



Parkmount Road Development, Manchester

08th March 2024

PV2310-APP-92-XX-RP-C-1001-P03-Drainage Statement

Drainage Statement

Parkmount Road Development, Manchester

Project no: PV2310
Document title: Drainage Statement
Document No.: PV2310-APP-92-XX-RP-C-1001
Revision: P03
Date: 08th March 2024
Client name: Mosscares St Vincent's
Client no: (TBC)
Project manager: (TBC)
Author: Louis Ford
File name: PV2310-APP-92-XX-RP-C-1001-Drainage-Statement

Align Property Partners
White Rose House (2nd Floor)
Northallerton Business Park
Northallerton, North Yorkshire DL6 2NA
United Kingdom
T +44 (0)1609 797373

Westmorland and Furness Office,
Riverside Business Park, Natland Road,
Kendal, Cumbria, LA9 7SX
United Kingdom
T +44 (0)1609 797373

www.alignpropertypartners.co.uk

© Copyright 2022 Align Property Partners. The concepts and information contained in this document are the property of Align Property Partners. Use or copying of this document in whole or in part without the written permission of Align Property Partners constitutes an infringement of copyright.

Limitation: This report has been prepared on behalf of the client Mosscares St Vincent's Housing Group and for the exclusive use of Align Property Partners Client. It is subject to, and issued in accordance with, the provisions of the contract between Align Property Partners and the Client. Align Property Partners accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

Document history and status

Revision	Date	Description	Originator	Checked	Approved
P01	19/09/2023	Initial Issue	SA	LF	ZS
P02	02/02/2024	Updated drainage strategy and appendices.	ZS	BD	BD
P03	08/03/2024	Updated surface water drainage design in line with United Utilities request for adoption.	ZS	BD	BD

Contents

1	Introduction	4
1.1	Terms of Reference	4
1.2	Site Location and Topographical Survey	4
2	Drainage Strategy	5
2.1	Flood Risk Overview	5
2.2	Existing Drainage	5
2.3	Proposed Surface Water Drainage	6
2.4	Water Quality Management	8
2.5	Proposed Foul Water Drainage	8
2.6	Drainage During Construction	9
3	SuDS Management and Maintenance Regime	10
3.1	General	10
3.2	Hydro Brake	11
3.3	Permeable Paving.....	12
3.4	Attenuation Tank.....	13

Appendices

Appendix A – CCTV Survey Plan

Appendix B – Drainage Layout

Appendix C – United Utilities Pre-development Response Email

Appendix D – Drainage Calculations

Appendix E – Typical Drainage Construction Details

Appendix F – Maintenance Data Sheets

Appendix G – Private Drainage Details

2 Drainage Strategy

2.1 Flood Risk Overview

- 2.1.1 The *National Planning Policy Framework* (NPPF) (July 2021) sets strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, national policy is clear that new development should not be allowed.
- 2.1.2 In areas at risk of flooding or for sites of 1 hectare or more, developers must undertake a site-specific flood risk assessment to accompany applications for planning permission (or prior approval for certain types of permitted development).
- 2.1.3 In accordance with the Environment Agency's flood risk mapping data, the site is located within a Flood Zone 1 area and < 1.0ha and it is therefore not subject to a flood risk assessment, unless the LLFA have specific Flood Risk concerns. A review of the EA flood risk mapping data does not indicate any immediate flood risk issues with the site.

2.2 Existing Drainage

- 2.2.1 The current site is predominantly made up of soft landscaping with mature trees. The historic map below shows that Marlfield Street used to pass along the hardstanding footpath. While the land accommodated terraced housing and a school at the southern part of site, which all were removed sometime ago between 1971 and 1978 according to later historic map.



Figure 2.2 1971 - 1973 historic mapping

- 2.2.2 From reviewing the CCTV surveys carried out by *Site Vision Survey reference: "1223-PD-0487-R2 CCTV Survey" dated 19/12/2023 (Appendix A)*, the existing United Utilities (UU) combined sewer manhole located to the East of Centre footpath extends to the west parallel to the existing footpath till Rochdale Road. This sewer had several branches, which is suspected to be used by previous houses. The CCTV footage showed no flow from these branches, suggesting the branches are not in use. The existing combined sewer located, coincides with the location of the previous Marlfield street. United Utilities (UU) map (2020) also indicates the route previously mentioned.

- 2.2.3 In addition to the above, the CCTV survey picked up an unrecorded drainage lateral which sits within the middle section of the site and connects into the existing 450dia combined sewer along Rochdale Road. This drainage lateral is expected to be abandoned, whereby it may have been used to serve previous dwellings, which are no longer there. Further CCTV works will be carried out in this location to determine the extents of this existing drainage prior to the commencement of on-site construction works.
- 2.2.4 UU map shows a 300mm dia. combined sewer pipe on Parkmount Road flowing from east to west, connecting into a 450mm dia. combined sewer pipe on Rochdale Road.
- 2.2.5 UU map also indicate three separates combined sewer routes on Rochdale Road, all flowing from North to South. The diameter of each route starting from east to west as following; 1500mm dia, 225mm dia, and 450mm dia.

2.3 Proposed Surface Water Drainage

- 2.3.1 The proposed surface water drainage network (Appendix B) connects into the existing combined UU drainage (located through middle of site) at combined rate of 11.5 l/s.
- 2.3.2 The proposed surface water drainage strategy has been designed in accordance *Sewers for Adoption, Design Construction Guidance (DCG)*, and *I or Building Regulations Part H* and in compliance with the *NPPF*, local requirements and current best practices¹, to collect, convey and attenuate runoff from all impermeable areas.
- 2.3.3 The proposed surface water drainage strategy was discussed and agreed with the Flood Risk Management Team on 06th December 2023 in terms of what they require.
- 2.3.4 Generally, the aim should be discharge surface runoff as high up the following hierarchy of drainage options as reasonably practicable:
- (a) Into the ground (infiltration)
 - (b) To a surface water body
 - (c) To a surface water sewer, highway drain or another drainage system;
 - (d) To a combined Sewer
- 2.3.5 With reference to *Phase II Geo-Environmental Assessment Report by Brownfield Solutions ref: MS/C4657/10658 dated January 2022* states:
- “In accordance with CIRIA C753 “The SUDS Manual”, infiltration viability should be given full consideration where rates of 10⁻⁶ m/s or greater exist on the site.”
- “If drainage to soakaway is to be considered, it is suggested that this is discussed with the Local Authority at the earliest opportunity, to confirm the adequacy of proposed testing and to allow their inspection of any test results”
- 2.3.6 Following a more in-depth review of the borehole tests that were carried out across the site by Brownfield solutions, Groundwater was identified in the number of tests locations, between a depth of 1.20m – 2.30m below ground level. Soakaways are required to have a 1m separation from groundwater and approximately 600mm cover from finished level for cellular crates. Therefore, the on-site groundwater level is not going to permit a sufficient depth to install soakaways. In order for the levels to tie in with the existing Parkmount Road/Shepherd Street and adjacent footways, the propose site levels are restricted, further compounding the issue.
- 2.3.7 Whilst Groundwater was not encountered at the bottom section of the site for the tests carried out by Brownfield Solutions, made ground and clay is present to approximately 3m below ground level, which would preclude the use of conventional soakaways. The depth at which

the Site Investigation encountered good soakage rates was between 3m – 4.8m below ground level, which will not be feasible to construct given the area of influence and the 5m offset distance required from any building, given the approved layout. Given the variable nature of the ground, depths required and groundwater presence, it means that the disposal by the means of infiltration is not considered viable for the site.

2.3.8 As there are also no nearby feasible watercourses to discharge into, it is therefore proposed to progress through the SuDS hierarchy and therefore to connect into a public combined sewer.

2.3.9 According to United Utilities map 2020, there are public combined sewers located both within the boundary and adjacent to the western and northern boundaries of the site. Therefore, discharge to sewer is likely to be appropriate.

2.3.10 A pre-development enquiry with UU was submitted and the following response was given:

“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 300mm diameter public combined sewer located within the site boundary of your proposed development/ to the 1500mm diameter public combined sewer in Rochdale Road at a pass forward flow to be agreed by the Lead Local Flood Authority.

2.3.11 The proposed drainage strategy has been designed to limit the surface water discharge rate to the rate stipulated by United Utilities. A combined 11.5l/s discharge rate will be achieved via. two separate hydraulic flow control devices. One flow control device (S3) is proposed to cater for the northern parcel at a restricted rate of 5.6 l/s and the second flow control device (S8) is proposed to cater for the southern parcel at a restricted rate of 5.9 l/s. Both flow control devices tap into the existing combined pipe network located at the centre of the site. Reduced discharge rates were proposed to United Utilities but these were rejected due to not meeting adoption requirements. The current proposed rates are the minimum accepted by UU for adoption. We have received an email from United Utilities confirming that they are happy with a combined discharge rate of 11.5 l/s. (Appendix C), and this is based on both Hydro-Brakes having a minimum 100mm orifice size that is required for adoption requirements.

2.3.12 Runoff rates in accordance with drainage design calculations (Appendix B) and subject to agreement with the Lead Local Flood Authority (Manchester LLFA).

2.3.13 Two attenuation tanks have been provided to provide the necessary attenuation at 30m³ and 50m³, which are located north and south of the development respectively, to cater for up to 100 year + 45% CC Storm Event. Storage up to the 1in30 year event is catered within the UU adopted oversize pipes.

2.3.14 The drainage system has been designed to cater for a total impermeable area of 0.378ha, including an allowance of 10% for Urban Creep.

2.3.15 The proposed drainage strategy has been designed so that:

- a) flooding does not occur on any part of the site for all events up to 3.3% AEP (1 in 30 years);
- b) flooding does not occur in any part of a building or utility plant susceptible to water for all events up to 1.0% AEP (1 in 100 years) + 45% climate change allowance. (Appendix D)

2.4 Water Quality Management

- 2.4.1 The suitability of the proposed drainage strategy to manage the development's pollution risk has been assessed using the simple index approach in *The SuDS Manual* (2015), as summarized in Table 2.4.

Runoff Route / Treatment Train 1				
Land Use / SuDS	Hazard Level	TSS	Metals	Hydro-Carbons
<i>Pollution Hazard Indices</i>				
Residential roofs	Very Low	0.2	0.2	0.05
Individual property driveways	Low	0.5	0.4	0.4
<i>SuDS Mitigation Indices</i>				
Permeable Paving	-	0.7	0.6	0.7
Total SuDS Mitigation Index ≥ Pollution Hazard Index (for each contaminant type)				

Table 2.4: Surface Water Quality Management (Simple Index Approach)

- 2.4.2 Lined Permeable paving is proposed to be used for the plot driveway areas, which is in order to treat surface water flows prior to into existing combined sewer.
- 2.4.3 Alternative methods of SuDS mitigation can be explored providing the pollution hazard indices can be mitigated by the SuDS Mitigation Indices as outlined in *The SuDS Manual* (2015).

2.5 Proposed Foul Water Drainage

- 2.5.1 Sewerage undertakers have a legal obligation under the Water Industries Act 1991 to provide developers with the right to connect to public (Foul) networks. The Water Industries Act 1991 also contains safeguards to ensure that flows resulting from developments do not cause detriment to the existing public sewerage networks by imposing a duty on sewerage undertakers to carry out works required to accommodate additional flows into their networks.
- 2.5.2 It is proposed to discharge the entire foul water network into the existing 300mm dia combined sewer located parallel to the centre footpath, which is running through the middle of the site from east to west.
- 2.5.3 From the United Utilities pre-development response:
- "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 300mm diameter public combined sewer within located the site boundary of your proposed development/ to the 1500mm diameter public combined sewer in Rochdale Road at an unrestricted rate."*
- 2.5.4 The proposed foul water rates for the development is 1.11l/s for the whole development and it is proposed to form a combined sewer connection with the proposed surface water drainage network to connect into the existing combined UU 300dia sewer, which is running through the centre of the site.

- 2.5.5 There is a small diversion required under the S185 agreement, which is located in the south east corner of the site (Appendix B). This will also be utilised as a discharge point for the three nearest plots.

2.6 Drainage During Construction

- 2.6.1 Drainage is typically an early activity in the construction of a development, taking form during the earthworks phase. However, the connection of piped drainage system to SuDS components should not take place until the end of construction works, unless a robust strategy for silt removal prior to occupation of the site is implemented.
- 2.6.2 Silt-laden runoff from construction sites represents a common form of waterborne pollution and cannot enter SuDS components, which are not specifically designed to manage this, as it can overwhelm the system and pollute receiving water features. Any gullies and piped systems should be capped off during construction and fully jetted and cleaned prior to connection to SuDS components.
- 2.6.3 The three principal aspects of drainage during construction are conveying runoff, controlling runoff and trapping sediments.
- 2.6.4 Conveyance of runoff can be achieved through small ditches / swales, channels and drains. Runoff control measures should be implemented to ensure that runoff does not overwhelm the temporary drainage system causing flooding on site or elsewhere.
- 2.6.5 Control of runoff can be achieved through perimeter ditches or appropriate grading to ensure that any runoff from the construction site stays on site. Runoff rates leaving the site should be managed so they do not exceed pre-development conditions.
- 2.6.6 Construction runoff should be directed to dedicated infiltration basins with adequate upstream sediment and pollution control such as sediment basins, silt fences and straw bales prior to infiltration or off-site discharge.
- 2.6.7 Additional conveyance, control and treatment measures should be installed as needed during grading. Slope stability needs to be considered when using open water features to convey, control and treat runoff across the site. Any necessary surface stabilisation measures should be applied immediately on all disturbed areas where construction work is either delayed or incomplete.
- 2.6.8 Maintenance inspections should be performed weekly, and maintenance repairs should be made immediately after periods of rainfall.
- 2.6.9 All drainage infrastructure (mainly underground features) must be protected from damage by construction traffic and heavy machinery through the implementation of measures such as protective barriers and storing construction materials away from the drainage infrastructure.

3 SuDS Management and Maintenance Regime

3.1 General

- 3.1.1 The main surface water drainage network including the Hydro-Brakes and the oversized pipes will be adopted and maintained by United Utilities.
- 3.1.2 The two proposed attenuation tanks and the permeable private driveways will be managed/maintained by the Mosscares St. Vincent's Housing's maintenance team or an appointed private management company.
- 3.1.3 Mosscares St. Vincent's Housing and any private management company appointed must fully understand their responsibilities outlined in this plan and be aware of any legally binding maintenance agreement.
- 3.1.4 Mosscares St. Vincent's Housing will ensure only trained personnel will be permitted to undertake maintenance of SuDS features. This work must be carried out in accordance with the Confined Space Regulations. To facilitate this maintenance, SuDS have been located in public open space, where possible, or where they are reasonably accessible.
- 3.1.5 Tables outlining the maintenance activities that should be undertaken for each SuDS feature, outlined in the following sections, in accordance with the SuDS Manual, CIRIA, 2015. These tables must be reviewed by Mosscares St. Vincent's Housing or the appointed private management company.

Table 3.1 Entities Responsible for SuDS Maintenance

SuDS Component	Location	Function	Responsible Entity
<u>Hydro-Brakes</u> S3 S8	Centre of Site Centre of Site	Restrict Flow Rate Restrict Flow Rate	Adopted by United Utilities under S104 Agreement
<u>Attenuation Tanks</u> Attenuation Tank 1 Attenuation Tank 2	Centre of site South of site	Store runoff Store runoff	Private Management company would be appointed by Mosscares St. Vincent Housing.
Oversize Surface Water Sewers	Within Development Access Roads	Store and convey runoff	Adopted by United Utilities under S104 Agreement
Permeable Paving	All individual driveways across the entire site	Treat runoff	Private Management company would be appointed by Mosscares St. Vincent Housing.

3.2 Hydro Brake

3.2.1 A hydro-brake is a flow control manhole, which restricts the velocity of water whereby the water enters through the inlet pipe with enough energy to create a vortex in the chamber. The vortex then controls the flow to the specified discharge rate. The main parameters that effect the hydro-brake specification (Appendix E) is the design head (m) and the specified discharge rate (l/s).

3.2.2 There are two hydro-brakes proposed for this development:

- One with a discharge rate of 5.6l/s and a design head of 1.75m (S3) located within the proposed centre section of the site before discharging into UU's combined water sewer running through the middle of the site.
- One with a discharge rate of 5.9/s and a design head of 2.0m (S8) located within the proposed centre section of the site before discharging into UU's combined water sewer running through the middle of the site.
- Both of the above Hydro-Brakes connect into an Existing Combined Network via a New combined manhole at a combined rate of 11.5 l/s

3.2.3 The Hydro-Brakes will be adopted and maintained by United Utilities.

3.2.4 Regular inspection and maintenance will be required to ensure the long-term effectiveness of the hydro-brakes

3.2.5 Hydro International have provided the following statement in terms of maintenance of the hydro-brake:

"Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur, they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard."

Following installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced, please do not hesitate to contact the company so that an investigation may be made.

3.3 Permeable Paving

- 3.3.1 Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the subbase and potentially allowed to infiltrate into the ground.
- 3.3.2 This method provides attenuation and treatment from surface flows.
- 3.3.3 The permeable paving is proposed for the plot driveways
- 3.3.4 The permeable private driveways will be managed/maintained by the Mosscaire St. Vincent's Housing's maintenance team or an appointed private management company.
- 3.3.5 Regular inspection and maintenance (Appendix F) would be required to ensure the long-term effectiveness of the paving.
- 3.3.6 A checklist for the maintenance of porous paving installed at the site and the party responsible for their maintenance, is provided in accordance with the 2015 SuDS Manual below:

Operation and maintenance requirements for Permeable Paving		
<i>Maintenance schedule</i>	<i>Required action</i>	<i>Typical frequency</i>
<i>Regular Maintenance</i>	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 observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
	Stabilise and mow contributing and adjacent areas	As required
<i>Remedial actions</i>	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
	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 used, and replace lost jointing material	As required
<i>Monitoring</i>	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).
	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, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3.3 – Permeable Paving (CIRIA, 2015)

- 3.3.7 Minor maintenance will be possible to be undertaken by the residents. However, remedial works and monitoring will be undertaken by Mossclare St. Vincent's Housing's maintenance team or private management company as appointed.

3.4 Attenuation Tank

- 3.4.1 Attenuation storage tanks are used to create a below ground void space for the temporary storage of surface water before use, infiltration or controlled release. Attenuation storage tanks can help reduce flow rates from a site by providing significant attenuation storage. Storage tanks do not provide any form of treatment of surface water runoff and therefore need to be combined in a "management train" with other methods that do provide suitable treatment of all relevant pollutants (coarse sediment must always be removed upstream of a storage tank).
- 3.4.2 The inherent flexibility in size and shape of the typical attenuation storage tank systems means that they can be tailored to suit the specific characteristics and requirements of any site.
- 3.4.3 Two cellular attenuation tanks are proposed; both are located at the centre section of the site within the private shared driveway/landscaping area.
- 3.4.4 The two proposed attenuation tanks will be managed/maintained by the Mossclare St. Vincent's Housing's maintenance team or an appointed private management company.
- 3.4.5 This method provides attenuation and reduces the volume of runoff and outflow.
- 3.4.6 Regular inspection and maintenance (Appendix F) would be required to ensure the long-term effectiveness of the attenuation tank.
- 3.4.7 A checklist for the maintenance of the attenuation tanks installed at the site and party responsible for their maintenance, is provided in accordance with the 2015 SuDS Manual below:

Operation and maintenance requirements for attenuation storage tanks		
<i>Maintenance schedule</i>	<i>Required action</i>	<i>Typical frequency</i>
<i>Regular Maintenance</i>	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
<i>Remedial actions</i>	Repair/rehabilitate inlets, outlet, overflows and vents	As required
<i>Monitoring</i>	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 3.4 – Attenuation Tanks (CIRIA, 2015)

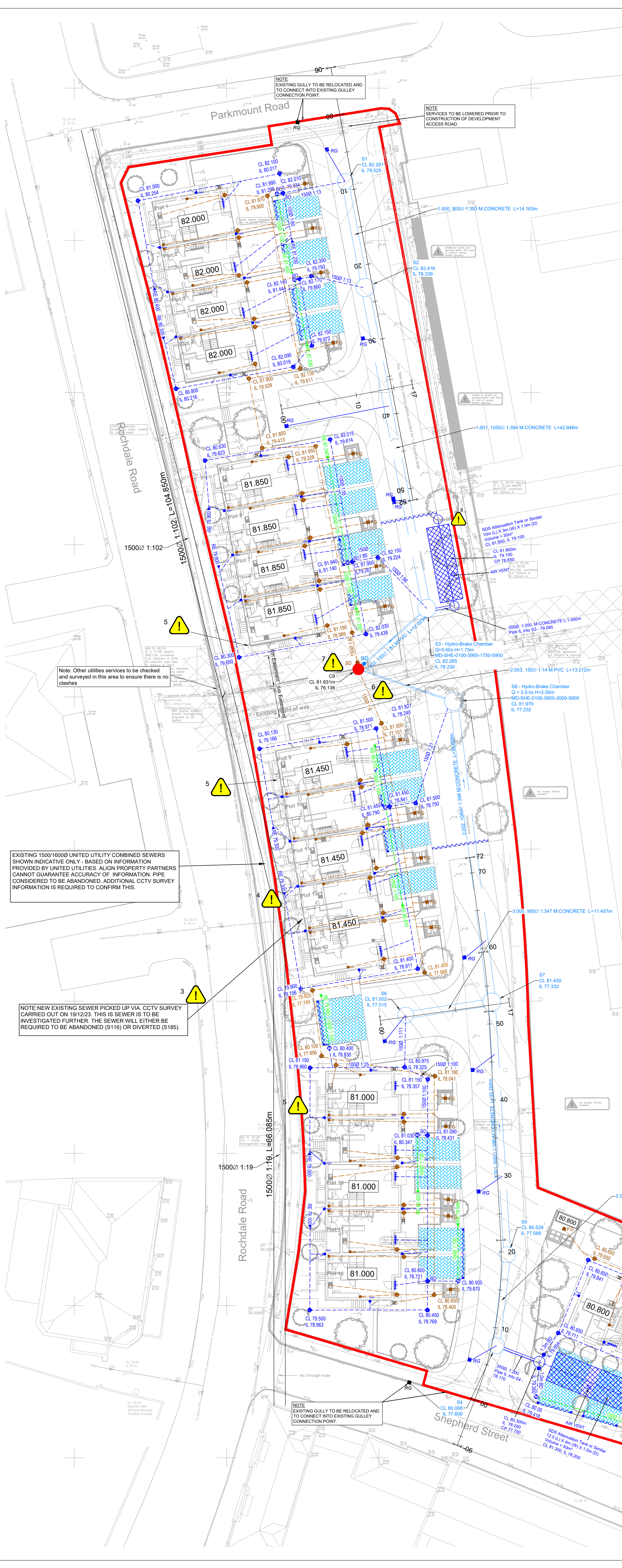
Appendices

Appendix A

CCTV Survey Plan

Appendix B

Drainage Layout



Drainage

- 1. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
- 2. ALL EXISTING DRAINS & SERVICES (LINE & LEVELS) TO BE CHECKED & CONFIRMED BY THE CONTRACTOR PRIOR COMMENCEMENT OF ANY ON SITE DRAINAGE WORKS. ANY DISCREPANCY IN LEVELS IS TO BE REPORTED IMMEDIATELY TO APP.
- 3. ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
- 4. ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S DETAILS, INSTRUCTIONS & SPECIFICATIONS.
- 5. ALL COVER LEVELS ARE APPROXIMATE. EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
- 6. INVERT LEVELS QUOTED AT MANHOLES & INSPECTION CHAMBERS ARE THOSE OF THE LARGEST CONNECTED PIPE DIAMETER. PIPES AT CHAMBERS TO BE LAID WITH SOFFITS LEVEL UNLESS NOTED OTHERWISE.
- 7. PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
- 8. REFER TO ARCHITECT'S DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
- 9. ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
- 10. PIPES & FITTINGS TO BE:
 - CONCRETE PIPES & ANCILLARY PRODUCTS TO BS 5911:2022 & BS EN 1916:2002.
 - VITRIFIED CLAY PIPES & FITTINGS TO BS EN 295:2013
 - DUCTILE IRON TO BS EN 598:2007 & BS ISO 4179:2005.
 - PERFORATED VITRIFIED CLAY PIPES FOR LAND DRAINAGE TO BS 1196.
 - PLASTIC PIPES FOR LAND DRAINAGE TO BS 4962:1982.
 - PLASTIC PIPING SYSTEMS FOR NON-PRESSURE UNDERGROUND DRAINAGE & SEWAGE TO BS EN 1401 & BS 4680 - SOLID WALL, STRUCTURED WALL PIPES TO BS EN 15476.
 - PRECAST CONCRETE MANHOLE UNITS TO BS EN 1917:2002.
 - PLASTIC INSPECTION CHAMBERS FOR DRAINS & SEWERS TO BS EN 124:1994.
 - GULLY & MANHOLE TOPS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 1433:2002.
- 11. ALL MANHOLE COVERS, ROAD GULLY COVERS & FRAMES TO COMPLY WITH BS EN 124 NON ROCKING TYPE.
- 12. REFER TO ARCHITECT'S DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
- 13. ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
- 14. PIPE BEDDING
 - USE CLASS 5 BEDDING UNLESS NOTED OTHERWISE. NB PROTECT AGAINST CONSTRUCTION TRAFFIC AS NECESSARY.
 - USE CLASS 2 CONCRETE BED & SURROUND OR CONCRETE SLAB PROTECTION AS FOLLOWS:
 - CLASS 120 CLAYWARE OR CLASS M CONCRETE (100 - 6000 PIPES)
 - LANDSCAPING - LESS THAN 800mm COVER TO CROWN.
 - HARDSTANDING - LESS THAN 1200mm COVER TO CROWN.
 - PLASTIC (100 - 3000 PIPES)
 - LANDSCAPING - LESS THAN 800mm COVER TO CROWN.
 - HARDSTANDING - LESS THAN 900mm COVER TO CROWN.
 - PIPES BELOW CONCRETE GROUND FLOOR SLABS:
 - WHERE THE CROWN OF THE PIPE IS WITHIN 300mm OF THE UNDERSIDE OF SLAB, SPECIAL PROTECTION TO BE PROVIDED IN ACCORDANCE WITH BUILDING REGULATIONS H1 2.44 OR 150mm GEN3 CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.
 - OTHERWISE USE CLASS 5 BEDDING.
- 15. MAIN BACKFILL TO BE WELL COMPACTED IN 150mm LAYERS OF SELECTED BACKFILL MATERIAL IN ALL SOFT LANDSCAPED AREAS.
- 16. TYPE 1 GRANULAR MATERIAL IN ALL HARDSTANDING AREAS & PUBLIC HIGHWAYS.
- 17. BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.
- 18. CCTV TO BE CARRIED OUT TO VERIFY CONDITION OF ANY DRAINAGE TO BE RE-USED.

HAZARD IDENTIFICATION BOX		
This table is provided to assist the Principal Contractor to fulfil their obligations under the CDM Regulations 2015		
Hazard Ref	Hazard Type (Construction, Maintenance / Use / Demolition)	Mitigation Measures / Residual Risk
1	Construction, Maintenance and Use	Carrying out work within area of live traffic. Ensuring the correct Traffic Management Plan is in place.
2	Construction, Maintenance and Use	S185 Diversion approval required for foul drainage. Liaise with United Utilities to determine an agreed solution relating the foul diversion route.
3	Construction, Maintenance and Use	Existing drainage stub running into site and crossing through proposed plot. Carry out further investigation on existing drainage stub to determine if it requires diverting or it can be terminated.
4	Construction, Maintenance, Use and Demolition	Unable to trace location/depth of existing 1500dia UU sewer, which can have effect on the proposed plot foundations, depending on location/depth of this existing large drain. APP to highlight major plot construction risk due to unknown location/depth of existing UU sewer. Further investigation is required prior to construction.
5	Construction, Maintenance and Use	Contact with existing live services on site, which are required to be diverted in some locations. Risk of disruption/injury. Non intrusive checks for existing services prior to construction.
6	Construction, Maintenance and Use	Existing water main in the middle of the site. Location and depth unknown. Further investigation to take place to ensure the Utilities Survey has been received.
7	Construction, Maintenance And Use.	Deep drainage excavation > 3m. No excavation to be left overnight. Sufficient covering and monitoring of weather conditions. Training to be required to work in confined spaces. Correct supports to be used for the excavation area.
8	Construction, Maintenance And Use.	Disturbing earthworks outside of site boundary due to deep excavations / foundations. Sheet piling or similar bracing to support excavated areas during works.

NOTE
PROPOSED TREE POSITIONS TO BE REVIEWED TO ENSURE NO CONFLICT WITH ATTENUATION TANK AND DRAINAGE.

ALL SUB-BASE LEVELS TO FALL TOWARDS LOCALLY LOWERED PERFORATED TRENCH. IF IN DOUBT, PLEASE ASK. PLEASE SEE LINED PERMEABLE PARKING BAY DETAILS IN DRAWING PV2310-APP-92-XX-DR-C-PRIVATE EXTERNAL CONSTRUCTION DETAILS.

General Notes

- 1. THE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLIENT, ARCHITECT, SERVICES ENGINEER, AND SPECIALIST CONTRACTOR DRAWINGS, REPORTS AND SPECIFICATIONS.
- 2. FOR SETTING OUT AND LEVELS REFER TO ARCHITECTS DRAWINGS.
- 3. FOR THE PURPOSE OF CONSTRUCTION ALL DRAWINGS MUST NOT BE SCALED AND ONLY WRITTEN OR CALCULATED DIMENSIONS USED. LEVEL DATUMS TO BE CONFIRMED BY THE ARCHITECT.
- 4. ANY REVISIONS TO THE LAYOUT DETAILS REQUIRED BY THE CONTRACTOR TO BE AGREED AND APPROVED BY THE ALIGN PROPERTY PARTNERS ENGINEER.
- 5. FINISHED FLOOR LEVELS TO BE DETERMINED.
- 6. ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND REQUIREMENTS.
- 7. GENERALLY, ONLY KNOWN PENETRATIONS, HOLES, POCKETS AND RECESSES ETC. WITH ANY DIMENSIONS GREATER THAN 150 ARE SHOWN ON THE DRAWINGS. FOR CONFIRMATION OF THESE AND FOR DETAILS OF SMALLER HOLES PLUS INSERTS, FIXINGS ETC. REFERENCE SHALL BE MADE TO THE ARCHITECT'S SERVICES ENGINEERS OR THE RELEVANT SUBCONTRACTOR'S BUILDERS WORK DRAWINGS.
- 8. THE CONTRACTOR SHALL ENSURE THAT TEMPORARY LOADS ON TO THE NEW STRUCTURES/DRAINAGE SHALL BE LESS THAN THOSE FOR WHICH IT HAS BEEN DESIGNED.
- 9. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND CHECKING THE SETTING OUT OF GRIDLINES, LEVELS AND DATUMS.
- 10. ANY DISCREPANCIES BETWEEN THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
- 11. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT NOISE, VIBRATION AND DUST RESULTING FROM THE WORKS ARE KEPT WITHIN REASONABLE LIMITS.
- 12. THE CONTRACTOR IS TO ALLOW A MINIMUM OF 10 WORKING DAYS IN THEIR PROGRAMME FOR THE REVIEW OF ANY CONTRACTORS DESIGN PORTIONS OF WORK FOR REVIEW BY THE ALIGN PROPERTY PARTNERS ENGINEER.
- 13. IRRESPECTIVE OF ANY NAMED MANUFACTURERS OF ANY PRODUCT/MATERIAL NOTED ON DRAWINGS, THE CONTRACTOR IS FREE TO PROPOSE AN EQUAL OR APPROVED PRODUCT/MATERIAL PROVIDED THAT ANY SUCH CHANGE TO THE SPECIFICATION MEETS A SIMILAR LEVEL OF PERFORMANCE AND IS NOTED ON ALL TENDER RETURNS AND DOCUMENTATION FOR ALIGN PROPERTY PARTNERS.

IMPORTANT:

DRAWING PROVIDED FOR INFORMATION ONLY AND IS SUBJECT TO THE FOLLOWING STATUTORY APPROVALS:

- UNITED UTILITIES APPROVAL
- MANCHESTER HIGHWAYS APPROVAL
- PLANNING APPROVAL
- BUILDING CONTROL

ALL CONSTRUCTION WORKS PRIOR TO APPROVALS ABOVE WILL BE UNDERTAKEN AT CLIENTS/CONTRACTORS RISK

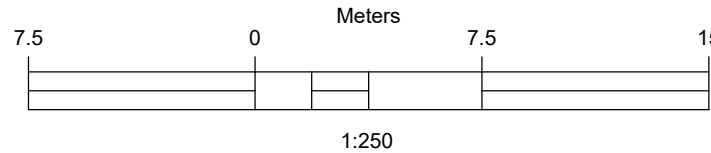
ALL SVP/RWP POSITIONS TO BE CHECKED BY CONTRACTOR AGAINST ARCHITECTS 1:50 DRAWINGS AND ANY DISCREPANCIES REPORTED TO ENGINEERS PRIOR TO CONSTRUCTION

Drainage Key

- NEW ADAPTABLE FOUL INSPECTION CHAMBER (SIZE VARIES). TO BE CONSTRUCTED IN ACCORDANCE WITH SSG APPENDIX C, DCG
- NEW FOUL BACKDROP
- NEW PRIVATE FOUL INSPECTION CHAMBER 450 DIA. POLYPROPYLENE OR VITRIFIED CLAY. UPTO 3000MM DEEP. MAX PIPE DIAMETER 150MM.
- NEW PRIVATE FOUL INSPECTION CHAMBER 225 DIA. POLYPROPYLENE OR VITRIFIED CLAY. UPTO 600MM DEEP. MAX PIPE DIAMETER 100MM.
- NEW PRIVATE FOUL DRAIN
- NEW PRIVATE FOUL GULLY
- CONDENSATE GULLY
- NEW SOIL PIPE
- EXISTING ADOPTED FOUL INSPECTION CHAMBER (SIZE VARIES)
- EXISTING ADOPTED FOUL SEWER
- EXISTING DRAINAGE TO BE ABANDONED
- NEW ADAPTABLE STORM INSPECTION CHAMBER (SIZE VARIES). TO BE CONSTRUCTED IN ACCORDANCE WITH SSG APPENDIX C, DCG
- NEW STORM BACKDROP
- NEW ADAPTABLE STORM SEWER
- NEW PRIVATE STORM INSPECTION CHAMBER 450 DIA. POLYPROPYLENE OR VITRIFIED CLAY. UPTO 3000MM DEEP. MAX PIPE DIAMETER 150MM.
- NEW PRIVATE STORM CATCH-PIT INSPECTION CHAMBER 450 DIA. POLYPROPYLENE OR VITRIFIED CLAY. UPTO 600MM DEEP. MAX PIPE DIAMETER 100MM.
- NEW PRIVATE STORM DRAIN
- NEW PRIVATE STORM RODDING EYE
- NEW PRIVATE PERFORATED PIPE WITHIN PERMEABLE DRIVEWAY (PIPE TO BE STANDARD CONSTRUCTION OUTSIDE PERMEABLE DRIVEWAY AREAS)
- ADOPTABLE HIGHWAY GULLY
- NEW PRIVATE YARD GULLY
- NEW PRIVATE LINEAR DRAINAGE CHANNEL
- NEW PRIVATE THRESHOLD ACCESS DRAIN
- MINIMUM SUB-BASE LEVEL OF PERMEABLE PAVING WHERE DIFFERENT FROM MINIMUM CONSTRUCTION.
- NEW PRIVATE ATTENUATION TANK
- NEW PRIVATE PERMEABLE PAVING (LINED)

UNLESS NOTED OTHERWISE:
• ALL FOUL & SURFACE WATER DRAINAGE IS 1000 LAID TO 1:80 MINIMUM FALL UNLESS NOTED OTHERWISE.

ALL ADOPTABLE SEWERS AND MATERIALS TO BE IN COMPLIANCE WITH DESIGN CONSTRUCTION GUIDANCE (DCG)



P04	AMENDED SURFACE WATER DRAINAGE AND OUTFALL FOLLOWING LUJ COMMENTS RECEIVED ON 16/02/24.	ZS 07/03/24	BD 07/03/24	BD 07/03/24
P03	Added private drainage and updated surface water drainage strategy to suit revised outfall positions.	ZS 02/02/24	BD 02/02/24	BD 02/02/24
P02	Updated storm drainage to allow for one outfall location at a rate of 5.0 l/s. Updated SW drainage for Road 1 layout updates and amendments to driveways for plots 19 - 24.	ZS 19/03/23	BD 19/03/23	BD 19/03/23
P01	Initial Issue.	ZS 03/03/23	BD 03/03/23	BD 03/03/23

align PROPERTY PARTNERS
White Rose House, Northallerton Business Park,
Thurston Road, Northallerton DL6 2NA

Client	MOSSCARE ST VINCENTS		
Project Name	PARKMOUNT ROAD, MANCHESTER		
Drawing Title	DRAINAGE PLAN		
Purpose	APPROVAL		
Scale	1:250	Drawn	BD
Original Size	A1	Date	19/07/23
Drawing Number	PV2310-APP-92-XX-DR-C-2500	Checked	BD
		Date	19/07/23
		Approved	BD
		Date	19/07/23
		Rev.	P04

Appendix C

United Utilities Pre-development Response Email

Zaffar Sultan

From: seweradoptions@uuplc.co.uk
Sent: 29 February 2024 13:54
To: Zaffar Sultan
Cc: steven@johnsouthworth.co.uk; patson.makangadza@msvhousing.co.uk; a.bayley@pooledick.co.uk; Louis Ford; Ben Douglas; dsutton@aewarchitects.com
Subject: RE: FW: S104 CA28, Land off Parkmount Road - 04949807 [Filed 05 Mar 2024 14:54]
Categories: Filed by Mail Manager

Hi Zaffar,

Thank you for your email.

I can confirm the flow control amendments including flow rates are acceptable in principal, however this is subject to full design checks.

I recommend you now submit a full amended design package for our assessment.

Please note I will be on Annual Leave after today and return on the 11th March and therefore I would anticipate a colleague completing the assessment.

Regards

Anthony



Anthony Laithwaite

Ww Engineer
Developer Services & Metering
Customer Services

M: 07880 298897
unitedutilities.com

----- Original Message -----

From: seweradoptions@uuplc.co.uk [seweradoptions@uuplc.co.uk]
Sent: 28/02/2024 15:00
To: zaffar.sultan@alignpropertypartners.co.uk
Cc: steven@johnsouthworth.co.uk; patson.makangadza@msvhousing.co.uk; a.bayley@pooledick.co.uk; louis.ford@alignpropertypartners.co.uk; ben.douglas@alignpropertypartners.co.uk; dsutton@aewarchitects.com
Subject: RE: FW: S104 CA28, Land off Parkmount Road - 04949807

Good Afternoon,

Thank you for your email this has been logged to the engineer Anthony, their number is 07880298897. They have a service level agreement to respond on or before 13/03/2024.

Kind Regards,



Katie Houghton

Customer Advisor Advanced
Developer Services & Metering
Customer Services

Tel: 0345 072 6067 (option 4)
unitedutilities.com

----- Original Message -----

From: Zaffar Sultan [zaffar.sultan@alignpropertypartners.co.uk]

Sent: 28/02/2024 14:09

To: seweradoptions@uuplc.co.uk

Cc: steven@johnsouthworth.co.uk; louis.ford@alignpropertypartners.co.uk;
patson.makangadza@msvhousing.co.uk; a.bayley@pooledick.co.uk; ben.douglas@alignpropertypartners.co.uk;
dsutton@aewarchitects.com

Subject: RE: FW: S104 CA28, Land off Parkmount Road - 04949807

Hi Anthony,

Please find attached the updated S104 plan for Parkmount Road, Manchester, which now shows two separate networks, which each have a Hydro-Brake and connect into the new combined manhole chamber.

Please note that the overall rate discharge rate tapping in the new combined manhole chamber for the storm is now 11.5 l/s.

Please can you confirm that you are happy with the attached drainage design.

If you have any questions, please feel free to contact us.

Kind Regards,

Zaffar Sultan BEng (Hons) IEng MICE

Senior Civil Engineer

Mobile: 07583 015 565

Appendix D

Drainage Calculations

North Yorkshire CC Schools ICT Services		Page 1
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for SW 1in100+45CC (P05)

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.400	Add Flow / Climate Change (%)	0
Ratio R	0.344	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

Network Design Table for SW 1in100+45CC (P05)

« - Indicates pipe capacity < flow

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	14.115	0.036	395.0	0.036	5.00	0.0	0.600	o	900	Pipe/Conduit	
S1.001	42.945	0.109	394.0	0.078	0.00	0.0	0.600	o	1050	Pipe/Conduit	
S1.002	12.023	0.150	80.2	0.037	0.00	0.0	0.600	o	150	Pipe/Conduit	
S2.000	12.034	0.034	353.9	0.062	5.00	0.0	0.600	o	900	Pipe/Conduit	
S2.001	33.264	0.084	395.0	0.032	0.00	0.0	0.600	o	900	Pipe/Conduit	
S3.000	11.458	0.033	347.2	0.059	5.00	0.0	0.600	o	900	Pipe/Conduit	
S2.002	39.837	0.100	398.4	0.029	0.00	0.0	0.600	o	1050	Pipe/Conduit	
S2.003	13.212	0.946	14.0	0.044	0.00	0.0	0.600	o	150	Pipe/Conduit	

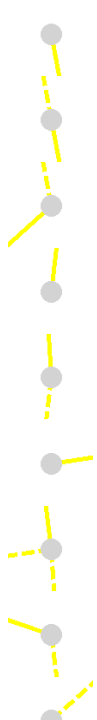
Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.15	78.525	0.036	0.0	0.0	0.0	1.57	999.0	4.9
S1.001	50.00	5.56	78.339	0.114	0.0	0.0	0.0	1.73	1498.0	15.4
S1.002	50.00	5.74	78.230	0.151	0.0	0.0	0.0	1.12	19.9«	20.4
S2.000	50.00	5.12	77.600	0.062	0.0	0.0	0.0	1.66	1055.8	8.4
S2.001	50.00	5.47	77.566	0.094	0.0	0.0	0.0	1.57	999.0	12.7
S3.000	50.00	5.11	77.515	0.059	0.0	0.0	0.0	1.68	1066.1	8.0
S2.002	50.00	5.86	77.332	0.182	0.0	0.0	0.0	1.72	1489.7	24.6
S2.003	50.00	5.94	77.232	0.226	0.0	0.0	0.0	2.71	47.9	30.6

North Yorkshire CC Schools ICT Services						Page 4																					
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...			Parkmount Road Manchester 1in100+45% CC																								
Date 07/03/2024			Designed by ZS																								
File P05 SW NETWORK CALCULAT...			Checked by ZS																								
Innovyze			Network 2020.1.3																								
Manhole Schedules for SW 1in100+45CC (P05) <table><tr><th>MH Name</th><th>Manhole Easting (m)</th><th>Manhole Northing (m)</th><th>Intersection Easting (m)</th><th>Intersection Northing (m)</th><th>Manhole Access</th><th>Layout (North)</th></tr><tr><td>S9</td><td>386017.312</td><td>402143.636</td><td>386017.312</td><td>402143.636</td><td>Required</td><td></td></tr><tr><td>SNew Combined MH - S10</td><td>385999.646</td><td>402140.260</td><td></td><td></td><td>No Entry</td><td></td></tr></table>							MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)	S9	386017.312	402143.636	386017.312	402143.636	Required		SNew Combined MH - S10	385999.646	402140.260			No Entry	
MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)																					
S9	386017.312	402143.636	386017.312	402143.636	Required																						
SNew Combined MH - S10	385999.646	402140.260			No Entry																						
©1982-2020 Innovyze																											

North Yorkshire CC Schools ICT Services		Page 5
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

Setting Out Information - True Coordinates (SW 1in100+45CC (P05))

PN	USMH Name	Dia/Len (mm)	Width (mm)	US Easting (m)	US Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Layout (North)
S1.000	S1	2100		386015.567	402207.720	386015.567	402207.720	
S1.001	S2	2400		386018.191	402193.802	386018.191	402193.802	
S1.002	S3 - HB	2400		386026.294	402151.628	386026.294	402151.628	
S2.000	S4	2100		386035.463	402054.736	386035.463	402054.736	
S2.001	S5	2100		386036.880	402066.686	386036.880	402066.686	
S3.000	S6	2100		386023.520	402098.162	386023.520	402098.162	
S2.002	S7	2400		386034.847	402099.888	386034.847	402099.888	
S2.003	S8-HB	2400		386029.829	402139.408	386029.829	402139.408	
S1.003	S9	1800		386017.312	402143.636	386017.312	402143.636	

PN	DSMH Name	Dia/Len (mm)	Width (mm)	DS Easting (m)	DS Northing (m)	Layout (North)
S1.003	SNew Combined MH - S10	1500		385999.646	402140.260	

Free Flowing Outfall Details for SW 1in100+45CC (P05)

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D, L (mm)	W (mm)
S1.003	SNew Combined MH - S10	80.654	75.110	0.000	1500	0

North Yorkshire CC Schools ICT Services		Page 6
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze Network 2020.1.3		

Simulation Criteria for SW 1in100+45CC (P05)

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	0.000
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	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)	18.300	Storm Duration (mins)	30
Ratio R	0.344		

©1982-2020 Innovyze

North Yorkshire CC Schools ICT Services		Page 7
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

Online Controls for SW 1in100+45CC (P05)

Hydro-Brake® Optimum Manhole: S3 - HB, DS/PN: S1.002, Volume (m³): 53.4

Unit Reference	MD-SHE-0100-5600-1750-5600
Design Head (m)	1.750
Design Flow (l/s)	5.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	78.230
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.750	5.6
Flush-Flo™	0.437	5.2
Kick-Flo®	0.896	4.1
Mean Flow over Head Range	-	4.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.3	1.200	4.7	3.000	7.2	7.000	10.8
0.200	4.7	1.400	5.0	3.500	7.7	7.500	11.1
0.300	5.0	1.600	5.4	4.000	8.2	8.000	11.5
0.400	5.1	1.800	5.7	4.500	8.7	8.500	11.8
0.500	5.1	2.000	6.0	5.000	9.2	9.000	12.1
0.600	5.1	2.200	6.2	5.500	9.6	9.500	12.4
0.800	4.6	2.400	6.5	6.000	10.0		
1.000	4.3	2.600	6.7	6.500	10.4		

Hydro-Brake® Optimum Manhole: S8-HB, DS/PN: S2.003, Volume (m³): 53.9

Unit Reference	MD-SHE-0100-5900-2000-5900
Design Head (m)	2.000
Design Flow (l/s)	5.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	77.232
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

North Yorkshire CC Schools ICT Services		Page 8																																																																																							
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC																																																																																								
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS																																																																																								
Innovyze	Network 2020.1.3																																																																																								
Hydro-Brake® Optimum Manhole: S8-HB, DS/PN: S2.003, Volume (m³): 53.9 <table><thead><tr><th>Control Points</th><th>Head (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>Design Point (Calculated)</td><td>2.000</td><td>5.9</td></tr><tr><td>Flush-Flo™</td><td>0.435</td><td>5.1</td></tr><tr><td>Kick-Flo®</td><td>0.890</td><td>4.0</td></tr><tr><td>Mean Flow over Head Range</td><td>-</td><td>4.7</td></tr></tbody></table> 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 <table><thead><tr><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th><th>Depth (m)</th><th>Flow (l/s)</th></tr></thead><tbody><tr><td>0.100</td><td>3.3</td><td>1.200</td><td>4.6</td><td>3.000</td><td>7.1</td><td>7.000</td><td>10.6</td></tr><tr><td>0.200</td><td>4.6</td><td>1.400</td><td>5.0</td><td>3.500</td><td>7.7</td><td>7.500</td><td>11.0</td></tr><tr><td>0.300</td><td>5.0</td><td>1.600</td><td>5.3</td><td>4.000</td><td>8.2</td><td>8.000</td><td>11.3</td></tr><tr><td>0.400</td><td>5.1</td><td>1.800</td><td>5.6</td><td>4.500</td><td>8.6</td><td>8.500</td><td>11.7</td></tr><tr><td>0.500</td><td>5.1</td><td>2.000</td><td>5.9</td><td>5.000</td><td>9.1</td><td>9.000</td><td>12.0</td></tr><tr><td>0.600</td><td>5.0</td><td>2.200</td><td>6.2</td><td>5.500</td><td>9.5</td><td>9.500</td><td>12.3</td></tr><tr><td>0.800</td><td>4.5</td><td>2.400</td><td>6.4</td><td>6.000</td><td>9.9</td><td></td><td></td></tr><tr><td>1.000</td><td>4.3</td><td>2.600</td><td>6.7</td><td>6.500</td><td>10.3</td><td></td><td></td></tr></tbody></table>			Control Points	Head (m)	Flow (l/s)	Design Point (Calculated)	2.000	5.9	Flush-Flo™	0.435	5.1	Kick-Flo®	0.890	4.0	Mean Flow over Head Range	-	4.7	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	0.100	3.3	1.200	4.6	3.000	7.1	7.000	10.6	0.200	4.6	1.400	5.0	3.500	7.7	7.500	11.0	0.300	5.0	1.600	5.3	4.000	8.2	8.000	11.3	0.400	5.1	1.800	5.6	4.500	8.6	8.500	11.7	0.500	5.1	2.000	5.9	5.000	9.1	9.000	12.0	0.600	5.0	2.200	6.2	5.500	9.5	9.500	12.3	0.800	4.5	2.400	6.4	6.000	9.9			1.000	4.3	2.600	6.7	6.500	10.3		
Control Points	Head (m)	Flow (l/s)																																																																																							
Design Point (Calculated)	2.000	5.9																																																																																							
Flush-Flo™	0.435	5.1																																																																																							
Kick-Flo®	0.890	4.0																																																																																							
Mean Flow over Head Range	-	4.7																																																																																							
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)																																																																																		
0.100	3.3	1.200	4.6	3.000	7.1	7.000	10.6																																																																																		
0.200	4.6	1.400	5.0	3.500	7.7	7.500	11.0																																																																																		
0.300	5.0	1.600	5.3	4.000	8.2	8.000	11.3																																																																																		
0.400	5.1	1.800	5.6	4.500	8.6	8.500	11.7																																																																																		
0.500	5.1	2.000	5.9	5.000	9.1	9.000	12.0																																																																																		
0.600	5.0	2.200	6.2	5.500	9.5	9.500	12.3																																																																																		
0.800	4.5	2.400	6.4	6.000	9.9																																																																																				
1.000	4.3	2.600	6.7	6.500	10.3																																																																																				
©1982-2020 Innovyze																																																																																									

North Yorkshire CC Schools ICT Services		Page 9
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

Storage Structures for SW 1in100+45CC (P05)

Cellular Storage Manhole: S3 - HB, DS/PN: S1.002

Invert Level (m) 79.100 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
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	30.0	0.0	1.001	0.0	0.0
1.000	30.0	0.0			

Cellular Storage Manhole: S4, DS/PN: S2.000

Invert Level (m) 78.200 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
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	50.0	0.0	1.001	0.0	0.0
1.000	50.0	0.0			

North Yorkshire CC Schools ICT Services		Page 10
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC (P05)

Simulation Criteria

Synthetic Rainfall Details

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

PN	US/MH		Storm	Return Period	Climate Change	First (X)		First (Y)	First (Z)	Overflow Act.
	Name					Surcharge	Flood	Overflow		
S1.000	S1	30	Summer	2	+0%	100/30	Summer			
S1.001	S2	30	Summer	2	+0%	100/30	Summer			
S1.002	S3 - HB	30	Summer	2	+0%	2/15	Summer			
S2.000		S4	120	Summer	2	+0%	100/30	Summer		
S2.001	S5	120	Summer	2	+0%	100/30	Summer			
S3.000	S6	120	Summer	2	+0%	100/30	Summer			
S2.002	S7	120	Summer	2	+0%	100/30	Summer			
S2.003	S8-HB	120	Summer	2	+0%	2/15	Summer			
S1.003		S9	30	Summer	2	+0%				

North Yorkshire CC Schools ICT Services		Page 11
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC (P05)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S2.000	S4	77.702	-0.798	0.000	0.01	36	5.2	OK
S2.001	S5	77.701	-0.765	0.000	0.01		7.5	OK
S3.000	S6	77.701	-0.714	0.000	0.01		4.5	OK
S2.002	S7	77.701	-0.681	0.000	0.01		11.2	OK
S2.003	S8-HB	77.701	0.319	0.000	0.12		5.1	SURCHARGED
S1.003	S9	76.187	-0.099	0.000	0.26		10.2	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3 - HB	
S2.000	S4	
S2.001	S5	
S3.000	S6	
S2.002	S7	
S2.003	S8-HB	
S1.003	S9	

North Yorkshire CC Schools ICT Services		Page 12
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC (P05)

Simulation Criteria

Synthetic Rainfall Details

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

PN	US/MH		Storm	Return Period	Climate Change	First (X)		First (Y)	First (Z)	Overflow Act.
	Name					Surcharge	Flood	Overflow		
S1.000	S1	60	Winter	30	+0%	100/30	Summer			
S1.001	S2	60	Winter	30	+0%	100/30	Summer			
S1.002	S3 - HB	60	Winter	30	+0%	2/15	Summer			
S2.000	S4	120	Winter	30	+0%	100/30	Summer			
S2.001	S5	120	Winter	30	+0%	100/30	Summer			
S3.000	S6	120	Winter	30	+0%	100/30	Summer			
S2.002	S7	120	Winter	30	+0%	100/30	Summer			
S2.003	S8-HB	120	Winter	30	+0%	2/15	Summer			
S1.003	S9	15	Summer	30	+0%					

North Yorkshire CC Schools ICT Services		Page 13
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for SW 1in100+45CC (P05)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S2.000	S4	78.101	-0.399	0.000	0.01	96	7.3	OK
S2.001	S5	78.101	-0.365	0.000	0.01		8.9	OK
S3.000	S6	78.101	-0.314	0.000	0.01		6.9	OK
S2.002	S7	78.101	-0.280	0.000	0.01		10.6	OK
S2.003	S8-HB	78.101	0.719	0.000	0.12		5.1	SURCHARGED
S1.003	S9	76.189	-0.097	0.000	0.27		10.6	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3 - HB	
S2.000	S4	
S2.001	S5	
S3.000	S6	
S2.002	S7	
S2.003	S8-HB	
S1.003	S9	

North Yorkshire CC Schools ICT Services		Page 14
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024	Designed by ZS	
File P05 SW NETWORK CALCULAT...	Checked by ZS	
Innovyze	Network 2020.1.3	

100 year Return Period	Summary of Critical Results by Maximum Level (Rank 1) for SW 1in100+45CC (P05)

Simulation Criteria

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

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

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	2, 30, 100
Climate Change (%)	0, 0, 45

PN	US/MH		Storm	Return Period	Climate Change	First (X)		First (Y)	First (Z)	Overflow
	Name					Surcharge	Flood	Overflow	Act.	
S1.000	S1	120	Winter	100	+45%	100/30	Summer			
S1.001	S2	120	Winter	100	+45%	100/30	Summer			
S1.002	S3 - HB	120	Winter	100	+45%	2/15	Summer			
S2.000		S4	240	Winter	100	+45%	100/30	Summer		
S2.001	S5	240	Winter	100	+45%	100/30	Summer			
S3.000	S6	240	Winter	100	+45%	100/30	Summer			
S2.002	S7	240	Winter	100	+45%	100/30	Summer			
S2.003	S8-HB	240	Winter	100	+45%	2/15	Summer			
S1.003		S9	120	Winter	100	+45%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S1.000	S1	79.849	0.424	0.000	0.02			7.8	SURCHARGED
S1.001	S2	79.849	0.460	0.000	0.02			21.3	SURCHARGED
S1.002	S3 - HB	79.849	1.469	0.000	0.30			5.4	SURCHARGED

North Yorkshire CC Schools ICT Services		Page 15
Mount View Property Partners 1st Fl, M... Northallerton, North Yorkshi...	Parkmount Road Manchester 1in100+45% CC	
Date 07/03/2024 File P05 SW NETWORK CALCULAT...	Designed by ZS Checked by ZS	
Innovyze	Network 2020.1.3	

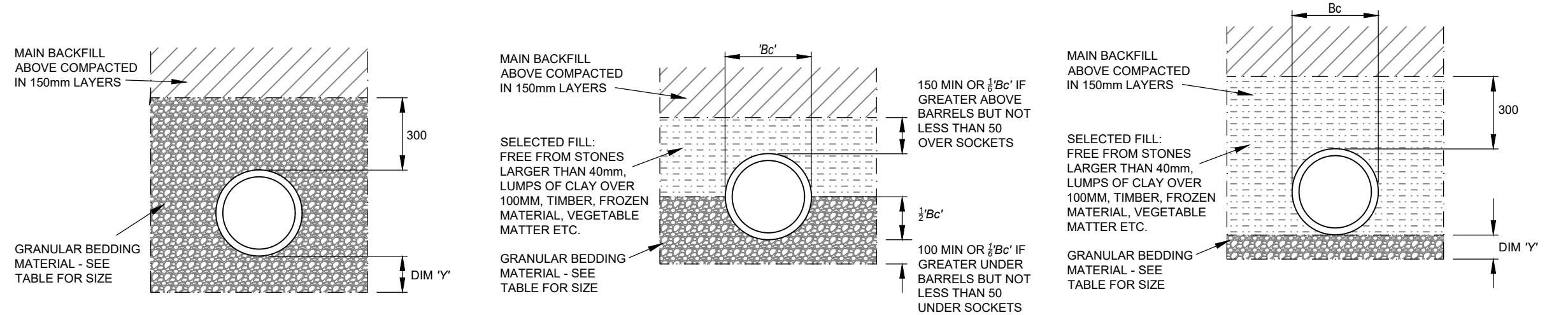
100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for SW 1in100+45CC (P05)

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m ³)	Flow / Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
S2.000	S4	79.161	0.661	0.000	0.02	124	13.7	SURCHARGED
S2.001	S5	79.164	0.698	0.000	0.02		13.1	SURCHARGED
S3.000	S6	79.171	0.756	0.000	0.02		8.6	SURCHARGED
S2.002	S7	79.170	0.788	0.000	0.01		9.6	SURCHARGED
S2.003	S8-HB	79.176	1.794	0.000	0.13		5.7	SURCHARGED
S1.003	S9	76.190	-0.096	0.000	0.28		11.1	OK

PN	US/MH Name	Level Exceeded
S1.000	S1	
S1.001	S2	
S1.002	S3 - HB	
S2.000	S4	
S2.001	S5	
S3.000	S6	
S2.002	S7	
S2.003	S8-HB	
S1.003	S9	

Appendix E

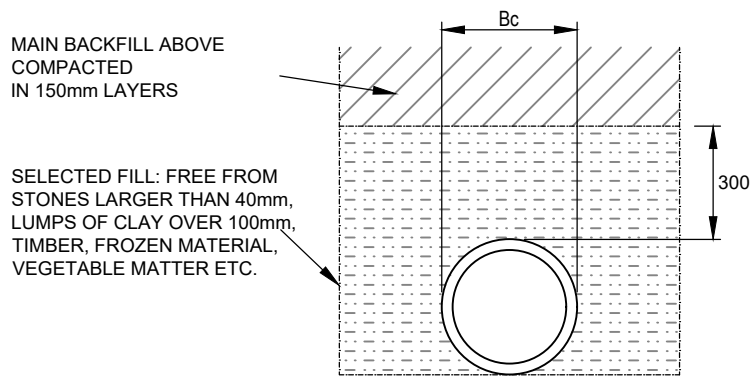
Typical Drainage Construction Details



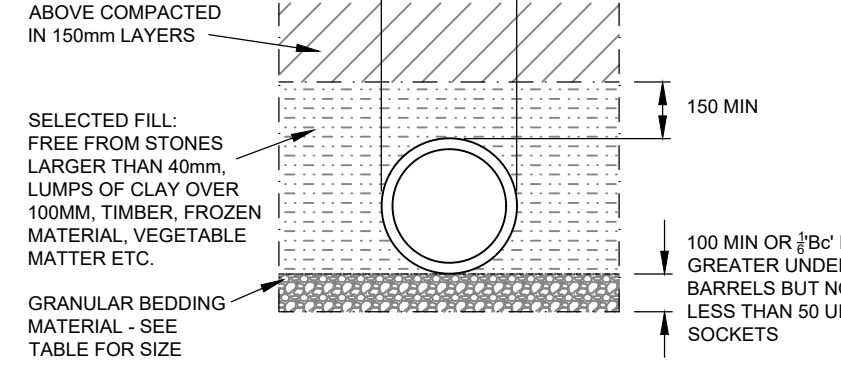
CLASS S
(BEDDING FACTOR 2.5) GENERALLY SUITABLE FOR ALL SOIL CONDITIONS

CLASS B
(BEDDING FACTOR 2.5) GENERALLY SUITABLE FOR ALL SOIL CONDITIONS

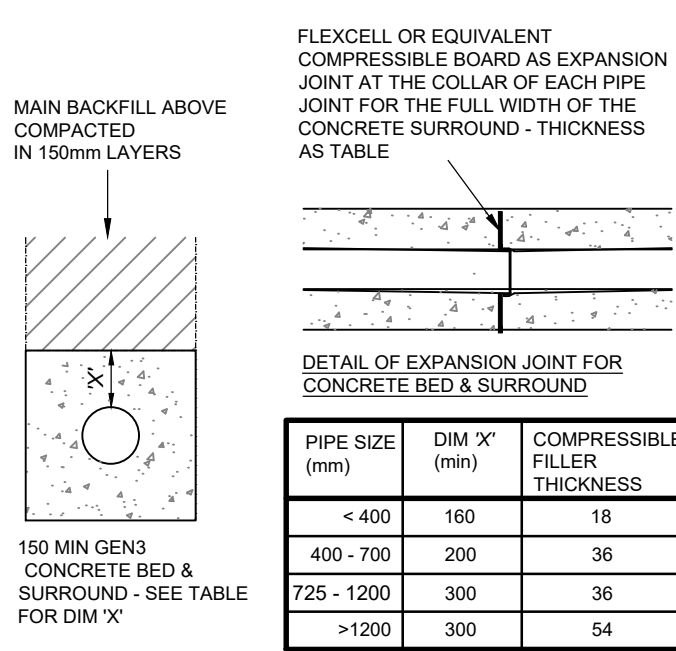
CLASS F
(BEDDING FACTOR 1.9) GENERALLY SUITABLE FOR ALL SOIL CONDITIONS



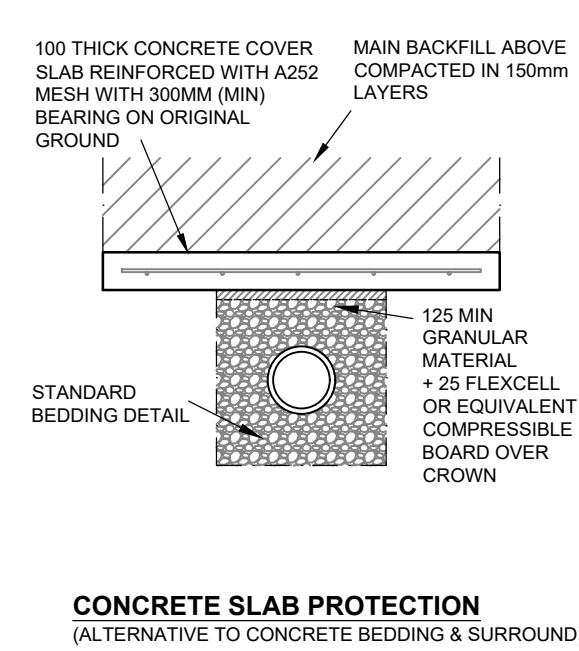
CLASS D
EMBEDMENT TYPE 4
HIGH STANDARD OF WORKMANSHIP REQUIRED
NOT TO BE USED UNLESS ACCURATE HAND TRIMMING BY SHOVEL IS POSSIBLE



CLASS N
(BEDDING FACTOR 1.1) ALTERNATIVE TO CLASS D WHERE ACCURATE HAND TRIMMING BY SHOVEL IS NOT POSSIBLE

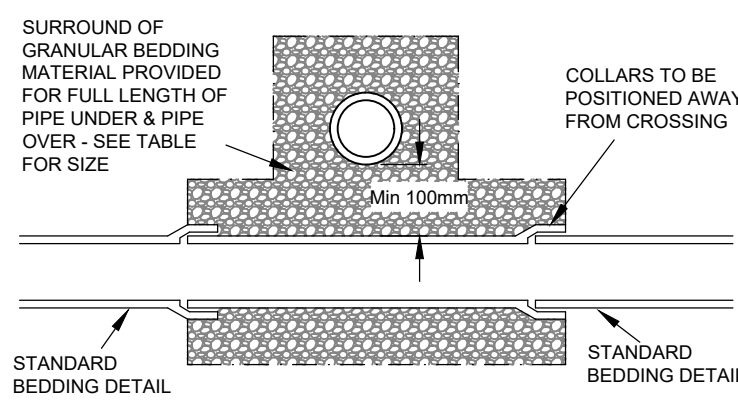


CLASS Z
CONCRETE BEDDING & SURROUND
REQUIRED WHERE COVER TO PIPEWORK IS LESS THAN 1.2m
GENERALLY SUITABLE FOR ALL SOIL CONDITIONS



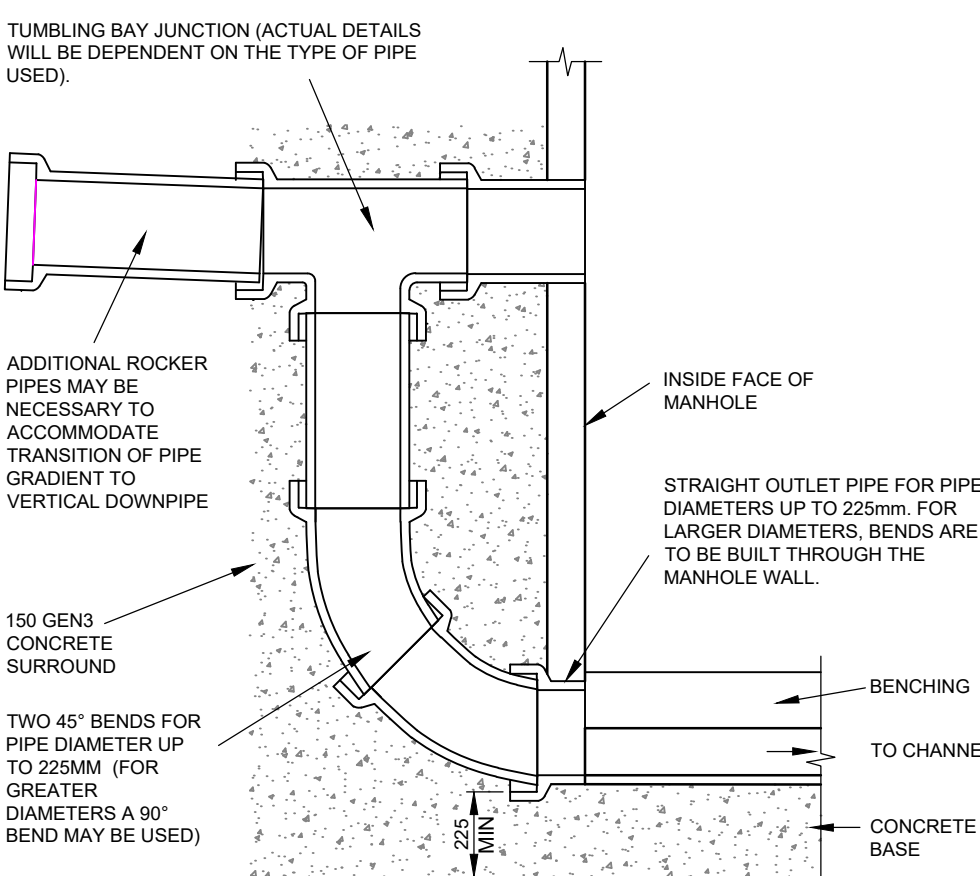
CONCRETE SLAB PROTECTION
(ALTERNATIVE TO CONCRETE BEDDING & SURROUND)

Drawn 1:20



PIPE CROSSINGS
(SCALE 1:20)

COMPRESSIBLE FILLER AND PACKING FOR PIPELINES AT EACH FLEXIBLE PIPE JOINT A JOINT FILLER (E.G. FIBREBOARD OR POLYSTYRENE) SHALL BE USED (SEE TABLE BELOW), AND SHALL EXTEND THROUGH THE FULL THICKNESS OF ANY CONCRETE IN CONTACT WITH THE PIPE. THE CONCRETE BED SHALL BE CUT AWAY AT EACH JOINT TO GIVE A CLEARANCE OF AT LEAST 50mm, SO THAT THE JOINT DOES NOT BEAR ON THE BED	
NOMINAL DIAMETER OF PIPE (mm)	THICKNESS OF COMPRESSIBLE FILLER (mm)
LESS THAN 450	18
450 - 1200	36
GREATER THAN 1200	54



ADOPTABLE MANHOLE
TYPICAL EXTERNAL VERTICAL BACKDROP DETAIL
(WHERE TUMBLING BAY IS NOT MORE THAN 1.5m ABOVE BENCHING)
(SCALE 1:20)

NOMINAL PIPE DIAMETER (mm)	DROPSHAFT DIAMETER (mm)
225 to 300	225
375	300
450	375
525 to 600	450
675	525
750 to 900	600

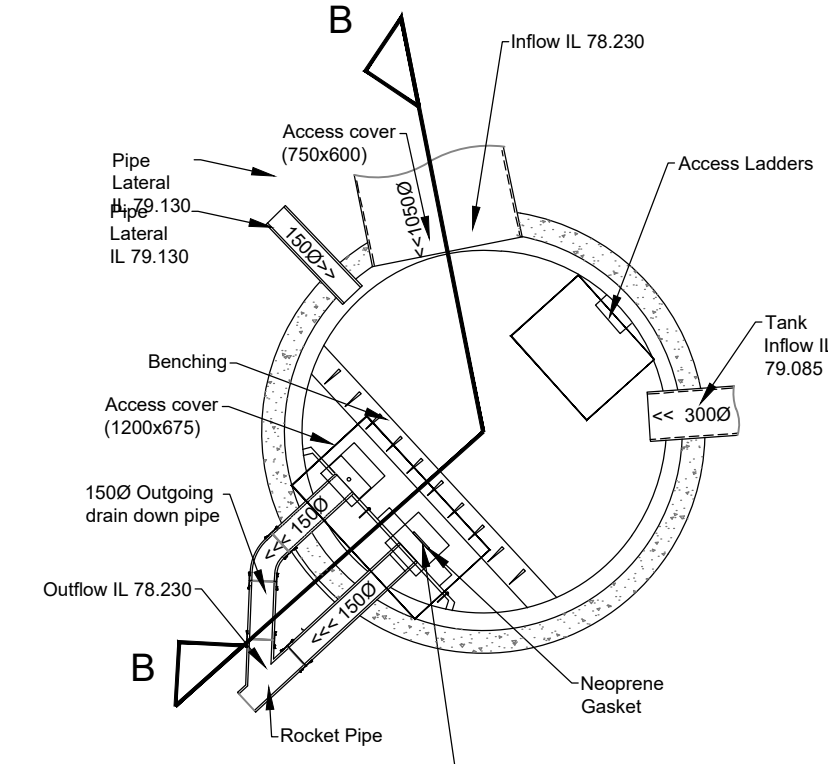
HYDRO-BRAKE OPTIMUM SHE-0100-5600-1750-5600 LIMITING DISCHARGE TO 5.6 l/s BASED ON A DESIGN HEAD OF 1.75m.
NOTE: IF AN ALTERNATIVE PRODUCT IS USED THIS WILL AFFECT THE STORAGE REQUIREMENTS & SUMP CONFIGURATION

MH S3 HYDRO-BRAKE OPTIMUM
SHE-0100-5600-1750-5600 FLOW CONTROL CHAMBER
(SCALE 1:50)

MANHOLE DETAILS	DETAIL
MANHOLE REF	SS
MH DIAMETER (m)	2.000
COVER LEVEL (AOSDm)	81.970
INVERT LEVEL (AOSDm)	77.232
MH TYPE (UU TYPE/SSG TYPE)	UU HYDRO-BRAKE
DEPTH TO SOFFIT (m)	3.688
CONNECTIONS (SIZE mm)	150x2, 1050
COVER SIZE(s) (mm)	1200x675
COVER DEPTH (mm)	150
COVER SPEC	D400
ACCESS LADDER OR DOUBLE STEPS	ACCESS LADDERR
SAFETY CHAIN	NO
SAFETY RAIL	NO
INVERT ACCESS STEPS	YES (FROM TOP)
SOLE SIZE IN COVER SLAB (mm)	1200x675

HYDRO-BRAKE OPTIMUM SHE-0100-5900-2000-5900 LIMITING DISCHARGE TO 5.9 l/s BASED ON A DESIGN HEAD OF 2.0m.
NOTE: IF AN ALTERNATIVE PRODUCT IS USED THIS WILL AFFECT THE STORAGE REQUIREMENTS & SUMP CONFIGURATION

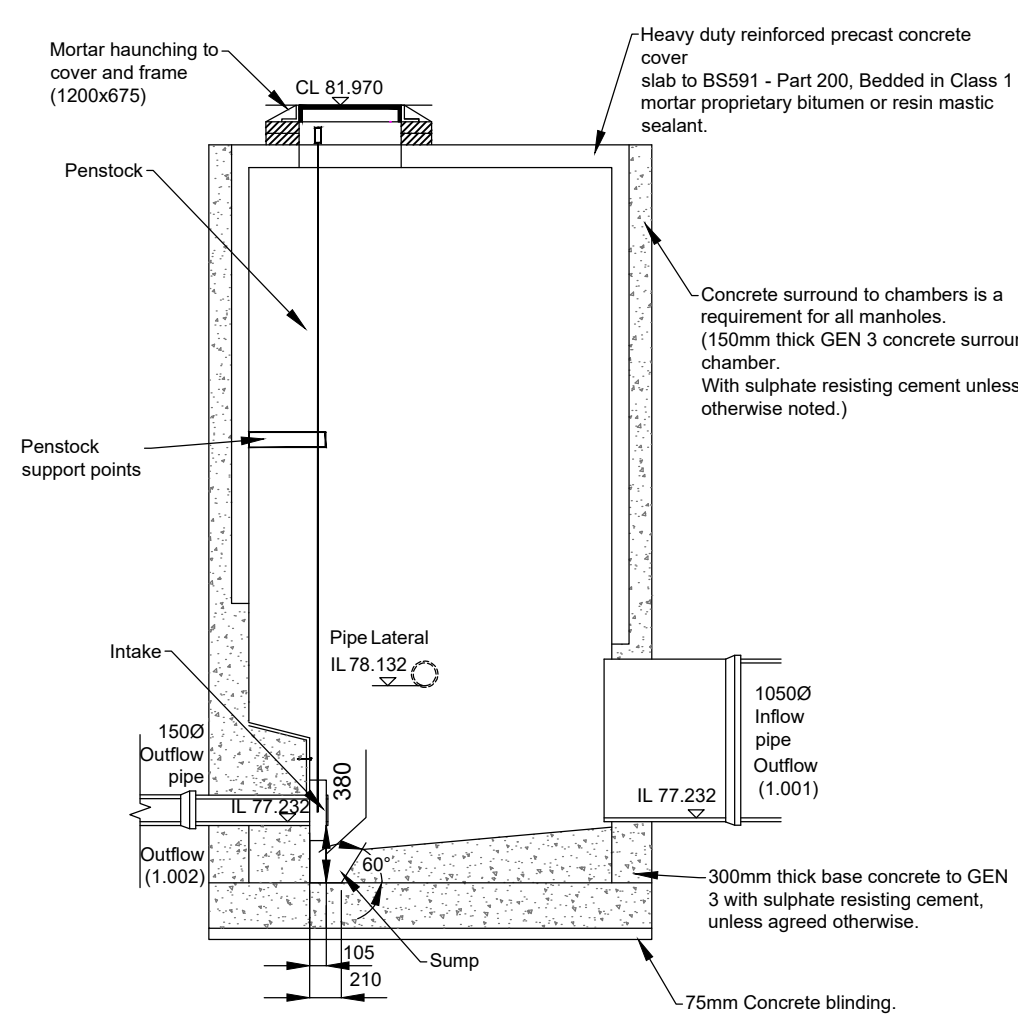
MH S8 HYDRO-BRAKE OPTIMUM
SHE-0100-5900-2000-5900 FLOW CONTROL CHAMBER
(SCALE 1:50)



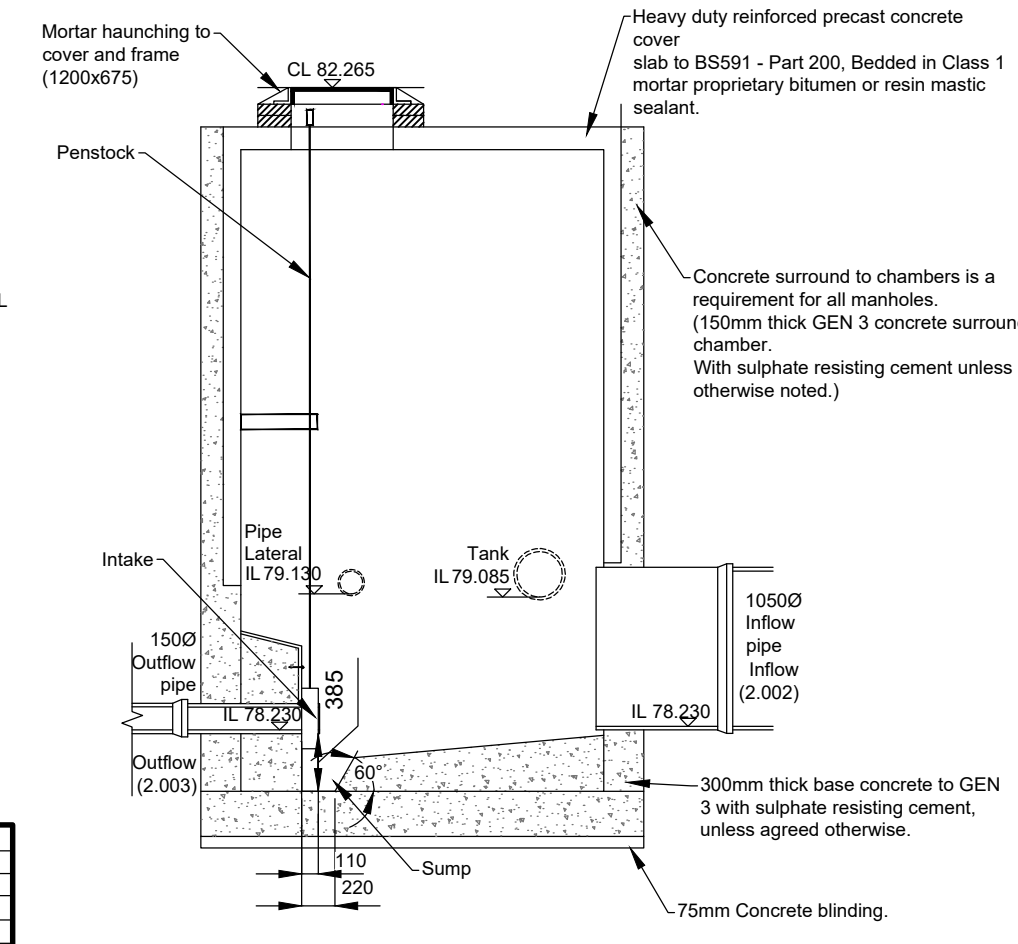
MANHOLE DETAILS	DETAIL
MANHOLE REF	SS
MH DIAMETER (m)	2.400
COVER LEVEL (AOSDm)	82.265
INVERT LEVEL (AOSDm)	78.230
MH TYPE (UU TYPE/SSG TYPE)	UU HYDRO-BRAKE
DEPTH TO SOFFIT (m)	2.985
CONNECTIONS (SIZE mm)	150x2, 300 & 1050
COVER SIZE(s) (mm)	1200x675
COVER DEPTH (mm)	150
COVER SPEC	D400
ACCESS LADDER OR DOUBLE STEPS	ACCESS LADDERR
SAFETY CHAIN	NO
SAFETY RAIL	NO
INVERT ACCESS STEPS	YES (FROM TOP)
SOLE SIZE IN COVER SLAB (mm)	1200x675

HYDRO-BRAKE OPTIMUM SHE-0100-5600-1750-5600 LIMITING DISCHARGE TO 5.6 l/s BASED ON A DESIGN HEAD OF 1.75m.
NOTE: IF AN ALTERNATIVE PRODUCT IS USED THIS WILL AFFECT THE STORAGE REQUIREMENTS & SUMP CONFIGURATION

MH S3 HYDRO-BRAKE OPTIMUM
SHE-0100-5600-1750-5600 FLOW CONTROL CHAMBER
(SCALE 1:50)



SECTION A-A



SECTION B-B

DRAINAGE

- ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
- ALL EXISTING DRAINS & SERVICES (LINE & LEVELS) TO BE CHECKED & CONFIRMED BY THE CONTRACTOR PRIOR COMMENCEMENT OF ANY ON SITE DRAINAGE WORKS. ANY DISCREPANCY IN LEVELS IS TO BE REPORTED IMMEDIATELY TO APP.
- ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
- ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S DETAILS, INSTRUCTIONS & SPECIFICATIONS.
- ALL COVER LEVELS ARE APPROXIMATE. EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
- INVERT LEVELS QUOTED AT MANHOLES & INSPECTION CHAMBERS ARE THOSE OF THE LARGEST CONNECTED PIPE DIAMETER. PIPES AT CHAMBERS TO BE LID WITH SOFFITS LEVEL UNLESS NOTED OTHERWISE.
- PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
- REFER TO ARCHITECT'S DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
- ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
- PIPES & FITTINGS TO BE:
 - CONCRETE PIPES & ANCILLARY PRODUCTS TO BS 5911:2022 & BS EN 1916:2002.
 - VITRIFIED CLAY PIPES & FITTINGS TO BS EN 295:2013
 - DUCTILE IRON TO BS EN 598:2007 & BS ISO 4179:2005.
 - PERFORATED VITRIFIED CLAY PIPES FOR LAND DRAINAGE TO BS 1196.
 - PLASTIC PIPES FOR LAND DRAINAGE TO BS 4962:1982.
 - PLASTIC PIPES SYSTEMS FOR NON-PRESSURE, UNDERGROUND DRAINAGE & SEWAGE TO BS EN 1401 & BS 4680 - SOLID WALL, STRUCTURED WALL PIPES TO BS EN 13476.
 - PRECAST CONCRETE MANHOLE UNITS TO BS EN 1917:2002.
 - PLASTIC INSPECTION CHAMBERS FOR DRAINS & SEWERS TO BS EN 13598:1:2010.
 - GULLY & MANHOLE TOPS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 124:1994.
 - DRAINAGE CHANNELS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 1433:2002.
- ALL MANHOLE COVERS, ROAD GULLY COVERS & FRAMES TO COMPLY WITH BS EN124 NON ROCKING TYPE.
- UNLESS NOTED OTHERWISE USE CLASS:
 - A15 FOR USE IN PEDESTRIAN AREAS WHERE VEHICLES HAVE NO ACCESS
 - B125 FOR USE IN CAR PARKS & PEDESTRIAN AREAS WHERE INFREQUENT LIGHT VEHICLE ACCESS IS LIKELY (INCLUDING DRIVEWAYS).
 - C250 FOR ACCESS COVERS & GULLY GRATINGS IN AREAS OF SLOW MOVING, HEAVY TRAFFIC, ALSO FOR GULLY GRATINGS IN CARRIAGEWAY WITHIN 500mm OF KERB & UP TO 200mm INTO THE FOOTWAY.
 - D400 FOR USE IN CARRIAGEWAYS OF ROADS & PARKING AREAS ACCESSIBLE BY ALL TYPES OF VEHICLES.
 - E800 FOR USE IN AREAS WHERE HIGH WHEEL LOADS ARE PRESENT.
 - F900 FOR USE IN AREAS WHERE EXTREMELY HIGH WHEEL LOADS ARE PRESENT SUCH AS AIRCRAFT PAVEMENTS, DOCKS, HEAVY INDUSTRIAL SITES.
- MANHOLES IN INTERNAL AREAS REQUIRE DOUBLE SEALED COVERS WITH LOCKING SCREWS. RECESSED WHERE REQUIRED TO ACCOMMODATE FLOOR FINISHES TO ARCHITECT'S SPECIFICATION.
- PIPE BEDDING
USE CLASS S BEDDING UNLESS NOTED OTHERWISE. NB PROTECT AGAINST CONSTRUCTION TRAFFIC AS NECESSARY
USE CLASS Z CONCRETE BED & SURROUND OR CONCRETE SLAB PROTECTION AS FOLLOWS:
 - CLASS 120 CLAYWARE OR CLASS M CONCRETE (100 - 6000 PIPES)
LANDSCAPING - LESS THAN 600mm COVER TO CROWN.
HARDSTANDING - LESS THAN 1200mm COVER TO CROWN.
 - PLASTIC (100 - 3000 PIPES)
LANDSCAPING - LESS THAN 600mm COVER TO CROWN.
HARDSTANDING - LESS THAN 900mm COVER TO CROWN.
- PIPES BELOW CONCRETE GROUND FLOOR SLABS:
WHERE THE CROWN OF THE PIPE IS WITHIN 300mm OF THE UNDERSIDE OF SLAB, SPECIAL PROTECTION TO BE PROVIDED IN ACCORDANCE WITH BUILDING REGULATIONS H1 2.44 OR 150mm GEN3 CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.
OTHERWISE USE CLASS S BEDDING.
- MAIN BACKFILL TO BE WELL COMPACTED IN 150mm LAYERS OF:
SELECTED BACKFILL MATERIAL IN ALL SOFT LANDSCAPED AREAS
TYPE 1 GRANULAR MATERIAL IN ALL HARDSTANDING AREAS & PUBLIC HIGHWAYS
- BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.
- CCTV TO BE CARRIED OUT TO VERIFY CONDITION OF ANY DRAINAGE TO BE RE-USED.

Notes

This Drawing is an instrument of service and shall remain the property of Align Property Partners Ltd copyright ©. It may not be reproduced or copied in any form. It shall not be used for the construction, enlargement or alteration of a building or area other than the said project without the authorisation of the issuing office. Contractors shall verify and be responsible for all dimensions and conditions and shall report any discrepancies to the issuing office before proceeding with any work. Drawings shall not be scaled.

GENERAL NOTES

- THE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLIENT, ARCHITECT, SERVICES ENGINEER, AND SPECIALIST CONTRACTOR DRAWINGS, REPORTS AND SPECIFICATIONS.
 - FOR SETTING OUT AND LEVELS REFER TO ARCHITECTS DRAWINGS.
 - FOR THE PURPOSE OF CONSTRUCTION ALL DRAWINGS MUST NOT BE SCALED AND ONLY WRITTEN OR CALCULATED DIMENSIONS USED. LEVEL DATUMS TO BE CONFIRMED BY THE ARCHITECT.
 - ANY REVISIONS TO THE LAYOUT DETAILS REQUIRED BY THE CONTRACTOR TO BE AGREED AND APPROVED BY THE ALIGN PROPERTY PARTNERS ENGINEER.
 - FINISHED FLOOR LEVELS TO BE DETERMINED.
 - ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND REQUIREMENTS.
 - GENERALLY, ONLY KNOWN PENETRATIONS, HOLES, POCKETS AND RECESSES ETC. WITH ANY DIMENSIONS GREATER THAN 150 ARE SHOWN ON THE DRAWINGS. FOR CONFIRMATION OF THESE AND FOR DETAILS OF SMALLER HOLES PLUS INSERTS, FIXINGS ETC. REFERENCE SHALL BE MADE TO THE ARCHITECT'S SERVICES ENGINEER'S OR THE RELEVANT SUBCONTRACTOR'S BUILDERS WORK DRAWINGS.
 - THE CONTRACTOR SHALL ENSURE THAT TEMPORARY LOADS ONTO THE NEW STRUCTURES/DRAINAGE SHALL BE LESS THAN THOSE FOR WHICH IT HAS BEEN DESIGNED.
 - THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND CHECKING THE SETTING OUT OF GRIDLINES, LEVELS AND DATUMS.
 - ANY DISCREPANCIES BETWEEN THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
 - THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT NOISE, VIBRATION AND RESULTING FROM THE WORKS ARE KEPT WITHIN REASONABLE LIMITS.
 - THE CONTRACTOR IS TO ALLOW A MINIMUM OF 10 WORKING DAYS IN THEIR PROGRAMME FOR THE REVIEW OF ANY CONTRACTOR'S DESIGN PORTIONS OF WORK FOR REVIEW BY THE ALIGN PROPERTY PARTNERS ENGINEER.
 - IRRESPECTIVE OF ANY NAMED MANUFACTURERS OF ANY PRODUCT/MATERIAL NOTED ON DRAWINGS, THE CONTRACTOR IS FREE TO PROPOSE AN EQUAL OR APPROVED PRODUCT/MATERIAL PROVIDED THAT ANY SUCH CHANGE TO THE SPECIFICATION MEETS A SIMILAR LEVEL OF PERFORMANCE AND IS NOTED ON ALL TENDER RETURNS AND DOCUMENTATION FOR ALIGN PROPERTY PARTNERS.
- IMPORTANT:**
- DRAWING PROVIDED FOR INFORMATION ONLY AND IS SUBJECT TO THE FOLLOWING STATUTORY APPROVALS:
- PLANNING APPROVAL
 - BUILDING CONTROL
 - UNITED UTILITIES APPROVAL
 - HIGHWAYS APPROVAL
- ALL CONSTRUCTION WORKS PRIOR TO APPROVALS ABOVE WILL BE UNDERTAKEN AT CLIENTS/CONTRACTORS RISK

P04	UPDATED HYDRO-BRAKE DETAILS TO SUIT LATEST SURFACE WATER DRAINAGE DESIGN.	ZS 19/09/23	BO 19/09/23	BD 19/09/23
P03	UPATED HYDRO-BRAKE DETAIL BACKDROP DETAIL ADDED	JSM 19/09/23	ZS 19/09/23	BD 19/09/23
P02	UPDATED HYDRO-BRAKE DETAIL TO REFLECT THE LATEST DRAINAGE LAYOUT PLAN	JSM 20/09/23	ZS 20/09/23	ZS 20/09/23
P01	INITIAL ISSUE	ZS 19/09/23	LF 19/09/23	LF 19/09/23
Rev	Details	Author & Date	Checked & Date	Approved & Date

align PROPERTY PARTNERS

Westmorland & Furness Office, Riverside Business Park, Natland Road, Kendal LA9 7SX

Client
MOSSCAE ST VINCENTS

Project Name
PARKMOUNT ROAD, MANCHESTER

Drawing Title
S104 DRAINAGE CONSTRUCTION DETAILS SHEET 2 OF 2

Purpose
PLANNING

Scale	Drawn	Checked	Approved
AS SHOWN	ZS	LF	LF
Original Size	Date	Date	Date
A1	19/09/23	19/09/23	19/09/23
Drawing Number	Rev.		
PV2310-APP-92-XX-DR-C-3201	P04		

Appendix F

Maintenance Date Sheets



MARSHALLS PRIORA: MAINTENANCE

Maintaining your Marshalls Priora Permeable Paving System is easy: simply ensure that the voids between the blocks don't get blocked and prevent water from flowing through the surface and into the sub-base.

However, it's important to remember that even if the voids do appear to be blocked, it's unlikely to stop the system working. This is because the voids on a Marshalls Priora surface have been specially engineered to be far wider than they need to be – so blocked voids are likely to only slow the flow of water, not stop it completely.

A Marshalls Priora surface made of 200mmx100mm blocks provides infiltration rates in excess of 18,000 litres per second per hectare (l/s/h). The average rainfall event in the UK provides flow at approximately 180 l/s/h. Independent research in 2006 by Soenke Borgwardt concluded that after 10 years, in a worst case scenario with absolutely zero maintenance, a permeable pavement might be reduced to 10% of its original permeability. In Priora's case, this would be 1,800 l/s/h – still TEN TIMES more permeable than it needs to be!



See for yourself!

Visit YouTube and search for "Marshalls Priora Maintenance Test" to see a real time infiltration test on an unmaintained Priora system!



Marshall's
Creating Better Spaces

5 SIMPLE STEPS TO MAINTAIN A MARSHALLS PRIORA SURFACE IN OPTIMUM CONDITION:

- **NEVER** dump sand, cement, soil or other loose material directly onto a Marshall's Priora surface. This could block the joints or even fall into the sub-base. If you do need to store any loose material on a Marshall's Priora surface, make sure you put down a tarpaulin or impenetrable sheet first.
- Every twelve months or so, undertake a visual inspection to check that the voids aren't blocked with dirt or other debris. This is usually best undertaken after a period of heavy rainfall. If any voids are blocked, ponding on the surface will be apparent.
- If you notice ponding, the joints in that area are blocked. To clear them, either sweep the joints with a stiff brush or vacuum the contaminated aggregate out and replace it. If using an automatic suction brush, angle the brushes at 30° to avoid aggregate migration.
- Any vegetation growing in the joints can be removed manually, or treated with a Glyphosate-based weedkiller. Glyphosate will be neutralised upon contact with the ground, so it will be safe to plant in the area soon after treatment
- For winter maintenance, pure (white) rock salt is an effective and readily available de-icer. However, avoid using salts which contain an additional abrasive such as sand or grit. For heavy ice, should an abrasive be required, mix pure (white) rock salt with 6mm Priora jointing aggregate. This can be brushed safely back into the joints once thawed. (nb – Use of chlorides is highly unlikely to increase chloride levels in the local ground).



Sustainable Drainage Systems Limited

SDS GEOLight Maintenance Datasheet

Once received, stormwater reaches the storage reservoir through one or more distribution pipes laid out between the GEOLight units.

The distribution pipes generally consist of 150mm to 600mm fully perforated twinwall pipe installed within a trench filled with draining material (washed rolled pebbles, free from fines, and 15/25 grading) requiring little compaction.

A high flow, non-woven GEOTextile is laid between the distribution pipe and the GEOLight units preventing the horizontal GEOLight units from being clogged by the draining materials.

The permeability of the supply and distribution pipe located within the reservoir is designed to prevent any clogging of the system upstream of the stormwater drain. The ends of the distribution pipes are generally connected to inspection chambers (manholes) acting as settling tanks, enabling inspection and maintenance of the whole distribution pipe.

For small discharges, stormwater does not penetrate the GEOLight blocks, but circulates either in an appropriate bypass, or in the distribution pipe drain itself. This allows draining of the first water which will be handled downstream if required.

When the reservoir is drained, water is drained through the distribution pipe, possibly the same as the one located at the input which operates in the opposite direction. Drainage discharge is controlled downstream either by the system piping or a flow control device. A drainage geocomposite is installed in the upper part of the reservoir allowing air to ventilate into the inspection chamber.

SDS generally recommend that the stormwater tank inspection chambers are checked periodically in conjunction with general maintenance of the underground pipe network

Appendix G

Private Drainage Details

