



Drainage Strategy
for
Proposed Development
Lyneham
Whiston L35 3TH

Client Name: The Built Group
Our ref: LRD32267
Date: August 2022
Revision: 003



SUTCLIFFE

Drainage Strategy

DOCUMENT VERIFICATION

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01	AUG 2022	Issued for Planning	DS	MP	DS
02	Sep 2022	Amended to suit revised Layout	DS	MP	DS
03	Feb 2023	Layout amended to planners request	DS	MP	DS

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1.0 Site Description and Proposals

The site is currently partly occupied with a car park and grassed land.

The total site area is approximately 0.44Ha

The site is to be developed with housing (19 units) and a new car park for the former pub, now a shop, is to be provided.

The site can be located by the following references.

Postcode L35 3TH

Coordinates 347800, 390980

Grid reference SJ478909

A copy of the existing and proposed sites are included in Appendix A.

2.0 Existing Flood Risk

An inspection of the Environment Agency flood maps reveals the following flood risk.

- That the site is located within a Zone 1, very low risk flood area and the site is, therefore, considered not to be at risk of flooding from rivers or sea.
- That the site is not at risk from surface water flooding.
- That the site is not at risk from flooding from reservoirs or other man-made water features

Therefore, from the above observations we confirm that the site has a very low flood risk from all sources.

3.0 Drainage Hierarchy

3.1 Infiltration to ground

Infiltration to ground is, in the main, provided by the provision of soakaways and permeable paving.

To provide infiltration via soakaways the ground conditions must be suitable to allow infiltration to occur and the ground water table must be at least 1.0m below the base of any soakaways provided.

To allow infiltration via permeable paving the ground conditions must be suitable to allow infiltration to occur.

Soakaways cannot be located within 5m of boundaries, highways or existing / proposed buildings.

The site has few areas that could accommodate soakaways, should infiltration be available.

3.1.1 Underlying geology

From the ground investigation the superficial deposit is noted as boulder clay and the solid geology is noted as being sandstone across the site.

3.1.2 Intrusive ground investigation

From the Phase 2 Interpretative Ground Assessment the ground investigation logs record the ground as generally having a band of made ground to depths of between 0.3m and 0.9m below existing ground levels overlying medium dense reddish brown slightly silty fine to medium grained sand. Trial holes were extended to a depth of no more than 2m.

A copy of the borehole logs are included in Appendix B.

3.1.3 British Geological Survey

A review of the BGS web site for logs in and around the proposed site, at the following web site address, [Borehole records - British Geological Survey \(bgs.ac.uk\)](http://bgs.ac.uk), was made.

No borehole records within meaningful distance of the site were indicated.

3.1.4 Infiltration Test

Two infiltration tests in accordance with BRE365 have been carried out.

No infiltrate rate was able to be calculated due to the nature of the ground.

There was slight movement of water within the test pits but not enough to calculate an infiltration rate..

The infiltration report is included in Appendix C.

3.2 **Discharge to a Water Course**

An inspection of historic / current maps and the Environment Agency maps reveal that there are no water courses located in the vicinity of the site.

The nearest water course is located approximately 350m to the east of the site on the opposite side of land known as Whiston Woods. No name for the water course is available.

3.3 **Discharge to surface water network**

A review of the existing drainage network within the surroundings of the development site was made and of United Utility sewer records. The review indicated that there is a surface water sewer within Lyneham, south of the site.

The diameter of the sewer is recorded as 300m Ø at a depth of approximately 3.35m deep.

3.4 **Discharge to combined sewer**

A review of the existing drainage network and of United Utility sewer records within the surroundings of the development site was made and of United Utility sewer records.

The review indicated that there are no combined sewers located in the vicinity of the site.

A copy of the existing drainage drawings are included in Appendix D.

4.0 Existing site surface water drainage

There is currently existing surface water drainage on site serving the car park area and is recorded as being no deeper than 1m below existing ground levels. The drainage does not drain any surface water from off the site.

A 225mm Ø surface water drain was located on site that drains houses from off site. This drain will be affected by the development and will require to be diverted.

There is a 300mm Ø surface water sewer located within Lyneham at an approximate depth of 3.0m.

A copy of the existing drainage network is included in Appendix D.

5.0 Proposed surface water drainage

From the above drainage hierarchy discussions evidence has been collected and recorded and the following discussion can be said.

Infiltration:	This is not possible as no infiltration rate was proved from the infiltration test.
Water course:	No water course is available within reasonable distance of the site.
Surface water sewer:	A surface water sewer is available located in the road (Lyneham) to the south of to the site.

The above discussion of the surface water drainage hierarchy has indicated that the proposed surface water drainage discharge point will be to the 300mm Ø surface water sewer located in Lyneham. The surface water drainage located within the site was investigated but proved to be too shallow to allow a connection from the development.

The NPPF, paragraph 196, states that major developments should incorporate SuDS unless there is clear evidence that it would be inappropriate.

The below table lists the potential SuDS options and identifies whether the SuDS element is site appropriate and also provides a brief commentary as to its suitability for this development in relation to the site layout provided.

SuDS Option	Appropriate To Development	Comments
Soakaways	N	No infiltration rates were obtained for either of the infiltration tests carried out.
Infiltration basin	N	Not appropriate for this project.
Sand filter	N	Not appropriate for this project.
Filter strip	N	Not appropriate for this project.
Filter drains	N	Not appropriate for this project.
Detention basin	N	Not appropriate for this project.
Swales	N	Not appropriate for this project.
Rainwater harvesting / Rainwater Butts	P	RWH is a possibility for this site. Rainwater Butts are a possibility for this site
Green roofs	N	Green roofs are not appropriate for general housing where pitched roofs are provided.
Geo-cellular storage systems	P	These are a potential storage method and should be wrapped in geo membrane to retain the attenuated surface water so it can be discharged in a controlled manner.
Permeable pavements	P	Due to the nature of the site layout, proposed services to each house (drainage, gas, electric etc.) it would not be practical to provide permeable paving to all plots but may be applicable to shared parking areas, where services are less likely to interfere. A lined system would be required as infiltration is not possible.
Ponds	N	Not appropriate for this project.
Oversized pipes	Y	These will be required to satisfy United Utilities as part of the proposed Section 104 Agreement that will be entered into to formally adopt the drainage located under the proposed adopted highway.
Tanks	P	A possible alternative to geo-cellular storage system, but generally more expensive, but may be required due to the location of required off line attenuation adjacent to the proposed highway.
Flow control devices	Y	Required to control off site discharge rates .

Where; Y: Suitable for use on a project of this size and nature
N: Not suitable for use on a project of this size and nature
P: Potentially suitable for use on a project of this size and nature

The following SuDS features have been identified as being potentially appropriate for this development.

The client has stated that rainwater harvesting is not appropriate for this development due to the density of the development and available space. Rainwater butts are acceptable to the client and are usually provided to the rear of the properties where re-use of the water is most likely.

Geo-cellular storage systems can be utilised as offline attenuation for storm events that are greater than 30 year events, up to the 100 year storm event including an allowance for climate change and urban creep.

Permeable paving may be a potential option but will not be used as attenuation due to the S104 adoption requirements that all surface water attenuation is retained within the sewer network up to and including the 30 year storm event. Permeable paving will, however, provide benefit for interception and water quality and are discussed in later sections of this drainage strategy.

Oversized pipes will be used to accommodate the storm events up to and including the 30 year storm events as part of the Section 104 sewers. If drainage is not offered for adoption then it is likely that oversized pipes will be replaced by a geo-cellular attenuation system for all storm events up to and including the 100 year rainfall event with an allowance for climate change.

Tanks may be required in lieu of geo-cellular attenuation and will depend on discussion with the Highway Authority in relation to the location of the required off line attenuation but is not likely to be required.

A flow control device will be required to reduce the surface water discharge from the site at green field runoff rates.

Therefore, from the above it is proposed to use a traditional drainage network, with off line attenuation, will be provided for this development. The client has stated that permeable paving and water butts are acceptable SuDS solutions that can be incorporated into the drainage scheme, as appropriate.

6.0 Climate Change and Urban Creep

6.1 Climate Change

From the DEFRA website the current peak rainfall allowances are provided.

Climate change allowances for peak rainfall in England allowances for the 2050's and the 2070's.

The life span for residential housing is taken as 100 years, which puts the allowance for consideration of climate change into the 2070's.

Climate change allowances are provided for both 30 year and 100 year annual exceedance rainfall events

The following information is provided by the EA on the DEFRA web site.

Catchment:	Lower Mersey Management Catchment
Central allowance 30 year:	30%
Higher allowance 30 year:	40%
Central allowance 100 year:	30%
Higher allowance 100 year:	45%

For this development we will use climate change values provided for the 100 year annual exceedance rainfall events, due to the lifetime of the development.

6.2 Urban Creep

Urban creep is the conversion of permeable surfaces to impermeable over time, e.g. impermeable surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas. The consideration of urban creep (is best) assessed on a site by site basis but is limited to residential development only.

It is important that the appropriate allowance for urban creep is included in the design of the drainage system over the lifetime of the proposed development. The allowances are set out in the Non-statutory technical guidance for sustainable drainage.

This development has a density of 19 dwellings within a site area of 0.44 Ha.

Therefore, the residential development density, dwellings per hectare, is 43.2%.

From the guidance provided an urban creep factor of 4% is applicable.

It should be noted that urban creep is not applicable to flats or apartments.

Therefore, urban creep will only be provided to plots 1 – 7 for this development.

7.0 Discussions with Utility Company

A pre-development enquiry was submitted to United Utilities and their response is included in Appendix H.

It states that we should follow the hierarchy of drainage options which we have discussed above. Where infiltration and discharge to water course can be discounted then a surface water discharge to a surface water sewer will be permitted at a maximum discharge rate of 5 l/s

United Utilities have requested that any surface water connection to their network be to the existing 300mm Ø surface water sewer in Lyneham.

8.0 Proposed surface water discharge rate

The site has been previously developed and is also partly drained by an existing car park that is currently drained.

It will not be possible to drain the development using the existing drainage and so the site is, therefore, classed as greenfield runoff.

The SuDS Manual, C753, and DEFRA Technical Standards direct the developer to discharge surface water at greenfield runoff rates.

Greenfield runoff rates for the site have been calculated as being.

Q_{bar} : 2.5 l/s

Q_{1yr} : 2.2 l/s

Q_{2yr} : 2.3 l/s

Q_{30yr} : 4.2 l/s

Q_{100yr} : 5.2 l/s

The above greenfield runoff rate, Q_{bar} , is not reasonable to maintain throughout the life time of the development.

In accordance with advice provided by the Defra / Environment Agency's report "Rainfall runoff management for developments" (Report SC030219) it is stated that a practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while keeping the risk of blockage to an acceptable level. This limit is set at 5 l/s, using an appropriate vortex or other flow control device.

Therefore, it is reasonable to manage and discharge surface water from the site at a runoff rate of 5.0 l/s.

This proposed discharge rate also accords with United Utilities requirements.

A copy of the greenfield calculation is included in Appendix E.

9.0 SuDS interception

The SuDS Manual, C753, seeks to intercept the first 5mm of rainfall.

Interception is deemed to be delivered using one or a combination of the following.

- Rainwater harvesting / butts
- Infiltration
- Evapotranspiration using temporary shallow ponding or storage within the soil or upper aggregate layers

Additional interception methods are identified in C753, table 24.6.

The below table lists the potential interception options and identifies whether the element is site appropriate and also provides a brief commentary as to its site suitability for this development in relation to the site layout provided.

Interception System	Interception methods that can be assumed to be compliant for zero runoff from the first 5mm rainfall for 80% of events during the summer and 50% in the winter	Comments for provision / non provision of interception system
Green Roof	All surfaces that have green roofs	Not appropriate for this project.
Rainwater harvesting system / Water butts	All surfaces drained to RWH systems designed to BS 8515:2009+A1 whether for surface water management or just water supply, provided the RWH design is based on regular daily demand for non-potable water	The client has stated that the use of a rain water harvesting tanks are not practical due to their high installation and maintenance costs, which would be borne by the housing association and not the occupier. The client stated that rainwater butts are acceptable to them.
Soakaway or other infiltration system	Areas of the site drained to systems that are designed to infiltrate runoff for events greater than a 1 month return period. Note: design of the infiltration system should be in accordance with C753 chapters 14 & 25	This is not possible for this site due to no infiltration via soakaways being possible.
Permeable pavements	All permeable pavements (lined or unlined) can be deemed to comply. Where the pavement also drains an adjacent impermeable area, compliance can be assumed when the permeable pavement is not lined. Refer to C753 for more details and description. Where the pavement also drains adjacent impermeable areas and is lined it is deemed not to comply	Permeable paving is acceptable to the client where appropriate and is likely to be more appropriate to shared parking areas. The highway will not be permeable due to adoption requirements and / or services / sewers.
Filter strips / swales	Refer to C753 for compliance notes	Not appropriate for this project.
Infiltration trenches	Roads drained by infiltration trenches can be considered to provide interception	Not appropriate for this project.
Detention basins	Refer to C753 for compliance notes	Not appropriate for this project.

Bioretention area and rain water gardens	Refer to C753 for compliance notes	Not appropriate for this project.
Ponds	Areas drained by ponds that is maintained by the provision of an outlet structure are not deemed to intercept	Not appropriate for this project.
Evapotranspiration using temporary shallow ponding or storage within the soil or upper aggregate layers	Refer to C753, Box 24.3 for design requirements	Appropriate for patio areas where levels allow runoff.

From the above table we have identified which interception systems may, or may not, be appropriate for this development.

The only form of potential interception is permeable paving to the private driveways. Some of the private driveways will not be suitable due to incoming services and drainage chambers as listed in the above table. If permeable paving is provided then it will be required to be lined due to infiltration not being available for this site.

10.0 Water quality management

Water quality needs to be considered in accordance with Section 26 of the SuDS manual.

We need to allocate suitable hazard indices (Table 26.2, C753) as follows.

Land Use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very Low	0.2	0.2	0.05
Property drives	Low	0.5	0.4	0.4
Total Indices	N/A	0.7	0.6	0.45

We determine the pollution mitigation indices in accordance with Table 26.3, C753 as follows.

SuDS Component	Mitigation indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8

Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.
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From the above table there is only 1 appropriate options to provide water quality management, which is permeable paving. Permeable paving can be provided to all shared driveways / parking areas.

We do not consider the use of permeable driveways to private drives due to the density of the development and the provision of drainage and service access requirements.

From the tables above the total mitigation index is required to be greater than or equal to the pollution hazard index, as below table.

	Total suspended solids (TSS)	Metals	Hydro-carbons
Total hazard indices	0.7	0.6	0.45
Total mitigation indices	0.7	0.6	0.7

11.0 Proposed surface water drainage layout

From the above discussions and decision making processes the following surface water drainage network is proposed.

The maximum surface water discharge rate from the site will be set at 5.0 l/s in accordance Defra / Environment Agency's report "Rainfall runoff management for developments" (Report SC030219) and United Utilities requirements.

This discharge rate is reasonable and can be managed and maintained throughout the lifetime of the development.

From the above discussion and evidence we confirm that the proposed drainage layout will discharge into the existing surface water sewer located in Lyneham. The existing surface water sewer is a 300mm Ø. This is the surface water sewer that United Utilities have directed surface water discharge to, following our investigation of the drainage hierarchy.

The onsite drainage will consist of a piped drainage network in conjunction with an off line geo-cellular attenuation tank to manage surface water discharge from the site to a maximum rate of 5.0 l/s up to and including a 1 in 100 year storm event including an allowance of 30% for climate change.

The drainage system will then be interrogated for a climate change of 45% that will identify the sensitivity of the site to climate change. The purpose of the check is to ensure that should flooding occur then no property is affected.

A copy of the proposed preliminary drainage layout is included in Appendix F.

A copy of the drainage areas plan indicating both permeable and impermeable areas is included in Appendix F.

Hydraulic calculations have been carried out for the 1 year, 2 year, 30 year and 100 year + 30% & 45% climate change. A copy of the calculations are included in Appendix E.

12.0 Flood exceedance / Drainage failure / Sensitivity test

There is no flooding up to and including the 100 year storm event with an allowance of 30% for climate change and the discharge rate does not exceed 5.0l/s.

There is no flooding up to and including the 100 year storm event with an allowance of 45% for climate change and the discharge rate does not exceed 6.0l/s.

In accordance with paragraph 167 (d) of the NPPF, we need to confirm that in the event of a drainage failure, or flood exceedance, event, that the development will remain safe and will not increase flood risk elsewhere and be safely managed.

The drainage network was interrogated using the higher allowance of 45%. The discharge rate did not exceed 6.0 l/s, but did not flood

A flood flow analysis was carried out for a 360 minute winter 100 year storm event with an allowance of 45% climate change for a storm duration. No flooding occurred so the discharge rate was reduced to 2.5 l/s to simulate a restricted discharge structure and to force flooding of the drainage system.

The results were saved and the output has been included on the flood exceedance drawing included in Appendix G.

Flooding was found to occur at the discharge of the new drainage network. The flooding is seen to flow from the offline cellular attenuation. It flows in an easterly direction through the rear area to the flats (plots 8 – 19) where it will re-enter the existing sewer network via existing road gullies in the cul-de-sac adjacent to plot 19.

Flooding does not exceed 50mm for the main of the flood routing, with the exception of a small area within the car parking area, that does not exceed 100mm and will be contained by kerbs.

Where there are vulnerable properties within a development, that cannot be relocated for whatever reason, it is necessary to incorporate appropriate flood resilience so that, in the event of a flood they can be brought back into use without significant refurbishment.

This site does not have any vulnerable properties and there are no properties affected by flooding. All exceedance flooding is retained within garden, shared parking and highway areas.

It can be seen from the exceedance / residual flooding drawing that there is safe access and egress to all plots in a flood event.

13.0 Management & Maintenance Plan

A Management & Maintenance Plan is required to ensure that the SuDS elements are maintained and managed to ensure they remain effective throughout the lifetime of the development.

Chapter 32 of The SuDS Manual, C753, provides information of maintenance requirements for SuDS systems.

This section of the drainage strategy will be developed in line with the end user so that they can have an input as to how it will be managed.

The end user will be a Housing Association and so the management and maintenance plan will require to be developed in line with their procedures.

At this stage of the design process we would request a planning condition in relation to Management & Maintenance.

The elements that will require maintenance are the permeable paving, rainwater butts and cellular attenuation.

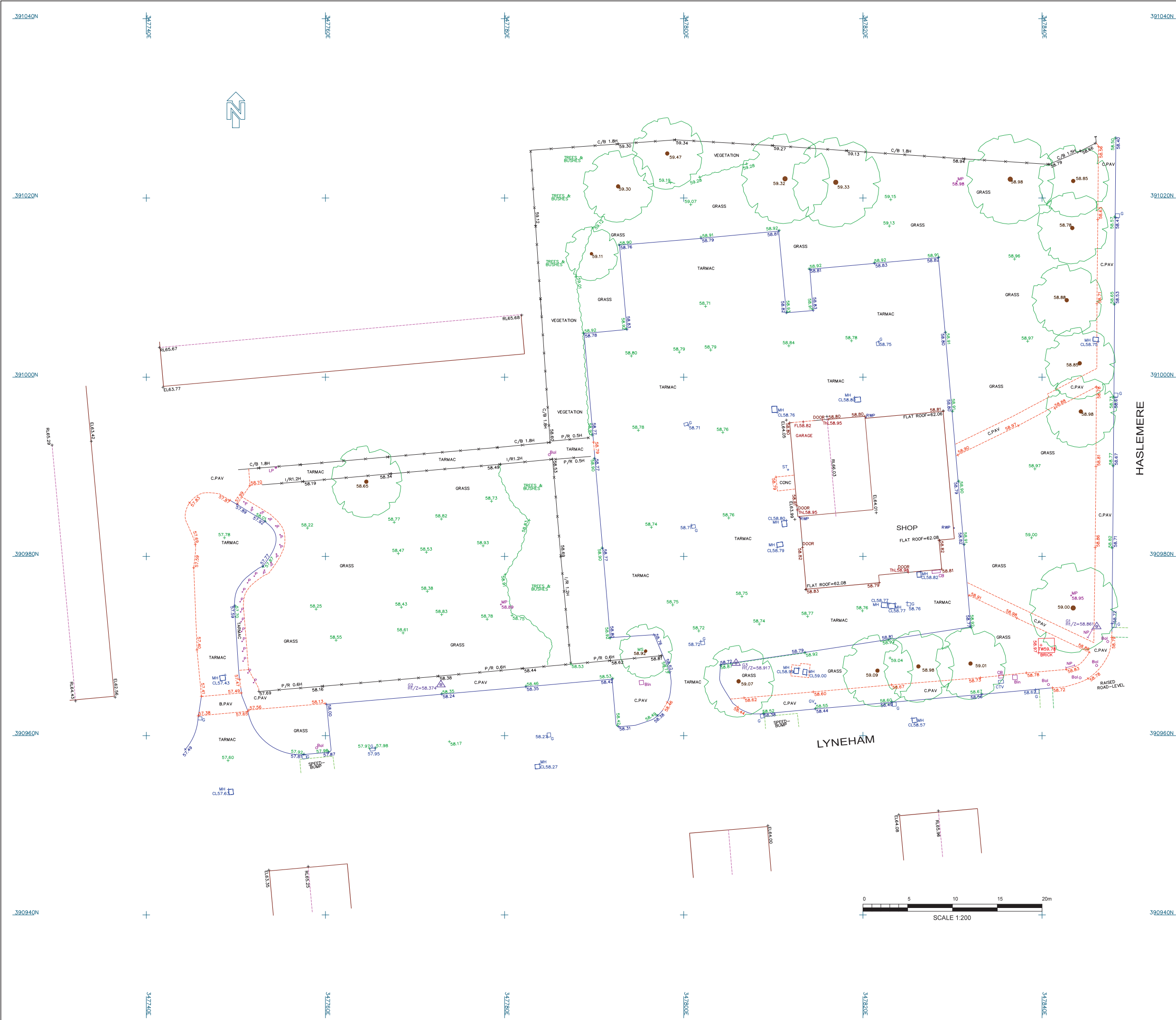
It is currently anticipated that the oversized pipes and flow control device will be adopted by United Utilities and it will become their responsibility to maintain them accordingly, once the final adoptions have taken place. If they do not become adopted then the Housing Association will be responsible for their maintenance.

It is currently anticipated that the highway will become adopted and so road gullies will become the responsibility of the adopting authority once final adoptions have taken place. If they do not become adopted then the Housing Association will be responsible for their maintenance.

Appendix A

Existing Site Layout

Proposed Site Layout



SYMBOLS

TREE

BENCH-MARK

STATION (WITH LEVEL)

BUILDING-LINE (AT GROUND)

FENCELINE -

GATE

HEDGE

LIMIT OF TREE CANOPY / BUSHES / SHRUBS

C/B CLOSE-BOARD

C/L CHAIN-LINK

C/P CONC. PANEL

VR RAILINGS OR PALLISADE

P/C POST & CHAIN

P/R POST & RAIL

P/W POST & WIRE

PAL PALINGS

ABBREVIATIONS

ACD "ACD" DRAINAGE CHANNEL

AV AIR-VALVE COVER

B.PAV BLOCK PAVING

BdL BED-LEVEL

BH BOREHOLE (WITH GROUND-LEVEL)

Bin LITTER-BIN

BoI BOLLARD

BT B.TELECOM IC

C.PAV CONCRETE PAVING (FLAGS)

Cam CAMERA/CAMERA-POLE

CB CONTROL-BOX

CHAN CHANNEL/SLOT-DRAIN

CHT CEILING HEIGHT

CqL CEILING LEVEL

CL COVER-LEVEL

CDBS STONE COBBLES

CONC CONCRETE

C-L CROWN LEVEL

CTV CABLE TV POINT/IC

EIC ELECTRIC IC

EL EAVES LEVEL

EP ELECTRIC-POLE

ER EARTH-RD

FB FOOTBRIDGE

TH FIRE HYDRANT COVER

FL FLOODLIGHT

F.L. FLOOR LEVEL

FP FLAGPOLE

G GULLEY

GL GROUND-LEVEL

Gri GRILLE-COVER

H HEIGHT (IN METRES)

HD HANDRAIL / SAFETY-RAIL

IL INVERT LEVEL

IC INSPECTION CHAMBER

IP INLET PIPE

IS INFORMATION SIGN

KD KERB-OUTLET

LB LETTER-BOX

LP LAMP POST

MH MANHOLE

MP MONITORING-POINT

NP NAME-PLATE

DGP OVER-GROUND PIPE/CONDUIT

DHE OVERHEAD ELECTRIC CABLE(S)

DHG OVERHEAD GANTRY/PIPE-BRIDGE

DHP OVERHEAD PIPE(S)

DHT OVERHEAD TELECOM CABLE(S)

DP OUTLET or DUTFALL PIPE

DSBM ORDNANCE SURVEY BENCH-MARK

P POST

PV PIPE (VERTICAL)

PZ PIEZOMETER (WITH GROUND-LEVEL)

RE RODDING-EYE

RL RIDGE LEVEL

RS ROAD-SIGN

RWP RAINWATER PIPE

S.PAV STONE PAVING

Sap SAPLING

SB SIGN-BOARD

Scht SUSPENDED-CEILING HEIGHT

SETTS STONE SETTS

ST STOP-TAP

Stp TREE-STUMP

SV STOP-VALVE

TAC TACTILE PAVING

TAR TARMAC

TBC TO BE CONFIRMED (ON-SITE)

TBM TEMPORARY BENCH-MARK

TCB TELEPHONE CALL-BOX

TEL TELECOM BOX

TL THRESHOLD LEVEL

TL TRAFFIC LIGHT

TP TELECOM POLE

TW TOP OF WALL LEVEL

UL UPLIGHTER

UTL UNABLE TO LIFT

UTS UNABLE TO SURVEY (ACCESS ISSUE)

U/S UNDERSIDE (SOFFIT)

VP VENT-PIPE

WL WATER LEVEL

WM WATER METER COVER

VO WASHOUT VALVE COVER

VV WATER VALVE COVER

NOTES

1. This survey has been presented at the survey scale indicated below with its accuracy commensurate with that scale.

2. All heights and levels in metres (u.o.n.)

3. All levels are at ground u.o.n.

CONTROL STATIONS				
REF	EASTING	NORTHING	LEVEL	TYPE
G1	347846.102	390972.186	58.861	NAIL
G2	347772.890	390965.699	58.374	NAIL
G3	347805.839	390968.101	58.917	NAIL

SURVEY GRID

ORDNANCE SURVEY OSGB36 NATIONAL GRID AT STATION G1.

GPS OBSERVATIONS ON ETRS89 TRANSFORMED USING OSTN02.

SURVEY THEN TRANSFORMED TO A SCALE FACTOR OF 1.000000 FROM STATION G1

LEVEL DATUM

ORDNANCE SURVEY DATUM NEWLYN (ODN) BY GPS OBSERVATIONS AT STATION G1

TRANSFORMED FROM ETRS89 USING OSGM02 GEIOD

REV	DESCRIPTION	CHECKED	DATE	BY	CHK	DATE
0	ORIGINAL ISSUE			MPW	LW	11/03/22
REV	DESCRIPTION	CHECKED	DATE	BY	CHK	DATE
DRAWN	MPW	CHECKED	LW	DATE	11 MARCH 2022	

TITLE

TOPOGRAPHICAL SURVEY AT
LYNEHAM & HASLEMERE
WHISTON, MERSEYSIDE L 35 3TH

CLIENT

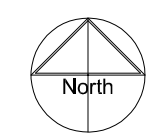
BUILT GROUP LTD

SURVEYED BY

GEOSPATIAL
ENGINEERING
SERVICES LTD

ANFIELD BUSINESS CENTRE
58 BRECKFIELD ROAD SOUTH
LIVERPOOL L6 5DR
TEL 0151-280-2021
EMAIL: mail@GESuk.net

CAD FILE	01126.DWG	SCALE	1 : 200	SHT. SIZE	A1
DRAWING No	01126			REVISION	O



- KEY**
- Application Site
 - Existing Shop
 - Trees to be removed
 - New trees
 - Footpaths
 - Natural grey concrete slabs or setts
 - Rowlawn turf/ Amenity
 - +58.68 Existing Levels
 - +58.72 Proposed Levels
 - Section Planes (see PLN15 and PLN16)
 - Electric Vehicle Charging
 - Shop Car Parking

Schedule of Accommodation

4 x 2bed Houses
3 x 4bed Houses
12 x 2bed Cottage Flats

TOTAL 19 Dwellings

31 NEW RESIDENT CAR PARKING BAYS

A3

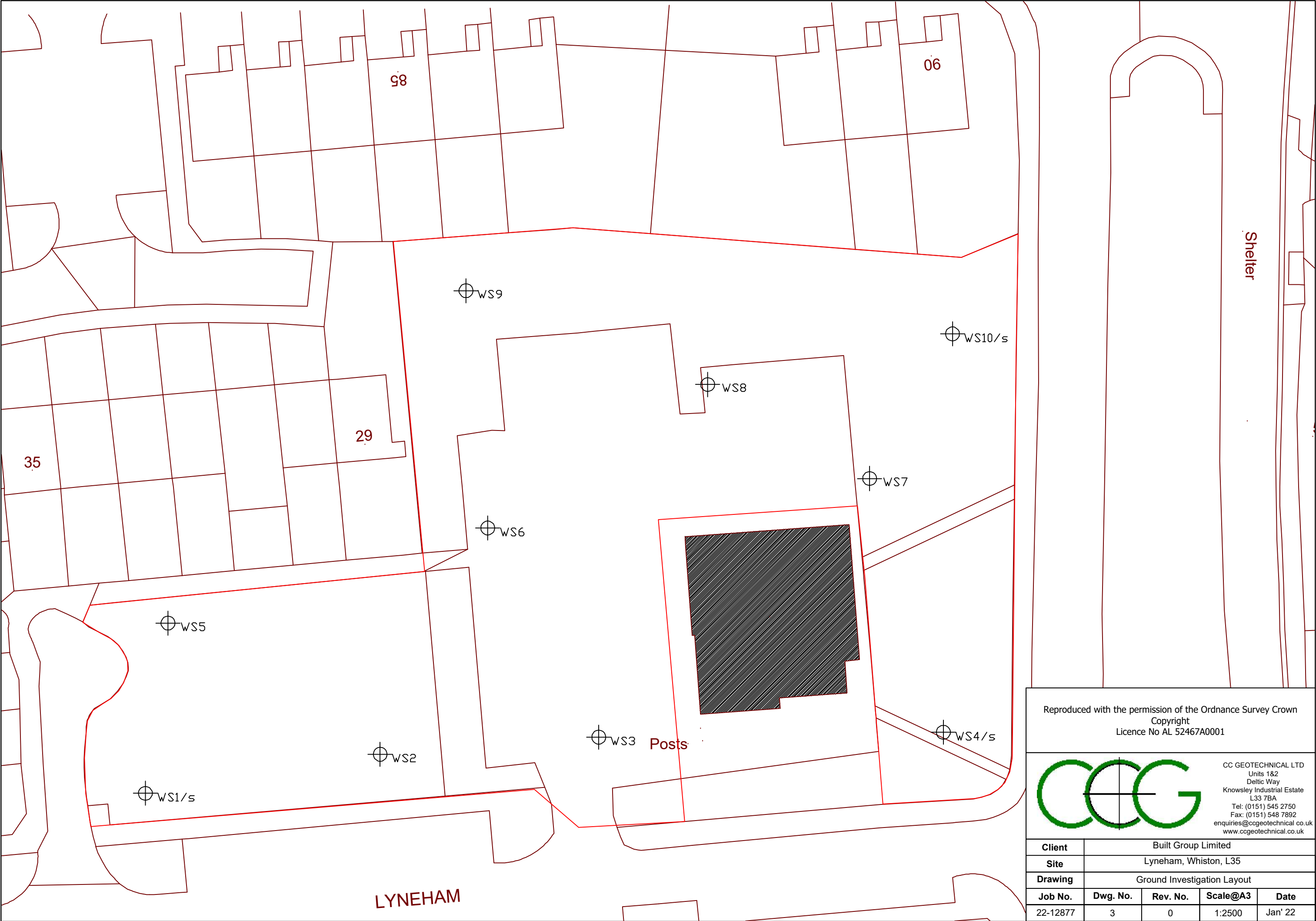
Level 2
architects

Project Lyneham, Whiston		
Title Proposed Site Plan		
Scale 1:400	Drawing 418-1-PLN-002	Rev B
PLANNING APPLICATION		

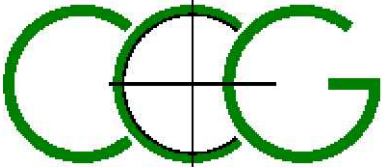
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Appendix B

Borehole Logs



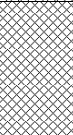
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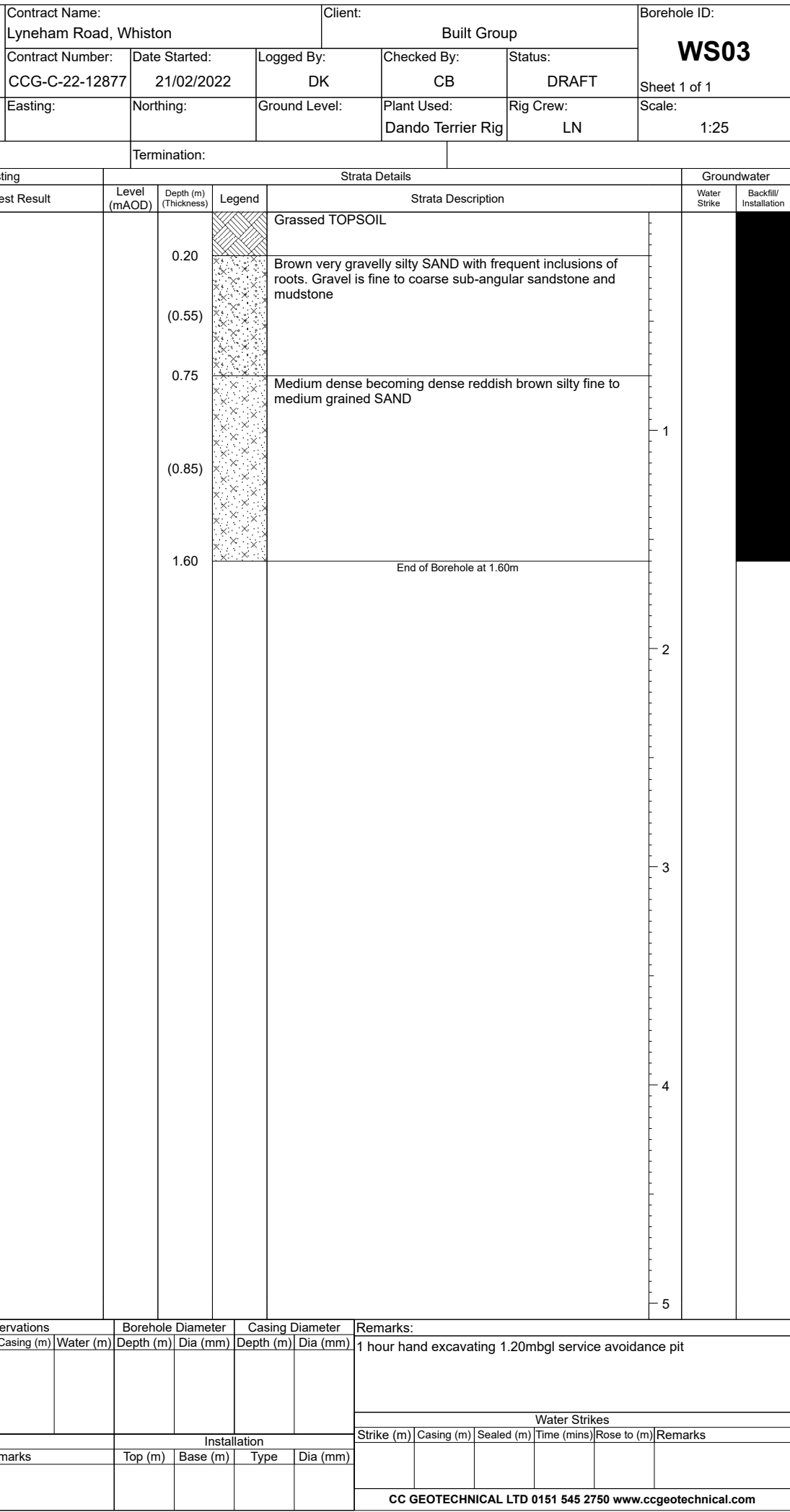


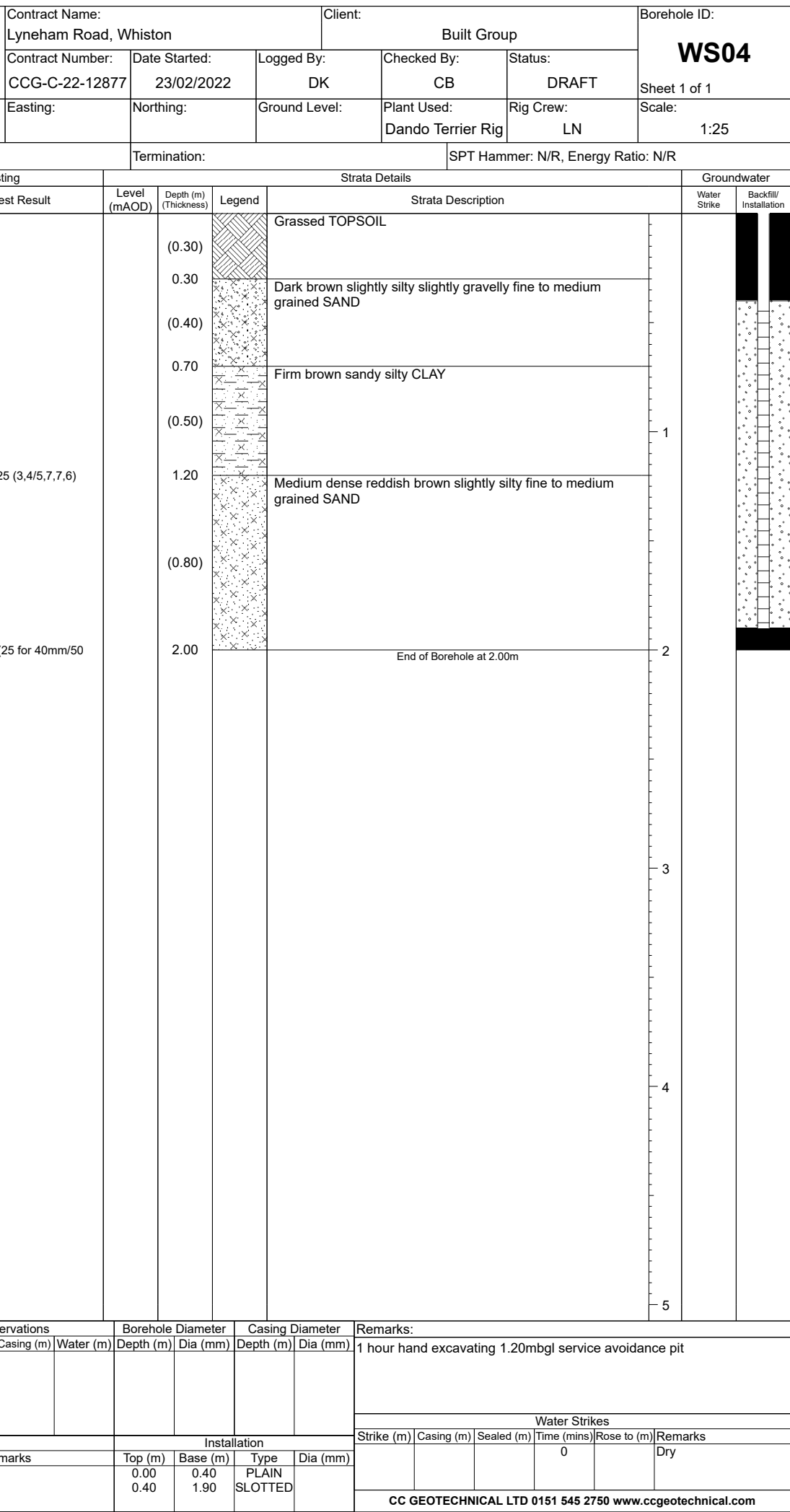
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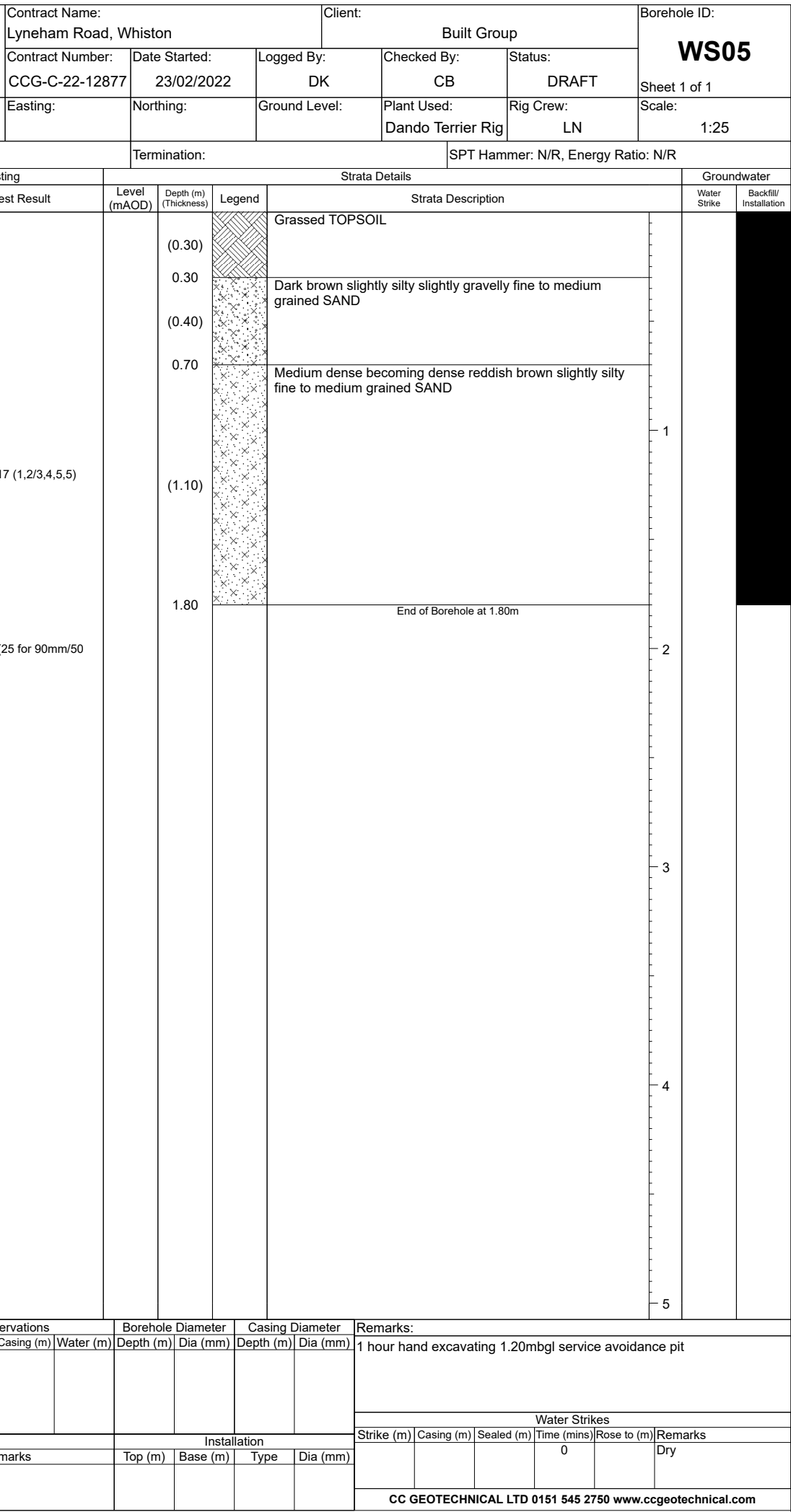
Client	Built Group Limited			
Site	Lyneham, Whiston, L35			
Drawing	Ground Investigation Layout			
Job No.	Dwg. No.	Rev. No.	Scale@A3	Date
22-12877	3	0	1:2500	Jan' 22

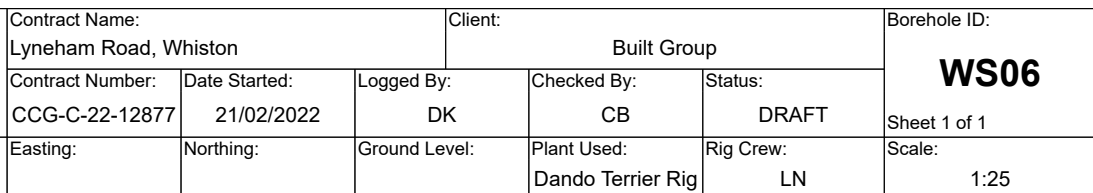
	Contract Name: Lyneham Road, Whiston				Client: Built Group			Borehole ID: WS01		
	Contract Number: CCG-C-22-12877		Date Started: 23/02/2022		Logged By: DK		Checked By: CB		Status: DRAFT	
	Easting:		Northing:		Ground Level:		Plant Used: Dando Terrier Rig		Rig Crew: LN	
Dynamic Sampling Borehole Log								Scale: 1:25		
Weather:				Termination:			SPT Hammer: N/R, Energy Ratio: N/R			
Samples & In Situ Testing				Strata Details					Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description			Water Strike	Backfill/ Installation
0.00 - 1.00	U			0.20 (0.40)		Grassed TOPSOIL				
				0.60 (0.30)		Dark brown slightly silty slightly gravelly fine to medium grained SAND (MADE GROUND)				
				0.90 (1.10)		Brown sandy GRAVEL. Gravel is fine to coarse angular to subround of brick cinders and coal (MADE GROUND)				
1.00 - 2.00	U	SPT(S)N=17 (2,3/3,4,5,5)		2.00		Medium dense becoming dense reddish brown slightly silty fine to medium grained SAND			1	
		SPT(S)50 (25 for 35mm/50 for 15mm)				End of Borehole at 2.00m			2	
									3	
									4	
									5	
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit	
Chiselling					Installation				Water Strikes	
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)
				0.00	0.50	PLAIN		1.00		
				0.50	1.90	SLOTTED				
									Time (mins)	Rose to (m)
									0	
									Remarks	
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com										

	Contract Name: Lyneham Road, Whiston				Client: Built Group				Borehole ID: WS02				
	Contract Number: CCG-C-22-12877		Date Started: 21/02/2022		Logged By: DK		Checked By: CB		Status: DRAFT				
	Easting:		Northing:		Ground Level:		Plant Used: Dando Terrier Rig		Rig Crew: LN				
Dynamic Sampling Borehole Log										Sheet 1 of 1			
										Scale: 1:25			
Weather:				Termination:									
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation		
0.00 - 1.00	U			0.20		Grassed TOPSOIL							
				(0.45)		Brown slightly silty slightly gravelly fine to medium grained SAND (MADE GROUND)							
				0.65		Light brown sandy slightly silty GRAVEL. Gravel is fine to coarse angular to sub-angular sandstone							
1.00 - 1.60	U			0.85		Medium dense becoming dense orange/reddish brown slightly silty fine to medium grained SAND				1			
				(0.75)									
				1.60		End of Borehole at 1.60m							
										2			
										3			
										4			
										5			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit				
Chiselling					Installation		Water Strikes						
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													





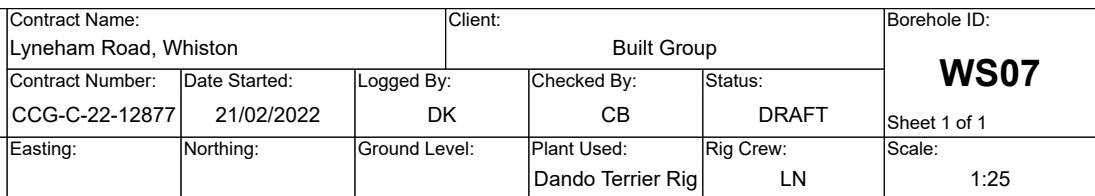




Weather:	Termination:	
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[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
									1 hour hand excavating 1.20mbgl service avoidance pit Water Strikes Strike (m) Casing (m) Sealed (m) Time (mins) Rose to (m) Remarks CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com
Chiselling					Installation				
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	

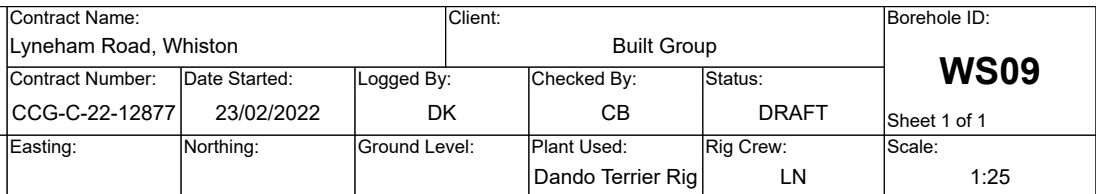


Weather:	Termination:	SPT Hammer: N/R, Energy Ratio: N/R
----------	--------------	------------------------------------

Samples & In Situ Testing				Strata Details			Groundwater	
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description	Water Strike	Backfill/ Installation
0.00 - 1.00	U					Grassed TOPSOIL		
				0.20		Brown silty gravelly fine to medium grained SAND (MADE GROUND)		
				(0.30)				
				0.50		Dark brown/grey silty very gravelly fine to medium grained SAND		
				(0.40)				
				0.90		Medium dense becoming dense reddish brown slightly silty fine to medium grained SAND	1	
1.00 - 2.00	U	SPT(C)N=10 (2,2/2,2,3,3)		(1.10)				
		SPT(S)N=100 (7,15/100 for 230mm)		2.00		End of Borehole at 2.00m	2	
							3	
							4	
							5	

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: 1 hour hand excavating 1.20mbgl service avoidance pit Water Strikes <table><thead><tr><th>Strike (m)</th><th>Casing (m)</th><th>Sealed (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr></thead><tbody><tr><td></td><td></td><td></td><td>0</td><td></td><td>Dry</td></tr></tbody></table> CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		Dry
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																
			0		Dry																
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)													
Chiselling				Installation																	
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)														

	Contract Name: Lyneham Road, Whiston				Client: Built Group				Borehole ID: WS08				
	Contract Number: CCG-C-22-12877		Date Started: 21/02/2022		Logged By: DK		Checked By: CB		Status: DRAFT				
	Easting:		Northing:		Ground Level:		Plant Used: Dando Terrier Rig		Rig Crew: LN				
Dynamic Sampling Borehole Log										Sheet 1 of 1			
										Scale: 1:25			
Weather:				Termination:									
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation		
0.00 - 1.00	U			(0.40)		Grassed TOPSOIL							
				0.40		Dark brown very gravelly silty fine to medium grained SAND. Gravel is fine to coarse sub-angular sandstone and mudstone							
				0.60		Medium dense varying to dense reddish brown slightly silty fine to medium grained SAND							
1.00 - 2.00	U			(1.40)						1			
				2.00		End of Borehole at 2.00m				2			
										3			
										4			
										5			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit				
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
											0		Dry
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com													



Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: 1 hour hand excavating 1.20mbgl service avoidance pit Water Strikes <table><thead><tr><th>Strike (m)</th><th>Casing (m)</th><th>Sealed (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr></thead><tbody><tr><td></td><td></td><td></td><td>0</td><td></td><td>Dry</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table> CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks				0		Dry																		
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																																		
			0		Dry																																		
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)																															
Chiselling					Installation																																		
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)																															

	Contract Name: Lyneham Road, Whiston				Client: Built Group				Borehole ID: WS10				
	Contract Number: CCG-C-22-12877		Date Started: 23/02/2022		Logged By: DK		Checked By: CB		Status: DRAFT				
	Easting:		Northing:		Ground Level:		Plant Used: Dando Terrier Rig		Rig Crew: LN				
Dynamic Sampling Borehole Log										Sheet 1 of 1 Scale: 1:25			
Weather:				Termination:				SPT Hammer: N/R, Energy Ratio: N/R					
Samples & In Situ Testing				Strata Details						Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/Installation		
0.00 - 1.00	U			(0.30)		Grassed TOPSOIL							
				0.30		Dark brown silty slightly gravelly fine to medium grained SAND (MADE GROUND)							
				(0.40)									
				0.70		Loose to medium dense becoming dense reddish brown slightly silty slightly gravelly fine to medium grained SAND							
1.00 - 2.00	U	SPT(S)N=10 (1,1/1,2,3,4)		(1.30)						1			
				2.00		End of Borehole at 2.00m				2			
		SPT(S)50 (25 for 100mm/50 for 95mm)								3			
										4			
										5			
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:				
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	1 hour hand excavating 1.20mbgl service avoidance pit				
Chiselling					Installation				Water Strikes				
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
				0.00	0.40	PLAIN					0		Dry
				0.40	1.80	SLOTTED							
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Appendix C

Infiltration Test Results



Infiltration Assessment Report

At

Lyneham
Whiston

Client: Built Group

Reference: 32267-SUT-ZZ-00-RP-G-705-0001

Date: July 2022

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SUTCLIFFE INVESTIGATIONS

Infiltration Assessment Report

Document Control Sheet

Report Reference: 32267-SUT-ZZ-00-RP-G-705-0001

Issue: P01 Date: July 2022

Prepared by:

Checked/Approved by:

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Title:	Geo Environmental Engineer	Title:	Senior Environmental Scientist	Director
Qualifications:		Qualifications:	BSc (Hons) FGS	BEng (Hons) CEng MIStructE AIEMA FGS

Revision History:

Rev.	Date	Description	Prepared	Checked	Approved
P01	July 2022	Interim Report	JS	DB	WGB
Signatures:					

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1.2	Site Location and Setting	1
1.3	Scope of Works	1
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	Drawings	C
	Drawing Ref. – 32267-SUT-ZZ-00-DR-G-720-0001 (Site Investigation on Existing Layout)	C

1 Introduction

1.1 Terms of Reference

Sutcliffe Investigations were instructed by Built Group (the “client”) to undertake Infiltration Testing at Lyneham, Whiston, L35 3TN.

The site is centred on National Grid Reference (NGR) 347797, 390998 and is approximately 0.43ha in area.

This report presents our exploratory trial pit log and soakaway test results.

With regards to the soakaway testing, this report is not an engineering design and the figures and calculations contained in the report should only be used by the Engineer.

Additionally, this report shall not be relied upon or transferred to any other parties without the express written authorisation of Sutcliffe Investigations. If an unauthorised third party comes into possession of this report, they rely on it at their peril and the authors owe them no duty of care and skill.

1.2 Site Location and Setting

The site is located at Lyneham, Whiston, L35 3TN at National Grid Reference (NGR) 347797, 390998.

1.3 Scope of Works

In accordance with the Client's instructions and our quotation, the following was included in our brief for this soakaway investigation:

- 2No. soakaway tests (SA101 & SA102) carried out on site using the BRE 365 methodology. The location was identified by the appointed Civil Engineer. The fieldwork was carried out on the 9th June 2022, the weather was overcast and dry during the site works.

2 Fieldwork

2.1 General Site Description

The site is irregular in shape, 0.43ha and can be accessed via Lyneham along the north south boundary of the site. The site appears to be relatively flat.

The site is currently in use as a car park, as well as vegetated areas of grass along the west and eastern boundaries.

2.2 Geology

The site geology consists of Kinnerton Sandstone – Sandstone for the solid geology with no superficial deposits being noted on the geology maps.

2.3 Ground Model

The soakaway test was undertaken in its proposed area, the ground conditions encountered were noted to comprise of Grass over dark brown sandy clay (made ground) over orange sand.

The trial pit logs for SA101 and SA102 are presented in Appendix A.

A plan detailing the location of the soakaway test in relation to the site is presented as Drawing No. 32267-SUT-ZZ-00-RP-G-702-0002.

3 Infiltration Test Methodology

3.1 Soakaway Design Digest – BRE365

The BRE365 Digest on soakaway design allows for the design of trench soakaways as well as traditional square and circular soakaways.

The test to measure the soil infiltration rate is carried out in pits which are excavated to the full depth of the proposed soakaway. The trial pits are filled and allowed to drain to empty or near empty, three times, on the same day or on consecutive days.

The pit is considered full when the water level is the same as the proposed inlet invert. The time for the water level to fall from $\frac{3}{4}$ full to $\frac{1}{4}$ full is obtained and the soil infiltration rate is obtained from the following formula:

$$f = \frac{V_{p75-25}}{ap50 \times tp75-25}$$

Where: f = soil infiltration rate (in this case expressed in $1/m^2/\text{minute}$)

V_{p75-25} = the effective storage volume of water in the trial pit between 75% and 25% effective depth

$ap50$ = the internal surface area of the trial pit up to 50% effective depth and excluding the base area;

$tp75-25$ = the time for the water level to fall from 75% to 25% effective depth.

The infiltration rates detailed within this report is expressed as $1/m^2/\text{minute}$, which is a convenient rate to use. The BRE use a unit of m/sec , which is the value in $1/m^2/\text{minute}$ divided by 60,000.

3.2 Infiltration Test Results

2No. infiltration tests were carried out on site at a location indicated by the Sutcliffe Engineer. Due to the inefficient infiltration characteristics of the ground at the excavation depths, the soakaway tests comprised a single fill.

The full results of the infiltration tests are presented in Appendix B.

The infiltration rates are summarised below:

Plate 1 - BRE 365 Infiltration Test Results – SA101

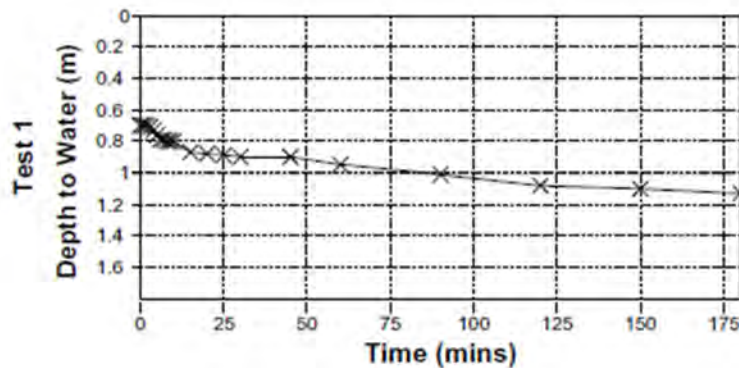
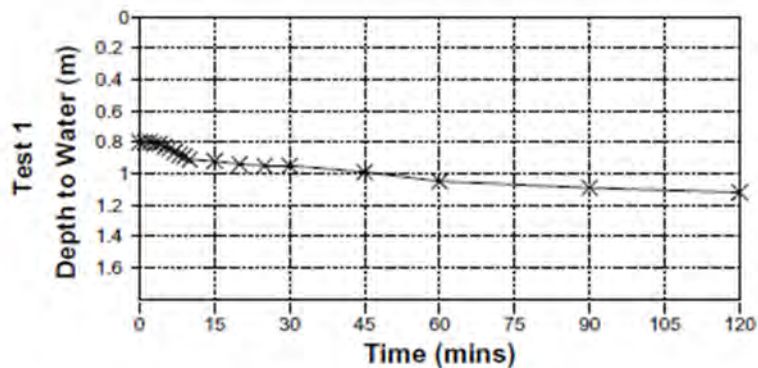


Plate 2 - BRE 365 Infiltration Test Results – SA102



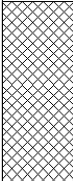
3.3 Summary

No groundwater was encountered during the site investigation.

Both test results did not provide an infiltration rate due to the inefficiencies of the ground to infiltrate.

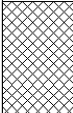
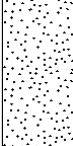
As the soakaway tests failed, it is advised that alternative methods of sustainable drainage are explored.

Appendix A – Trial Pit Logs

 Sutcliffe					Site Lyneham, Whiston		Trial Pit Number SA101		
Excavation Method BRE 365 'Soakaway'		Dimensions		Ground Level (mOD)		Client Built Group		Job Number 32267LG	
		Location		Dates 09/06/2022		Engineer AT		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
						Grass over MADE GROUND: dark brown sandy CLAY with root material and fine to medium brick and concrete fragments. Sand is fine			
					Orange brown fine to medium grained SAND				
							Complete at 1.80m		



Remarks Trial pit dry		
Scale (approx) 1:25	Logged By AT	Figure No. 32267LG.SA101

 Sutcliffe						Site Lyneham, Whiston		Trial Pit Number SA102	
Excavation Method BRE 365 'Soakaway'		Dimensions		Ground Level (mOD)		Client Built Group		Job Number 32267LG	
		Location		Dates 09/06/2022		Engineer AT		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
					(0.80) 0.80 (1.00) 1.80	Grass over MADE GROUND: dark brown sandy CLAY with root material and fine to coarse brick and concrete fragments. Sand is fine Orange brown fine to medium grained SAND Complete at 1.80m	 		
						Remarks Trial pit dry			
						Scale (approx) 1:50		Logged By AT	

Appendix B – BRE 365 Infiltration Test Results & Calculations

Site : Lyneham, Whiston

Client : Built Group

Engineer: AT

Job Number
32267LG

Sheet
1 / 2

Location	Date	Level	Location
SA101	09/06/2022		

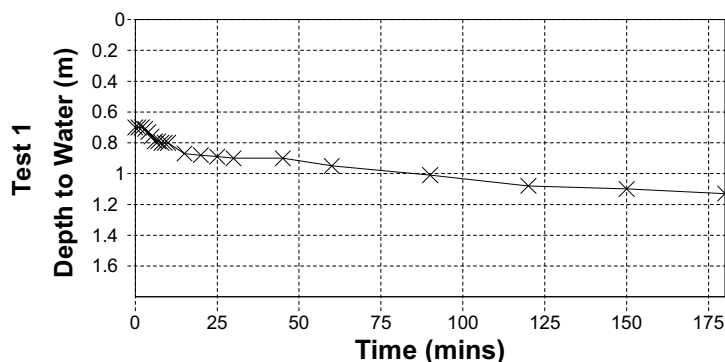
Pit Width (m)	0.70
Pit Depth (m)	1.80
Pit Length (m)	1.80

Soil type at test level	Clayey SAND
Groundwater	
Drain discharge depth	0.7
Sidewall stability	Solid
Stone filled or open pit	Open pit

	1
Effective depth (m)	1.10
Volume outflowing between 75% & 25% (m3)	
Mean surface area through which outflow occurs (m2)	
Time for outflow between 75% & 25% (min)	
SOIL INFILTRATION RATE (ms-1), f	Test Failed

Remarks

Elapsed time (mins)	Depth to Water Test 1
0	0.70
1	0.70
2	0.70
3	0.71
4	0.73
5	0.76
6	0.79
7	0.79
8	0.80
9	0.80
10	0.80
15	0.87
20	0.88
25	0.89
30	0.90
45	0.90
60	0.95
90	1.01
120	1.08
150	1.10
180	1.13



Site : Lyneham, Whiston

Client : Built Group

Engineer: AT

Job Number
32267LG

Sheet
2 / 2

Location	Date	Level	Location
SA102	09/06/2022		

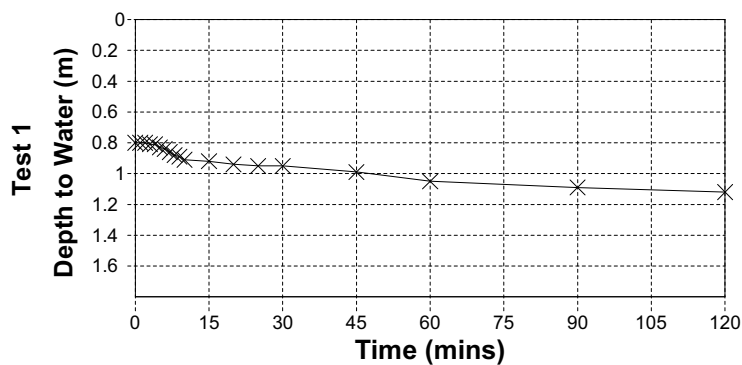
Pit Width (m)	0.70
Pit Depth (m)	1.80
Pit Length (m)	1.70

Soil type at test level	Clayey SAND
Groundwater	
Drain discharge depth	0.8
Sidewall stability	Solid
Stone filled or open pit	Open pit

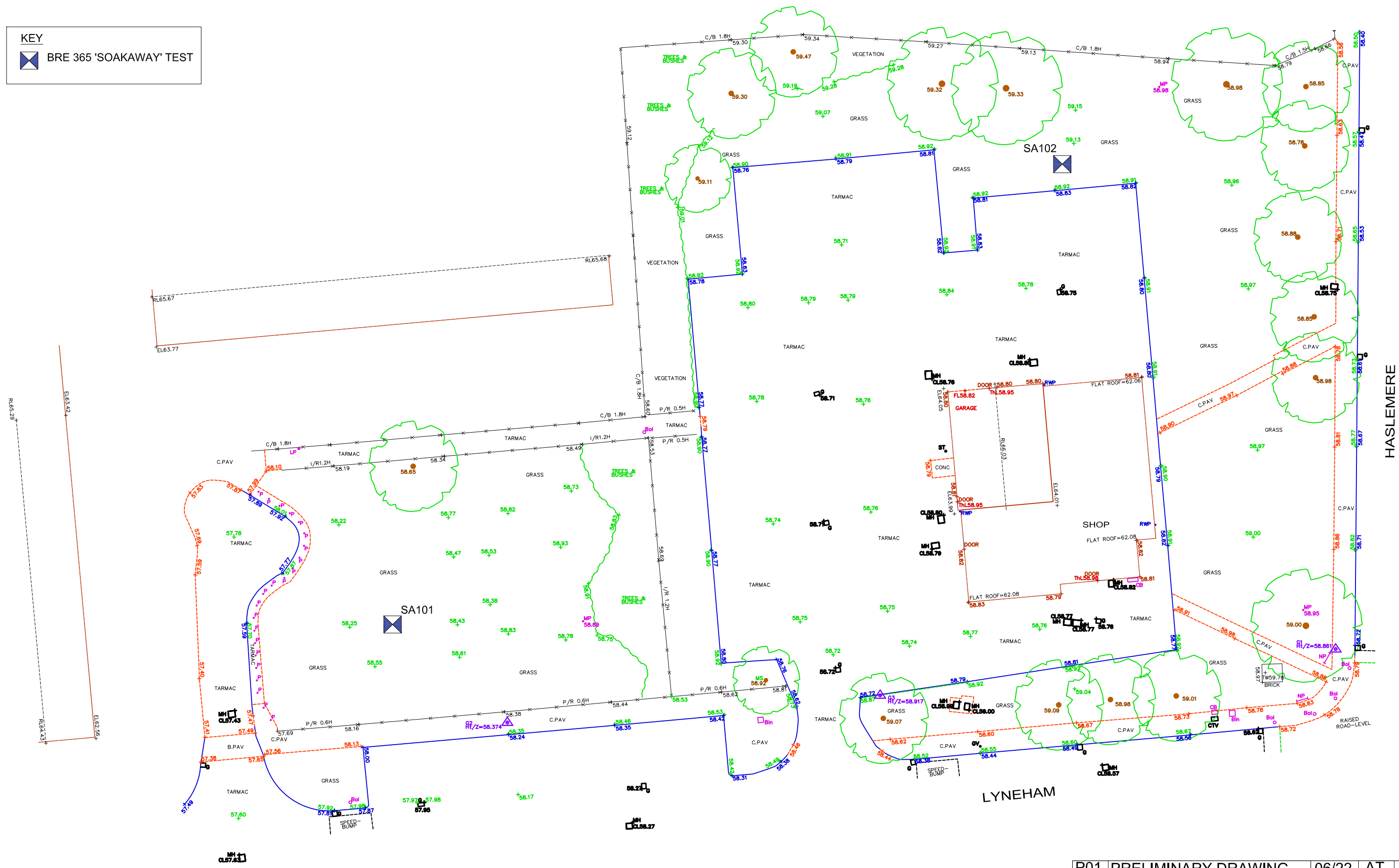
	1
Effective depth (m)	1.00
Volume outflowing between 75% & 25% (m3)	
Mean surface area through which outflow occurs (m2)	
Time for outflow between 75% & 25% (min)	
SOIL INFILTRATION RATE (ms ⁻¹), f	Test Failed

Remarks

Elapsed time (mins)	Depth to Water Test 1
0	0.80
1	0.80
2	0.80
3	0.81
4	0.81
5	0.83
6	0.84
7	0.86
8	0.88
9	0.89
10	0.91
15	0.92
20	0.94
25	0.95
30	0.95
45	0.99
60	1.05
90	1.09
120	1.12



Drawing Ref. – 32267-SUT-ZZ-00-DR-G-720-0001 (Site Investigation on Existing Layout)

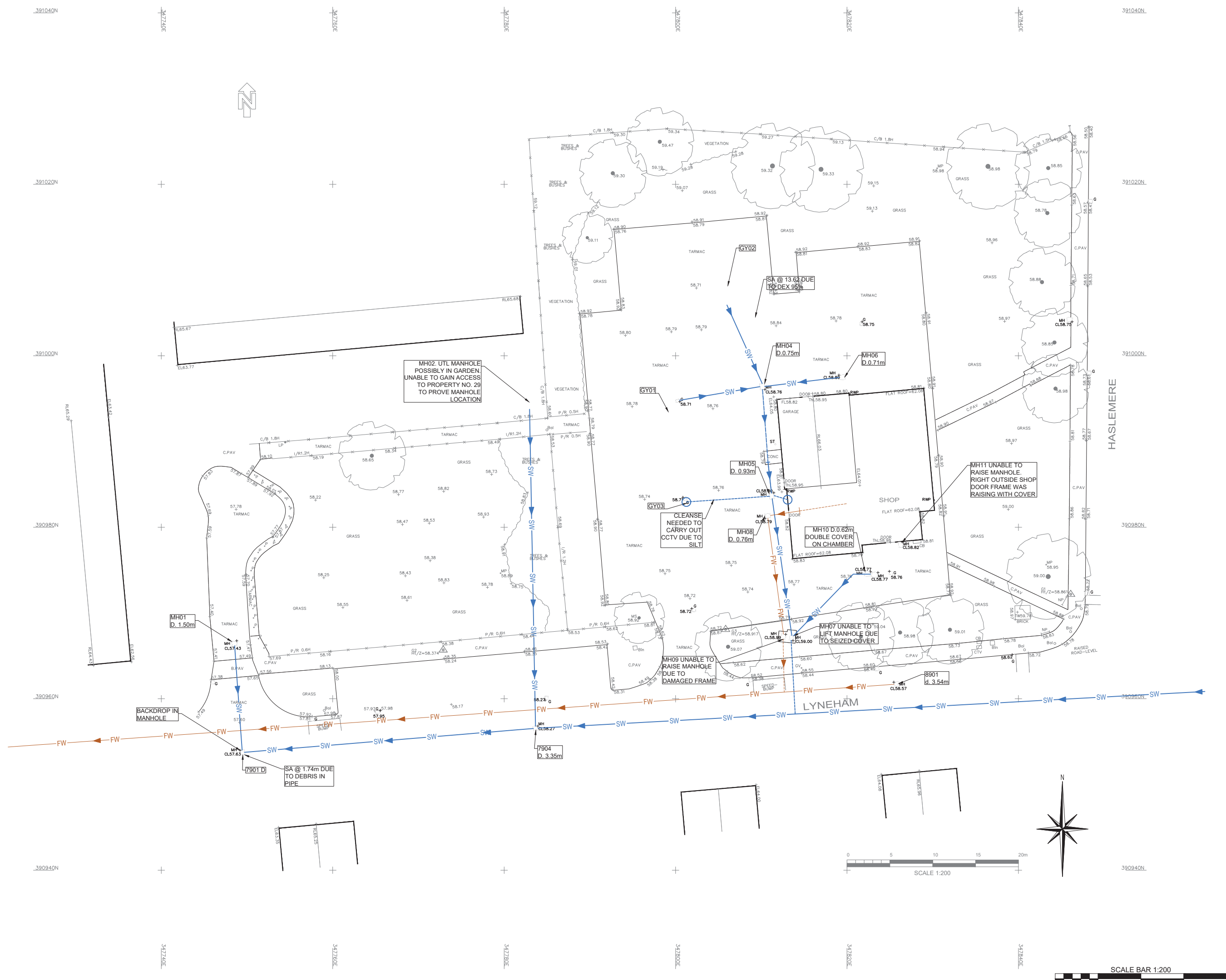


LYNEHAM

P01	PRELIMINARY DRAWING		06/22	AT	DB
Rev	Description		Date	By	Chkd
Date JUNE 2022		Drawn By A TOSH	Checked By DB		
Scale at A3 NTS			Project Number 32267LG		
Sheet Number 32267-SUT-ZZ-00-DR-G-720-0001				Revision P01	

Appendix D

Existing Drainage Layout



General Notes

DO NOT SCALE OFF THIS DRAWING

THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D.M. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

EXISTING SERVICES

ROAD SIGNS AND LAMP COLUMNS ON THE SITE PERIPHERY TO BE RE-SITED IF REQUIRED BY, AND TO THE APPROVAL OF, THE LOCAL AUTHORITY.

CONTRACTOR TO SATISFY THEMSELVES THAT EXISTING AND PROPOSED SERVICES DO NOT CLASH WITH PROPOSED DRAINAGE

KNOWN EXISTING SERVICES ARE INDICATED ON THE PLAN WHERE THEY CROSS THE PROPOSED DRAINAGE, THE EXACT TYPE AND LOCATION SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO START OF WORKS TO ENSURE THAT PROPOSED DRAINAGE DO NOT INTERFERE WITH SERVICES. ALL DISCREPANCIES SHALL BE REPORTED TO ENGINEER IMMEDIATELY.

THE FOLLOWING EXISTING SERVICE INFORMATION IS INDICATED ON THIS DRAWING AND HAS BEEN OBTAINED FROM THE SOURCES LISTED.

EXISTING SERVICE	OBTAINED FROM
SEWERS	TOPOGRAPHICAL SURVEY BY GEOSPATIAL ENGINEERING SERVICES LTD DATED 11-03-2022 DRG REF: 01126 CCTV DRAINAGE INVESTIGATION BY UNDERGROUND SURVEYS LTD DATED 04-04-2022 REF: 14711 UNITED UTILITIES RECORDS
GAS	NOT INDICATED
ELECTRICITY	NOT INDICATED
TELEPHONE	NOT INDICATED
CABLE	NOT INDICATED
OTHERS	NOT INDICATED

THE CONTRACTOR SHALL CHECK ALL EXISTING COVER / INVERT LEVELS AND PIPE / SEWER SIZES ON SITE PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE CAN BE CONSTRUCTED AS INDICATED ON THE DRAWING. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

ALL REDUNDANT DRAINAGE WITHIN SITE TO BE GRUBBED UP, CHASED AND SEALED TO APPROVAL OF LOCAL AUTHORITY

KEY

—SW—

EXISTING SURFACE WATER DRAIN / SEWER

—FW—

EXISTING FOUL WATER DRAIN / SEWER

EXTG MH
CL: XXX
IL: XXX

EXISTING MANHOLE / ACCESS CHAMBER

EX RG

EXISTING ROAD GULLEY

P01	ISSUED FOR COMMENT	13.07.22	AJB	DS
Rev	Description	Date	By	Chkd

Drawing Status

PRELIMINARY DRAWING

Sutcliffe

Geotechnical & Civil Engineering
Geotechnical & Environmental Investigations
Building Surveying
Pre Planning Services

London Head Office
01753 227 2155

Manchester Office
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South Wales Office
01495 414111

London Office
020 7461 1000

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Client

BUILT GROUP LTD

Project

LYNEHAM WHISTON

Drawing Title

EXISTING DRAINAGE LAYOUT

Date	Drawn By	Checked By
JULY 2022	AJB	DS

Scale at A1

1:200

Project Number

32267

Sheet Number

32267-SUT-ZZ-XX-DR-C-6000

Revision

P01

Appendix E

Qbar Hydraulic Calculations

Proposed Drainage Network Hydraulic Calculations

Sutcliffe		Page 1
18-20 Harrington Street Liverpool L2 9QA	Lyneham Whiston	
Date 12/07/2022 12:52 File	Designed by DS Checked by	
Innovyze Source Control 2020.1.3		

ICP SUDS Mean Annual Flood

Input

Return Period (years)	2	Soil	0.450
Area (ha)	0.371	Urban	0.000
SAAR (mm)	871	Region Number	Region 10

Results 1/s

QBAR Rural	2.1
QBAR Urban	2.1
Q2 years	2.0
Q1 year	1.8
Q30 years	3.6
Q100 years	4.4

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Sutcliffe		Page 0
18-20 Harrington Street Liverpool L2 9QA	Lyneham Whiston	
Date 23/02/2023 14:34 File 32267_MODEL 003_100 Yea...	Designed by DS Checked by	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.397	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)	400

Designed with Level Soffits

Network Design Table for Surface Network 1

« - 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
1.000	11.733	0.029	400.0	0.029	5.00	0.0	0.600	o	1200	Pipe/Conduit	
2.000	11.123	0.664	16.8	0.085	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	17.188	0.043	398.3	0.004	0.00	0.0	0.600	o	1200	Pipe/Conduit	
3.000	2.790	0.028	100.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	9.516	0.095	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	19.452	0.049	398.3	0.090	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.003	7.535	0.076	99.2	0.047	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)
1.000	50.00	5.10	55.515	0.029	0.0	0.0	0.0	1.86	2108.6	3.9
2.000	50.00	5.07	57.200	0.085	0.0	0.0	0.0	2.47	43.7	11.5
1.001	50.00	5.26	55.486	0.118	0.0	0.0	0.0	1.87	2113.2	15.9
3.000	50.00	5.04	55.566	0.000	0.0	0.0	0.0	1.31	52.0	0.0
3.001	50.00	5.19	55.538	0.000	0.0	0.0	0.0	1.00	17.8	0.0
1.002	50.00	5.43	55.443	0.207	0.0	0.0	0.0	1.87	2113.2	28.1
1.003	50.00	5.56	55.394	0.255	0.0	0.0	0.0	1.01	17.8«	34.5

Sutcliffe		Page 1
18-20 Harrington Street Liverpool L2 9QA	Lyneham Whiston	
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Area Summary for Surface Network 1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.029	0.029	0.029
2.000	-	-	100	0.085	0.085	0.085
1.001	User	-	100	0.004	0.004	0.004
3.000	-	-	100	0.000	0.000	0.000
3.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.034	0.034	0.034
	User	-	100	0.055	0.055	0.090
1.003	User	-	100	0.014	0.014	0.014
	User	-	100	0.034	0.034	0.047
				Total	Total	Total
				0.255	0.255	0.255

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

1.003	S10 NEW MH	58.419	55.318	0.000	1200	0
-------	------------	--------	--------	-------	------	---

Simulation Criteria for Surface Network 1

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	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.397		

Sutcliffe		Page 2
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Online Controls for Surface Network 1

Non Return Valve Manhole: S7, DS/PN: 3.001, Volume (m³): 3.6

Hydro-Brake® Optimum Manhole: S3, DS/PN: 1.003, Volume (m³): 36.6

Unit Reference	MD-SHE-0100-5000-1410-5000
Design Head (m)	1.410
Design Flow (l/s)	5.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	100
Invert Level (m)	55.394
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.410	5.0
Flush-Flo™	0.424	5.0
Kick-Flo®	0.866	4.0
Mean Flow over Head Range	-	4.4

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	4.6	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	4.9	1.600	5.3	4.000	8.2	8.000	11.3
0.400	5.0	1.800	5.6	4.500	8.6	8.500	11.7
0.500	5.0	2.000	5.9	5.000	9.1	9.000	12.0
0.600	4.9	2.200	6.2	5.500	9.5	9.500	12.3
0.800	4.4	2.400	6.4	6.000	9.9		
1.000	4.3	2.600	6.7	6.500	10.3		

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Offline Controls for Surface Network 1

Pipe Manhole: S4, DS/PN: 1.002, Loop to PN: 3.000

Diameter (m)	0.225	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	56.650

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18-20 Harrington Street Liverpool L2 9QA		Lyneham Whiston																																																																											
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Innovyze		Network 2020.1.3																																																																											
<u>Storage Structures for Surface Network 1</u> <u>Cellular Storage Manhole: S8, DS/PN: 3.000</u> Invert Level (m) 55.566 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>50.0</td><td>60.0</td><td>1.201</td><td>0.0</td><td>104.8</td></tr><tr><td>1.200</td><td>50.0</td><td>104.8</td><td></td><td></td><td></td></tr></table> <u>Volume Summary (Static)</u> Length Calculations based on True Length <table><tr><th>Pipe Number</th><th>USMH Name</th><th>Manhole Volume (m³)</th><th>Pipe Volume (m³)</th><th>Storage Structure Volume (m³)</th><th>Total Volume (m³)</th></tr><tr><td>1.000</td><td>S5</td><td>11.649</td><td>10.555</td><td>0.000</td><td>22.204</td></tr><tr><td>2.000</td><td>S6</td><td>2.264</td><td>0.161</td><td>0.000</td><td>2.425</td></tr><tr><td>1.001</td><td>S2</td><td>19.558</td><td>16.725</td><td>0.000</td><td>36.283</td></tr><tr><td>3.000</td><td>S8</td><td>3.428</td><td>0.063</td><td>57.016</td><td>60.507</td></tr><tr><td>3.001</td><td>S7</td><td>3.491</td><td>0.139</td><td>0.000</td><td>3.630</td></tr><tr><td>1.002</td><td>S4</td><td>11.134</td><td>19.286</td><td>0.000</td><td>30.420</td></tr><tr><td>1.003</td><td>S3</td><td>17.265</td><td>0.099</td><td>0.000</td><td>17.364</td></tr><tr><td colspan="2">Total</td><td>68.790</td><td>47.027</td><td>57.016</td><td>172.834</td></tr></table>						Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	50.0	60.0	1.201	0.0	104.8	1.200	50.0	104.8				Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)	1.000	S5	11.649	10.555	0.000	22.204	2.000	S6	2.264	0.161	0.000	2.425	1.001	S2	19.558	16.725	0.000	36.283	3.000	S8	3.428	0.063	57.016	60.507	3.001	S7	3.491	0.139	0.000	3.630	1.002	S4	11.134	19.286	0.000	30.420	1.003	S3	17.265	0.099	0.000	17.364	Total		68.790	47.027	57.016	172.834
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																																								
0.000	50.0	60.0	1.201	0.0	104.8																																																																								
1.200	50.0	104.8																																																																											
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1.000	S5	11.649	10.555	0.000	22.204																																																																								
2.000	S6	2.264	0.161	0.000	2.425																																																																								
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3.000	S8	3.428	0.063	57.016	60.507																																																																								
3.001	S7	3.491	0.139	0.000	3.630																																																																								
1.002	S4	11.134	19.286	0.000	30.420																																																																								
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Total		68.790	47.027	57.016	172.834																																																																								
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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.397
 Region England and Wales Cv (Summer) 1.000
 M5-60 (mm) 20.000 Cv (Winter) 1.000

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

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

								Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Level
							Act.	(m)
1.000	S5	60 Summer	1	+0%				55.891
2.000	S6	15 Summer	1	+0%				57.264
1.001	S2	60 Summer	1	+0%				55.891
3.000	S8	15 Summer	1	+0%				55.566
3.001	S7	15 Summer	1	+0%				55.538
1.002	S4	60 Summer	1	+0%			0	55.891
1.003	S3	60 Summer	1	+0%	1/15 Summer			55.890

Surcharged Flooded					Half Drain	Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow Cap.	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	S5	-0.825	0.000	0.00		1.8	OK	
2.000	S6	-0.086	0.000	0.38		15.0	OK	
1.001	S2	-0.795	0.000	0.01		6.7	OK	
3.000	S8	-0.225	0.000	0.00		0.0	OK	
3.001	S7	-0.150	0.000	0.00		0.0	OK	
1.002	S4	-0.752	0.000	0.01	0.0	9.9	OK	
1.003	S3	0.346	0.000	0.32		5.0	SURCHARGED	

Sutcliffe		Page 0
18-20 Harrington Street Liverpool L2 9QA	Lyneham Whiston	
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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.397
 Region England and Wales Cv (Summer) 1.000
 M5-60 (mm) 20.000 Cv (Winter) 1.000

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

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

								Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Level
							Act.	(m)
1.000	S5	60 Winter	2	+0%				56.008
2.000	S6	15 Summer	2	+0%				57.275
1.001	S2	60 Winter	2	+0%				56.008
3.000	S8	15 Summer	2	+0%				55.566
3.001	S7	15 Summer	2	+0%				55.538
1.002	S4	60 Winter	2	+0%			0	56.008
1.003	S3	60 Winter	2	+0%	2/15 Summer			56.008

Surcharged Flooded					Half Drain	Pipe		
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow Cap.	Time (mins)	Flow (l/s)	Status	Level Exceeded
1.000	S5	-0.708	0.000	0.00		1.8	OK	
2.000	S6	-0.075	0.000	0.49		19.4	OK	
1.001	S2	-0.678	0.000	0.01		6.4	OK	
3.000	S8	-0.225	0.000	0.00		0.0	OK	
3.001	S7	-0.150	0.000	0.00		0.0	OK	
1.002	S4	-0.635	0.000	0.01	0.0	9.0	OK	
1.003	S3	0.464	0.000	0.32		5.0	SURCHARGED	

Sutcliffe		Page 0
18-20 Harrington Street Liverpool L2 9QA	Lyneham Whiston	
Date 23/02/2023 14:36 File 32267_MODEL 003_100 Yea...	Designed by DS Checked by	
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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.397
 Region England and Wales Cv (Summer) 1.000
 M5-60 (mm) 20.000 Cv (Winter) 1.000

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

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

									Water
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
1.000	S5	120 Winter	30	+0%					56.620
2.000	S6	15 Summer	30	+0%					57.315
1.001	S2	120 Winter	30	+0%					56.620
3.000	S8	15 Summer	30	+0%					55.566
3.001	S7	15 Summer	30	+0%					55.538
1.002	S4	120 Winter	30	+0%				0	56.620
1.003	S3	120 Winter	30	+0%	30/15 Summer				56.616

Surcharged Flooded					Half Drain	Pipe			
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Overflow Cap.	Time (mins)	Flow (l/s)	Status	Level Exceeded	
1.000	S5	-0.095	0.000	0.00		2.2	OK		
2.000	S6	-0.035	0.000	0.94		36.8	OK		
1.001	S2	-0.066	0.000	0.01		6.7	OK		
3.000	S8	-0.225	0.000	0.00		0.0	OK		
3.001	S7	-0.150	0.000	0.00		0.0	OK		
1.002	S4	-0.023	0.000	0.01	0.0	9.5	OK		
1.003	S3	1.072	0.000	0.32		5.0	SURCHARGED		

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

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.397
 Region England and Wales Cv (Summer) 1.000
 M5-60 (mm) 20.000 Cv (Winter) 1.000

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

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

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S5	60 Summer	100	+30%	100/15 Summer			
2.000	S6	15 Summer	100	+30%	100/15 Summer			
1.001	S2	60 Summer	100	+30%	100/15 Summer			
3.000	S8	120 Winter	100	+30%	100/30 Summer			
3.001	S7	120 Winter	100	+30%	100/15 Summer			
1.002	S4	60 Summer	100	+30%	100/15 Summer		100/15 Summer	17
1.003	S3	60 Summer	100	+30%	100/15 Summer			

PN	US/MH Name	Water Level	Surcharged Depth	Flooded Volume	Flow / Overflow		Half Drain Time	Pipe Flow	Status
		(m)	(m)	(m³)	Cap.	(l/s)	(mins)	(l/s)	
1.000	S5	56.825	0.109	0.000	0.01			10.9	SURCHARGED
2.000	S6	58.203	0.853	0.000	1.50			59.0	SURCHARGED
1.001	S2	56.824	0.138	0.000	0.04			48.2	SURCHARGED
3.000	S8	56.812	1.021	0.000	0.08		248	2.4	SURCHARGED
3.001	S7	56.816	1.128	0.000	0.16			2.5	SURCHARGED
1.002	S4	56.822	0.179	0.000	0.02	90.6		24.5	SURCHARGED
1.003	S3	56.823	1.279	0.000	0.33			5.0	SURCHARGED

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1</u>		
	US/MH Level PN Name Exceeded	
	1.000 S5	
	2.000 S6	
	1.001 S2	
	3.000 S8	
	3.001 S7	
	1.002 S4	
	1.003 S3	
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Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1

Simulation Criteria

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

Number of Input Hydrographs 0 Number of Storage Structures 1
 Number of Online Controls 2 Number of Time/Area Diagrams 0
 Number of Offline Controls 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.397
 Region England and Wales Cv (Summer) 1.000
 M5-60 (mm) 20.000 Cv (Winter) 1.000

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

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

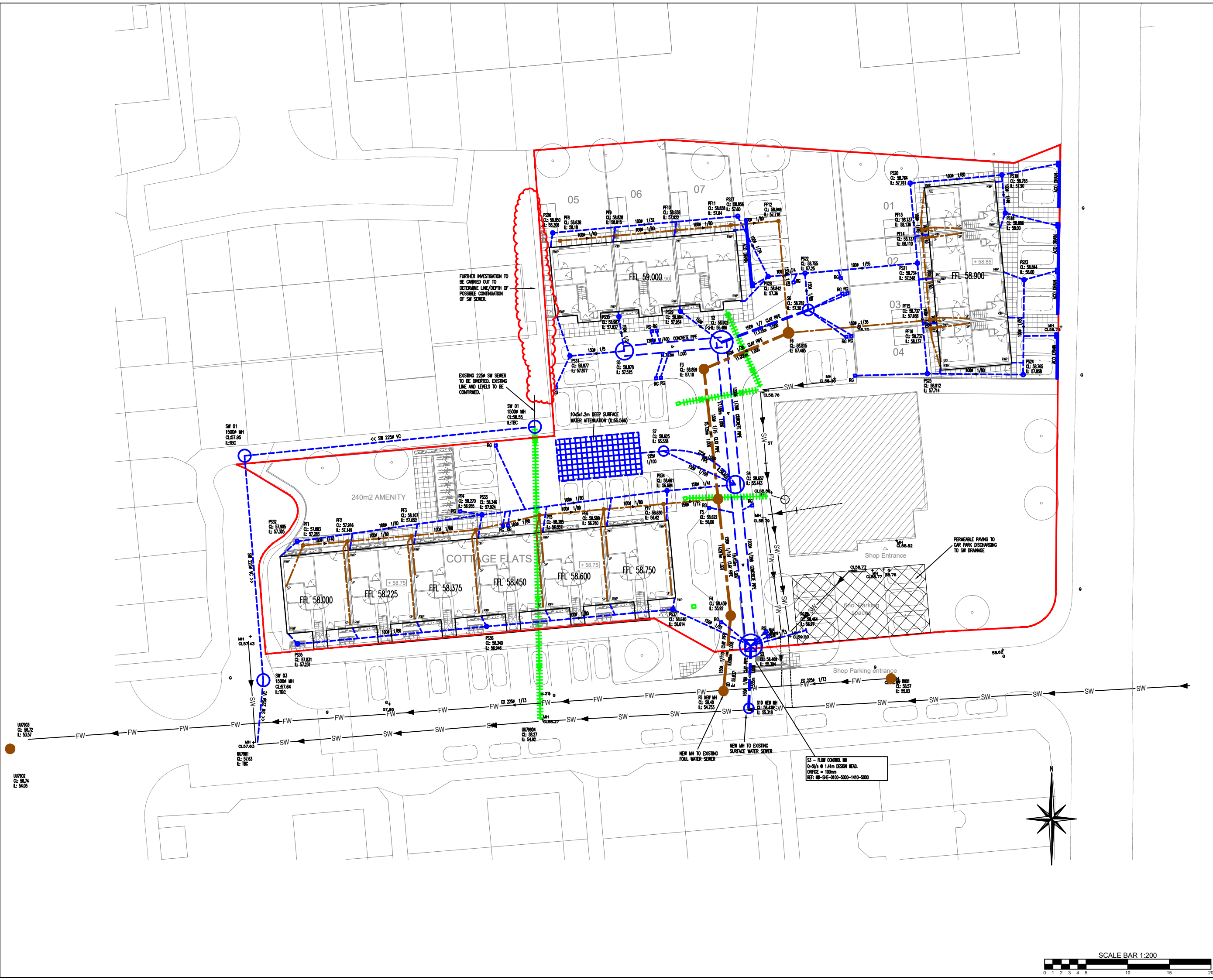
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	S5	120 Winter	100	+45%	100/15 Summer			
2.000	S6	15 Summer	100	+45%	100/15 Summer			
1.001	S2	120 Winter	100	+45%	100/15 Summer			
3.000	S8	120 Winter	100	+45%	100/15 Summer			
3.001	S7	240 Winter	100	+45%	100/15 Summer			
1.002	S4	120 Winter	100	+45%	100/15 Summer		100/15 Summer	18
1.003	S3	240 Winter	100	+45%	100/15 Summer			

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Overflow Cap. (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	S5	57.563	0.848	0.000	0.01		7.0	SURCHARGED
2.000	S6	58.543	1.193	0.000	1.65		64.9	FLOOD RISK
1.001	S2	57.569	0.883	0.000	0.03		28.8	SURCHARGED
3.000	S8	57.738	1.947	0.000	0.10	294	3.0	SURCHARGED
3.001	S7	57.528	1.840	0.000	0.17		2.6	SURCHARGED
1.002	S4	57.574	0.931	0.000	0.01	57.2	13.1	SURCHARGED
1.003	S3	57.490	1.946	0.000	0.39		6.0	SURCHARGED

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<u>Summary of Critical Results by Maximum Level (Rank 1) for Surface Network 1</u>		

Appendix F

Proposed Drainage Layout Drainage Areas Plan



General Notes

DO NOT SCALE OFF THIS DRAWING

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.

ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D.M. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.

FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.

ALL FLOOR LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION

ALL COVER LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION

ALL DRAINAGE PENETRATING THROUGH FLOOR SLABS AND RAINWATER PIPE LOCATIONS TAKEN FROM ARCHITECT'S DRAWINGS. ARCHITECT TO CONFIRM LOCATIONS PRIOR TO CONSTRUCTION.

EXISTING SERVICES

ROAD SIGNS AND LAMP COLLARS ON THE SITE PERIMETRY TO BE RE-SITED IF REQUIRED BY, AND TO THE APPROVAL OF, THE LOCAL AUTHORITY.

CONTRACTOR TO SATISFY THEMSELVES THAT EXISTING AND PROPOSED SERVICES DO NOT CLASH WITH PROPOSED DRAINAGE

KNOWN EXISTING SERVICES ARE INDICATED ON THE PLAN WHERE THEY CROSS THE PROPOSED DRAINAGE. THE EXACT TYPE AND LOCATION SHALL BE CONFIRMED BY THE CONTRACTOR PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE LEVELS DO NOT INTERFERE WITH SERVICES. ALL DISCREPANCIES SHALL BE REPORTED TO ENGINEER IMMEDIATELY.

THE CONTRACTOR SHALL CHECK ALL EXISTING COVER / INVERT LEVELS AND PIPE / SEWER SIZES ON SITE PRIOR TO START OF WORKS TO ENSURE PROPOSED DRAINAGE CAN BE CONSTRUCTED AS INDICATED ON THE DRAWING. ANY DISCREPANCIES TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

ALL REDUNDANT DRAINAGE WITHIN SITE TO BE GRUBBED UP, CHASED AND SEALED TO APPROVAL OF LOCAL AUTHORITY

PROPOSED DRAINAGE

ALL DRAINAGE IN HIGHWAYS/CAR PARKING AREAS/DRIVEWAYS LESS THAN 1.2m DEEP TO BE CONCRETE ENCASED.

ALL PPIC'S GREATER THAN 1.2m DEEP TO HAVE REDUCED ACCESS COVERS TO PREVENT MAN ENTRY.

SURFACE WATER DRAINAGE:
ALL PRIVATE SURFACE WATER DRAINAGE TO BE 100mm @ 1:80 GRADIENT UNLESS NOTED OTHERWISE.

FOUL WATER / COMBINED DRAINAGE:
ALL UNDERGROUND FOUL WATER DRAINAGE TO BE 100mm @ 1:40 GRADIENT UNLESS NOTED OTHERWISE. ALL OTHER PRIVATE FOUL WATER DRAINAGE TO BE 100mm @ 1:80 GRADIENT UNLESS NOTED OTHERWISE.

INTERNAL VENTING OF DRAINAGE SYSTEM TO ARCHITECT'S DETAILS

ALL INTERNAL SP/SWP POSITIONS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION OF GROUND FLOOR SLAB

DRAINAGE KEY

	New surface water drain / sewer
	Existing surface water drain / sewer
	New foul water drain / sewer
	Existing foul water drain / sewer
	Extg drainage to be abandoned to U/L/A approval
	New manhole - refer to plan for size
	Existing manhole / access chamber
	New polypropylene inspection chamber (PPIC)
	New manhole access chamber
	EXTG MH
	CL: XXX
	IL: XXX
	RWP
	SP
	BIG
	EX RG
	RG
	DG
	Permeable access road / driveway
	Surface Water Attenuation Cells

NOTE: ALL RWP/SP/BIG POSITIONS TO BE CONFIRMED BY ARCHITECT PRIOR TO START OF WORKS ON SITE

P03	AMENDED TO LATEST SITE LAYOUT	09.02.23	AJB	DS
P02	LAYOUT AMENDED	13.09.22	AJB	DS
P01	ISSUED FOR COMMENT	13.07.22	AJB	DS
Rev	Description	Date	By	Chkd

Drawing Status

PRELIMINARY DRAWING

Sutcliffe
Geotechnical & Environmental Investigation
Building Surveying
Pre Planning Services

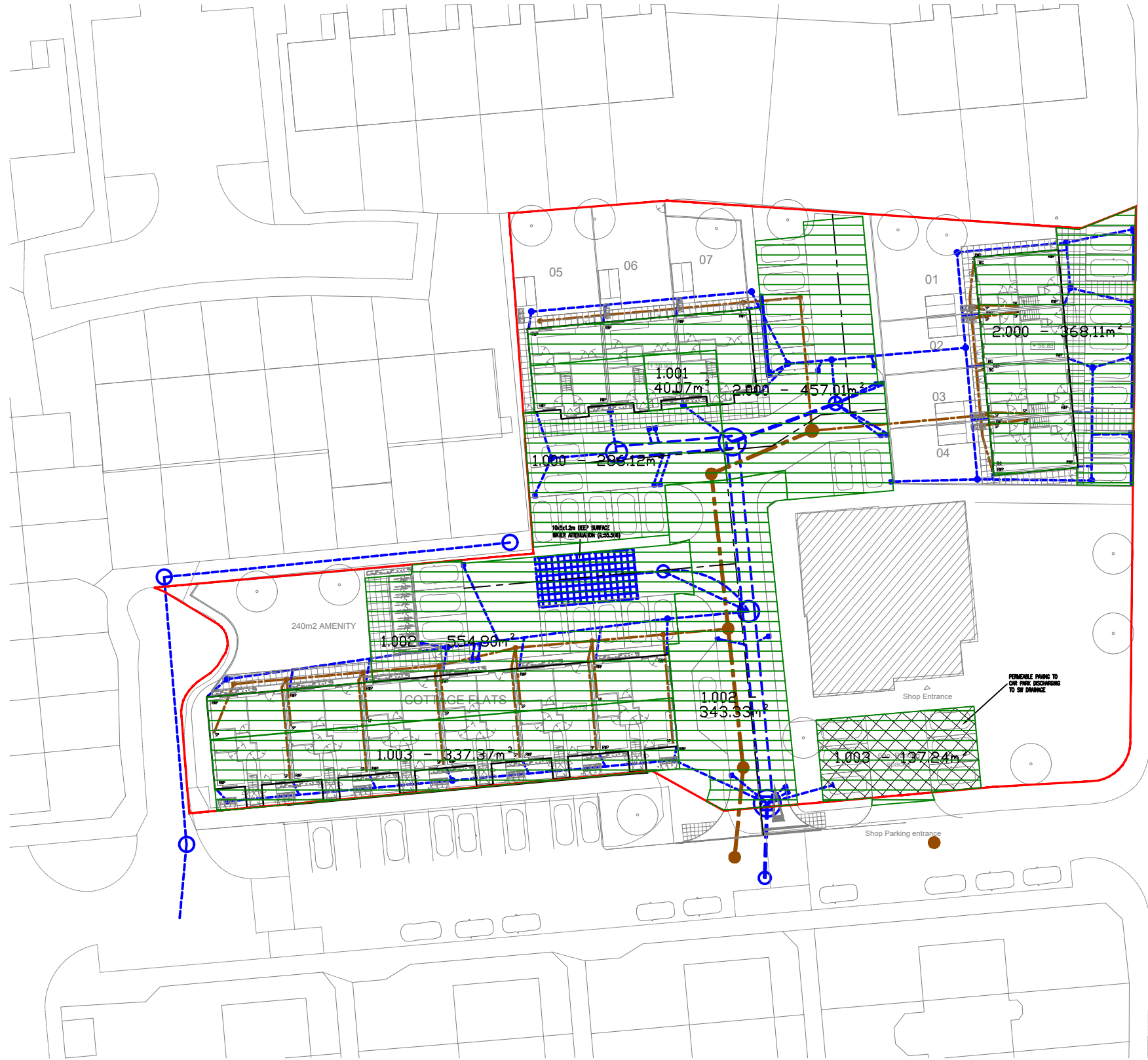
www.sutcliffe.co.uk

Client
BUILT GROUP LTD

Project
LYNEHAM WHISTON

Drawing Title
PROPOSED DRAINAGE LAYOUT

Date JULY 2022	Drawn By AJB	Checked By DS
Scale at A1 1:200	Project Number 32267	Sheet Number 32267-SUT-ZZ-XX-DR-C-6200
Revision P03		



P03	LAYOUT AMENDED	23.02.23	AJB	DS
P02	LAYOUT AMENDED	13.09.22	AJB	DS
P01	ISSUED FOR COMMENT	13.07.22	AJB	DS
Rev	Description	Date	By	Chkd
Date	Drawn By	Checked By		
JULY 2022	AJB	DS		
Scale at A3 1:500		Project Number 32267		
Sheet Number 32267-SUT-ZZ-XX-DR-C-6210				Revision P03

Appendix G

Flood Exceedance

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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Surface Network 1

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.397	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)	400

Designed with Level Soffits

Time Area Diagram for Surface Network 1

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.211	4-8	0.043

Total Area Contributing (ha) = 0.255

Total Pipe Volume (m³) = 55.318

Network Design Table for Surface Network 1

« - 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
1.000	11.733	0.029	400.0	0.029	5.00	0.0	0.600	o	1200	Pipe/Conduit	⚠
2.000	11.123	0.664	16.8	0.085	5.00	0.0	0.600	o	150	Pipe/Conduit	⚠
1.001	17.188	0.043	398.3	0.004	0.00	0.0	0.600	o	1200	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	5.10	55.515	0.029	0.0	0.0	0.0	1.86	2108.6	3.9
2.000	50.00	5.07	57.200	0.085	0.0	0.0	0.0	2.47	43.7	11.5
1.001	50.00	5.26	55.486	0.118	0.0	0.0	0.0	1.87	2113.2	15.9

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Network Design Table for Surface Network 1

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
3.000	2.790	0.028	100.0	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
3.001	9.516	0.095	100.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	19.452	0.049	398.3	0.090	0.00	0.0	0.600	o	1200	Pipe/Conduit	
1.003	7.535	0.076	99.2	0.047	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)
3.000	50.00	5.04	55.566	0.000	0.0	0.0	0.0	1.31	52.0	0.0
3.001	50.00	5.19	55.538	0.000	0.0	0.0	0.0	1.00	17.8	0.0
1.002	50.00	5.43	55.443	0.207	0.0	0.0	0.0	1.87	2113.2	28.1
1.003	50.00	5.56	55.394	0.255	0.0	0.0	0.0	1.01	17.8«	34.5

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Area Summary for Surface Network 1

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.029	0.029	0.029
2.000	-	-	100	0.085	0.085	0.085
1.001	User	-	100	0.004	0.004	0.004
3.000	-	-	100	0.000	0.000	0.000
3.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.034	0.034	0.034
	User	-	100	0.055	0.055	0.090
1.003	User	-	100	0.014	0.014	0.014
	User	-	100	0.034	0.034	0.047
				Total	Total	Total
				0.255	0.255	0.255

Free Flowing Outfall Details for Surface Network 1

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.003	S10 NEW MH	58.419	55.318	0.000	1200	0
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Simulation Criteria for Surface Network 1

Volumetric Runoff Coeff	1.000	Additional Flow - % of Total Flow	45.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/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)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6
Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	2	Number of Time/Area Diagrams	0
Number of Offline Controls	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.000	Storm Duration (mins)	360
Ratio R	0.397		

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Online Controls for Surface Network 1

Non Return Valve Manhole: S7, DS/PN: 3.001, Volume (m³): 3.6

Hydro-Brake® Optimum Manhole: S3, DS/PN: 1.003, Volume (m³): 36.6

Unit Reference	MD-SHE-0069-2500-1410-2500
Design Head (m)	1.410
Design Flow (l/s)	2.5
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	69
Invert Level (m)	55.394
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.410	2.5
Flush-Flo™	0.305	2.1
Kick-Flo®	0.620	1.7
Mean Flow over Head Range	-	2.0

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	1.8	1.200	2.3	3.000	3.5	7.000	5.3
0.200	2.1	1.400	2.5	3.500	3.8	7.500	5.4
0.300	2.1	1.600	2.6	4.000	4.0	8.000	5.6
0.400	2.1	1.800	2.8	4.500	4.3	8.500	5.8
0.500	2.0	2.000	2.9	5.000	4.5	9.000	5.9
0.600	1.8	2.200	3.1	5.500	4.7	9.500	6.1
0.800	1.9	2.400	3.2	6.000	4.9		
1.000	2.1	2.600	3.3	6.500	5.1		

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Offline Controls for Surface Network 1

Pipe Manhole: S4, DS/PN: 1.002, Loop to PN: 3.000

Diameter (m)	0.225	Roughness k (mm)	0.600
Section Type	Pipe/Conduit	Entry Loss Coefficient	0.500
Slope (1:X)	10.0	Coefficient of Contraction	0.600
Length (m)	5.000	Upstream Invert Level (m)	56.650

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Storage Structures for Surface Network 1

Cellular Storage Manhole: S8, DS/PN: 3.000

Invert Level (m) 55.566 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	60.0	1.201	0.0	104.8
1.200	50.0	104.8			

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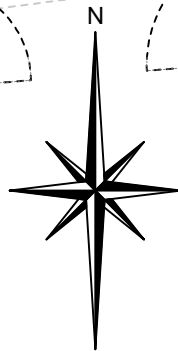
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Summary of Results for 360 minute 100 year Summer (Surface Network 1)

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

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

		Water	Surcharged	Flooded		Half Drain	Pipe	
	US/MH	Level	Depth	Volume	Flow / Overflow	Time	Flow	
PN	Name	(m)	(m)	(m³)	Cap. (l/s)	(mins)	(l/s)	Status
1.000	S5	58.453	1.738	0.000	0.01		4.6	SURCHARGED
2.000	S6	58.435	1.085	0.000	0.34		13.5	SURCHARGED
1.001	S2	58.453	1.767	0.000	0.02		18.7	SURCHARGED
3.000	S8	58.594	2.803	9.442	0.09		2.8	FLOOD
3.001	S7	58.394	2.706	0.000	0.13		2.0	FLOOD RISK
1.002	S4	58.452	1.809	0.000	0.00	38.1	6.0	FLOOD RISK
1.003	S3	58.402	2.858	0.000	0.23		3.5	FLOOD RISK



General Notes
DO NOT SCALE OFF THIS DRAWING
THIS DRAWING TO READ IN CONJUNCTION WITH ALL RELEVANT STRUCTURAL AND ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.
ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR / FABRICATOR PRIOR TO COMMENCEMENT OF WORKS.
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
ALL WORKS TO BE CARRIED OUT IN STRICT ACCORDANCE WITH THE ENGINEER'S SPECIFICATIONS, RELEVANT BRITISH STANDARDS, STATUTORY HEALTH AND SAFETY/C.D.M. REGULATIONS, RELEVANT CODES OF PRACTICE AND THE CURRENT EDITION OF THE BUILDING REGULATIONS.
FOR FINAL SETTING OUT INFORMATION RELATING TO GRID LINES AND WALL POSITIONS REFER TO THE ARCHITECT'S DRAWINGS.
ALL FINISHED FLOOR LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION
ALL COVER LEVELS TO BE CONFIRMED BY ARCHITECT PRIOR TO CONSTRUCTION
ALL DRAINAGE PENETRATING THROUGH FLOOR SLABS AND RAINWATER PIPE LOCATIONS TAKEN FROM ARCHITECTS DRAWINGS. ARCHITECT TO CONFIRM LOCATIONS PRIOR TO CONSTRUCTION.

KEY:

DEPTH OF WATER < 25MM

DEPTH OF WATER 50 - 150MM

DEPTH OF WATER > 150MM

DIRECTION OF SURFACE WATER FLOOD FLOW



P03	LAYOUT AMENDED	23.02.23	MJG	DS
P02	LAYOUT AMENDED	13.09.22	MJG	DS
P01	FOR INFORMATION	16.08.22	MJG	DS
Rev	Description	Date	By	Chkd

Drawing Status
PRELIMINARY DRAWING



Client
BUILT GROUP LTD
Project
LYNEHAM WHISTON

Drawing Title
PROPOSED FLOOD ROUTING AND EXCEEDANCE FLOODING

Date	Drawn By	Checked By
AUG 22	MJG	DS
Scale at A1	Project Number	Revision
1:200	32267	
Sheet Number	32267-SUT-ZZ-XX-DR-C-6201	P03



Appendix H

Correspondence

From: wastewaterdeveloperservices@uuplc.co.uk
To: [Dave Samuels](#); wastewaterdeveloperservices@uuplc.co.uk
Subject: Pre Development Enquiry for: Lyneham, Whiston, Merseyside UU Reference Number : 02152538
Date: 19 May 2022 09:41:45

Picture1



Good Morning, Dave

Pre Development Enquiry for: Lyneham, Whiston, Merseyside UU Reference Number : 02152538

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

<https://www.unitedutilities.com/builders-developers/working-near-our-assets/>

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 225mm diameter public foul water sewer within Lyneham located to the South of your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

In accordance with our infrastructure plans we may ask you to change your point of connection. Therefore please contact us when you are ready to formalise your drainage proposals, we would suggest before you submit for Full Planning.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.

This is outlined as follows, in order of priority:

- 1. into the ground (infiltration);**
- 2. to a surface waterbody;**
- 3. to a surface water sewer or highway drain;**
- 4. to a combined sewer.**

For guidance, The [North West SuDS Pro-Forma](#) provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

<https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs>

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

<https://www.gov.uk/government/publications/groundwater-protection-position-statements>

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 225mm diameter public surface water sewer located within the boundary of the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 5l/s.

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the public sewerage network under any circumstances

Sewer Adoptions

You have indicated on your application form that you intend to put the sewers forward for adoption (including any SuDS components that can come within the meaning of a sewer).

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

<https://www.unitedutilities.com/builders-developers/larger->

[developments/wastewater/sewer-adoptions/](#)

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

<https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/>

A free copy of the new Design & Construction Guidance can be downloaded via the link below:

<https://www.water.org.uk/sewerage-sector-guidance-approved-documents/>

Existing Wastewater Assets Crossing the Site

According to our public sewer records there are public sewers located within your site boundary. We will require unrestricted access to the sewer for maintenance purposes, we would ask that you maintain a minimum clearance of 6m which is measured 3m from the centre line of the pipe unless there happens to be a formal easement agreement in place,

in which case the specified easement width would apply. If you cannot achieve this then you may wish to consider diverting and or abandoning the public sewer.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

<https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/>

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

<https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/>

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

<https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/>

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Gary Jaundrell

Assistant Developer Engineer
Developer Services & Metering
Customer Services



Assistant Developer Engineer
Developer Services & Metering
Customer Services
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Did you know we now have a live chat facility available to you Mon to Friday 8 -5pm.
You just click on the orange live chat box on our webpage and one of our advisors will
be ready to chat to you and help you with your enquiry

<https://www.unitedutilities.com/builders-developers/> or you can email us at
WastewaterDeveloperServices@uuplc.co.uk

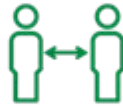
Coronavirus | Prevent the spread



Wash your
hands



Disinfect
common surfaces



Practise social
distancing



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COUGH

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