



Proposed SEN School,
North Hulme,
Manchester

Report to Discharge Proposed
Drainage Related Planning
Condition

Project number: 3577

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1.0 Introduction

In 2020 a planning application was submitted to Manchester City Council for the construction of a new single storey educational facility associated with the existing Castlefield Campus following demolition of an existing building, including car parking, landscaping works and boundary treatments, and new pedestrian and vehicular access points onto Jackson Crescent. This planning application was approved in November 2020. This report has been prepared to satisfy the two drainage related planning conditions.

2.0 Drainage Related Planning Conditions

2.1 Condition 19

No development shall take place until surface water drainage works have been implemented in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards and details that have been submitted to and approved in writing by the Local Planning Authority.

2.2 Condition 20

No development hereby permitted shall be occupied until details of the implementation, maintenance and management of the sustainable drainage scheme have been submitted to and approved by the local planning authority. The scheme shall be implemented and thereafter managed and maintained in accordance with the approved details. Those details shall include:

- *Verification report providing photographic evidence of construction as per design drawings;*
- *As built construction drawings if different from design construction drawings;*
- *Management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.*

3.0 Drainage Strategy

3.1 Surface Water Strategy

- 3.1.1 There is an existing building on site with associated hardstanding areas, based on the existing manhole positions these buildings currently connect into the combined sewer network. There is also a significant portion of the site which is overgrown vegetation. Therefore, both greenfield and brownfield runoff rates apply.
- 3.1.2 Site investigations confirmed that the site is underlain by Made Ground, associated with the previous development, to depths of approximately 1.3m. Slightly gravelly sandy clay is then found to depths of 1.5m, overly slightly gravelly silty sand to depths of 1.8m. After 1.8m very gravelly sand was found to depths of greater than 3m. Infiltration tests have been carried out and confirmed that soakaways are a viable option for the site with a rate of 2.41×10^{-5} m/s.
- 3.1.3 There are no watercourses in close proximity to the site, therefore this option is not viable.
- 3.1.4 There are no surface water sewers in close proximity to the site. There is an existing 400 x 900mm diameter combined sewer running through the site which connects into a 1510 x 850mm diameter combined sewer in New York Street. All the required United Utilities easements have been adhered to with the proposed building and foundations located at least 3m away. The site has existing connections into the combined sewer network.
- 3.1.5 Based on the SuDS Hierarchal Approach, surface water from the development site will discharge via a piped network into a geo-cellular soakaway in the northeast of the site. The required storage volume of this soakaway has been calculated based on an infiltration rate of 0.08676m/hr as per the results of the infiltration tests in Appendix C (further details can also be found on drawing NHE-SHD-02-XX-DR-C-90101 in Appendix A and calculations in Appendix B).
- 3.1.6 The 1 in 30-year event will be contained below ground to satisfy all guidance. In the case of this development, any exceedance flooding for storms in excess of the 1 in 30-year event and up to the 1 in 100-year event (including a 20% increase to allow for climate change) will be directed away from the School building and retained within the hard and soft landscaping areas. Refer to Flood Route Plan RWD-SHD-02-XX-DR-C-90106 in Appendix A for details of these overland flow routes. The 20% increase to allow for climate change has been used and agreed by MCC LLFA for all other SEN Schools in this group and this increase is also appropriate for North Hulme.
- 3.1.7 The proposed drainage layout has been designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance, i.e. up to the 30-year storm return period criterion and tested for the extreme 100-year event to confirm no flood risk to the School.
- 3.1.8 Silt is to be prevented from entering the drainage system by the use of trapped gullies and channels with silt traps.

3.1.9 As all surface water runoff is to be retained on-site, there are no flow control devices. Refer to drawing NHE-SHD-02-XX-DR-C-90107 in Appendix A for construction details of the proposed SuDS devices.

3.2 Foul Water Drainage Strategy

3.2.1 A new foul water drainage network A new foul water drainage network will collect foul flows from the new development and connect into the existing foul network on the adjacent Castlefield Campus.

3.2.2 The proposed private drainage layout for the new development site will be designed in accordance with BS EN 752: 2008 and Building Regulations Part H guidance.

3.3 Management and Maintenance

3.3.1 The regular management and maintenance of surface water and foul water drainage systems is essential to ensure that the system always operates at its maximum efficiency. The maintenance schedules below taken from CIRIA document C753 outlines the required programme of maintenance for the geocellular storage.

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks		
Maintenance schedule	Required action	Typical frequency
Regular maintenance	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
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	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

3.3.2 The long-term maintenance of the drainage infrastructure will be the responsibility of the School and included within the OM Manual.

3.3.3 The School will need to carry out annual inspections and undertake clearing of private drainage channels. There will be a site management health and safety document prepared in respect of the final development. This will include the required maintenance regime for the on-site private drains and drainage facilities such as the channels, pipes, chambers and geocellular storage.

Appendix A – Scott Hughes Design Drawings

CONTENTS	
Identifier	Name
NHE-SHD-02-XX-DR-C-90101	Proposed Drainage GA
NHE-SHD-02-XX-DR-C-90105	Manhole Schedule
NHE-SHD-02-XX-DR-C-90106	Flood Route Plan
NHE-SHD-02-XX-DR-C-90107	SuDS Details

THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.

2. THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN-OFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF SUMPS, PUMPING AND DEWATERING AS APPROPRIATE, IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.

3. ALL PRIVATE DRAINAGE WITHIN THE SITE IS TO COMPLY WITH THE REQUIREMENTS OF BSEN752 AND BUILDING REGULATIONS PART H. WHERE APPROPRIATE, ALL ADOPTED DRAINAGE SHALL BE DESIGN AND CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6th EDITION AND THE ADOPTING AUTHORITIES STANDARD REQUIREMENTS.

4. ALL PRIVATE DRAINAGE PIPES TO BE LAID IN TRENCHES BEDDED CLASS 'B' ON SINGLE SIZED AGGREGATE AND BACKFILLED WITH APPROVED SELECTED FILL (40mm DOWN) REUSED FROM EXCAVATED MATERIAL UNDER BUILDINGS AND WHERE COVER TO INVERT IS LESS THAN 1200mm UNDER TRAFFICKED AREAS PIPES TO BE CAST IN CONCRETE (CLASS 2 BEDDING), CLASS 'S' BED AND SURROUND MAY BE REQUIRED FOR SEWERS TO BE ADOPTED. REFER TO SPECIFIC DRAWINGS FOR FURTHER INFORMATION.

5. SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM EXCAVATED MATERIAL FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, CONTAMINATED MATERIAL. SELECTED BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS. THE MATERIAL SHALL BE COMPACTED TO ACHIEVE NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED IN LABORATORY COMPACTION TESTS. SUFFICIENT TESTING SHALL BE CARRIED OUT, BY THE CONTRACTOR, TO DEMONSTRATE THIS IS ACHIEVED (NUMBER AND FREQUENCY OF TESTING TO BE AGREED WITH SHD). WHERE THE MOISTURE CONTENT OF THE MATERIAL PROHIBITS COMPLIANCE WITH THE ABOVE 6F1 OR SIMILAR IMPORTED MATERIAL SHALL BE USED.

6. CONCRETE PROTECTION TO PIPEWORK IS TO BE PROVIDED AS FOLLOWS:

- a) ALL PIPEWORK WITHIN PEDESTRIAN/SOFT AREAS WITH LESS THAN 600mm COVER.
- b) ALL PIPEWORK SUBJECT TO VEHICULAR OVERRUN WITH LESS THAN 1.2m COVER.

7. ALL PIPEWORK WITHIN MANHOLES ARE TO BE LAID SOFFIT TO SOFFIT (U.N.O). ALL CHAMBER INVERT LEVELS ARE FOR THE OUTGOING PIPE LEVELS. BACKDROP PIPEWORK SHALL BE CONNECTED AT SOFFIT TO SOFFIT WITH THE RODDING ACCESS LEVEL SPECIFIED.

8. ALL DRAINS TO BE LAID ACCURATELY TO LINE AND LEVEL IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

9. ANY GRADIENTS OF DRAINS INDICATED ARE INDICATIVE ONLY AND THE CONTRACTOR SHALL INSTALL THE DRAINS TO THE SPECIFIED LEVELS SHOWN FOR EACH MANHOLE (U.N.O). CATCHPIT INVERT LEVELS ARE FOR THE OUTGOING PIPE WITH THE SUMP LEVEL SPECIFIED SEPARATELY.

10. CO-ORDINATE SETTING OUT INFORMATION FOR MANHOLES IS TO THE INTERSECTION THE DRAINS AND NOT THE CENTRE OF THE MANHOLE.

11. COVER LEVELS OF THE MANHOLES ARE PROVISIONAL AND SUBJECT TO ADJUSTMENT ON SITE TO SUIT THE FINISHED GROUND LEVELS. ALL EXTERNAL WORKS CONSTRUCTION AREAS TO BE AS LOCATED BY THE ARCHITECT.

12. MANHOLE COVERS AND FRAMES ARE TO BE IN ACCORDANCE WITH BS EN 124 AND THE FOLLOWING:

- a) VEHICULAR AREAS: CLASS D400 (E600 IN VULNERABLE SERVICE YARD LOCATIONS), DOUBLE TRIANGULAR, 150mm DEEP DUCTILE IRON COVER AND FRAME WITH THREE POINT COVER SEATING, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
- b) PEDESTRIAN AREAS: CLASS B125, 100mm DEEP, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.

13. POSITIONS AND SIZES OF ABOVE GROUND FOUL AND SURFACE WATER DRAINAGE CONNECTIONS ARE TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH THE ARCHITECT & M&E ENGINEER.

14. GULLY GRATINGS AND STEEL CHANNEL COVERS ARE TO BE IN ACCORDANCE WITH BS EN 124 AS FOLLOWS:

- a) AREAS SUBJECT TO VEHICULAR OVERRUN: CLASS D400 MINIMUM.
- b) AREAS NOT SUBJECT TO REGULAR VEHICLE OVERRUN (ADJACENT TO KERBS ETC): CLASS C250.

c) GULLY GRATES ADJACENT TO KERBS SHALL BE HINGED ON THE SIDE OF THE TRAFFIC DIRECTION (LEFT HAND SIDE).

15. ALL BRICKWORK IN CONNECTION WITH DRAINAGE IS TO BE SOLID CLASS B ENGINEERING BRICK TO BS3921.

16. ALL PRECAST CONCRETE PIPES, CHAMBER PRODUCTS AND ROAD GULLIES SHALL BE TO BS5911 AND BE KITEMARKED.

17. ALL DRAINAGE IN SITU CONCRETE SHALL BE GEN3 (U.N.O).

18. ALL IN SITU AND CONCRETE PRODUCTS SHALL COMPLY WITH THE REQUIREMENTS FOR SULPHATE EXPOSURE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1, CONCRETE IN AGGRESSIVE GROUND (2001) PART 1: TABLE 2.

19. UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE EXISTING DRAINAGE SYSTEM.

20. CONSTRUCTION JOINTS IN CONCRETE SURROUND MUST NOT BE WITHIN 150MM OF CHAMBER/SHAFT RING JOINTS.

21. ROCKER PIPES TO BE SURROUNDED WITH CONCRETE LOCATED 150mm MINIMUM 200mm MAXIMUM FROM THE FIRST FLEXIBLE JOINT TO THE MANHOLE WALL.

22. SOFT SPOTS IN THE TRENCH FORMATION SHALL BE REMOVED AND REPLACED WITH GRANULAR BEDDING UNLESS INSTRUCTED OTHERWISE.

23. LATERAL CONNECTIONS IN BETWEEN MANHOLE RUNS SHALL BE FORMED BY USING PURPOSE MADE JUNCTION FITTINGS. BEND FITTINGS SHALL BE PROVIDED WHERE APPROPRIATE TO DIRECT THE FLOW INTO MAIN RUNS.

24. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO LIAISE WITH BUILDING CONTROL FOR APPROVALS, INTERIM INSPECTION, SNAGGING AND FINAL INSPECTIONS OF THEIR WORK.

25. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING STATUTORY UNDERTAKERS APPARATUS AND SERVICE CONNECTIONS ADJACENT TO AND CROSSING THE WORKS BY TRIAL PITS PRIOR TO COMMENCING MACHINE DIG.

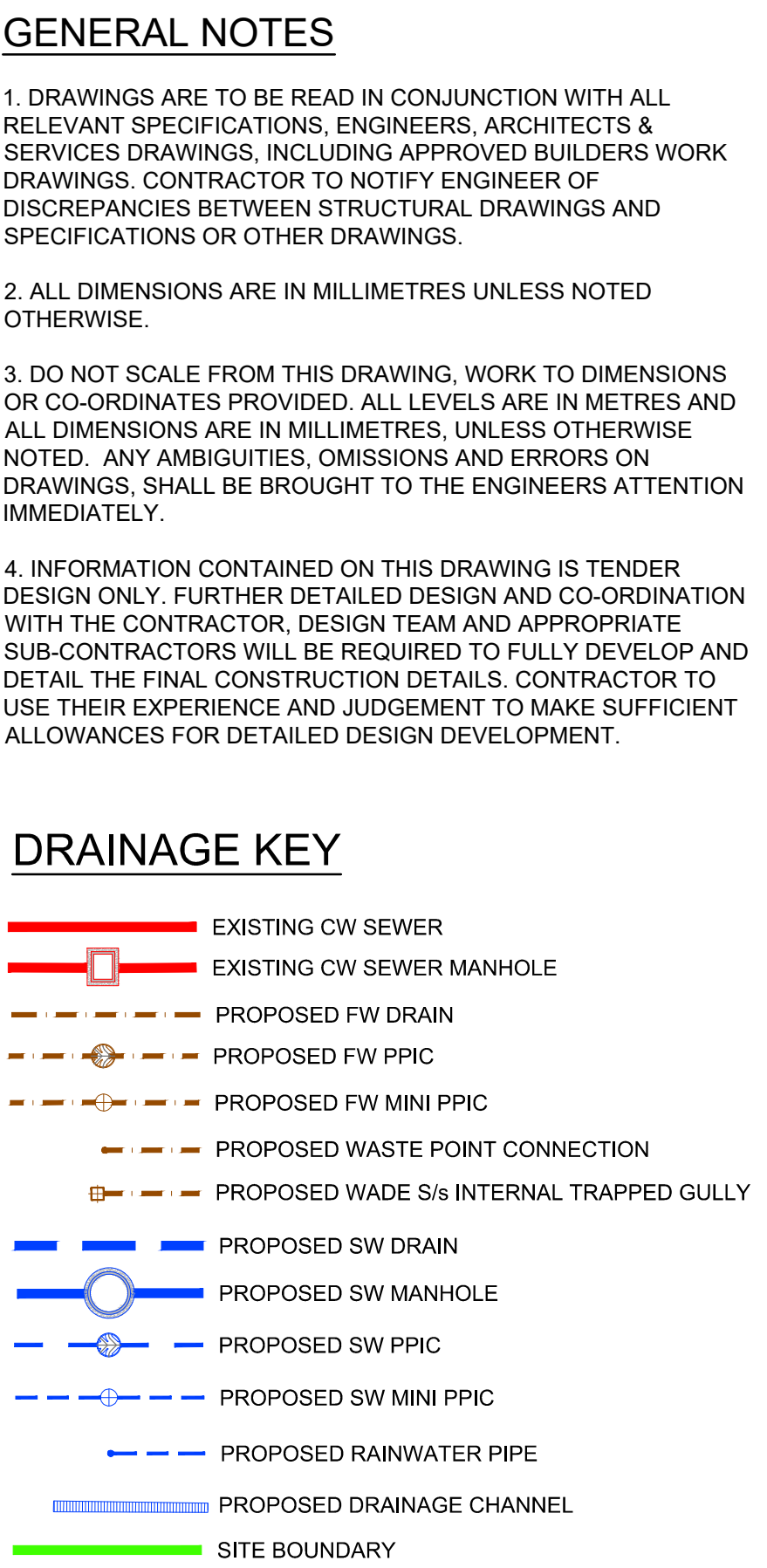
26. AT THE CONCLUSION OF THE WORKS THE CONTRACTOR SHALL PROVIDE A MARKED UP DRAWING TO RECORD ANY AS BUILT VARIATIONS NOT SHOWN ON THE DRAWINGS.

27. THE DRAINAGE SYSTEM IS NOT DESIGNED TO ACCEPT UNTREATED EFFLUENT FROM A COMMERCIAL OR INDUSTRIAL SINKING GREASE AND OILS. REMOVAL OF GREASE AND OIL SHOULD BE MADE AT SOURCE USING A FLOOR MOUNTED ABOVE GROUND GREASE REMOVAL SYSTEM. IT IS RECOMMENDED THAT A MECHANICAL GREASE REMOVAL SYSTEM BE EMPLOYED FOR THIS PURPOSE NOT A PASSIVE SYSTEM.

28. PRIVATE NOT ADOPTED PIPEWORK TO BE OF THE FOLLOWING MANUFACTURER: 'POLYSEWER' UPVC DRAINAGE SYSTEM BY POLYPIPE WHEN INSTALLED IN LINE WITH THE MANUFACTURERS RECOMMENDATIONS. FILTER DRAINAGE TO BE PERFORATED HDPE.

29. ALL RWP, WPC & GULLY CONNECTIONS TO BE 100mm DIA UNO & ARE RODDABLE AT LOCATIONS ABOVE GROUND LEVEL.

30. ALL INSPECTION CHAMBERS WITH A DEPTH GREATER THAN 1.2m TO HAVE A 350mm DIAMETER REDUCING PLATE LOCATED BENEATH COVER AND FRAME TO PREVENT ACCESS.



1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING. WORK TO DIMENSIONS OR CO-ORDINATES PROVIDED. ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES. UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS, SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY.
4. INFORMATION CONTAINED ON THIS DRAWING IS TENDER DESIGN ONLY. FURTHER DETAILED DESIGN AND CO-ORDINATION WITH THE CONTRACTOR, DESIGN TEAM AND APPROPRIATE SUB-CONTRACTORS WILL BE REQUIRED TO FULLY DEVELOP AND DETAIL THE FINAL CONSTRUCTION DETAILS. CONTRACTOR TO USE THEIR EXPERIENCE AND JUDGEMENT TO MAKE SUFFICIENT ALLOWANCES FOR DETAILED DESIGN DEVELOPMENT.

 EXISTING CW SEWER
 EXISTING CW SEWER MANHOLE
 PROPOSED FW DRAIN
 PROPOSED FW PPIC
 PROPOSED FW MINI PPIC
 PROPOSED WASTE POINT CONNECTION
 PROPOSED WADE S/s INTERNAL TRAPPED GULLY
 PROPOSED SW DRAIN
 PROPOSED SW MANHOLE
 PROPOSED SW PPIC
 PROPOSED SW MINI PPIC
 PROPOSED RAINWATER PIPE
 PROPOSED DRAINAGE CHANNEL
 SITE BOUNDARY

ALL 300mm DIA PPICs TO HAVE 450X450 CAST IRON COVER AND FRAME. ALL 450 & 600mm DIA PPICs TO HAVE 600X600 CAST IRON COVER AND FRAME. ALL COVERS & FRAMES IN VEHICULAR AREAS TO BE CLASS D400 AND IN PEDESTRIAN AREAS TO BE CLASS B125. ALL RWP, GULLY AND WPC CONNECTIONS TO BE 100 DIA UNO AND ROADABLE ABOVE GROUND LEVEL. ALL Y-JUNCTION WPCs TO HAVE ABOVE GROUND ROADABLE ACCESS. REFER TO SPECIALIST DRAWING.
DRAINAGE TO BE CO-ORDINATED WITH BELOW GROUND SERVICES.
ALL CHANNEL DRAINAGE TO BE ACO MD100 10.0 OR SIMILAR APPROVED UNLESS OTHERWISE STATED.

P2	14.10.20	EJD	PG	UPDATED TO INFILTRATION	
P1	21.08.20	EJD	PG	TENDER ISSUE	
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D2		TENDER			
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PROJECT		SEN SCHOOLS NORTH HULME			
DRAWER		AS	ENGINEER		EJD
TITLE		PROJECT REFERENCE: 3577			
PROPOSED DRAINAGE GA					
SCALE	SHEET	DRAWING No		REV	
1-250	A1	NHE-SHD-02-XX-DR-C-90101		P2	



GENERAL NOTES

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MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
S01	E:383145.843 N:397076.291	33.198	0.700	450	IC	From CHANNEL, IL=32.498, 100mmØ	To S02, IL=32.498, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S02	E:383160.290 N:397042.347	33.182	0.994	450	IC	From S01 , IL=32.188, 150mmØ From CHANNEL 3, IL=32.188, 100mmØ	To S03, IL=32.188, 150mmØ	600 x 600 D400	CAST IRON COVER AND FRAME
S03	E:383173.760 N:397048.525	33.203	1.139	450	IC	From S02, IL=32.064, 150mmØ	To S04, IL=32.064, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S04	E:383173.451 N:397050.706	33.200	1.156	450	IC	From S03, IL=32.044, 150mmØ	To S05, IL=32.044, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S05	E:383179.461 N:397053.547	33.200	1.287	600	IC	From S04, IL=31.913, 150mmØ	To S06, IL=31.913, 225mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S06	E:383167.395 N:397080.162	33.207	1.433	600	IC	From CHANNEL 5, IL=31.774, 100mmØ From RWP, IL=31.774, 100mmØ From S05, IL=31.774, 225mmØ	To S08, IL=31.774, 225mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S07	E:383156.771 N:397102.683	33.203	2.051	450	IC	From RWP , IL=31.152, 100mmØ From CHANNEL 6, IL=32.177, 100mmØ	To S08, IL=31.152, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
S08	E:383160.785 N:397094.174	33.204	1.557	600	IC	From S06, IL=31.647, 225mmØ From RWP., IL=31.647 , 100mmØ From S07, IL=31.647, 150mmØ	To TANK , IL=31.647, 225mmØ	600 x 600 D400	CAST IRON COVER & FRAME

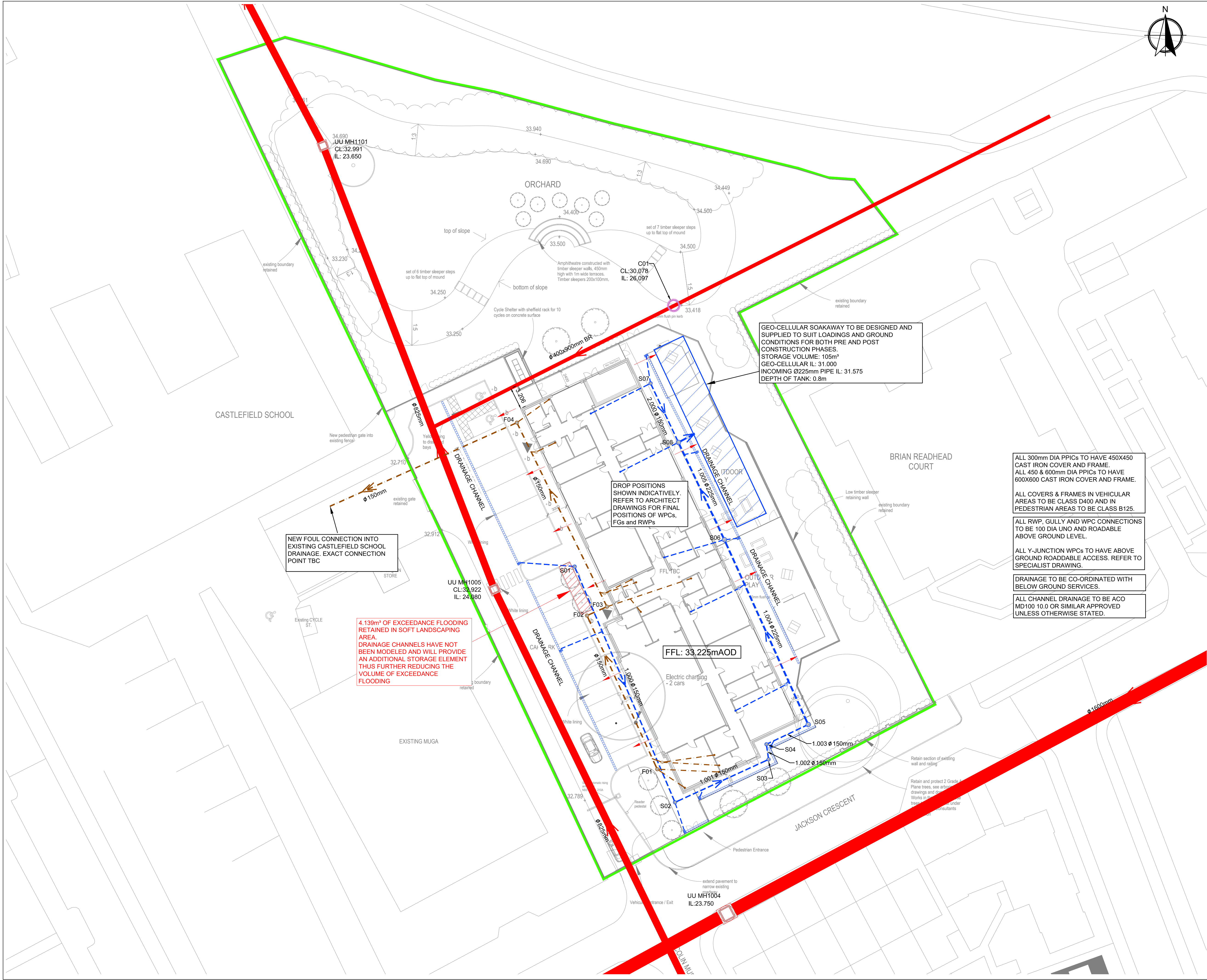
MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
F01	E:383157.738 N:397047.118	33.197	0.801	450	IC	From SVP1, IL=32.396, 100mmØ From SVP, IL=32.396, 100mmØ	To F02, IL=32.396, 150mmØ	600 x 600 D400	CAST IRON COVER AND FRAME
F02	E:383147.625 N:397069.240	33.189	1.097	450	IC	From F01, IL=32.092, 150mmØ	To F03, IL=32.092, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
F03	E:383150.499 N:397070.519	33.225	1.197	450	IC	From F02, IL=32.028, 150mmØ From SVP2, IL=32.028, 100mmØ	To F04, IL=32.028, 150mmØ	600 x 600 D400	CAST IRON COVER & FRAME
F04	E:383137.531 N:397097.020	33.192	1.533	450	IC	From SVP3, IL=31.659, 100mmØ From F03, IL=31.659, 150mmØ	To EX FW, IL=31.659, 150mmØ	600 x 600 D400	CAST IRON COVER AND FRAME

P1	14.10.20	EJD	PG	TENDER ISSUE	
No	DATE	DRAWN	REV'D ENG.	AMENDMENT	

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PROJECT SEN SCHOOLS NORTH HULME			
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TITLE MANHOLE SCHEDULE		PROJECT REFERENCE: 3577	
SCALE 1-250	SHEET A1	DRAWING No NHE-SHD-02-XX-DR-C-90105	REV P1



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FLOW ROUTE DIRECTION

ALL 300mm DIA PPICs TO HAVE 450X450 CAST IRON COVER AND FRAME.
ALL 450 & 600mm DIA PPICs TO HAVE 600X600 CAST IRON COVER AND FRAME.

ALL COVERS & FRAMES IN VEHICULAR AREAS TO BE CLASS D400 AND IN PEDESTRIAN AREAS TO BE CLASS B125.

ALL RWP, GULLY AND WPC CONNECTIONS TO BE 100 DIA UNO AND ROADABLE ABOVE GROUND LEVEL.

ALL Y-JUNCTION WPCs TO HAVE ABOVE GROUND ROADABLE ACCESS. REFER TO SPECIALIST DRAWING.

DRAINAGE TO BE CO-ORDINATED WITH BELOW GROUND SERVICES.

ALL CHANNEL DRAINAGE TO BE ACO MD100 10.0 OR SIMILAR APPROVED UNLESS OTHERWISE STATED.

NEW FOUL CONNECTION INTO EXISTING CASTLEFIELD SCHOOL DRAINAGE. EXACT CONNECTION POINT TBC

4,139m³ OF EXCEEDANCE FLOODING RETAINED IN SOFT LANDSCAPING AREA. DRAINAGE CHANNELS HAVE NOT BEEN MODELED AND WILL PROVIDE AN ADDITIONAL STORAGE ELEMENT THUS FURTHER REDUCING THE VOLUME OF EXCEEDANCE FLOODING

DROP POSITIONS SHOWN INDICATIVELY. REFER TO ARCHITECT DRAWINGS FOR FINAL POSITIONS OF WPCs, FGs and RWPs

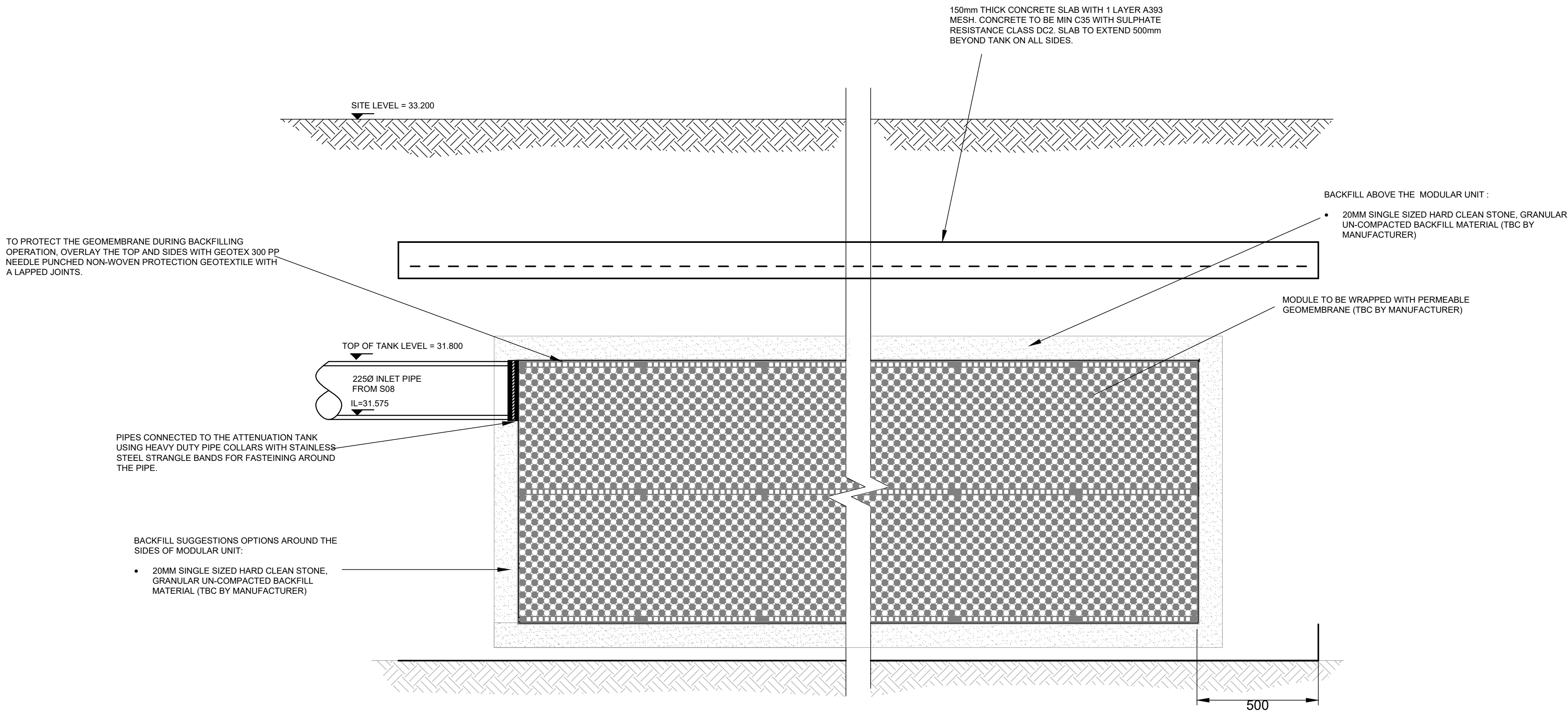
GEO-CELLULAR SOAKAWAY TO BE DESIGNED AND SUPPLIED TO SUIT LOADINGS AND GROUND CONDITIONS FOR BOTH PRE AND POST CONSTRUCTION PHASES.
STORAGE VOLUME: 105m³
GEO-CELLULAR IL: 31.000
INCOMING Ø225mm PIPE IL: 31.575
DEPTH OF TANK: 0.8m

FFL: 33.225mAOD

P1	14.10.20	EJD	PG	PRELIMINARY ISSUE
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CLIENT MANCHESTER CITY COUNCIL				
PROJECT SEN SCHOOLS NORTH HULME				
DRAFTER AS		ENGINEER EJD		
TITLE FLOOD ROUTE PLAN		PROJECT REFERENCE: 3577		
SCALE 1-250	SHEET A1	DRAWING No NHE-SHD-02-XX-DR-C-90106	REV P1	

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TYPICAL DETAILS OF GEO-CELLULAR SOAKAWAY

INLET/OUTLET PIPES MUST BE SUPPORTED WITH CONCRETE TO PROTECT IT DURING BACKFILLING

THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, PILLING MATERIALS, HEAVY PLANTS ETC.,

P1	14.10.20	EJD	PG	PRELIMINARY ISSUE
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
S2	FOR INFORMATION

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CLIENT MANCHESTER CITY COUNCIL

PROJECT SEN SCHOOLS NORTH HULME

DRAFTER AS ENGINEER EJD

TITLE SuDS DETAILS

SCALE	SHEET	DRAWING No	REV
1-20	A1	NHE-SHD-02-XX-DR-C-90107	P1

Appendix B – Hydraulic Calculations

Outputs from the Microdrainage software for the surface water drainage networks serving the development are provided. Pipe references from the hydraulic models can be located on the drainage layout plan.

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	North Hulme	
Date 14/10/2020	Designed by EJD	
File Surface Water Drainage Calcs (Infiltration) 02...	Checked by PG	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes Pipe Manhole Sizes Manhole

FSR Rainfall Model - England and Wales

Return Period (years)	100	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	18.000	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.363	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	0	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Network Design Table for Storm

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
1.000	37.141	0.310	120.0	0.076	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	14.884	0.124	120.0	0.004	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	2.485	0.021	120.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.003	6.647	0.055	120.0	0.001	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	29.233	0.139	210.0	0.073	0.00	0.0	0.600	o	225	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)
1.000	50.00	5.68	32.498	0.076	0.0	0.0	0.0	0.92	16.2	10.3
1.001	50.00	5.95	32.188	0.080	0.0	0.0	0.0	0.92	16.2	10.8
1.002	50.00	5.99	32.064	0.080	0.0	0.0	0.0	0.92	16.2	10.8
1.003	50.00	6.11	32.044	0.081	0.0	0.0	0.0	0.92	16.2	11.0
1.004	50.00	6.65	31.913	0.154	0.0	0.0	0.0	0.90	35.7	20.9

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Micro Drainage	Network 2018.1	

Network Design Table for Storm

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
1.005	26.768	0.127	210.0	0.042	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	9.338	0.093	100.4	0.020	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	2.652	0.016	165.8	0.020	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.007	2.000	0.012	166.7	0.000	0.00	0.0	0.600	o	225	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)
1.005	50.00	7.15	31.774	0.196	0.0	0.0	0.0	0.90	35.7	26.5
2.000	50.00	5.16	32.152	0.020	0.0	0.0	0.0	1.00	17.7	2.7
1.006	50.00	7.20	31.647	0.236	0.0	0.0	0.0	1.01	40.3	32.0
1.007	50.00	7.23	31.000	0.236	0.0	0.0	0.0	1.01	40.2	32.0

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File Surface Water Drainage Calcs (Infiltration) 02...	Checked by PG	
Micro Drainage	Network 2018.1	

Online Controls for Storm

Pump Manhole: TANK, DS/PN: 1.007, Volume (m³): 2.6

Invert Level (m) 31.000

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.200	0.0000	1.200	0.0000	2.200	0.0000	3.200	0.0000	4.200	0.0000	5.200	0.0000
0.400	0.0000	1.400	0.0000	2.400	0.0000	3.400	0.0000	4.400	0.0000	5.400	0.0000
0.600	0.0000	1.600	0.0000	2.600	0.0000	3.600	0.0000	4.600	0.0000	5.600	0.0000
0.800	0.0000	1.800	0.0000	2.800	0.0000	3.800	0.0000	4.800	0.0000	5.800	0.0000
1.000	0.0000	2.000	0.0000	3.000	0.0000	4.000	0.0000	5.000	0.0000	6.000	0.0000

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	North Hulme	
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Date 14/10/2020	File Surface Water Drainage Calcs (Infiltration) 02...	
Micro Drainage		Network 2018.1

Storage Structures for Storm

Cellular Storage Manhole: TANK, DS/PN: 1.007

Invert Level (m) 31.000 Infiltration Coefficient Side (m/hr) 0.08676 Porosity 0.95
 Infiltration Coefficient Base (m/hr) 0.08676 Safety Factor 2.0

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	130.0	130.0	0.800	130.0	166.5	0.801	0.0	166.5

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File Surface Water Drainage Calcs (Infiltration) 02...	Checked by PG	
Micro Drainage		Network 2018.1

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

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.365 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 20

PN	US/MH		Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water	Surcharged	Flooded	Flow / Overflow Cap.	Pipe Flow (l/s)	Status	Level Exceeded
	Name	Storm							Level (m)	Depth (m)	Volume (m³)				
1.000	S01	15 Winter	1	+0%	30/15 Summer	100/15 Summer			32.581	-0.067	0.000	0.57	9.0	OK	5
1.001	S02	15 Winter	1	+0%	30/15 Summer				32.274	-0.064	0.000	0.62	9.3	OK	
1.002	S03	15 Winter	1	+0%	30/15 Summer				32.172	-0.042	0.000	0.86	9.3	OK	
1.003	S04	15 Winter	1	+0%	30/15 Summer				32.136	-0.058	0.000	0.69	9.4	OK	
1.004	S05	15 Winter	1	+0%	30/15 Summer				32.026	-0.112	0.000	0.49	16.3	OK	
1.005	S06	15 Winter	1	+0%	30/15 Summer				31.901	-0.098	0.000	0.60	19.8	OK	
2.000	S07	15 Winter	1	+0%	100/360 Winter				32.191	-0.111	0.000	0.15	2.4	OK	
1.006	S08	15 Winter	1	+0%	30/15 Summer				31.807	-0.064	0.000	0.85	23.4	OK	
1.007	TANK	180 Winter	1	+0%	30/15 Winter				31.164	-0.061	0.000	0.00	0.0	OK	

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The Flint Glass Works 64 Jersey Street Manchester M4 6JW	North Hulme	
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File Surface Water Drainage Calcs (Infiltration) 02...	Checked by PG	
Micro Drainage	Network 2018.1	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.365 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S01	15 Winter	30	+0%	30/15 Summer	100/15 Summer			33.025	0.377	0.000	1.08		16.9	FLOOD RISK
1.001	S02	15 Winter	30	+0%	30/15 Summer				32.673	0.335	0.000	1.24		18.5	SURCHARGED
1.002	S03	15 Winter	30	+0%	30/15 Summer				32.521	0.306	0.000	1.72		18.7	SURCHARGED
1.003	S04	15 Winter	30	+0%	30/15 Summer				32.450	0.256	0.000	1.38		18.9	SURCHARGED
1.004	S05	15 Winter	30	+0%	30/15 Summer				32.368	0.229	0.000	1.00		33.3	SURCHARGED
1.005	S06	15 Winter	30	+0%	30/15 Summer				32.223	0.224	0.000	1.30		43.2	SURCHARGED
2.000	S07	15 Winter	30	+0%	100/360 Winter				32.216	-0.086	0.000	0.38		5.9	OK
1.006	S08	15 Winter	30	+0%	30/15 Summer				31.996	0.124	0.000	1.96		54.0	SURCHARGED
1.007	TANK	240 Winter	30	+0%	30/15 Winter				31.487	0.262	0.000	0.00		0.0	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

US/MH		Level
PN	Name	Exceeded
1.000	S01	5
1.001	S02	
1.002	S03	
1.003	S04	
1.004	S05	
1.005	S06	
2.000	S07	
1.006	S08	
1.007	TANK	

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Date 14/10/2020	Designed by EJD	
File Surface Water Drainage Calcs (Infiltration) 02...	Checked by PG	
Micro Drainage	Network 2018.1	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Manhole Headloss Coeff (Global) 0.500 MADD Factor * 10m³/ha Storage 2.000
 Hot Start (mins) 0 Foul Sewage per hectare (l/s) 0.000 Inlet Coefficient 0.800
 Hot Start Level (mm) 0 Additional Flow - % of Total Flow 0.000 Flow per Person per Day (l/per/day) 0.000

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

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.365 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	S01	15 Winter	100	+20%	30/15 Summer	100/15 Summer			33.202	0.554	4.139	1.35	21.2		FLOOD
1.001	S02	15 Winter	100	+20%	30/15 Summer				33.094	0.755	0.000	1.42	21.2		FLOOD RISK
1.002	S03	15 Winter	100	+20%	30/15 Summer				32.999	0.784	0.000	1.96	21.2		FLOOD RISK
1.003	S04	15 Winter	100	+20%	30/15 Summer				32.954	0.760	0.000	1.55	21.2		FLOOD RISK
1.004	S05	15 Winter	100	+20%	30/15 Summer				32.896	0.758	0.000	1.36	45.5		SURCHARGED
1.005	S06	15 Winter	100	+20%	30/15 Summer				32.624	0.625	0.000	1.86	61.6		SURCHARGED
2.000	S07	360 Winter	100	+20%	100/360 Winter				32.425	0.123	0.000	0.09	1.4		SURCHARGED
1.006	S08	360 Winter	100	+20%	30/15 Summer				32.424	0.553	0.000	0.60	16.5		SURCHARGED
1.007	TANK	360 Winter	100	+20%	30/15 Winter				32.423	1.198	0.000	0.00	0.0		SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

US/MH Level		
PN	Name	Exceeded
1.000	S01	5
1.001	S02	
1.002	S03	
1.003	S04	
1.004	S05	
1.005	S06	
2.000	S07	
1.006	S08	
1.007	TANK	

Appendix C – Infiltration Test Results

Site : North Hulme Adventure Playground

Client : ISG

Engineer :

Job Number

LKC 20 1737

Sheet

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Location	Date	Level	Location
SA101	18/09/2020	34.00 mOD	SA101

Pit Width (m)	1.20
Pit Depth (m)	3.00
Pit Length (m)	2.70

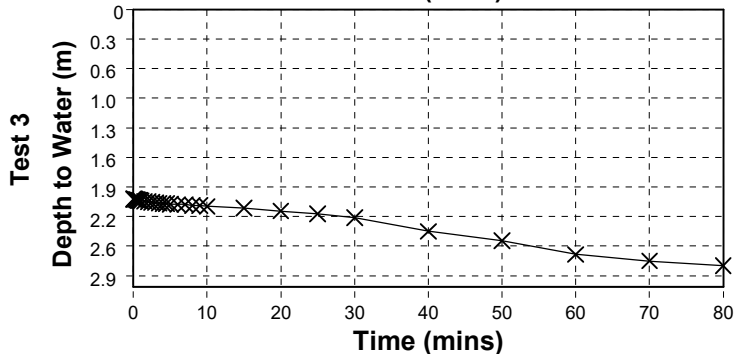
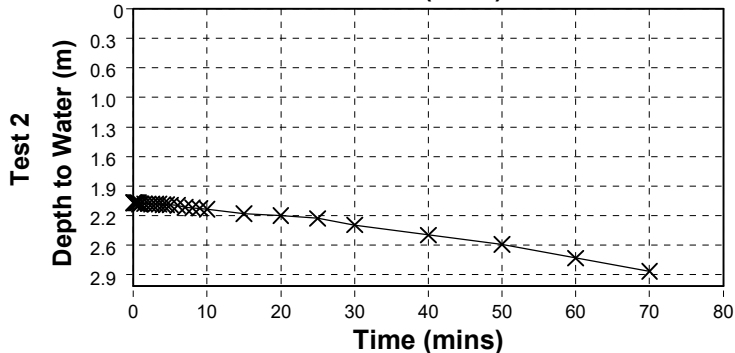
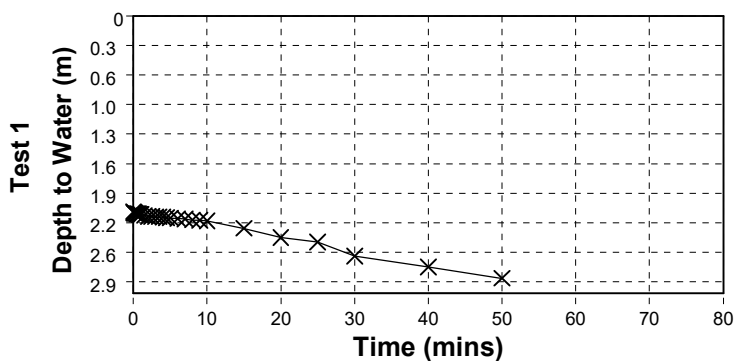
Soil type at test level	gravelly SAND with cobble and boulders content
Groundwater	none recorded
Drain discharge depth	2.12
Sidewall stability	stable
Stone filled or open pit	Stone filled

	1	2	3
Effective depth (m)	0.88	0.90	0.95
Volume outflowing between 75% & 25% (m3)*	0.43	0.44	0.46
Mean surface area through which outflow occurs (m2)	6.67	6.75	6.95
Time for outflow between 75% & 25% (min)	28.00	36.43	46.00
SOIL INFILTRATION RATE (ms-1), f	3.82E-5	2.96E-5	2.41E-5

Remarks

* Volume outflowing reduced to account for granular backfill used during testing (30 % of free volume assumed).

Elapsed time (hh:mm:ss)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
00:00:00	2.12	2.10	2.05
00:00:05	2.13	2.10	2.05
00:00:10	2.135	2.10	2.05
00:00:20	2.14	2.10	2.055
00:00:30	2.145	2.10	2.06
00:00:40	2.145	2.10	2.065
00:00:50	2.15	2.115	2.065
00:01:00	2.15	2.11	2.07
00:01:30	2.16	2.11	2.075
00:02:00	2.17	2.11	2.08
00:02:30	2.17	2.115	2.085
00:03:00	2.175	2.115	2.09
00:03:30	2.175	2.115	2.095
00:04:00	2.18	2.12	2.10
00:04:30	2.185	2.12	2.10
00:05:00	2.19	2.125	2.105
00:06:00	2.195	2.13	2.11
00:07:00	2.20	2.15	2.11
00:08:00	2.21	2.155	2.12
00:09:00	2.215	2.16	2.12
00:10:00	2.22	2.17	2.13
00:15:00	2.30	2.22	2.15
00:20:00	2.40	2.24	2.18
00:25:00	2.45	2.27	2.21
00:30:00	2.60	2.34	2.25
00:40:00	2.72	2.45	2.40
00:50:00	2.84	2.55	2.50
01:00:00		2.70	2.65
01:10:00		2.84	2.72
01:20:00			2.77



Excavation Method

Machine excavated trial pit to 3.0mbgl for percolation testing.

Dimensions

1.2x2.7x3.0m deep

Ground Level (mOD)

34.00

Client

ISG

Job Number

LKC 20 1737

Location (Handheld GPS)

383171 E 397091 N

Dates

18/09/2020

Engineer
Sheet

1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						MADE GROUND: Blackish brown gravelly slightly sandy clayey SILT with occasional brick fragments, rootlets, rare plastic, glass, ash and clinker. Sand is medium. Gravel is fine to medium, subangular to subrounded of mixed lithologies. Layer of ash and clinker noted at 0.3m. Brick layer noted between 0.6-1.3m at the SE side of pit. Probable relict foundations.		
				32.70	1.30 (0.20)	Firm consistency orangey brown slightly gravelly sandy CLAY. Sand is medium. Gravel is fine to medium subrounded of mixed lithologies.		
				32.50	1.50 (0.30)	Yellowish brown slightly gravelly silty SAND. Sand is medium. Gravel is fine to medium, subrounded of mixed lithologies. Strata is wet.		
				32.20	1.80 (1.20)	Light brown very gravelly SAND with low cobble and boulders content. Sand is medium to coarse. Gravel is fine to coarse, subrounded to rounded of mixed lithologies.		
				31.00	3.00	Complete at 3.00m		


Remarks

Elevation estimated from www.freemaptools.com/elevation-finder.
Handheld GPS used for location and elevation. GPS coordinates accurate to 3-5m.
Trial pit dry and stable.
Filled with clean stone to perform percolation testing.

Scale (approx)

1:25

Logged By

AM

Figure No.

LKC 20 1737.SA101