inspection chamber
- Proposed surface water flow control chamber with orifice plate
- Proposed headwall
- Extents of proposed tanked permeable paving
- Proposed 600mm wide sub-surface collection trench (fin drain)
- Proposed perforated carrier pipe
- Proposed foul water drain
- Proposed foul water inspection chamber
- Proposed soil vent pipe (connection point on prefabricated unit)

- Key:
- Foul water CCTV surveyed
 - Foul water predicted route
 - Surface water CCTV surveyed
 - Surface water predicted route
 - Combined water CCTV surveyed
 - Combined water predicted route
 - UTA - Unable to access
 - UTR - Unable to raise
 - UTS - Unable to survey
 - UTL - Unable to locate
 - SA - Survey abandoned



Ingleton Wood LLP shall have no liability to the Employer arising out of any unauthorized modification or amendment to, or any transmission, copy or use of the material, or any proprietary work contained therein, by the Employer, Other Project Team Member, or any other third party.

All dimensions are to be checked and verified on-site by the Main Contractor prior to commencement; any discrepancies are to be reported to the Contract Administrator.

This drawing is to be read in conjunction with all other relevant drawings and specifications

Do Not Scale

© Ingleton Wood LLP

NOTES:

- this drawing is to be read in conjunction with all other architect's, engineer's and specialist's drawings, specifications and documentation as part of the design package of information.
- all private drainage works are to be constructed in accordance with the building regulations approved document h : 2015.

DRAINAGE NOTES - GENERAL:

- connections to the existing public sewers shall be subject to the approval of the sewerage undertaker and shall be carried out by a contractor approved by them. the contractor shall comply with the requirements of the sewerage undertaker with regards to submitting method statements, risk assessments etc for obtaining a 'permit to work' on the existing sewer.
- where possible orientation of manhole access covers to be orthogonal with adjacent kerb line.
- manhole covers to be set flush with binder course on new road construction and raised to final levels when surface course is laid at later date.
- all cement and concrete products used in foul and surface water sewers to be sulphate resisting.
- all pipes entering or leaving manholes shall be laid with their soffits level, unless shown or agreed otherwise.
- gully connections to be 150mm dia at a gradient no flatter than 1 in 150 unless stated otherwise.
- all private connections to adopted foul and surface water sewers to be made with either vc or concrete pipes.

PRIVATE DRAINAGE NOTES:

- all private foul and storm water sewers shall be 100/110mm dia clayware or pvc unless stated otherwise. storm sewers shall be laid at a gradient no flatter than 1 in 100, and foul sewers to a gradient no flatter than 1 in 80 unless stated otherwise on the drawings. private foul drains without a wc connected shall be laid to a gradient no flatter than 1 in 40.
- all private connections to adopted foul and surface water sewers to be made with either vc or concrete pipes.
- the private foul and storm water drainage shall be subject to inspections by the local building control officer. the contractor shall liaise with the building inspector with regard to making inspections at the appropriate stages of the work.

PROTECTION TO PRIVATE SEWERS:

- type s bedding to be used in non-trafficked areas.
- type s bedding to be used in trafficked areas where the cover to the crown of the sewer is greater than or equal to 900mm.
- concrete pipe surround (type z) to be used in trafficked areas where the cover to the crown of the sewer is less than 900mm.

P1	Initial Issue.	25/02/22	MC	-
Rev	Description	Date	Chk	Apr
Project No:	Scale @ A2:	Drawn By:		
813069	1:200	MS		

Ingleton Wood	Property and Construction Consultants
	Issuing office: Colchester T: 01206 224270 www.ingletonwood.co.uk

Vision, form and function

Project:

The Roundway Accommodation
167 Roundway,
Tottenham,
N17 7HE

Client:

London Borough of Haringey

Title:

Proposed Drainage Layout

Drawing Number:

RNDWAY- IW -XX-XX-DR-C-6000

Status:	Purpose of Issue:	Revision:
S2	Preliminary	P1

Project

Project Name: Hill Group - 167 Roundway - 08.09.22
Project Description: Drainage CCTV Survey
Project Number: 8161
Project Status: Issued
Project Date: 08/09/2022



Table of Contents

Project Name	Project Number	Project Date
Hill Group - 167 Roundway - 08.09.22	8161	08/09/2022

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Scoring Summary	P-2
Section Item 1: FWMH3 > FWMH1 (FWMH3X)	1
Section Item 2: FWMH1 > FWMH2 (FWMH1X)	4
Terms & Conditions	7

Project Information

Project Name	Project Number	Project Date
Hill Group - 167 Roundway - 08.09.22	8161	08/09/2022

Client

Company: Hill Group Services Ltd
Contact: Lewis Crowe
Department: Assistant Technical Coordinator
Street: The Power House, Gunpowder Mill, Powdermill Lane
Town or City: Waltham Abbey
County: Essex
Post Code: EN9 1BN
Phone: 028 8527 1400
Mobile: 077 4553 9218
Email: LewisCrowe@hill.co.uk



Site

Company: Hill Group Services Ltd
Contact: Lewis Crowe
Department: Assistant Technical Coordinator
Street: The Roundway Accommodation, 167 Roundway
Town or City: Tottenham
Post Code: N17 7HE
Phone: 020 8527 1400
Mobile: 077 4553 9218
Email: LewisCrowe@hill.co.uk

Contractor

Company: Drain Technology (UK) Ltd
Contact: Daniel Sullivan
Department: Senior Report Writer
Street: 22 Nuffield Road
Town or City: Abingdon
County: Oxfordshire
Post Code: OX14 1RL
Phone: 01865 587086
Email: reports@draintechnology.co.uk



Scoring Summary

Project Name Hill Group - 167 Roundway - 08.09.22	Project Number 8161	Project Date 08/09/2022
---	-------------------------------	-----------------------------------

Structural Defects

Grade 3: Best practice suggests consideration should be given to repairs in the medium term.

Grade 4: Best practice suggests consideration should be given to repairs to avoid a potential collapse.

Grade 5: Best practice suggests that this pipe is at risk of collapse at any time. Urgent consideration should be given to repairs to avoid total failure.

Section	PLR	Grade	Description
1	FWMH3X	4	Fracture spiral from 10 o'clock to 2 o'clock
2	FWMH1X	4	Multiple defects

Service / Operational Condition

Grade 3: Best practice suggests consideration should be given to maintenance activities in the medium term.

Grade 4: Best practice suggests consideration should be given to maintenance activity to avoid potential blockages.

Grade 5: Best practice suggests that this pipe is at a high risk of backing up or causing flooding.

Section	PLR	Grade	Description
1	FWMH3X	3	Attached deposits, encrustation at joint from 4 o'clock to 8 o'clock, 10% cross-sectional area loss
2	FWMH1X	4	Settled deposits, hard or compacted, 30% cross-sectional area loss

Abandoned Surveys

Section	PLR	Description
All inspections complete, none are abandoned.		

Information

These scoring summaries are based on the SRM grading from the WRc.

Section Inspection - 14/09/2022 - FWMH3X

Item No.	Insp. No.	Date:	Time:	Client's Job Ref	Weather	Pre Cleaned	PLR
1	1	14/09/22	15:06	hill group services	No Rain Or Snow	Yes	FWMH3X
Operator		Vehicle		Camera	Preset Length	Legal Status	Alternative ID
DTL12SC		Not Specified		Not Specified	Not Specified	Not Specified	1

Town or Village:	Tottenham	Inspection Direction:	Upstream	Upstream Node:	FWMH3
Road:	165 Roundway	Inspected Length:	28.39 m	Upstream Pipe Depth:	
Location:	Gardens	Total Length:	28.39 m	Downstream Node:	FWMH1
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul		Pipe Shape:	Circular	
Type of Pipe:	Gravity drain/sewer		Dia/Height:	100 mm	
Flow Control:	No flow control		Pipe Material:	Vitrified clay pipe (i.e. all clayware)	
Year Constructed:	Not Specified		Lining Type:	No Lining	
Inspection Purpose:	Sample survey to determine asset condition		Lining Material:	No Lining	
Comments:	0				
Recommendations:					

Scale:	1:246	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m FWMH1 0.00 0.00 4.70 4.70 6.69 10.31 16.35 16.35 17.02 18.67 21.71 24.41 26.58 28.39 FWMH3 Depth: m							
		0.00	MH	Start node, manhole, reference: FWMH1	00:00:00		
		0.00	WL	Water level, 5% of the vertical dimension: FLOWING	00:00:21		
		4.70	JN	Junction at 10 o'clock, diameter: 100mm	00:00:54		
		4.70	DEEJ	Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 5% cross-sectional area loss	00:00:54	4008.jpg	2
		6.69	JN	Junction at 10 o'clock, diameter: 100mm	00:01:10		
		10.31	JN	Junction at 10 o'clock, diameter: 100mm	00:01:26		
		16.35	JN	Junction at 10 o'clock, diameter: 100mm	00:01:51		
		16.35	DEEJ	Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 5% cross-sectional area loss	00:01:53	32080.jpg	2
		17.02	DEEJ	Attached deposits, encrustation at joint from 4 o'clock to 8 o'clock, 10% cross-sectional area loss	00:02:03	55785.jpg	3
		18.67	JN	Junction at 10 o'clock, diameter: 100mm	00:02:13		
		21.71	JN	Junction at 10 o'clock, diameter: 100mm	00:02:25		
		24.41	FCJ	Fracture, circumferential at joint from 12 o'clock to 12 o'clock	00:02:39	4691.jpg	3
		26.58	FS	Fracture spiral from 10 o'clock to 2 o'clock	00:03:08	7168.jpg	4
		28.39	MHF	Finish node, manhole, reference: FWMH3	00:03:18		

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
2	80.0	4.2	120.0	4.0	3	2.0	0.1	4.0	3.0

Section Pictures - 14/09/2022 - FWMH3X

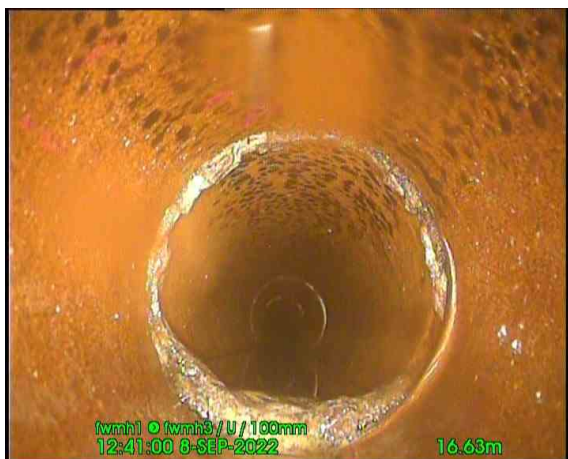
Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Upstream	FWMH3X	hill group services	8161



4008.jpg, 00:00:54, 4.70 m
Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 5% cross-sectional area loss



32080.jpg, 00:01:53, 16.35 m
Attached deposits, encrustation at joint from 5 o'clock to 7 o'clock, 5% cross-sectional area loss



55785.jpg, 00:02:03, 17.02 m
Attached deposits, encrustation at joint from 4 o'clock to 8 o'clock, 10% cross-sectional area loss



4691.jpg, 00:02:39, 24.41 m
Fracture, circumferential at joint from 12 o'clock to 12 o'clock

Section Pictures - 14/09/2022 - FWMH3X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
1	Upstream	FWMH3X	hill group services	8161



7168.jpg, 00:03:08, 26.58 m
Fracture spiral from 10 o'clock to 2 o'clock

Section Inspection - 08/09/2022 - FWMH1X

Item No. 2	Insp. No. 1	Date: 08/09/22	Time: 12:48	Client's Job Ref hill group services	Weather No Rain Or Snow	Pre Cleaned Yes	PLR FWMH1X
Operator DTL12SC		Vehicle Not Specified		Camera Not Specified	Preset Length Not Specified	Legal Status Not Specified	Alternative ID 1

Town or Village:	Tottenham	Inspection Direction:	Downstream	Upstream Node:	FWMH1
Road:	165 Roundway	Inspected Length:	11.33 m	Upstream Pipe Depth:	
Location:	Gardens	Total Length:	11.33 m	Downstream Node:	FWMH2
Surface Type:		Joint Length:		Downstream Pipe Depth:	
Use:	Foul	Pipe Shape:	Circular		
Type of Pipe:	Gravity drain/sewer	Dia/Height:	100 mm		
Flow Control:	No flow control	Pipe Material:	Vitrified clay pipe (i.e. all clayware)		
Year Constructed:	Not Specified	Lining Type:	No Lining		
Inspection Purpose:	Sample survey to determine asset condition	Lining Material:	No Lining		
Comments:	0				
Recommendations:					

Scale:	1:99	Position [m]	Code	Observation	MPEG	Photo	Grade
Depth: m							
FWMH1	0.00		MH	Start node, manhole, reference: FWMH1	00:00:00		
	0.00		WL	Water level, 5% of the vertical dimension: FLOWING	00:00:05		
	1.90		FS	Fracture spiral from 11 o'clock to 4 o'clock	00:00:19	44995.jpg	4
	2.05		H	Hole in drain or sewer from 9 o'clock to 11 o'clock	00:00:25	10350.jpg	4
	2.05		RM	Roots, mass, 10% cross-sectional area loss	00:00:25	50419.jpg	3
	2.05		B	Broken pipe from 11 o'clock to 1 o'clock	00:00:27	8721.jpg	4
	2.05		FM	Fracture, multiple from 12 o'clock to 12 o'clock	00:00:27	8360.jpg	4
	2.05		ID	Infiltration, dripping at 11 o'clock	00:00:27	3817.jpg	
	3.92		JN	Junction at 3 o'clock, diameter: 100mm	00:00:45		
	5.23		JN	Junction at 3 o'clock, diameter: 100mm	00:00:51		
	10.17		DEC	Settled deposits, hard or compacted, 30% cross-sectional area loss	00:01:11	54142.jpg	4
	10.17		WL	Water level, 30% of the vertical dimension	00:01:11		
	10.32		FC	Fracture, circumferential from 9 o'clock to 3 o'clock	00:01:15	49934.jpg	3
	11.33		LR	Line deviates right	00:01:44		
FWMH2	11.33		MHF	Finish node, manhole, reference: FWMH2	00:01:48		
Depth: m							

Construction Features					Miscellaneous Features				
Structural Defects					Service & Operational Observations				
STR No. Def	STR Peak	STR Mean	STR Total	STR Grade	SER No. Def	SER Peak	SER Mean	SER Total	SER Grade
5	320.0	31.8	360.0	4.0	2	5.0	0.8	9.0	4.0

Section Pictures - 08/09/2022 - FWMH1X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	FWMH1X	hill group services	8161



44995.jpg, 00:00:19, 1.90 m
Fracture spiral from 11 o'clock to 4 o'clock



10350.jpg, 00:00:25, 2.05 m
Hole in drain or sewer from 9 o'clock to 11 o'clock



50419.jpg, 00:00:25, 2.05 m
Roots, mass, 10% cross-sectional area loss



8721.jpg, 00:00:27, 2.05 m
Broken pipe from 11 o'clock to 1 o'clock

Section Pictures - 08/09/2022 - FWMH1X

Item No.	Inspection Direction	PLR	Client's Job Ref	Contractor's Job Ref
2	Downstream	FWMH1X	hill group services	8161



8360.jpg, 00:00:27, 2.05 m
Fracture, multiple from 12 o'clock to 12 o'clock



3817.jpg, 00:00:27, 2.05 m
Infiltration, dripping at 11 o'clock



54142.jpg, 00:01:11, 10.17 m
Settled deposits, hard or compacted, 30% cross-sectional area loss



49934.jpg, 00:01:15, 10.32 m
Fracture, circumferential from 9 o'clock to 3 o'clock

Terms & Conditions

The information provided with in this report is based purely on a visual examination. No guarantee is offered or responsibility accepted for the drain systems water tightness or structural integrity.

Any observations or recommendation with in this report are made based on what was found at the date and time of the survey only. We reserve the right to amend our opinion in the event of additional information being made available at some future date.

All remedial and rehabilitation recommendations offered with in this report are based on the grading summary for each drain run or defect with in a drain run and as such follow the WRc best practise recommendation scoring guide.

To what extent of the drainage survey being complete is dependent on what access is available to the drain system at the time of the survey and the company cannot be held responsible or accept responsibility where complete access to all drainage is not possible.

The company will make every effort to ensure as much of the drainage system is surveyed as possible, where defects, obstructions or other anomalies are present preventing the camera access, these runs may be abandoned and form part of the report and any recommendations.

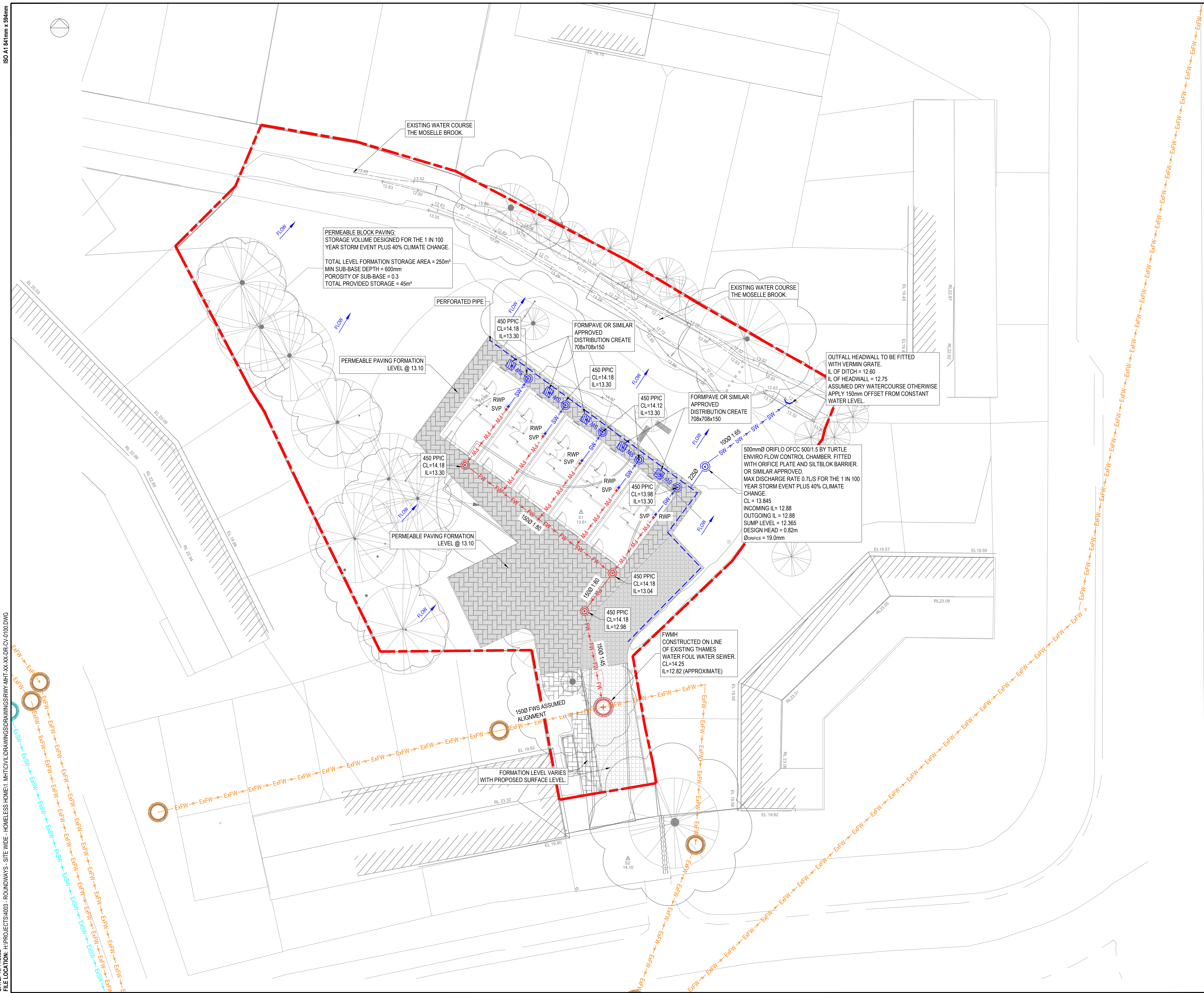
Unless previously agreed, it is the customers responsibility to provide Drain Technology with site access, water and power if needed.

Any work undertaken will be charged by time either by the hour or by the day.

Any project timescale estimated is purely a guide based on the information supplied. The company do not guarantee this timescale or offer a fixed price unless previously agreed as the company have no prior knowledge of the drainage systems condition, site restrictions, access or if the information originally received is indeed accurate.

Once the report has been issued, if a client is not satisfied or unhappy with any part within the report, then they must inform Drain Technology within 7 days.

Appendix C – Meinhardt Drawings

[illegible]

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
3. THIS DRAWING IS FOR APPROVAL PURPOSES ONLY. NOT FOR CONSTRUCTION.
4. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND CONSULTANTS DRAWINGS AND SPECIFICATIONS.
5. DRAWING BASED ON:
 - TERRAIN SURVEYS - TOPOGRAPHICAL SURVEY - TS21-441-1, SEPTEMBER 2021.

	SITE BOUNDARY
	PROPOSED SURFACE WATER SEWER
	PROPOSED FOUL WATER SEWER
	EXISTING THAMES WATER FOUL WATER SEWER
	EXISTING THAMES WATER COMBINED WATER SEWER
	PROPOSED SURFACE WATER MANHOLE
	EXISTING THAMES WATER FOUL WATER MANHOLE
	PROPOSED FOUL WATER MANHOLE
	EXISTING THAMES WATER SURFACE WATER MANHOLE
	FORMPAVE DISTRIBUTION CRATE OR SIMILAR APPROVED
	PERMEABLE BLOCK PAVING
	PERMEABLE GRASS CRETE
	PROPOSED SOIL VENT PIPE
	PROPOSED RAIN WATER PIPE
	PERMEABLE PAVING WITH SET FORMATION LEVEL REFER TO PLAN
	EXCEEDANCE FLOW PATHS
	PROPOSED PERFORATED PIPE

CDM RESIDUAL CIVIL / STRUCTURAL DESIGN RISKS



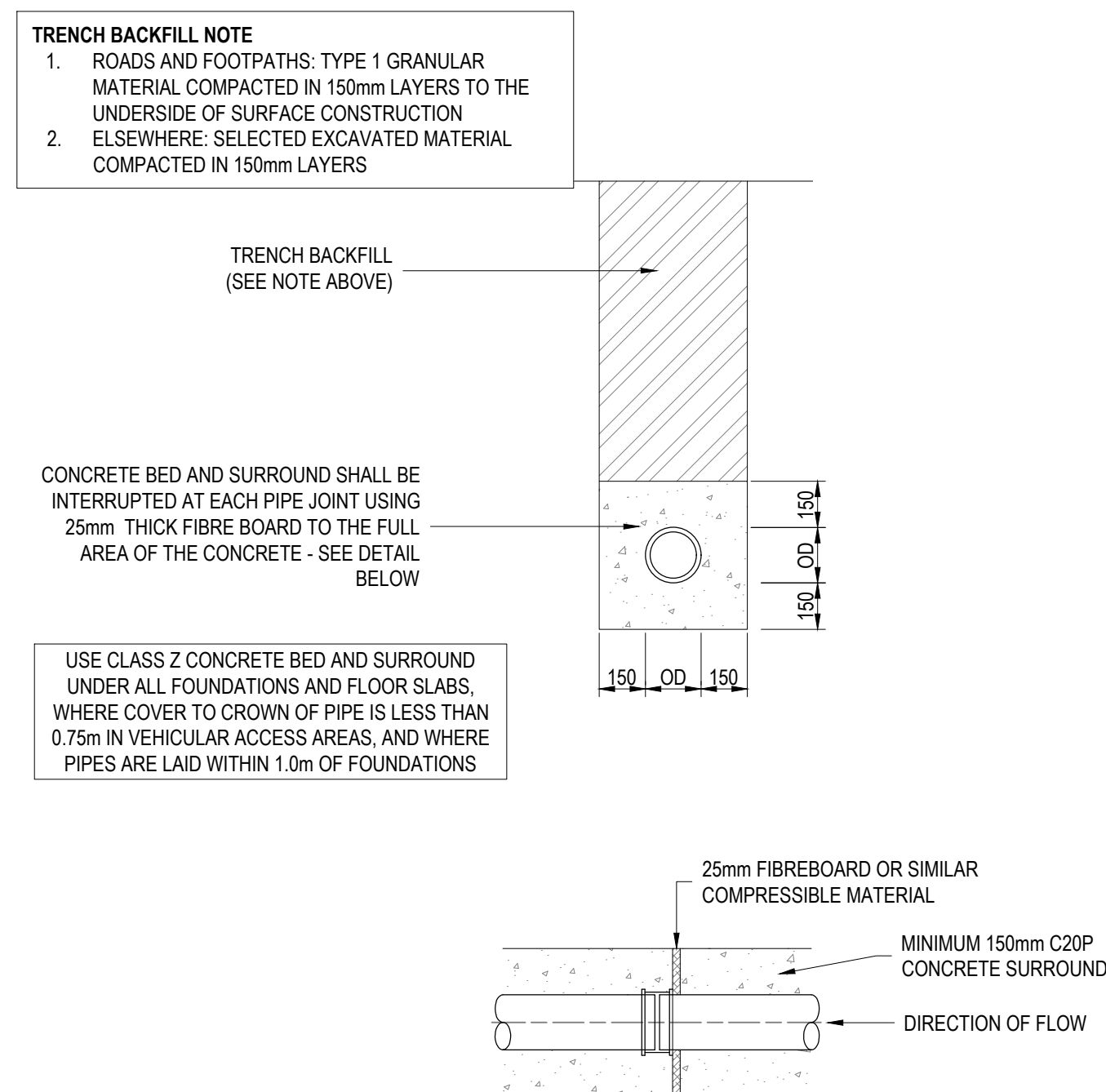
PROJECT

THE ROUNDWAY HOMELESS HOME

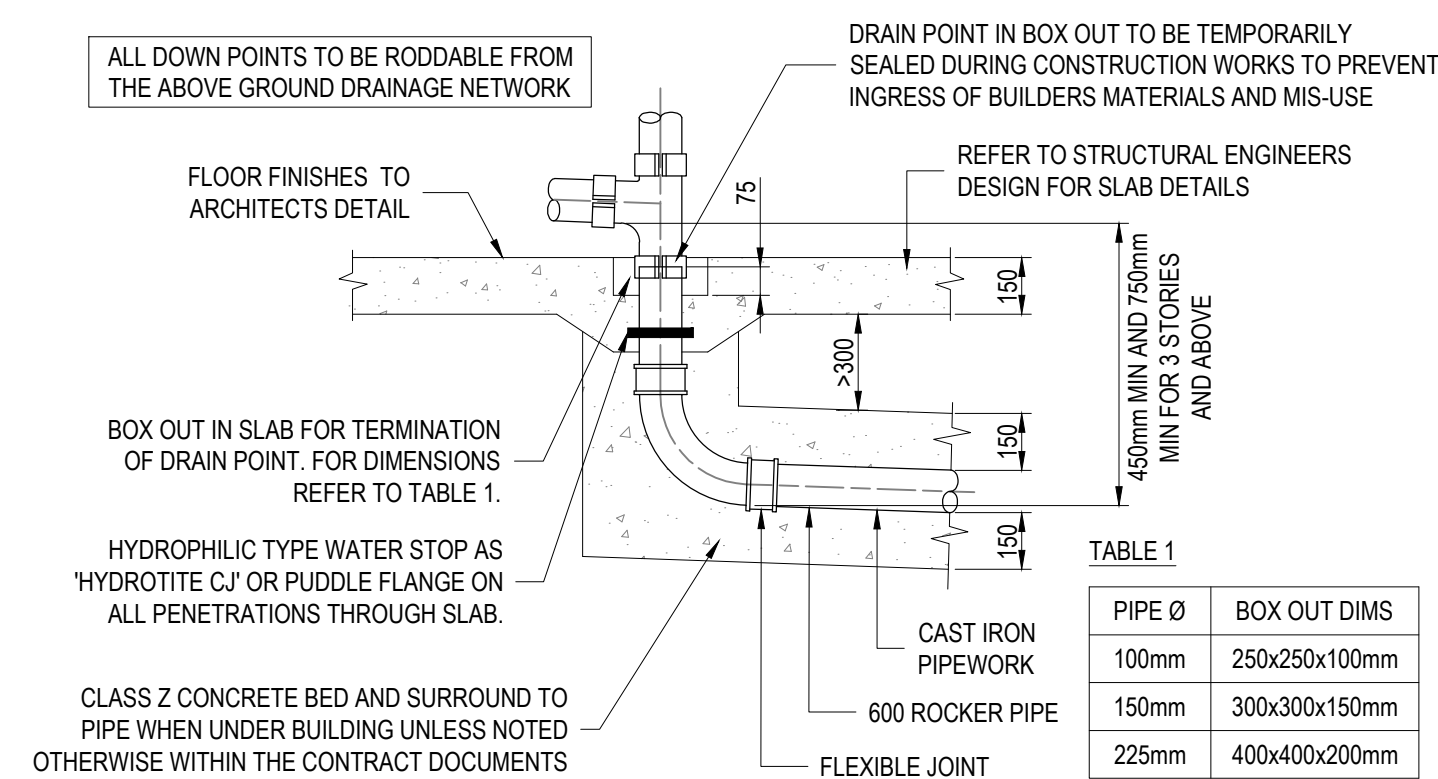
CLIENT
HILL

TITLE
PROPOSED BELOW GROUND
DRAINAGE LAYOUT

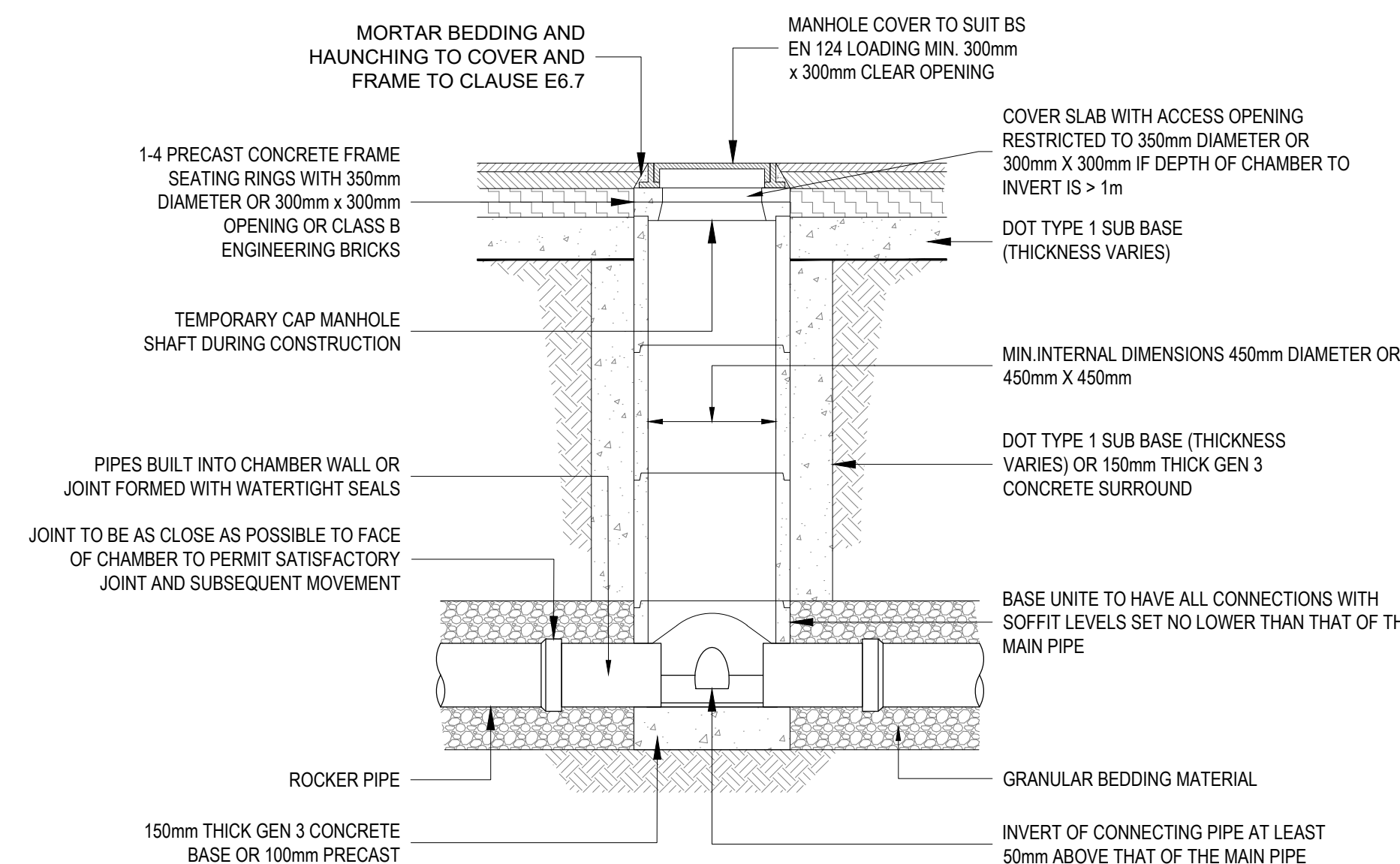
DISCIPLINE CIVIL			SCALE 1:150
DRAWN LH	DESIGNED LH	CHECKED CM	APPROVED CM
DRAWING No RWY-MHT-XX-XX-DR-CV-0100			ISSUE P02



CLASS Z CONCRETE BED AND SURROUND

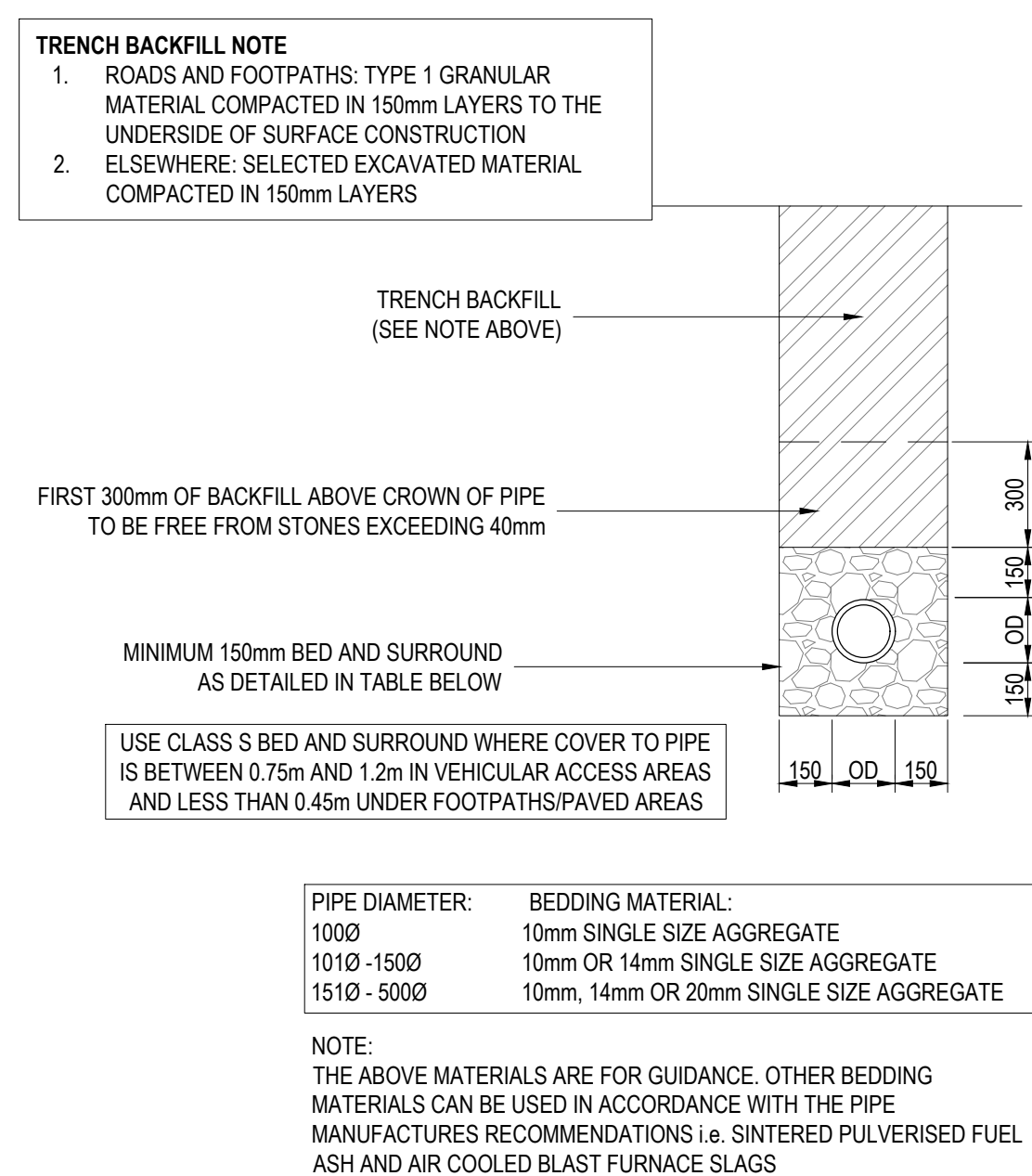


TYPICAL DRAIN POINT

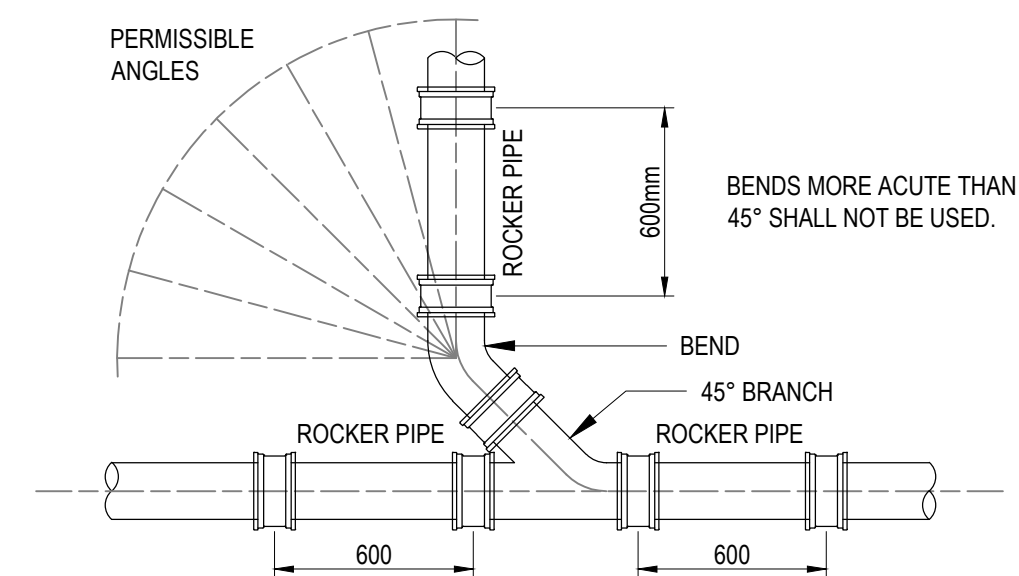


EXTERNAL INSPECTION CHAMBER DETAIL -TYPE 3
(RIGID MATERIAL DETAIL)

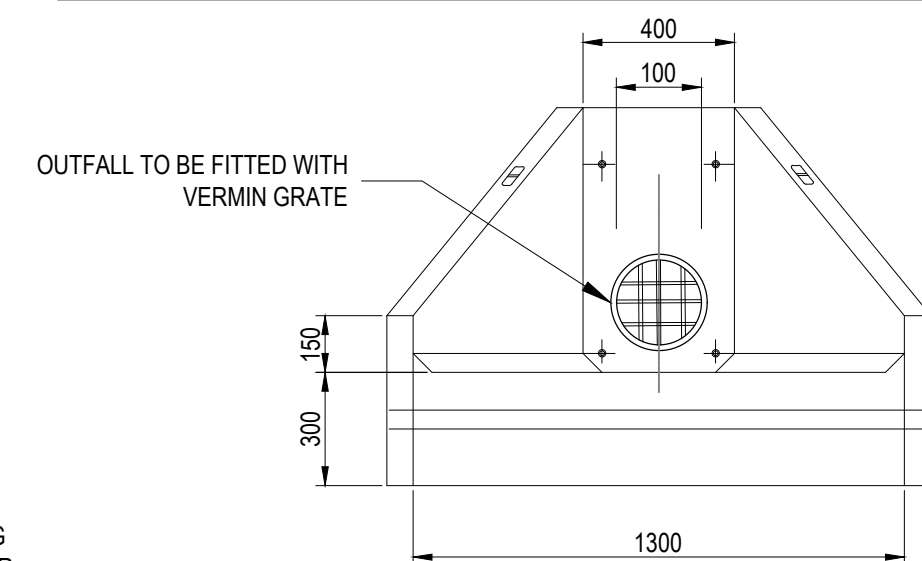
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE IN AREAS SUBJECT TO VEHICLE LOADING 3m
NON-ENTRY



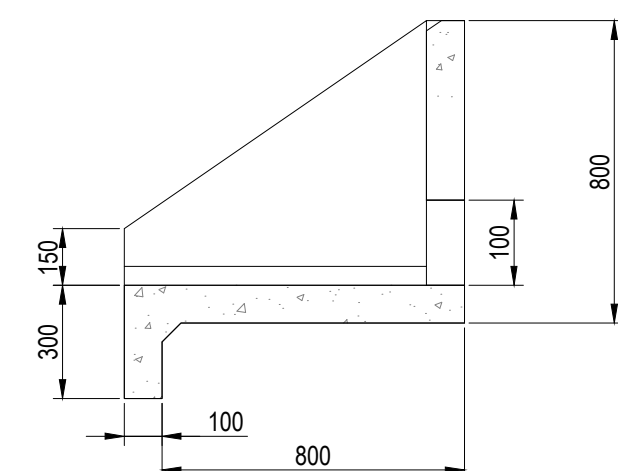
CLASS S GRANULAR BED AND SURROUND



OBLIQUE JUNCTION ARRANGEMENT DETAIL

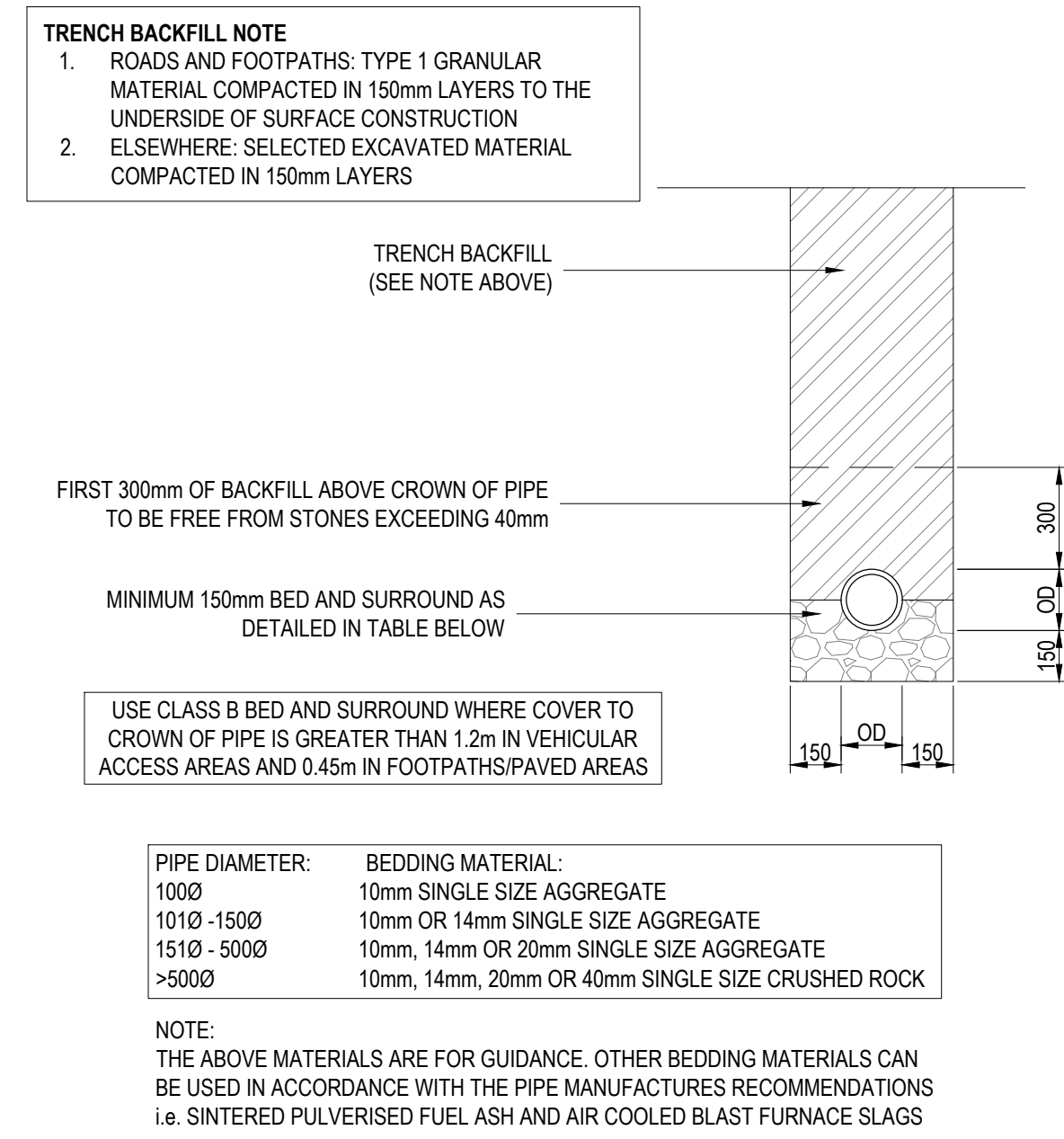


ELEVATION OF CONCRETE HEADWALL

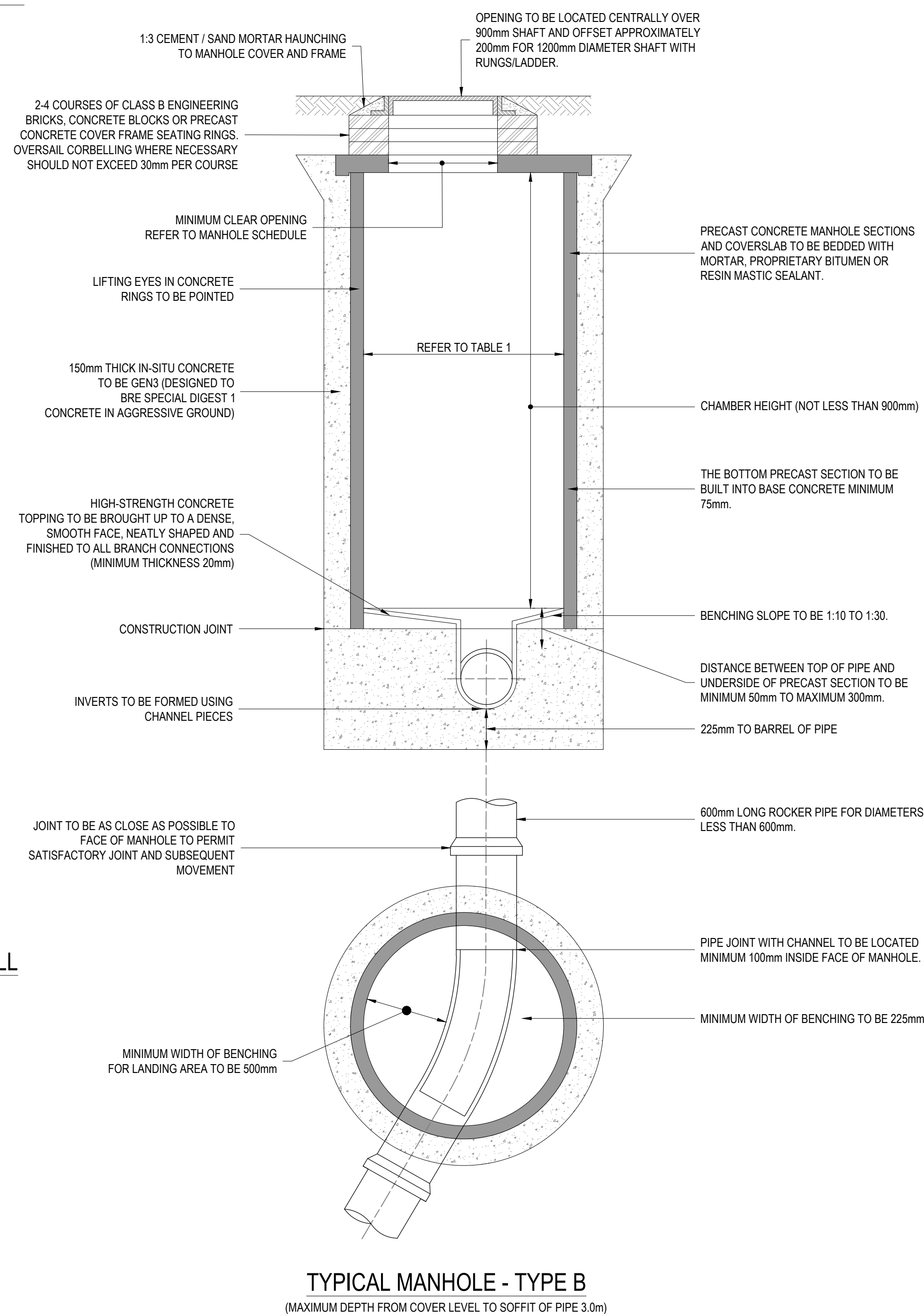


CROSS SECTION OF CONCRETE HEADWALL
N.T.S

<u>MANHOLE DEPTH</u>	<u>PIPE Ø</u>	<u>INTERNAL DIAMETER OF MANHOLE</u>
< 1.5m	≤ 150	1000Ø
	225 - 300	1200Ø
	300 - 700	1500Ø
	≥ 700	THE LARGER OF 1800Ø OR (DN+450)
>1.5m	100 - 375	1200Ø
	375 - 700	1500Ø
	≥ 700	THE LARGER OF 1800Ø OR (DN+775)



CLASS B GRANULAR BED AND SURROUND



TYPICAL MANHOLE - TYPE B

(MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0m)

ISSUED FOR
APPROVAL

[illegible]

NOTES:

1. DO NOT SCALE FROM THIS DRAWING
2. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
3. THIS DRAWING IS FOR APPROVAL PURPOSES ONLY. NOT FOR CONSTRUCTION.
4. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND CONSULTANTS DRAWINGS AND SPECIFICATIONS.

CDM RESIDUAL CIVIL / STRUCTURAL DESIGN RISKS



PROJECT

THE ROUNDWAY HOMELESS HOME

CLIENT
HILL

TITLE
PROPOSED BELOW GROUND
DRAINAGE DETAILS
SHEET 1

DISCIPLINE
CIVIL

DRAWN	DESIGNED	CHECKED	APPROVED
LH	LH	CM	CM
DRAWING No			ISSUE

ROVED
M
UE

Appendix D – Modelling Results

[Print](#)[Close Report](#)

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Site name:

Site location:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:

Longitude:

Reference:

Date:

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

SOIL type:

HOST class:

SPR/SPRHOST:

Hydrological characteristics

SAAR (mm):

Hydrological region:

Growth curve factor 1 year:

Growth curve factor 30 years:

Growth curve factor 100 years:

Growth curve factor 200 years:

Notes

(1) Is $Q_{BAR} < 2.0$ l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

Q_{BAR} (l/s):

1 in 1 year (l/s):

1 in 30 years (l/s):

1 in 100 year (l/s):

1 in 200 years (l/s):

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Meinhardt (UK) Ltd		Page 1
10 Aldersgate Street London EC1A 4HJ		
Date 09/11/2022 09:08 File 4003 - Proposed Surface...	Designed by Luke.Hornblow Checked by	
Innovyze	Network 2020.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FEH Rainfall Model	
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 532527 191109 TQ 32527 91109
Data Type	Point
Maximum Rainfall (mm/hr)	50
Maximum Time of Concentration (mins)	30
Foul Sewage (l/s/ha)	0.000
Volumetric Runoff Coeff.	1.000
PIMP (%)	100
Add Flow / Climate Change (%)	0
Minimum Backdrop Height (m)	0.200
Maximum Backdrop Height (m)	1.500
Min Design Depth for Optimisation (m)	1.200
Min Vel for Auto Design only (m/s)	1.00
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	0.036	4-8	0.012

Total Area Contributing (ha) = 0.047

Total Pipe Volume (m³) = 0.300

Meinhardt (UK) Ltd		Page 2
10 Aldersgate Street London EC1A 4HJ		
Date 09/11/2022 09:08 File 4003 - Proposed Surface...	Designed by Luke.Hornblow Checked by	
Innovyze	Network 2020.1	

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.047	0.047	0.047
1.001	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.047	0.047	0.047

Simulation Criteria for Storm

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 532527 191109 TQ 32527 91109
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	0.840
Storm Duration (mins)	30

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Storage Structures for Storm

Cellular Storage Manhole: S1, DS/PN: S1.000

Invert Level (m) 13.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	250.0	0.0	0.601	0.0	0.0
0.600	250.0	0.0			

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<u>2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>																																																										
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Number of Online Controls 1 Number of Time/Area Diagrams 0																																																										
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Analysis Timestep 2.5 Second Increment (Extended)																																																										
DTS Status OFF																																																										
DVD Status ON																																																										
Inertia Status ON																																																										
Profile(s) Summer and Winter																																																										
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440																																																										
Return Period(s) (years) 2, 30, 100																																																										
Climate Change (%) 0, 0, 40																																																										
<table><tr><td colspan="8"></td><td>Water</td></tr><tr><td>PN</td><td>US/MH</td><td></td><td>Return</td><td>Climate</td><td>First (X)</td><td>First (Y)</td><td>First (Z)</td><td>Overflow</td><td>Level</td></tr><tr><td></td><td>Name</td><td>Storm</td><td>Period</td><td>Change</td><td>Surcharge</td><td>Flood</td><td>Overflow</td><td>Act.</td><td>(m)</td></tr><tr><td>S1.000</td><td>S1</td><td>240 Winter</td><td>2</td><td>+0%</td><td>30/120 Summer</td><td></td><td></td><td></td><td>13.210</td></tr><tr><td>S1.001</td><td>S2</td><td>240 Winter</td><td>2</td><td>+0%</td><td>2/15 Summer</td><td></td><td></td><td></td><td>13.216</td></tr></table>																	Water	PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level		Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	(m)	S1.000	S1	240 Winter	2	+0%	30/120 Summer				13.210	S1.001	S2	240 Winter	2	+0%	2/15 Summer				13.216	
								Water																																																		
PN	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level																																																	
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<table><tr><td colspan="3"></td><td colspan="2">Surcharged Flooded</td><td colspan="2">Half Drain</td><td>Pipe</td><td colspan="2"></td></tr><tr><td>PN</td><td>US/MH</td><td>Depth</td><td>Volume</td><td>Flow /</td><td>Overflow</td><td>Time</td><td>Flow</td><td></td><td>Level</td></tr><tr><td></td><td>Name</td><td>(m)</td><td>(m³)</td><td>Cap.</td><td>(l/s)</td><td>(mins)</td><td>(l/s)</td><td>Status</td><td>Exceeded</td></tr><tr><td>S1.000</td><td>S1</td><td>-0.115</td><td>0.000</td><td>0.01</td><td></td><td>227</td><td>0.4</td><td>OK</td><td></td></tr><tr><td>S1.001</td><td>S2</td><td>0.236</td><td>0.000</td><td>0.05</td><td></td><td></td><td>0.3</td><td>SURCHARGED</td><td></td></tr></table>												Surcharged Flooded		Half Drain		Pipe			PN	US/MH	Depth	Volume	Flow /	Overflow	Time	Flow		Level		Name	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded	S1.000	S1	-0.115	0.000	0.01		227	0.4	OK		S1.001	S2	0.236	0.000	0.05			0.3	SURCHARGED	
			Surcharged Flooded		Half Drain		Pipe																																																			
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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

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	Winter	30	+0%	30/120 Summer				13.385
S1.001	S2 480	Summer	30	+0%	2/15 Summer				13.765

PN	US/MH Name	Surcharged	Flooded	Half Drain		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)		
S1.000	S1	0.060	0.000	0.02		1.1	SURCHARGED	
S1.001	S2	0.785	0.000	0.06		0.4	FLOOD RISK	

Appendix E – Development Plans

GREAT CAMBRIDGE ROAD



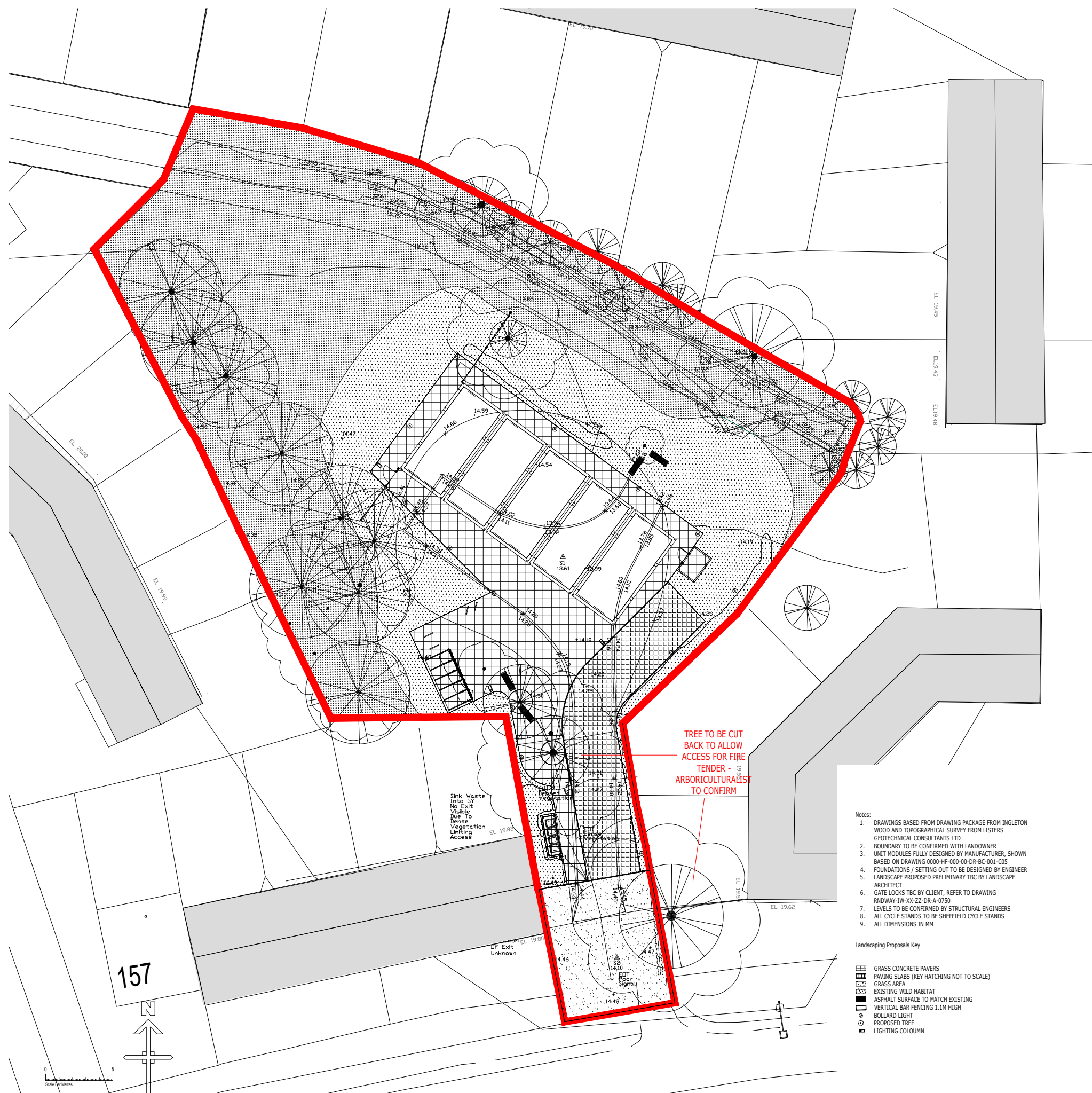
Client:
Hill Residential Limited
The Courtyard, Abbey Barns,
Ickleton, CB101SX

Project:
The Roundway, London

Drawing:
Proposed Site Layout

Scale: 1:300@A3	Date: September 2022
Drawn By: BB	Checked By: JT
Drawing No: 109-83-WD-002	Rev. N
CAD Ref:	

THIS DRAWING IS A COPYRIGHT
All dimensions to be checked on site or in the workshop before work commences.
Only figured dimensions to be worked to. Any discrepancies to be reported to the Architect





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