

7424

Whitehouse Club,

Middleton Road

Drainage Strategy Report

Introduction

This statement supports the development proposal for Planning Application No. 115468/00/2017. Branley Homes Ltd are proposing 50 residential houses, 24-plot apartment block with associated car parking and landscaping and a new club house with car parking.

Site Description

The site was formerly the Whitehouse Club building and its associated forecourt and bowling green, together with adjoining land to the west of the club. The overall site area is measured as 19725sq.m. and has an existing impermeable area of 2165sq.m. combined roof and hardstanding.

A CCTV drainage survey by General Utilities Northwest Limited has identified both foul and surface water flows discharge into the public 225dia combined sewer on White House Avenue. There is no attenuation / flow control on site so all flows leaving are unrestricted.

The site is being redeveloped for residential use and will comprise of 50 residential houses a 24-plot apartment block associated car parking and landscaping and a new club house with car parking. The proposed layout has an impermeable area of 11,155sq.m.

The site is not at risk of flooding from rivers, surface water or reservoirs.

Run off Rates

Existing brownfield run off rates have been calculated based on 50mm/hr rainfall intensity.

$$\begin{aligned} &= A \times i \\ &= 2165\text{sq/m} \times 50\text{mm/hr} \\ &= 30 \text{ l/s} \end{aligned}$$

Greenfield Run off rates using the IH124 method have been calculated for the remainder of the site area of 16,625sq.m

$$\begin{aligned} 1\text{yr} &= 10.09 \text{ l/s} \\ 30\text{yr} &= 19.72 \text{ l/s} \\ 100\text{yr} &= 24.13 \text{ l/s} \\ Q_{\text{bar}} &= 11.6 \text{ l/s} \end{aligned}$$

Proposed Run off Rate = Brownfield 50% + Qbar

$$= 15\text{l/s} + 11.6\text{l/s} = 26.6\text{l/s}$$

Following discussions with United Utilities a flow rate of 15l/s has been agreed. Providing a betterment on the existing situation.

Surface Water Drainage Proposal

The surface water drainage will be designed in accordance with 'Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems (March 2015). This guidance is as follows:

Peak flow control

S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event should never exceed the peak greenfield runoff rate for the same event.

S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1-year rainfall event and the 1 in 100-year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.

Volume control

S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event should never exceed the greenfield runoff volume for the same event.

S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100-year, 6-hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.

Following the hierarchy for disposal of surface water, as set out in Building Regulations:

Infiltration

Borehole and trial pit data from the phase 2 site investigation report by CC Geotechnical Ltd identifies the majority of the site is made ground over clay therefore making the site unsuitable for infiltration and alternate means of disposal of surface water from the site will be required.

Discharge to Watercourse

There are no watercourses within or close to the development. The River Irk runs approx. 320m to the North East of the site however the length of the route and crossing third party land to discharge to the watercourse can be discounted.

Discharge to Surface Water Sewer

A CCTV drainage survey by General Utilities Northwest Limited has identified public surface water sewers within Counhill Drive. Levels don't allow for a gravity connection into this public surface water sewer, furthermore the CCTV survey has proven the public surface water sewer discharges into the public combined sewer within Middleton Road further downstream.

Discharge to Combined Sewer

We are proposing to discharge all surface water flows from roof and hardstanding of the proposed development into the combined sewer within Middleton Road.

Surface water flows from the site will be restricted to 15l/s as agreed with United Utilities. This is a betterment of on the existing run off rate calculation of = Brownfield 50% + Qbar.

Generally, a residential development is considered to have a design life of 100 years. Therefore, for the purpose of this assessment, taking into account of the Environments Agency's climate change allowances (published in February 2016), a 40% increase in peak rainfall intensity should be included.

The proposed surface water network has been designed for 100-year flood event plus an additional 40% allowance for climate change. Attenuation is provided within oversized on-line pipes and off-line buried cellular crates. The flows will be restricted using a Hydrobrake flow control device installed in the last manhole before flows exist the site. All on line pipes and manholes will be offered to United Utilities for adoption under S104 Agreement and all offline components will be maintained by a management company.

SUDS Strategy

The prime function of SuDS, as with conventional drainage, is to provide effective surface water drainage, ensuring the greatest degree of flood risk protection over the long term both within and downstream of the development and prevent pollution. However, SuDS approaches can bring wider benefits too. Appropriately designed, constructed and maintained, SuDS are more sustainable than conventional drainage systems and can help to:

- Reduce run-off surface water flow-rates and/or volumes and hence reduce the risk of flooding
- Encourage natural groundwater re-charge
- Reduce pollutant concentrations in storm water
- Provide habitat for wildlife.

There are many site-specific factors which will influence the choice of any single or combination of SuDS devices used within a development. The primary factors are:

- Whether the development is domestic, commercial or industrial
- Whether the underlying ground is contaminated. If so, infiltration systems will most probably not be permitted.
- Whether the underlying ground is permeable enough for infiltration systems to be considered.
- Whether the ground water levels are deep enough for infiltration systems to be considered
- Whether the site is steeply sloping and its general topography
- The availability of space inside the development for each potential SUDS facility.
- Health & Safety aspects should the development be likely to be inhabited or used by children.

To ensure no increased flood risk to offsite land and development, disposal of surface water to the ground is encouraged and runoff volumes will be reduced through the SuDS management train where ground conditions permit. Where ground conditions are unsuitable, a discharge to an open water body / sewer will be necessary with rates restricted to the existing site conditions.

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	Not suitable: Architectural proposals for the development involve a pitched roof arrangement which are not suitable for green roofs.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site, and reduces treated water consumption.	Not suitable: Additional costs of installation would have severe effect on viability of the development. Running and maintenance costs would not be acceptable to our client. The ability to restrict peak flow rates and short -term peak volumes is non-existent where a critical storm event occurs. Water butts will be installed to rear RWP of residential houses for reuse in the garden.
Infiltration	Reduces total run off volume from the development	Not suitable due to present of cohesive soils on site
Permeable Surfacing (Infiltration)	Reduces total run off volume from the development. Can be used to enhance quality of run-off water.	Not suitable due to present of cohesive soils on site
Permeable Surfacing (Tanked)	Can be used to enhance quality of run-off water. Sub-base provides 'source' storage and reduces the volume of storage downstream. The storage can be created with selection of the stone fill or use of plastic box systems. Impermeable membrane at base of construction to prevent impact on pavement stability	Not suitable: Long term maintenance required and risk of reduction in permeability. Specialist maintenance required to maintain porous surfaces. No services to run beneath areas of permeable surface (due to presence of base impermeable barrier which is very difficult to excavate through and reinstate if required). Spatial constraints of site do not allow alternative routes for services along plot frontages. Difficult to install small areas of tanked systems that require very small flow controls which can lead to maintenance issues. Presence of shallow sewers on site will make it difficult to install. Construction sequence can make it difficult to construct without use of a sacrificial road base surface
Macro-Previous Paving	Provide at source surface water storage and removal of oil and suspended solids.	Suitable: To be installed in apartment car park bays to provide at source surface water storage

		and improve water quality prior to discharge into piped system.
Swales, basins and ponds	Provide areas for above ground surface run off storage. Swales also allow filtering of particulate matter, improving water quality.	Not suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability
Bio-Retention Areas	Collect and retain run -off to help improve water quality, prior to discharge in piped system or infiltration	Suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability however SUDS planters can be provided on RWP's of the club house with overflow to piped network.
Highway Tree Planters	Suitable as traffic calming features. Can be used as surface water run off storage and improve water quality prior to discharge in piped system or infiltration.	Not Suitable: Due to the site topography, driveway locations, junctions and steep highway gradients there are no suitable locations to introduce tree planters. Site geology not suitable for infiltration.
Geo-cellular storage	Suitable for sites with insufficient space for basins etc. Suitable for sites where topography prevents the use of open basins etc. Can be very effective infiltration devices subject to ground conditions.	Suitable: Subject to detailed design and drainage layout suitable for attenuation. Infiltration not suitable due to soil conditions, clay strata.
Large Pipes, conduits and tanks	Suitable for sites with insufficient space for basins etc. Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. Generally, be suitable for adoption by the statutory water company (e.g. United Utilities).	Suitable: Large diameter on-line pipes can be located within the highway corridor and will be adopted by United Utilities via S104 agreement

Foul Drainage Proposal

Foul water will discharge into the combined sewer in Middleton Road via a gravity drainage network within the highway corridor as agreed with United Utilities and offered for adoption under S104 agreement.

Conclusion

This strategy demonstrates solutions for both surface water and foul drainage can be provided to serve the proposed residential development. The conceptual surface water attenuation scheme presented on Coopers Drawing No. 7424 SK/08 is intended to demonstrate that a feasible surface water attenuation solution can be achieved on the site to meet the requirements of the NPPF. The detailed drainage design for the proposed development has incorporated SUDS source control components where possible with the use of rainwater collection for use in gardens, macro-pervious paving in parking areas where possible and the use of SUDS planters on RWP's.

Discharge of foul and surface water into the combined sewer in Middleton Road has been agreed with United Utilities under S104 agreement.

Refer to Coopers Drawing No.7424_SK08_A Drainage Strategy for drainage proposals.

Liam Worthington
Infrastructure Engineer
COOPERS

23/06/21

Supporting Information:

1. Existing Impermeable Areas
2. CCTV Drainage Survey
3. Site Investigation Logs
4. Correspondence with United Utilities
5. Drawings
6. Calculations



	19725m ²	Site Area
	16625m ²	Greenfield Area
Existing		
	880m ²	Roof Areas
	1285m ²	Hardstanding Areas
	2165m ²	Existing Impermeable Areas (11% of the site)

DO NOT SCALE

 **coopers**
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Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU

Drawing No.

7424 / SK04

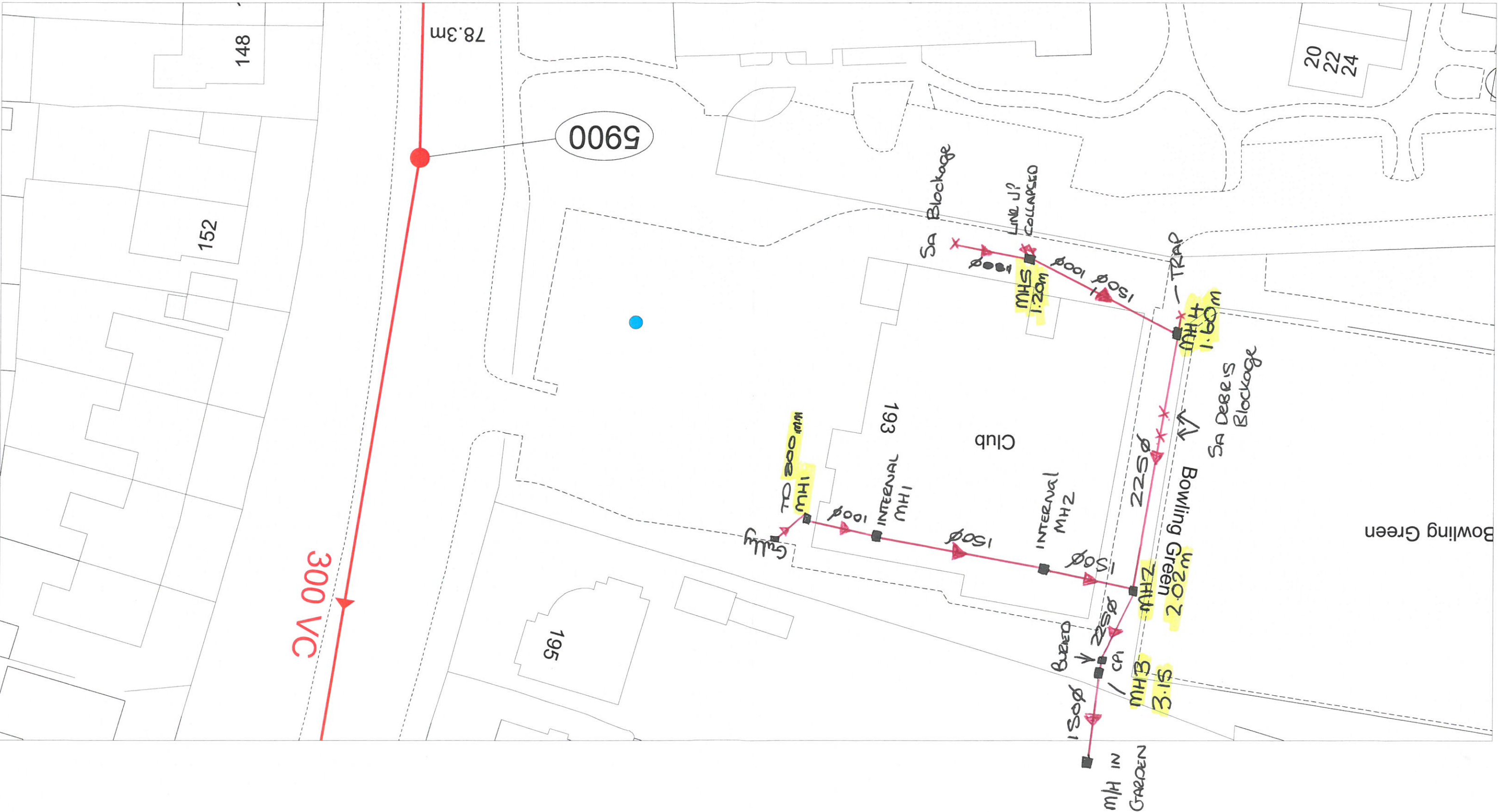
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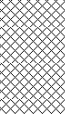
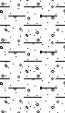
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5000A 2.71 BACK-PROP
4.82M
5000 UTR.

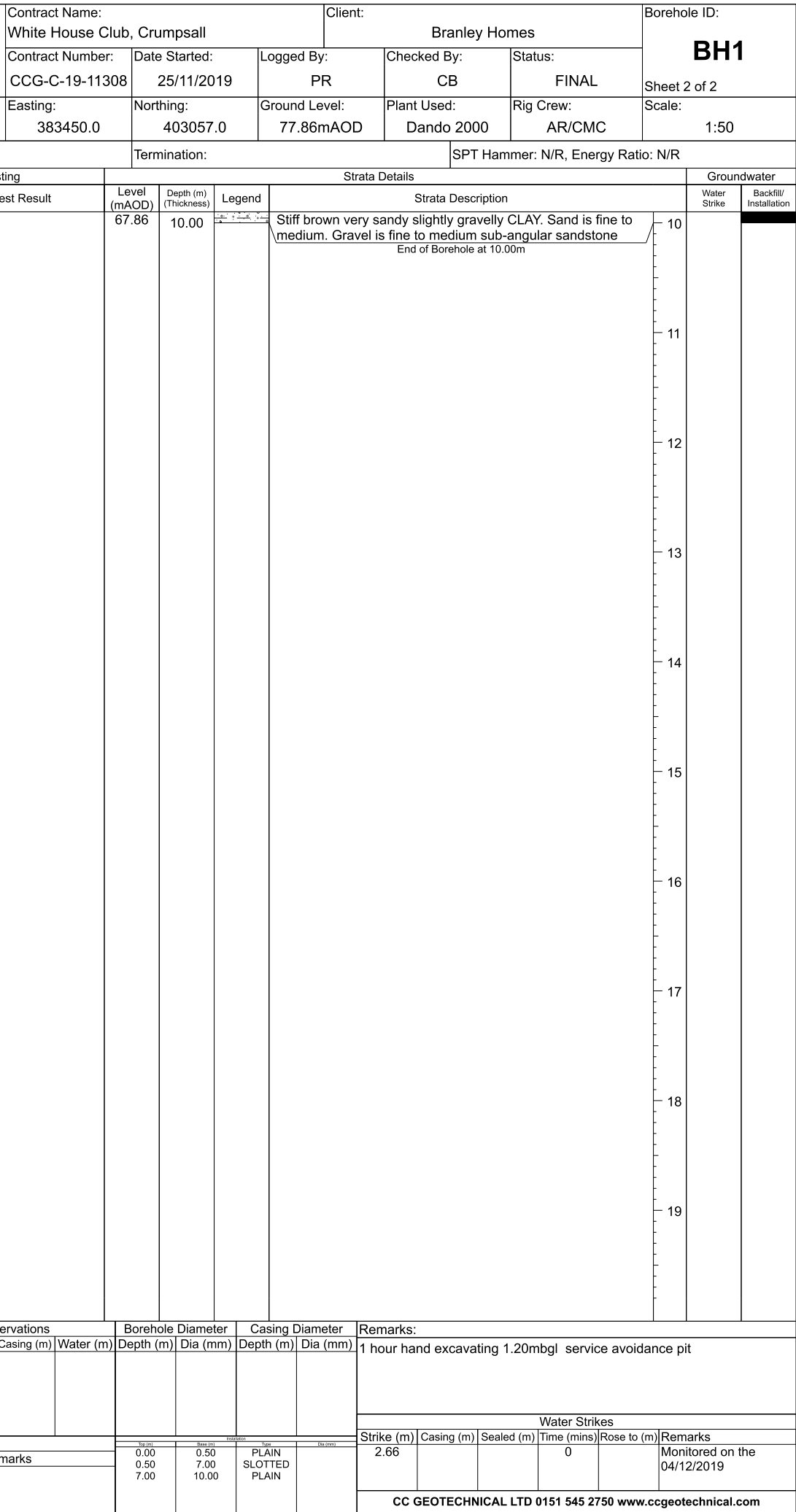
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COMPLETE.



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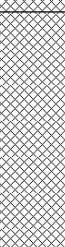
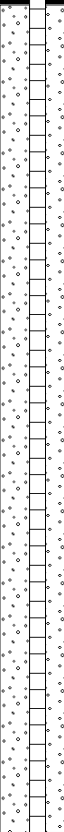
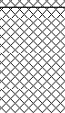
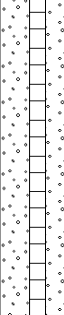
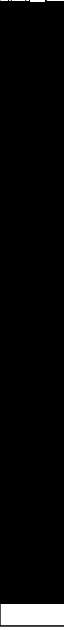
APPENDIX D: CABLE PERCUSSIVE BORHOLE LOGS

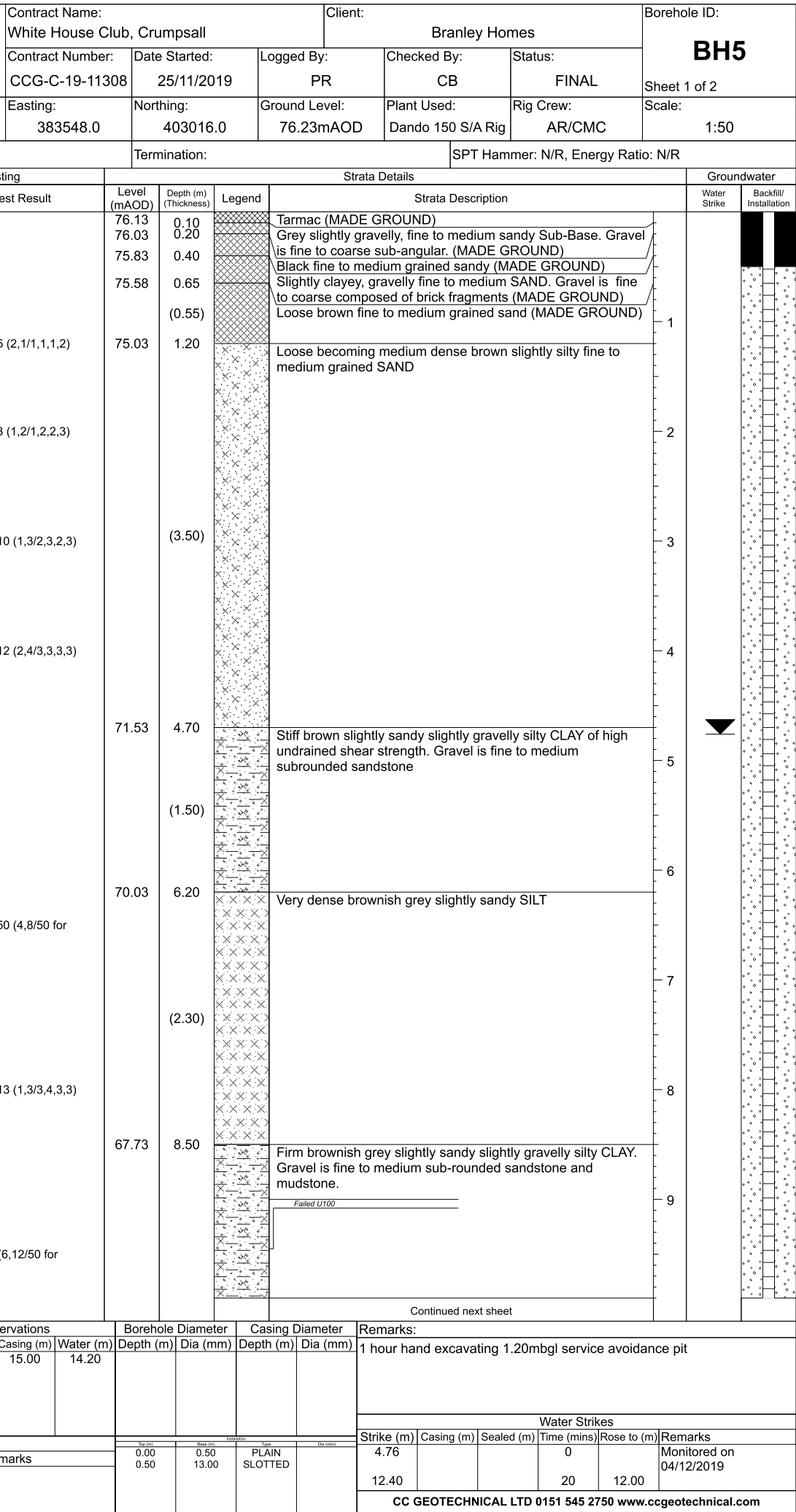
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	Contract Number: CCG-C-19-11308	Date Started: 25/11/2019	Logged By: PR	Checked By: CB	Status: FINAL					
Cable Percussion Borehole Log		Easting: 383450.0	Northing: 403057.0	Ground Level: 77.86mAOD	Plant Used: Dando 2000	Rig Crew: AR/CMC	Sheet 1 of 2 Scale: 1:50			
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	
0.50	B	SPT(S)N=6 (2,1/1,1,2,2)	77.76	0.10		Grassed TOPSOIL	1			
1.00	B		77.06	0.80		Brown very silty slightly gravelly fine to medium SAND. Gravel is fine to medium sub-rounded sandstone (MADE GROUND)				
1.50	B		76.46	1.40		Dark brown very clayey gravelly fine to medium SAND. Gravel is fine to medium sub-angular ceramic and brick (MADE GROUND)				
2.50	B	SPT(S)N=9 (2,2/3,2,2,2)	75.06	(1.40)			2			
3.50	B	SPT(S)N=14 (2,4/3,4,3,4)		2.80						Medium dense, brown very gravelly slightly silty fine to medium SAND . Gravel is fine to coarse sub-angular to sub-rounded sandstone and mudstone (Possibly Reworked)
4.50	B	SPT(S)N=14 (4,5/4,4,3,3)		(1.80)						4
5.00	U	HVP=80	73.26	4.60	Firm to stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine sub-angular sandstone	5				
6.00	B	SPT(S)N=39 (5,7/9,10,10,10)	71.46	(1.80)		6				
7.50	B			6.40				Stiff brown very sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium sub-angular sandstone	7	
8.00	U			SPT(S)N=50 (7,12/50 for 275mm)				(3.60)		8
9.00	B	SPT(S)N=50 (6,13/50 for 270mm)	9							
Continued next sheet										
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					Borehole		Water Strikes			
From (m)	To (m)	Duration	Remarks	Top (m)	Base (m)	Diagnose	Strike (m)	Casing (m)	Sealed (m)	Time (mins)
				0.00	0.50	PLAIN	2.66			0
				0.50	7.00	SLOTTED				
				7.00	10.00	PLAIN				
									Remarks Monitored on the 04/12/2019	
CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com										

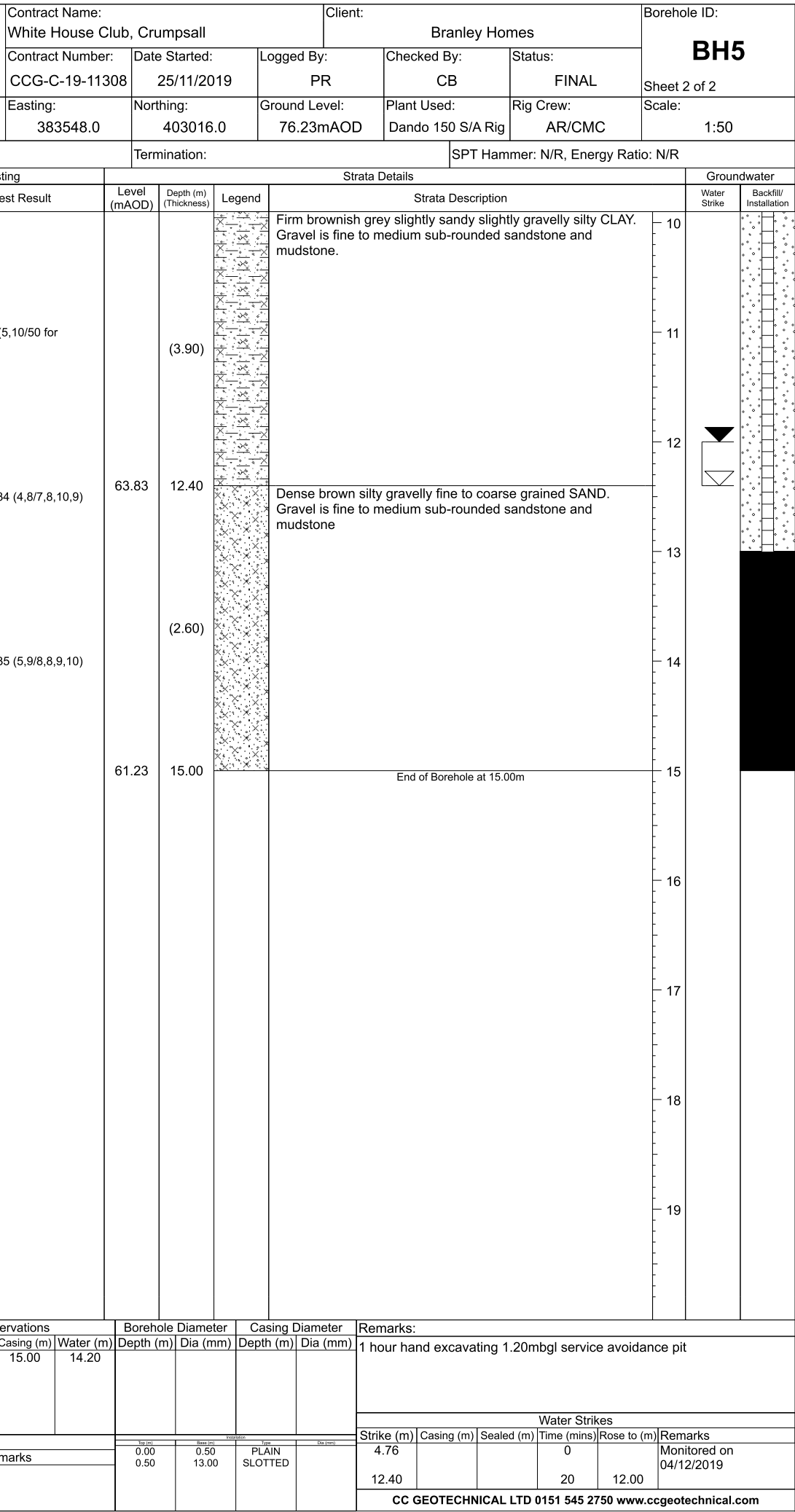


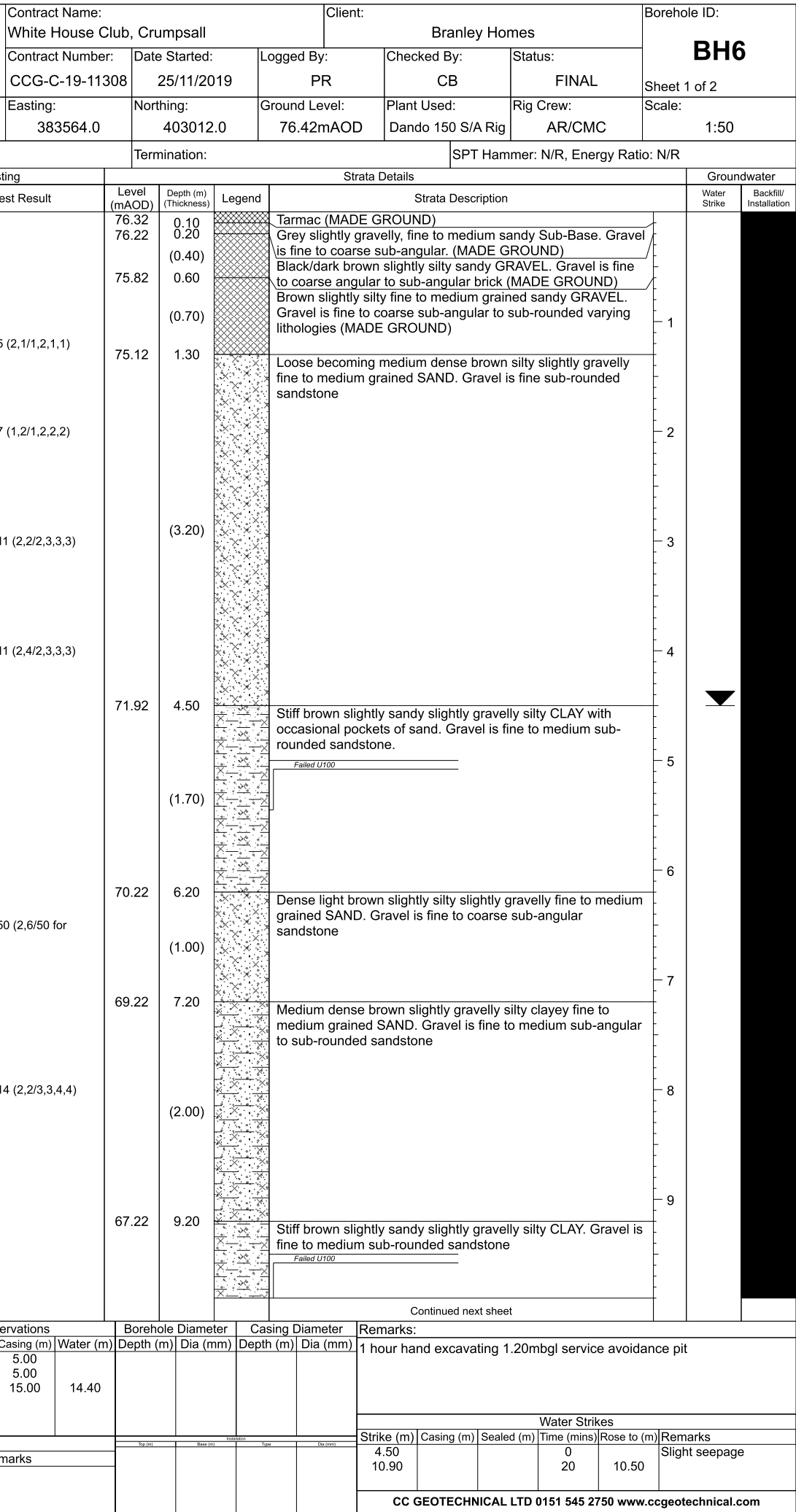
	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Borehole ID: BH2			
	Contract Number: CCG-C-19-11308	Date Started: 25/11/2019	Logged By: PR	Checked By: CB	Status: FINAL					
Cable Percussion Borehole Log	Easting: 383417.0	Northing: 403017.0	Ground Level: 81.55mAOD	Plant Used: Dando 2000	Rig Crew: AR/CMC	Sheet 1 of 1 Scale: 1:50				
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	
0.50	B	SPT(S) 1.20m, N=6 (1,2/1,2,1,2)	81.25	(0.30) 0.30		Grassed TOPSOIL		1		
1.00	B		Soft becoming firm brown slightly sandy silty CLAY (Reworked)							
1.50	B	SPT(S) 2.00m, N=9 (2,2/2,3,2,2)	79.95	1.60		Loose becoming medium dense brown sandy clayey SILT (Reworked)		2		
2.50	B					Loose becoming medium dense brown sandy clayey SILT (Reworked)				
3.50	B	SPT(S) 3.00m, N=8 (1,1/2,2,2,2)	76.55	(3.40)		Medium dense becoming dense brown silty fine to medium grained SAND		3		
4.50	B					Medium dense becoming dense brown silty fine to medium grained SAND				
5.00	B	SPT(S) 4.00m, N=10 (2,1/2,3,2,3)	76.55	5.00		Medium dense becoming dense brown silty fine to medium grained SAND		4		
6.00	B					Medium dense becoming dense brown silty fine to medium grained SAND				
7.50	B	SPT(S) 5.00m, N=10 (3,2/2,3,2,3)	76.55	(5.00)		Medium dense becoming dense brown silty fine to medium grained SAND		5		
8.00	B					Medium dense becoming dense brown silty fine to medium grained SAND				
9.00	B	SPT(S) 6.50m, N=23 (3,4/5,5,7,6)	71.55	10.00		Medium dense becoming dense brown silty fine to medium grained SAND		6		
7.00	B					Medium dense becoming dense brown silty fine to medium grained SAND				
8.00	B	SPT(S) 8.00m, N=32 (4,7/7,9,8,8)	71.55	10.00		Medium dense becoming dense brown silty fine to medium grained SAND		7		
9.00	B					Medium dense becoming dense brown silty fine to medium grained SAND				
9.00	B	SPT(S) 9.50m, N=34 (3,8/8,9,8,9)	71.55	10.00		End of Borehole at 10.00m		8		
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)
					0.00	0.50	PLAIN			
					0.50	7.00	SLOTTED			
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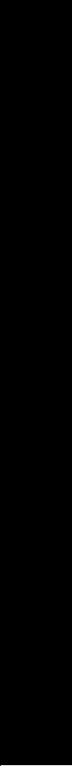
Weather:		Termination:		SPT Hammer: N/R, Energy Ratio: N/R								
Samples & In Situ Testing					Strata Details				Groundwater			
Depth	Sample ID	Test Result	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description				Water Strike	Backfill/ Installation	
0.40	B	SPT(S) 1.20m, N=5 (1,1/2,1,1,1)	80.62	(0.50)		Grassed TOPSOIL				1		
1.00	B			0.50		Loose brown very clayey slightly gravelly fine to medium grained SAND. Gravel is fine subrounded sandstone. (Reworked)						
1.50	B											
		SPT(S) 2.00m, N=5 (2,1/1,2,1,1)		(2.90)						2		
2.50	B	SPT(S) 3.00m, N=7 (1,2/2,1,2,2)	77.72							3		
3.50	B			3.40		Loose becoming medium dense brown sandy slightly gravelly clayey SILT. Gravel is fine to medium sub-rounded sandstone (Possibly Reworked)				4		
4.50	B									5		
		SPT(S) 4.00m, N=7 (2,1/2,1,2,2)		(1.70)								
		SPT(S) 5.00m, N=20 (2,4/4,5,5,6)	76.02	5.10		Dense brown slightly silty fine to medium grained SAND				6		
6.00	B									7		
		SPT(S) 6.50m, N=32 (3,6/7,9,8,8)								8		
7.50	B	SPT(S) 8.00m, N=31 (4,6/8,7,8,8)		(4.90)						9		
9.00	B	SPT(S) 9.50m, N=35 (5,8/8,9,8,10)	71.12							10		
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		
Chiselling					Installation							
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)				
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	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Borehole ID: BH4						
	Contract Number: CCG-C-19-11308	Date Started: 25/11/2019	Logged By: PR	Checked By: CB	Status: FINAL								
Cable Percussion Borehole Log		Easting: 383328.0	Northing: 403038.0	Ground Level: 81.50mAOD	Plant Used: Dando 2000	Rig Crew: AR/CMC	Sheet 1 of 1 Scale: 1:50						
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				
0.50	B		81.30	0.20		Grassed TOPSOIL							
				(0.50)		Brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-rounded sandstone (Reworked)							
1.00	B	SPT(S) 1.20m, N=6 (1,2/1,1,2,2)	80.80	0.70		Brown silty slightly gravelly fine to medium grained SAND. Gravel is fine to medium sub-rounded sandstone (Reworked)		1					
1.50	B							2					
2.50	B	SPT(S) 2.00m, N=9 (2,2/2,3,2,2)		(2.80)				3					
3.50	B	SPT(S) 3.00m, N=11 (2,3/3,2,3,3)	78.00	3.50		Brown very silty fine grained SAND (Reworked)		4					
4.50	B	SPT(S) 4.00m, N=8 (1,2/1,3,2,2)		(0.90)				5					
6.00	B	SPT(S) 5.00m, N=24 (3,5/5,6,6,7)	77.10	4.40		Medium dense becoming dense brown slightly silty slightly gravelly fine to coarse grained SAND. Gravel is fine sub-rounded sandstone		6					
7.50	B	SPT(S) 6.50m, N=33 (4,6/8,9,8,8)		(5.60)				7					
9.00	B	SPT(S) 8.00m, N=35 (5,8/8,9,9,9)						8					
		SPT(S) 9.50m, N=38 (6,9/9,10,9,10)	71.50	10.00		End of Borehole at 10.00m		9					
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	0.50	PLAIN		3.45			0		Monitored 04/12/2019
				0.50	6.00	SLOTTED							
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		Contract Name: White House Club, Crumpsall			Client: Branley Homes			Borehole ID: BH6 Sheet 2 of 2	
		Contract Number: CCG-C-19-11308	Date Started: 25/11/2019	Logged By: PR	Checked By: CB	Status: FINAL			
Cable Percussion Borehole Log		Easting: 383564.0	Northing: 403012.0	Ground Level: 76.42mAOD	Plant Used: Dando 150 S/A Rig	Rig Crew: AR/CMC	Scale: 1:50		
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
10.50	B	SPT(S)50 (7,4/50 for 155mm)	65.52	(1.70)		Stiff brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium sub-rounded sandstone	10		
		SPT(S)N=34 (5,7/8,8,9,9)		10.90		Dense brown slightly silty slightly gravelly fine to medium grained SAND. Gravel is fine to coarse sub-rounded to sub-angular sandstone	11		
12.00	B	SPT(S)N=34 (2,5/7,8,10,9)	61.42	(4.10)			12		
		SPT(S)N=33 (4,6/7,8,9,9)		15.00		End of Borehole at 15.00m	15		
13.50	B						16		
							17		
							18		
							19		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: 1 hour hand excavating 1.20mbgl service avoidance pit
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	
11-11-2019	16:00	5.00	5.00						
12-11-2019	08:00	5.00	5.00						
	16:00	15.00		14.40					
Chiselling					Seepage		Water Strikes		
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	
					4.50				
					10.90				
							0	10.50	
							20		
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APPENDIX E: TRIAL PIT LOGS

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP1				
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1					
	Easting: 383449.0		Northing: 403024.0	Ground Level: 77.95mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50				
Trial Pit Log			Weather:			Hole Termination: Collapse			Stability:		
Samples & In Situ Testing				Strata Details						Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description					
0.20	B		77.75	0.20		TOP SOIL containing roots, grass, wood and plastics.				1	
0.20	ES		(0.40)	Black slightly silty, slightly sandy, gravelly MADE GROUND. Gravel is angular to sub-angular composed of broken and whole brick with a high cobble content. Glass, plastic, rootlets and ferrous material present.							
0.60	B		77.35	0.60		Brown slightly silty, slightly gravelly fine to medium SAND. Gravel is sub-angular to angular brick and sandstone. (MADE GROUND)					
			(1.20)								
1.80	B		76.15	1.80		Light brown, slightly gravelly, silty fine to medium SAND. Gravel is fine to coarse sub-angular to angular sandstone (MADE GROUND)				2	
			(1.20)								
3.00	B		74.95	3.00		Slightly clayey, silty fine to medium SAND, containing black ash material (MADE GROUND)				3	
			(0.50)								
3.50	B		74.45	3.50		Light brown, slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular sandstone				4	
			(0.50)								
			73.95	4.00		End of Trial Pit at 4.00m				4	
										5	
										6	
										7	
Dimensions:						General Remarks:					
Final Depth: 4.00m						Sides Collapse					
← Length (m) → m ↑ Width (m) ↓ m Orientation: ° ←											
Inclination: °						Water Strikes					
						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
						4.00			0		Seepage
						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP2				
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1					
	Easting: 383396.0		Northing: 403059.0		Ground Level: 80.35mAOD		Plant Used: JCB 3CX Excavator		Date Printed: 10/01/2020	Scale: 1:50	
Trial Pit Log											
Weather:			Hole Termination:			Stability:					
Samples & In Situ Testing			Strata Details							Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description					
0.30	B	HVP=35kPa	80.05	(0.30)		TOP SOIL comprised of soils, grass, rootlets and plant matter				1	
0.80	B		79.60	0.30		Black/brown silty SAND. Sand is fine to medium grained (MADE GROUND)					
0.80	ES		0.75		Soft brown slightly sandy CLAY. Sand is fine to medium grained (MADE GROUND)						
				(1.25)							
2.00	B	HVP=30kPa	78.35	2.00		Soft brown slightly silty, fine to coarse sandy CLAY (MADE GROUND)				2	
					(0.90)						
2.90	B		77.45	2.90		Brown, slightly silty, slightly gravelly fine to medium SAND. Gravel is fine to medium sub-angular to angular sandstone and broken brick (MADE GROUND)				3	
				(1.10)							
			76.35	4.00	End of Trial Pit at 4.00m				4		
									5		
									6		
									7		
Dimensions:						General Remarks:					
Final Depth: 4.00m											
← Length (m) → m ↑ Width (m) ↓ m Orientation: ° ←											
						Water Strikes					
						Strike (m)Casing (m)Sealed (m)Time (mins)Rose to (m)Remarks					
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

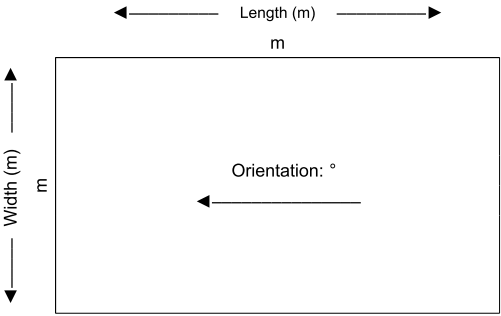
	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP3				
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1					
Trial Pit Log	Easting: 383351.0	Northing: 403066.0	Ground Level: 80.27mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50					
	Weather:			Hole Termination: Collapse		Stability:					
Samples & In Situ Testing			Strata Details				Water	Backfill			
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description					
0.30 0.30	B ES	HVP=30kPa	80.07	0.20 (0.80)		TOP SOIL composed of grass, plant matter and rootlets Slightly silty slightly gravelly sandy loose CLAY. Sand is fine to coarse. Gravel is medium subangular (MADE GROUND)	1				
1.00	B	HVP=35kPa	79.27	1.00 (0.60)		Soft brown slightly sandy CLAY. Sand is fine to medium (MADE GROUND)					
1.60	B		78.67	1.60 (1.40)		Firm light brown slightly silty slightly clayey SAND. Sand is fine to medium containing a black argillaceous matter (MADE GROUND)			2		
3.00	B		77.27	3.00	----- End of Trial Pit at 3.00m		3				
							4				
							5				
							6				
							7				
Dimensions:						General Remarks:					
Final Depth: 3.00m						Side Collapse					
← Length (m) → m ↑ Width (m) m Orientation: ° ←											
						Water Strikes					
						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

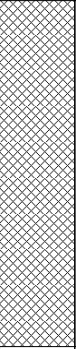
	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP4																
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1																	
	Easting: 383324.0		Northing: 403054.0	Ground Level: 80.40mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50																
Trial Pit Log			Weather:			Hole Termination: Collapse			Stability:														
Samples & In Situ Testing				Strata Details						Water	Backfill												
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																	
0.45	B		80.00	(0.40)		Grassed TOPSOIL				1													
0.80	ES		79.55	(0.45)		Brown slightly sandy slightly gravelly silty CLAY. Sand is fine to medium grained. Gravel is fine to medium sub-angular sandstone (Possibly Reworked)																	
1.40	B		78.90	(0.65)		Reddish brown slightly gravelly sandy SILT. Gravel is fine to medium sub-angular sandstone (Possibly Reworked)																	
				1.50		Brown slightly gravelly silty fine to medium grained SAND. Gravel is fine to medium sub-angular sandstone (Possibly Reworked)				2													
				(1.50)																			
3.00	B		77.40	3.00		End of Trial Pit at 3.00m				3													
										4													
										5													
										6													
										7													
Dimensions:						General Remarks:																	
Final Depth: 3.00m						Side Collapse																	
← Length (m) → m ↑ Width (m) ↓ m Orientation: ° ←																							
						Water Strikes																	
						<table><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><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks						
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																		
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com																	

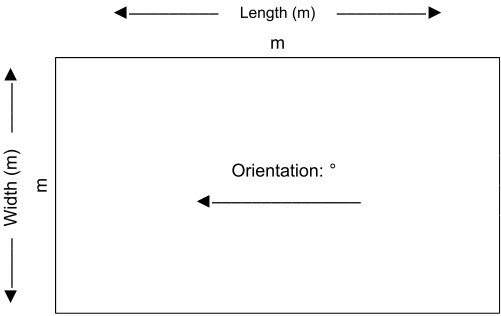
	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP5																						
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1																							
	Easting: 383337.0		Northing: 402988.0	Ground Level: 81.75mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50																						
Trial Pit Log				Weather:			Hole Termination: Collapse			Stability:																			
Samples & In Situ Testing				Strata Details						Water	Backfill																		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																							
0.30 0.30	B ES		81.55	0.20		TOP SOIL composed of grass and plant material				1																			
				(0.80)		Slightly gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded (MADE GROUND)																							
1.00	B		80.75	1.00		Brown slightly silty, slightly clayey, fine to medium SAND. Black ash material present throughout (MADE GROUND)				2																			
				(1.20)																									
2.20	B		79.55	2.20		Light brown clean SAND. Sand is fine to medium grained (Possibly Reworked)				3																			
				(1.80)																									
3.20	B		77.75	4.00		End of Trial Pit at 4.00m				4																			
										5																			
										6																			
										7																			
Dimensions:						General Remarks:																							
Final Depth: 4.00m						Side Collapse																							
← Length (m) → m ↑ Width (m) ↓ m Orientation: ° ←																													
						<table><tr><th colspan="6">Water Strikes</th></tr><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><tr><td>1.80</td><td></td><td></td><td>0</td><td></td><td>Seepage</td></tr></table>						Water Strikes						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	1.80			0		Seepage
Water Strikes																													
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																								
1.80			0		Seepage																								
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com																							

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP6	
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL		Sheet 1 of 1	
Trial Pit Log		Easting: 383356.0	Northing: 403036.0	Ground Level: 80.99mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50	
Weather:			Hole Termination:			Stability:		

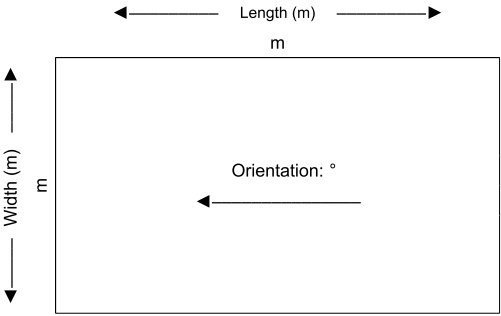
Samples & In Situ Testing			Strata Details					Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description			
0.35	B		80.69	(0.30)		Grassed TOPSOIL			
0.80	ES		80.14	0.30		Brown slightly silty slightly gravelly fine to coarse SAND. Gravel is fine to coarse sub-angular sandstone (MADE GROUND)			
1.30	B		79.79	(0.55)					
				0.85		Brown slightly gravelly slightly sandy silty CLAY. Sand is fine to medium grained. Gravel is fine to coarse sub-angular sandstone (MADE GROUND)	1		
				(0.35)					
				1.20		Firm mottled fine to medium grained sandy CLAY (MADE GROUND)			
				(1.70)			2		
3.00	B		78.09	2.90		Brown slightly silty slightly gravelly fine to medium grained SAND. Gravel is fine to medium sub-angular to sub-rounded coal/ash material and sandstone (MADE GROUND)	3		
				(1.10)					
			76.99	4.00		End of Trial Pit at 4.00m	4		
							5		
							6		
							7		

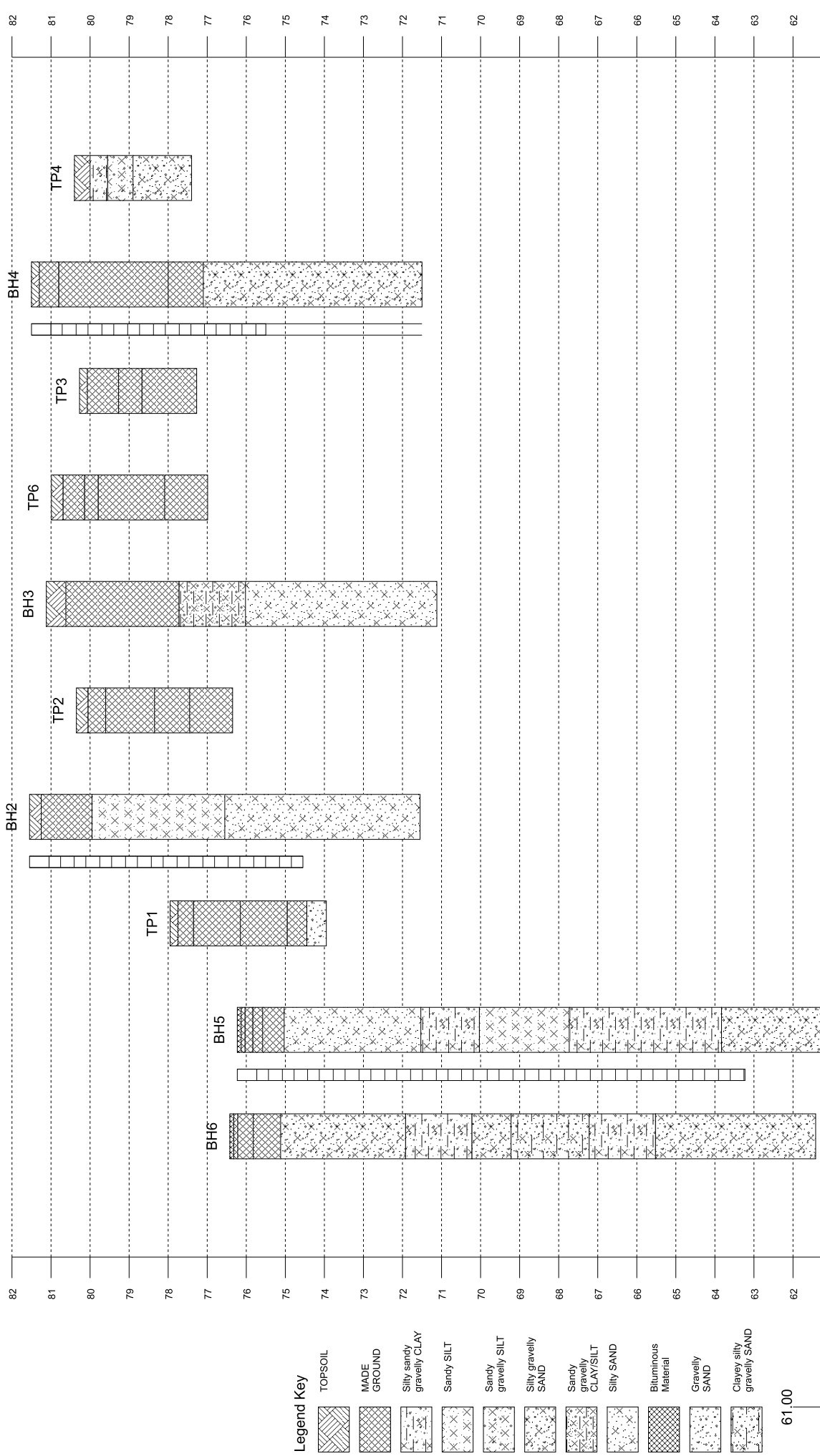
Dimensions: Final Depth: 4.00m 			General Remarks: Water Strikes <table border="1"> <tr> <th>Strike (m)</th> <th>Casing (m)</th> <th>Sealed (m)</th> <th>Time (mins)</th> <th>Rose to (m)</th> <th>Remarks</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>			Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks						
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks												
Inclination: °			CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com														

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP7				
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1					
	Easting: 383365.0		Northing: 403000.0	Ground Level: 81.85mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50				
Trial Pit Log		Weather:			Hole Termination: Collapse			Stability:			
Samples & In Situ Testing			Strata Details					Water	Backfill		
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description					
0.60	ES		81.65	0.20 (0.45)		Grassed TOPSOIL	1				
1.10	B		81.20	0.65 (0.55)		Light brown silty slightly sandy slightly gravelly CLAY. Sand is fine to coarse grained. Gravel is fine to medium sub-angular sandstone (MADE GROUND)					
			80.65	1.20		Light brown slightly gravelly silty fine to medium grained SAND. Gravel is fine to medium sub-rounded sandstone (MADE GROUND)					
3.50	B		78.35	3.50 (2.30)		Brown slightly sandy slightly gravelly silty CLAY trending to silty SAND (MADE GROUND)	2				
							3				
							4				
							5				
							6				
							7				
End of Trial Pit at 3.50m											
Dimensions:						General Remarks:					
Final Depth: 3.50m						Side Collapse					
← Length (m) → m ↑ Width (m) ↓ m Orientation: ° ←											
						Water Strikes					
						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

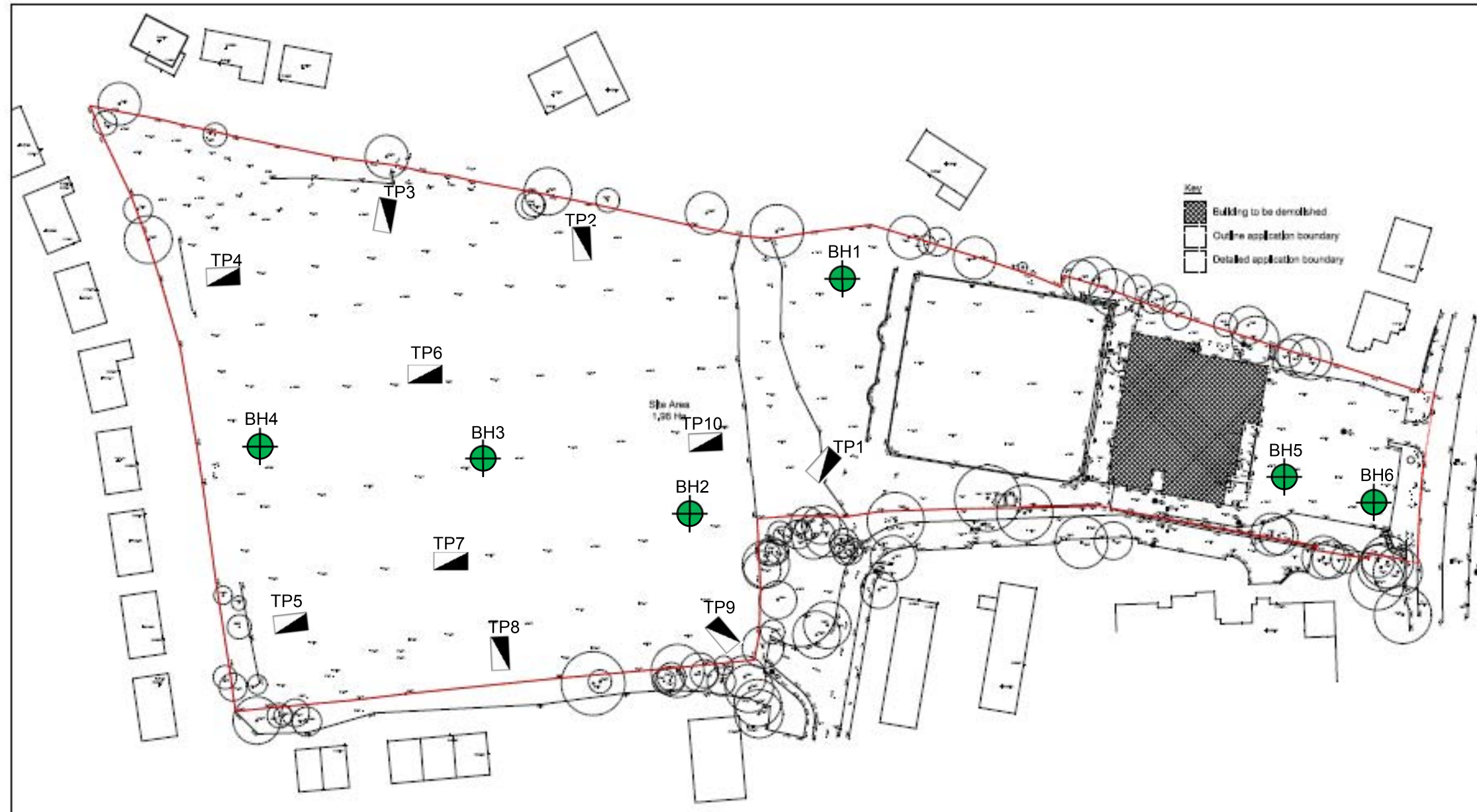
	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP8																
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1																	
	Easting: 383373.0		Northing: 402979.0		Ground Level: 81.68mAOD		Plant Used: JCB 3CX Excavator		Date Printed: 10/01/2020	Scale: 1:50													
Trial Pit Log			Weather:			Hole Termination:			Stability:														
Samples & In Situ Testing			Strata Details							Water	Backfill												
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description																	
0.35 0.50 0.60	B ES B		81.38	(0.30) 0.30		Grassed TOPSOIL				1													
			81.13	0.55		Black slightly sandy gravelly silty CLAY. Gravel is fine to medium sub-angular of varying lithologies (MADE GROUND)																	
				(0.65)		Light brown slightly sandy slightly gravelly silty CLAY with frequent pockets of sand (MADE GROUND)																	
1.30	B		80.48	1.20		Light brown slightly sandy slightly gravelly silty CLAY. (MADE GROUND)				2													
			79.88	(0.60)																			
			79.58	1.80		Brown slightly sandy gravelly silty CLAY. Sand is fine to medium grained. Gravel is fine to medium sub-angular sandstone and broken brick (MADE GROUND)				3													
2.20	B			(0.30)																			
				2.10		Light brown slightly gravelly silty fine to medium grained SAND. Gravel is fine to medium sub-angular sandstone				4													
				(1.90)																			
			77.68	4.00	End of Trial Pit at 4.00m						4												
										5													
										6													
										7													
Dimensions:					General Remarks:																		
Final Depth: 4.00m																							
																							
					Water Strikes																		
					<table><tr><td>Strike (m)</td><td>Casing (m)</td><td>Sealed (m)</td><td>Time (mins)</td><td>Rose to (m)</td><td>Remarks</td></tr><tr><td>4.00</td><td></td><td></td><td>0</td><td></td><td>Seepage</td></tr></table>							Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	4.00			0		Seepage
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																		
4.00			0		Seepage																		
Inclination: °					CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com																		

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP9																																																																																														
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL			Sheet 1 of 1																																																																																													
Trial Pit Log		Easting: 383425.0	Northing: 402987.0	Ground Level: 82.48mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020		Scale: 1:50																																																																																													
Weather:			Hole Termination:			Stability:																																																																																															
<table><tr><th colspan="3">Samples & In Situ Testing</th><th colspan="4">Strata Details</th><th rowspan="2">Water</th><th rowspan="2">Backfill</th></tr><tr><th>Depths</th><th>Sample ID</th><th>Test Result</th><th>Reduced Level</th><th>Depth (m) (Thickness)</th><th>Legend</th><th colspan="2">Strata Description</th></tr><tr><td>0.30 0.30</td><td>B ES</td><td></td><td>82.23</td><td>0.25 (0.55)</td><td></td><td colspan="2">Grassed TOPSOIL</td><td rowspan="3">1</td><td rowspan="3"></td></tr><tr><td>0.90</td><td>B</td><td></td><td>81.68</td><td>0.80 (0.50)</td><td></td><td colspan="2">Dark brown slightly gravelly silty fine to coarse grained SAND. Gravel is fine to medium sub-angular sandstone and brick fragments (MADE GROUND)</td></tr><tr><td>1.40</td><td>B</td><td></td><td>81.18</td><td>1.30 (1.20)</td><td></td><td colspan="2">Light brown slightly silty fine to medium grained SAND (MADE GROUND)</td></tr><tr><td>2.50</td><td>B</td><td></td><td>79.98</td><td>2.50 (1.50)</td><td></td><td colspan="2">Brown slightly gravelly slightly silty fine to medium grained SAND. Gravel is fine to medium angular brick (MADE GROUND)</td><td>3</td><td></td></tr><tr><td></td><td></td><td></td><td>78.48</td><td>4.00</td><td></td><td colspan="2">End of Trial Pit at 4.00m</td><td>4</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td><td>5</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td><td>6</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td><td>7</td><td></td></tr></table>									Samples & In Situ Testing			Strata Details				Water	Backfill	Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		0.30 0.30	B ES		82.23	0.25 (0.55)		Grassed TOPSOIL		1		0.90	B		81.68	0.80 (0.50)		Dark brown slightly gravelly silty fine to coarse grained SAND. Gravel is fine to medium sub-angular sandstone and brick fragments (MADE GROUND)		1.40	B		81.18	1.30 (1.20)		Light brown slightly silty fine to medium grained SAND (MADE GROUND)		2.50	B		79.98	2.50 (1.50)		Brown slightly gravelly slightly silty fine to medium grained SAND. Gravel is fine to medium angular brick (MADE GROUND)		3					78.48	4.00		End of Trial Pit at 4.00m		4										5										6										7	
Samples & In Situ Testing			Strata Details				Water	Backfill																																																																																													
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Inclination: °					CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com																																																																																																

	Contract Name: White House Club, Crumpsall			Client: Branley Homes			Trial Pit ID: TP10				
	Contract Number: CCG-C-19-11308	Date Started: 04/11/2019	Logged By: PR	Checked By: CB	Status: FINAL	Sheet 1 of 1					
	Easting: 383418.0		Northing: 403029.0	Ground Level: 81.00mAOD	Plant Used: JCB 3CX Excavator	Date Printed: 10/01/2020	Scale: 1:50				
Trial Pit Log			Weather:			Hole Termination: Collapse			Stability:		
Samples & In Situ Testing			Strata Details						Water	Backfill	
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description					
0.70 0.80	ES B		80.80	0.20		Grassed TOPSOIL			1		
				(0.55)		Brown slightly silty slightly gravelly fine to medium grained SAND with inclusions of roots (MADE GROUND)					
1.60	B		80.25	0.75		Brown slightly silty slightly gravelly fine to medium grained SAND (MADE GROUND)			2		
				(0.85)		Dark brown slightly sandy slightly gravelly silty CLAY. Gravel is medium to coarse angular brick fragments (MADE GROUND)					
2.50	B		79.40	1.60		Dark brown slightly sandy slightly gravelly silty CLAY. Gravel is medium to coarse angular brick fragments (MADE GROUND)			3		
				(0.90)		Brown slightly silty slightly gravelly SAND. Sand is fine to coarse grained. Gravel is fine to coarse subangular sandstone and angular fragments of brick (MADE GROUND)					
			78.50	2.50		Brown slightly silty slightly gravelly SAND. Sand is fine to coarse grained. Gravel is fine to coarse subangular sandstone and angular fragments of brick (MADE GROUND)			4		
				(1.00)		End of Trial Pit at 3.50m					
			77.50	3.50					5		
									6		
									7		
Dimensions:						General Remarks:					
Final Depth: 3.50m						Sides Collapse					
											
						Water Strikes					
						Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
						2.50			0		Seepage
Inclination: °						CC GEOTECHNICAL LTD 0151 545 2750 www.ccgeotechnical.com					

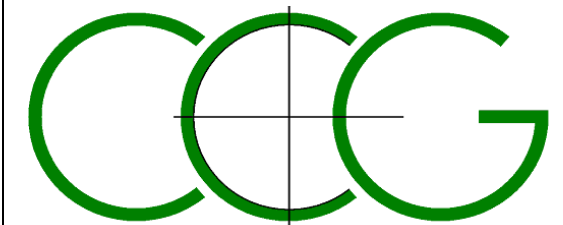


61.00



Notes:

- Site Boundary
- Trial Pit
- Cable Percussive Borehole



CC GEOTECHNICAL LIMITED
UNIT 1 DELTIC WAY
KNOWSLEY INDUSTRIAL ESTATE
LIVERPOOL
L33 7BA
0151 545 2750

Client:
BRANLEY HOMES

Project:
**The White House Club, Middleton Rd,
Crumpsall, Manchester M8 4JZ**

Title:
Site Investigation Plan

Scale:
NTS

Issue:
01

Drawn by:
PR

Date:
January 2020

Project Number:
CCG-C-19-11308

Drawing Number:
03

© CC GEOTECHNICAL LIMITED

Andy Jones

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 17 March 2020 11:35
To: Liam Worthington; Wastewater Developer Services
Subject: RE: 7424 Whitehouse Club, Middleton - 4200030669

Dear Customer

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

Foul will be allowed to drain to the public combined sewer network at an unrestricted rate. The connection(s) to the public sewer can be at a point(s) convenient to yourself

Surface water can drain to the 300mm combined sewer on Middleton Road at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 15 l/s.

Should your proposals to discharge to the public sewer include highway drainage runoff as well as surface water runoff from the buildings and yards, United Utilities request the inclusion of SuDS components that will control the volume and rate of discharge to the receiving sewer to be demonstrated within the sites drainage strategy.

If you require any further guidance please follow <http://www.unitedutilities.com/builders-developers.aspx>

If you need a make further enquiry relating to this matter please send your enquiry to WastewaterDeveloperServices@uuplc.co.uk Please quote your DEXXXX/42XXXXXXX/GEXXXX reference number

Please Note:- enquiries sent to any other United Utilities e-mail address will be deleted.

Connection Application

Although we may discuss and agree discharge points & 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

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, Planning Conditions and local flood authority guidelines, we would recommend that you liaise and make suitable agreements with the relevant statutory bodies.



Sue King

Customer Services Advanced
Developer Services & Metering
Customer Services
T: 01925 679413
unitedutilities.com

From: Liam Worthington [<mailto:lworthington@coopers.co.uk>]
Sent: 05 March 2020 16:23
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Cc: Andy Jones <ajones@coopers.co.uk>
Subject: 7424 Whitehouse Club, Middleton

7424 Whitehouse Club, Middleton

Please see a download link below to the pre development enquiry form and supporting information for a proposed residential development (24 No. apartments, 50 No. Houses and New Club House) on the Whitehouse Club site.

<http://upload-admin.coopers.co.uk/7WCa2F>

Existing Drainage

- Foul & Surface Water flows from the club house and car park currently drain via a combined private sewer, proven by the on-site CCTV survey. The sewer leaves the site to the north into private land and is assumed to discharge into the public combined sewer on Whitehouse Avenue.

Proposed Drainage

Foul – Foul water will discharge to a combined sewer on site before discharging to the existing combined public sewer on Middleton Road via a gravity drainage network.

Surface Water - Infiltration – No intrusive Site Investigation has been conducted to establish ground conditions although local geology suggests clay strata therefore we do not anticipate the site being suitable for infiltration.

Watercourse – No open or culverted watercourse within the vicinity of the site.

Surface Water – Levels don't allow for the site to be drained to the SW sewer in Counthill Drive, to the south of the site, therefore the SW will discharge into a combined sewer on site before discharging into the public combined sewer on Middleton Road via a gravity drainage network. It should be noted the public SW sewer in Counthill Drive discharges into the combined sewer in Middleton Road.

Please let me know if you require any additional information.

Regards,

Liam Worthington

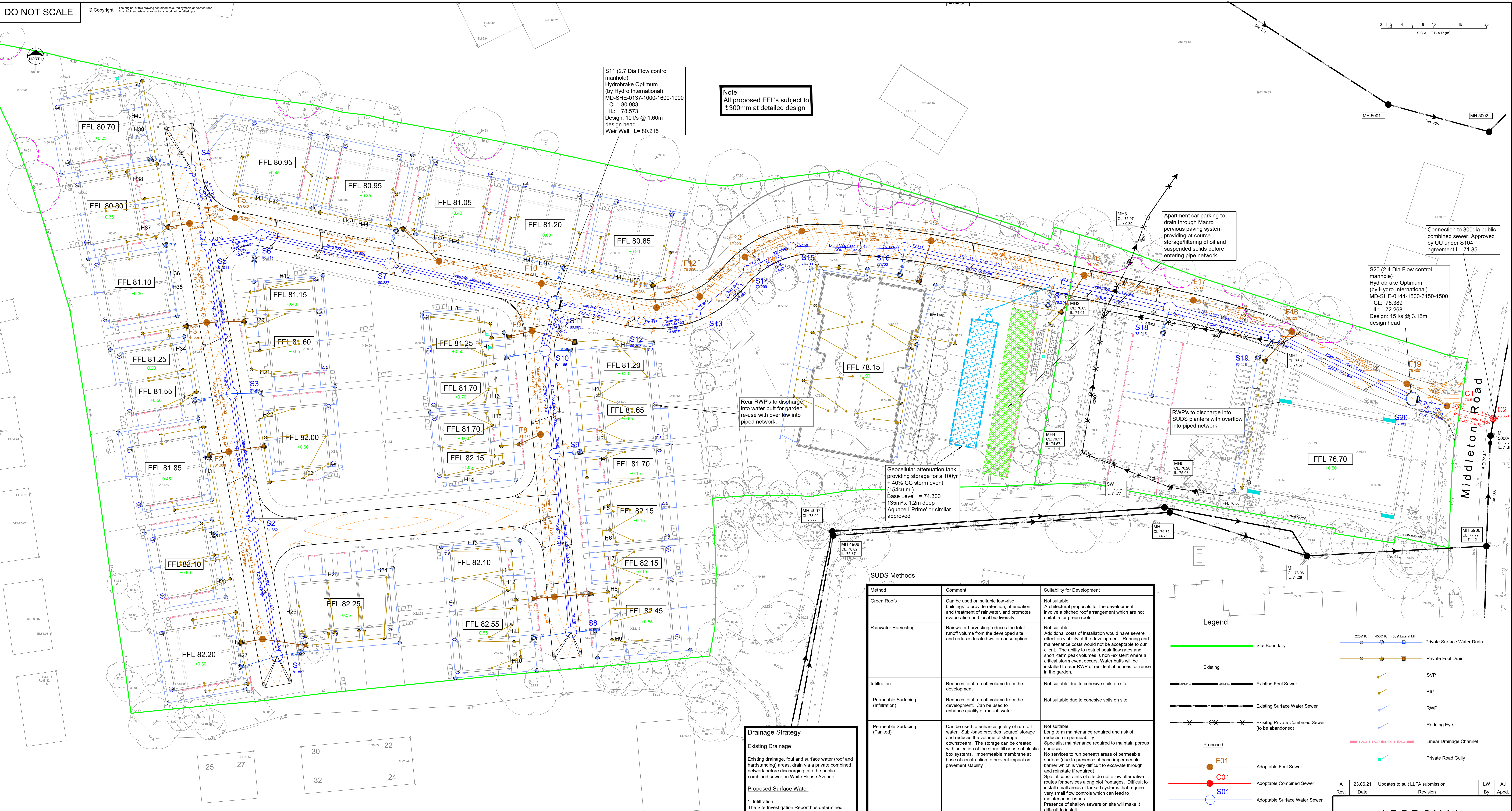
Engineer for Coopers

Tel: 01244 684910
Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU
www.coopers.co.uk

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0 1 2 4 6 8 10 15 20
SCALE BAR (m)



Note:
All proposed FFL's subject to
+300mm at detailed design

S11 (2.7 Dia Flow control
manhole)
Hydrobrake Optimum
(by Hydro International)
MD-SHE-0137-1000-1600-1000
CL: 80.983
IL: 78.573
Design: 10 l/s @ 1.60m
design head
Weir Wall IL= 80.215

Connection to 300dia public
combined sewer. Approved
by UU under S104
agreement IL=71.85

S20 (2.4 Dia Flow control
manhole)
Hydrobrake Optimum
(by Hydro International)
MD-SHE-0144-1500-3150-1500
CL: 76.389
IL: 72.268
Design: 15 l/s @ 3.15m
design head

Apartment car parking to
drain through Macro
pervious paving system
providing at source
storage/filtering of oil and
suspended solids before
entering pipe network.

Rear RWP's to discharge
into water butt for garden
re-use with overflow into
piped network.

Geocellular attenuation tank
providing storage for a 100yr
+ 40% CC storm event
(154cu.m.)
Base Level = 74.300
135m² x 1.2m deep
Aquacell 'Prime' or similar
approved

SUDS Methods

Method	Comment	Suitability for Development
Green Roofs	Can be used on suitable low-rise buildings to provide retention, attenuation and treatment of rainwater, and promotes evaporation and local biodiversity.	Not suitable: Architectural proposals for the development involve a pitched roof arrangement which are not suitable for green roofs.
Rainwater Harvesting	Rainwater harvesting reduces the total runoff volume from the developed site, and reduces treated water consumption.	Not suitable: Additional costs of installation would have severe effect on viability of the development. Running and maintenance costs would not be acceptable to our client. The ability to restrict peak flow rates and short-term peak volumes is non-existent where a critical storm event occurs. Water butts will be installed to rear RWP of residential houses for reuse in the garden.
Infiltration	Reduces total run off volume from the development.	Not suitable due to cohesive soils on site
Permeable Surfacing (Infiltration)	Reduces total run off volume from the development. Can be used to enhance quality of run-off water.	Not suitable due to cohesive soils on site
Permeable Surfacing (Tanked)	Can be used to enhance quality of run-off water. Sub-base provides 'source' storage and reduces the volume of storage downstream. The storage can be created with selection of the stone fill or use of plastic box systems. Impermeable membrane at base of construction to prevent impact on pavement stability	Not suitable: Long term maintenance required and risk of reduction in permeability. Specialist maintenance required to maintain porous surfaces. No services to run beneath areas of permeable surface (due to presence of base impermeable barrier which is very difficult to excavate through and reinstatement if required). Spatial constraints of site do not allow alternative routes for services along plot frontages. Difficult to install small areas of tanked systems that require very small flow controls which can lead to maintenance issues. Presence of shallow sewers on site will make it difficult to install. Construction sequence can make it difficult to construct without use of a sacrificial road base surface.
Macro-Previous Paving	Provide at source surface water storage and removal of oil and suspended solids.	Suitable: To be installed in apartment car park bays to provide at source surface water storage and improve water quality prior to discharge into piped system.
Swales, basins and ponds	Provide areas for above ground surface run off storage. Swales also allow filtering of particulate matter, improving water quality.	Not suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability
Bio-Retention Areas	Collect and retain run-off to help improve water quality, prior to discharge in piped system or infiltration	Suitable: Space constraints on site do not permit large above ground areas for flood storage. No scope to reduce plot numbers due to site viability however SUDS planters can be provided on RWPs of the club house with overflow to piped network.
Highway Tree Planters	Suitable as traffic calming features. Can be used as surface water run off storage and improve water quality prior to discharge in piped system or infiltration.	Not Suitable: Due to the site topography, driveway locations, junctions and steep highway gradients there are no suitable locations to introduce tree planters. Site geology not suitable for infiltration.
Geocellular storage	Suitable for sites with insufficient space for basins etc. Suitable for sites where topography prevents the use of open basins etc. Can be very effective infiltration devices subject to ground conditions.	Suitable: Subject to detailed design and drainage layout suitable for attenuation. Infiltration not suitable due to soil conditions, clay strata.
Large Pipes, conduits and tanks	Suitable for sites with insufficient space for basins etc. Provide a volume of below ground storage with a high void ratio and good man entry provision to allow for future maintenance and cleaning. Generally, be suitable for adoption by the statutory water company (e.g. United Utilities).	Suitable: Larger diameter on-line pipes can be located within the highway corridor and will be adopted by United Utilities via S104 agreement

Legend

- Site Boundary
- Existing
- Existing Foul Sewer
- Existing Surface Water Sewer
- Existing Private Combined Sewer (to be abandoned)
- Proposed
- Adoptable Foul Sewer
- Adoptable Combined Sewer
- Adoptable Surface Water Sewer
- Flow Control Manhole
- Proposed Slab Levels
- Depth of cut (Between existing & proposed finished level)
- Depth of fill (Between existing & proposed finished level)
- Water Butt (Garden Reuse)
- Highway Gully
- SUDS Planter (at RWP Outlet)
- 100yr Attenuation
- Macro Pervious Paving
- Tree Canopy Area
- Private Surface Water Drain
- Private Foul Drain
- SVP
- BIG
- RWP
- Rodding Eye
- Linear Drainage Channel
- Private Road Gully

Drainage Strategy

Existing Drainage

Existing drainage, foul and surface water (roof and hardstanding) areas, drain via a private combined network before discharging into the public combined sewer on White House Avenue.

Proposed Surface Water

- Infiltration**
The Site Investigation Report has determined soakaways are unlikely to be feasible due to unsuitable soil conditions, clay strata.
- Watercourse**
There is no watercourse close to the development.
- Surface Water Sewer**
Levels don't allow for the site to be drained to SW sewers in Counthill Drive.
- Combined Sewer**
SW sewer discharges into combined sewer in Middleton Rd via gravity drainage network.

The proposed drainage networks will be designed for 100-year storm event plus an additional 40% allowance for climate change. Attenuation will be provided within oversized on-line pipes and off-line buried cellular crates. All on-line pipes and manholes will be offered to United Utilities for adoption under a S104 Agreement and all off-line components will be maintained by a management company.

All flows will be contained within the drainage network and will result in no overland flows for a 100-year storm event plus and additional 40% climate change.

Proposed Foul

Discharge to the existing combined sewer in Middleton Road via a gravity drainage network.

Surface Water Flow Rates

Site Area = 19725sq.m.
Impermeable Area = 2165sq.m

Existing Brownfield Run-off Rate

(Based on 50mm/hr rainfall intensity)

= A x i
= 2165sq/m x 50mm/hr
= 30 l/s

Greenfield Run-off Rate

(Based on 19625sq.m.)

1yr = 10.09 l/s
30yr = 19.72 l/s
100yr = 24.13 l/s
Qbar = 11.6 l/s

Proposed Run-off Rate

= Brownfield less 50% + Qbar
= 15 l/s + 11.6 l/s = 26.6 l/s

Following calculations with UI a flow rate of 15 l/s has been agreed. A betterment of 46% of proposed run-off rates

SUDS Strategy

The prime function of SuDS, as with conventional drainage, is to provide effective surface water drainage, ensuring the greatest degree of flood risk protection over the long term both within and downstream of the development and prevent pollution. However, SuDS approaches can bring wider benefits too. Appropriately designed, constructed and maintained, SuDS are more sustainable than conventional drainage systems and can help to:

- Reduce run-off surface water flow-rates and/or volumes and hence reduce the risk of flooding
- Encourage natural groundwater re-charge
- Reduce pollutant concentrations in storm water
- Provide habitat for wildlife.

There are many site-specific factors which will influence the choice of any single or combination of SuDS devices used within a development. The primary factors are:

- Whether the development is domestic, commercial or industrial
- Whether the underlying ground is contaminated. If so, infiltration systems will most probably not be permitted.
- Whether the underlying ground is permeable enough for infiltration systems to be considered.
- Whether the ground water levels are deep enough for infiltration systems to be considered
- Whether the site is steeply sloping and its general topography
- The availability of space inside the development for each potential SuDS facility.
- Health & Safety aspects should the development be likely to be inhabited or used by children.

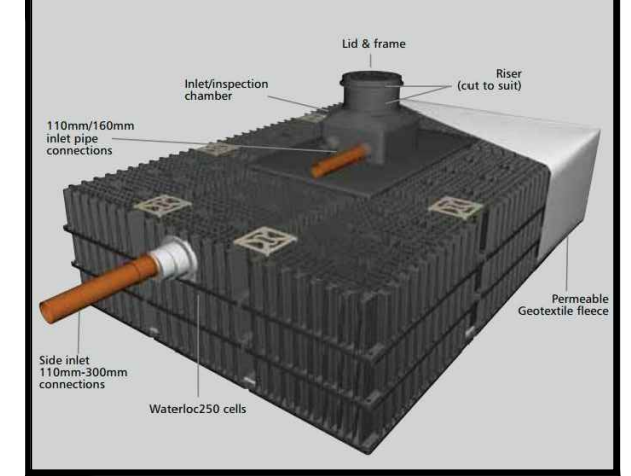
To ensure no increased flood risk to offsite land and development, disposal of surface water to the ground is encouraged and runoff volumes will be restricted to no overland flows for a 100-year storm event plus and additional 40% climate change. Where ground conditions are unsuitable, a discharge to an open water body / sewer will be necessary with rates restricted to the existing site conditions.



Water Butt



SUDS Planter



Cellular Storage



Macro Pervious Paving System

APPROVAL

chartered consulting engineers
Tel: 01244 684910
Fax: 01244 684911
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client
BRANLEY HOMES LTD

Project
White House Club, Middleton Road, Manchester

Title
Drainage Strategy

DRAWING NUMBER
7424 / SK08

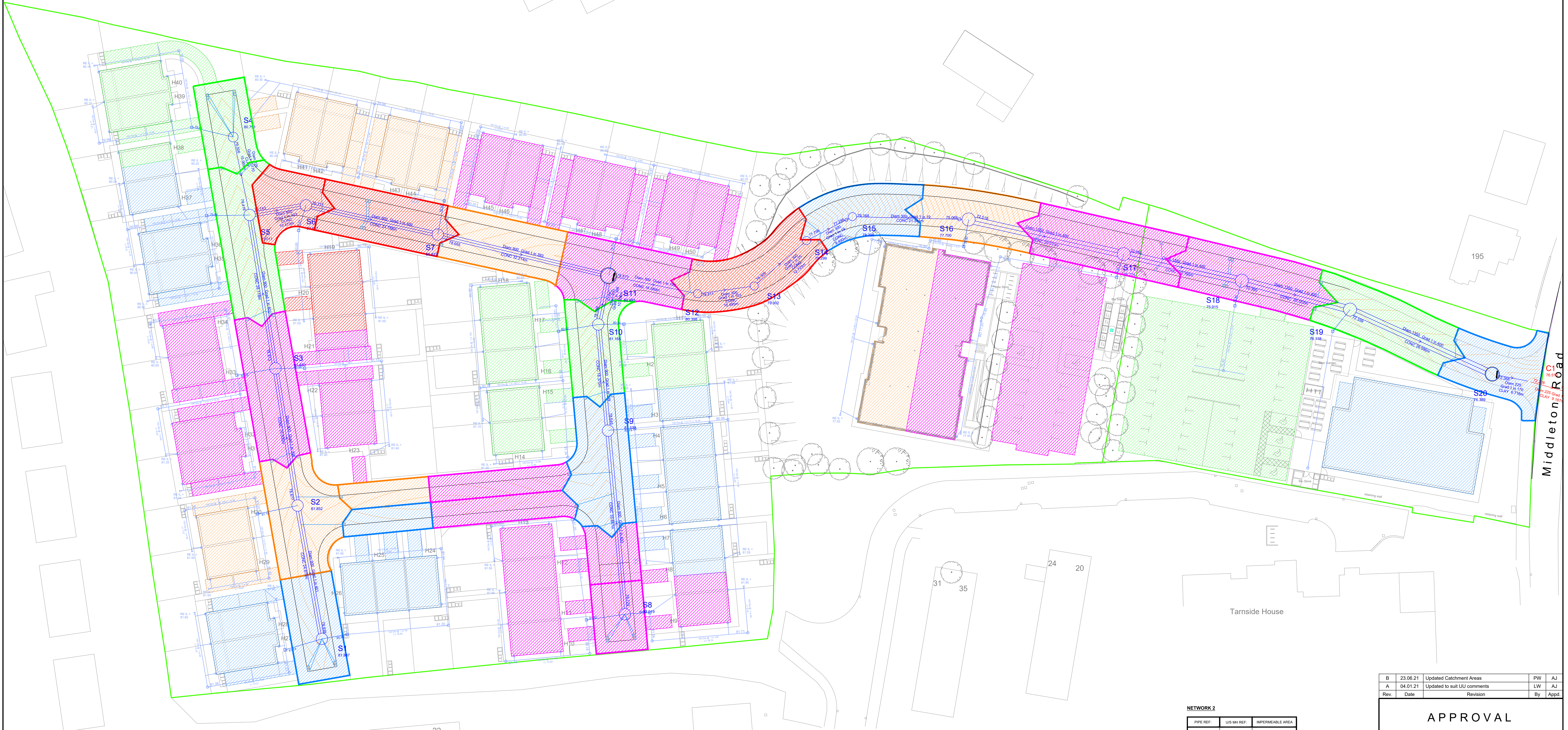
SCALE at A0
DATE
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AJ

REVISION
A

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0 1 2 4 6 8 10 15 20
SCALE BAR (m)



NETWORK 2		
PIPE REF.	LWS ANY REF.	IMPERMEABLE AREA
1.000	S1	670
1.001	S2	505
1.002	S3	845
2.000	S4	670
1.003	S5	295
1.004	S6	530
1.005	S7	600
3.000	S8	845
3.001	S9	615
3.002	S10	650
1.006	S11	835
1.007	S12	-
1.008	S13	-
1.009	S14	290
1.010	S15	200
1.011	S16	500
1.012	S17	1345
1.013	S18	1150
1.014	S19	600
1.015	S20	-
1.016	-	-
TOTAL=11155		

B	23.06.21	Updated Catchment Areas	PW	AJ
A	04.01.21	Updated to suit UIU comments	LW	AJ
Rev.	Date	Revision	By	Appd.

APPROVAL

coopers
chartered consulting engineers
Tel: 01244 684910
Fax: 01244 684911
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client
BRANLEY HOMES LTD

Project
White House Club, Middleton Road, Manchester

Title
Surface Water Catchment Areas

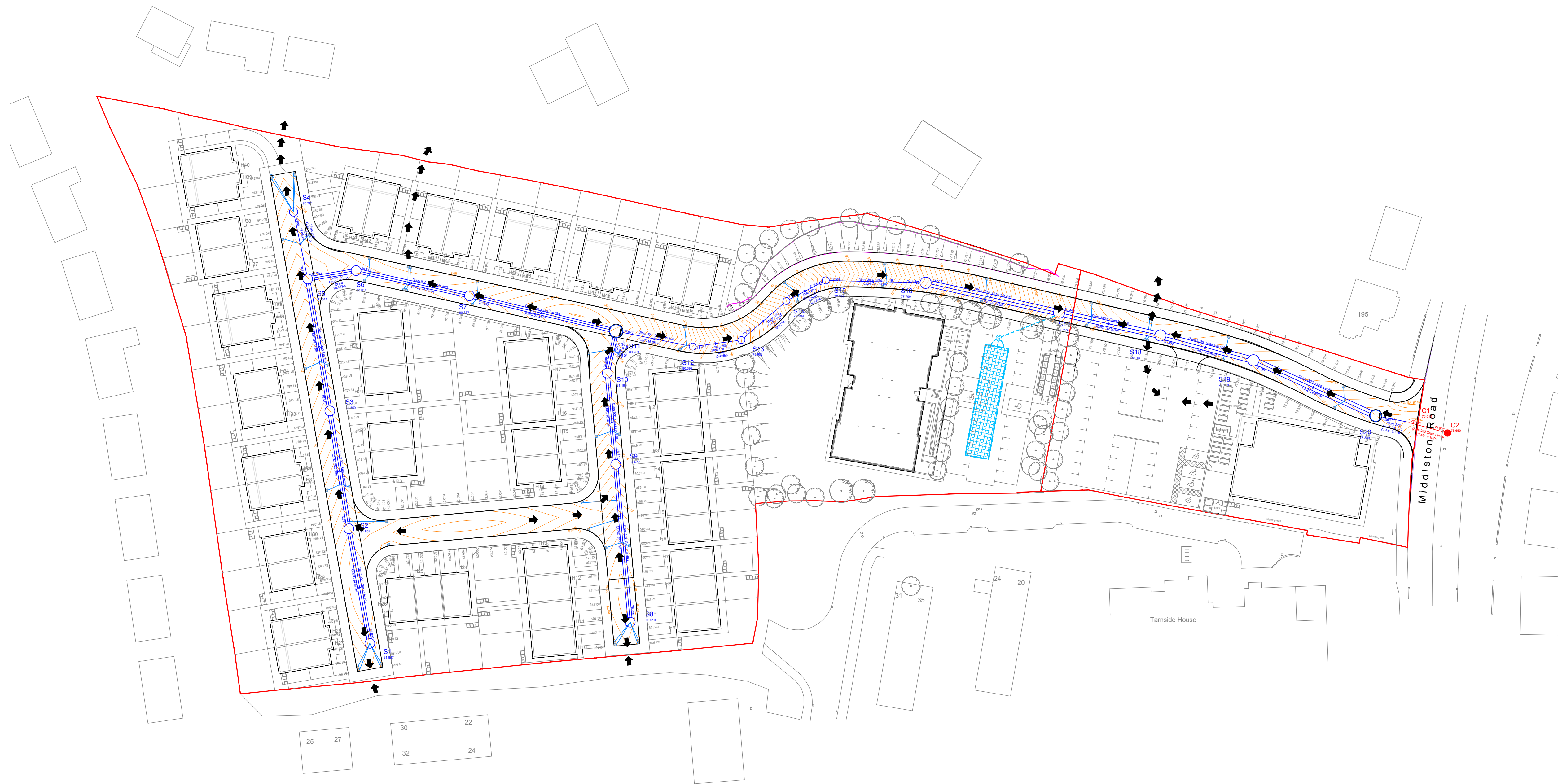
DRAWING NUMBER	SCALE at A0	1:250	REVISION
7424 / 15	DATE	JAN 20	LW
	DRAWN	AJ	B
	CHECKED		

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Legend

➡ Surface Water Flow Direction



APPROVAL



Tel: 01244 684910
Email: admin@coopers.co.uk
Web: <http://coopers.co.uk>

Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU

Client
BRANLEY HOMES LTD

Project
**White House Club, Middleton Road,
Manchester**

Title
**Exceedance Flood Routing
Plan**

DRAWING NUMBER	SCALE at A1	1:500	REVISION
7424 / 21	DATE	23.06.21	
	DRAWN	PW	
	CHECKED	AJ	

Calculated by:	Liam Worthington
Site name:	Whitehouse Club
Site location:	Middleton Road

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

Site Details

Latitude:	53.52375° N
Longitude:	2.25118° W
Reference:	444019250
Date:	Jun 23 2021 12:05

Runoff estimation approach

Site characteristics

Total site area (ha):	1.6625
-----------------------	-------------------------------------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	959	959
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

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

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

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

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

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

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

Greenfield runoff rates

	Default	Edited
Q _{BAR} (l/s):	11.6	11.6
1 in 1 year (l/s):	10.09	10.09
1 in 30 years (l/s):	19.72	19.72
1 in 100 year (l/s):	24.13	24.13
1 in 200 years (l/s):	27.49	27.49

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

Coopers		Page 1
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage	Network 2019.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 7424 N1 SW01.SWS

Pipe Sizes 7424 N1 SW01 Manhole Sizes 7424 N1 SW01

FSR Rainfall Model - England and Wales			
Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.600	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	0	Maximum Backdrop Height (m)	0.000
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)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for 7424 N1 SW01.SWS

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	24.878	0.062	401.3	0.067	5.00	0.0	0.600	o	900	Pipe/Conduit	
1.001	25.499	0.064	398.4	0.050	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.002	28.118	0.070	401.7	0.085	0.00	0.0	0.600	o	900	Pipe/Conduit	
2.000	15.000	0.088	170.5	0.067	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	10.474	0.026	402.8	0.029	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.004	24.787	0.062	399.8	0.052	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.005	32.214	0.082	392.9	0.060	0.00	0.0	0.600	o	900	Pipe/Conduit	
3.000	33.847	0.084	402.9	0.084	5.00	0.0	0.600	o	900	Pipe/Conduit	
3.001	18.371	0.046	399.4	0.062	0.00	0.0	0.600	o	900	Pipe/Conduit	
3.002	10.307	0.026	396.4	0.065	0.00	0.0	0.600	o	900	Pipe/Conduit	
1.006	16.680	0.162	103.0	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.007	10.495	0.102	102.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	12.723	0.510	24.9	0.000	0.00	0.0	0.600	o	300	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	0.00	5.27	78.939	0.067	0.0	0.0	0.0	1.56	991.1	0.0
1.001	0.00	5.54	78.877	0.117	0.0	0.0	0.0	1.56	994.7	0.0
1.002	0.00	5.84	78.813	0.202	0.0	0.0	0.0	1.56	990.6	0.0
2.000	0.00	5.25	79.506	0.067	0.0	0.0	0.0	1.00	39.7	0.0
1.003	0.00	5.95	78.743	0.298	0.0	0.0	0.0	1.55	989.2	0.0
1.004	0.00	6.22	78.717	0.350	0.0	0.0	0.0	1.56	993.0	0.0
1.005	0.00	6.56	78.655	0.410	0.0	0.0	0.0	1.57	1001.8	0.0
3.000	0.00	5.36	78.729	0.084	0.0	0.0	0.0	1.55	989.0	0.0
3.001	0.00	5.56	78.645	0.146	0.0	0.0	0.0	1.56	993.5	0.0
3.002	0.00	5.67	78.599	0.211	0.0	0.0	0.0	1.57	997.2	0.0
1.006	0.00	6.74	78.573	0.705	0.0	0.0	0.0	1.55	109.5	0.0
1.007	0.00	6.85	78.411	0.705	0.0	0.0	0.0	1.55	109.6	0.0
1.008	0.00	6.92	78.309	0.705	0.0	0.0	0.0	3.16	223.4	0.0

Coopers		Page 2
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage	Network 2019.1	

Network Design Table for 7424 N1 SW01.SWS

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
1.009	9.490	0.500	19.0	0.025	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.010	21.342	1.100	19.4	0.020	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.011	29.073	0.073	398.3	0.050	0.00	0.0	0.600	o	1350	Pipe/Conduit	
4.000	10.000	0.050	200.0	0.026	5.00	0.0	0.600	o	300	Pipe/Conduit	
4.001	10.000	2.000	5.0	0.027	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.012	22.195	0.055	403.5	0.082	0.00	0.0	0.600	o	1350	Pipe/Conduit	
1.013	20.552	0.051	403.0	0.115	0.00	0.0	0.600	o	1350	Pipe/Conduit	
1.014	28.586	0.071	402.6	0.065	0.00	0.0	0.600	o	1350	Pipe/Conduit	
1.015	6.716	0.040	170.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.016	9.183	0.303	30.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.009	0.00	6.96	77.799	0.730	0.0	0.0	0.0	3.63	256.3	0.0
1.010	0.00	7.06	76.168	0.750	0.0	0.0	0.0	3.59	253.5	0.0
1.011	0.00	7.30	72.518	0.800	0.0	0.0	0.0	2.01	2875.6	0.0
4.000	0.00	5.15	77.160	0.026	0.0	0.0	0.0	1.11	78.3	0.0
4.001	0.00	5.17	77.110	0.053	0.0	0.0	0.0	7.08	500.2	0.0
1.012	0.00	7.49	72.445	0.935	0.0	0.0	0.0	2.00	2856.6	0.0
1.013	0.00	7.66	72.390	1.050	0.0	0.0	0.0	2.00	2858.6	0.0
1.014	0.00	7.90	72.339	1.115	0.0	0.0	0.0	2.00	2859.9	0.0
1.015	0.00	8.01	72.268	1.115	0.0	0.0	0.0	1.00	39.8	0.0
1.016	0.00	8.07	72.228	1.115	0.0	0.0	0.0	2.39	94.8	0.0

Coopers		Page 3
Park House Sandpiper Court Chester CH4 9QU		Whithouse Club Middleton Road Manchester
Date 23/06/2010 File 7424 N1 SW13.MDX		Designed by LW Checked by AJ
Micro Drainage		Network 2019.1



Manhole Schedules for 7424 N1 SW01.SWS

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	81.887	2.948	Open Manhole	2100	1.000	78.939	900				
2	81.852	2.975	Open Manhole	2100	1.001	78.877	900	1.000	78.877	900	
3	81.450	2.637	Open Manhole	2100	1.002	78.813	900	1.001	78.813	900	
4	80.791	1.285	Open Manhole	1800	2.000	79.506	225				
5	81.011	2.268	Open Manhole	2100	1.003	78.743	900	1.002	78.743	900	
								2.000	79.418	225	
6	80.817	2.100	Open Manhole	2100	1.004	78.717	900	1.003	78.717	900	
7	80.837	2.182	Open Manhole	2100	1.005	78.655	900	1.004	78.655	900	
8	82.019	3.290	Open Manhole	2100	3.000	78.729	900				
9	81.572	2.927	Open Manhole	2100	3.001	78.645	900	3.000	78.645	900	
10	81.165	2.566	Open Manhole	2100	3.002	78.599	900	3.001	78.599	900	
11	80.983	2.410	Open Manhole	2700	1.006	78.573	300	1.005	78.573	900	
								3.002	78.573	900	
12	80.398	1.987	Open Manhole	1500	1.007	78.411	300	1.006	78.411	300	
13	79.902	1.593	Open Manhole	1500	1.008	78.309	300	1.007	78.309	300	
14	79.299	1.500	Open Manhole	1500	1.009	77.799	300	1.008	77.799	300	
15	78.799	2.631	Open Manhole	1500	1.010	76.168	300	1.009	77.299	300	1131
16	77.700	5.182	Open Manhole	2400	1.011	72.518	1350	1.010	75.068	300	1500
17	77.760	0.600	Open Manhole	1200	4.000	77.160	300				
17	77.760	0.650	Open Manhole	1200	4.001	77.110	300	4.000	77.110	300	
17	76.274	3.829	Open Manhole	2400	1.012	72.445	1350	1.011	72.445	1350	
								4.001	75.110	300	1615
18	75.915	3.525	Open Manhole	2400	1.013	72.390	1350	1.012	72.390	1350	
19	76.118	3.779	Open Manhole	2400	1.014	72.339	1350	1.013	72.339	1350	
20	76.389	4.121	Open Manhole	2400	1.015	72.268	225	1.014	72.268	1350	
C1	76.510	4.282	Open Manhole	1200	1.016	72.228	225	1.015	72.228	225	
C2	76.650	4.725	Open Manhole	1200		OUTFALL		1.016	71.925	225	

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
1	383351.281	402974.767	383351.281	402974.767	Required	
2	383346.807	402999.240	383346.807	402999.240	Required	
3	383342.738	403024.413	383342.738	403024.413	Required	
4	383334.996	403066.890	383334.996	403066.890	Required	
5	383338.103	403052.146	383338.103	403052.146	Required	



Coopers		Page 4
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage		Network 2019.1

Manhole Schedules for 7424 N1 SW01.SWS

MH Name	Manhole Easting (m)	Manhole Northing (m)	Intersection Easting (m)	Intersection Northing (m)	Manhole Access	Layout (North)
6	383348.339	403054.362	383348.339	403054.362	Required	
7	383372.539	403048.995	383372.539	403048.995	Required	
8	383406.869	402979.281	383406.869	402979.281	Required	
9	383403.767	403012.986	383403.767	403012.986	Required	
10	383402.084	403031.279	383402.084	403031.279	Required	
11	383403.853	403041.434	383403.853	403041.434	Required	
12	383420.203	403038.130	383420.203	403038.130	Required	
13	383430.603	403039.537	383430.603	403039.537	Required	
14	383440.211	403047.877	383440.211	403047.877	Required	
15	383448.619	403052.278	383448.619	403052.278	Required	
16	383469.934	403051.215	383469.934	403051.215	Required	
17	383498.384	403045.231	383498.384	403045.231	Required	
18	383520.073	403040.521	383520.073	403040.521	Required	
19	383539.822	403034.831	383539.822	403034.831	Required	
20	383565.862	403023.039	383565.862	403023.039	Required	
C1	383572.511	403022.093	383572.511	403022.093	Required	
C2	383581.351	403019.669			No Entry	

Coopers		Page 5
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage	Network 2019.1	

PIPELINE SCHEDULES for 7424 N1 SW01.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	900	1	81.887	78.939	2.048	Open Manhole	2100
1.001	o	900	2	81.852	78.877	2.075	Open Manhole	2100
1.002	o	900	3	81.450	78.813	1.737	Open Manhole	2100
2.000	o	225	4	80.791	79.506	1.060	Open Manhole	1800
1.003	o	900	5	81.011	78.743	1.368	Open Manhole	2100
1.004	o	900	6	80.817	78.717	1.200	Open Manhole	2100
1.005	o	900	7	80.837	78.655	1.282	Open Manhole	2100
3.000	o	900	8	82.019	78.729	2.390	Open Manhole	2100
3.001	o	900	9	81.572	78.645	2.027	Open Manhole	2100
3.002	o	900	10	81.165	78.599	1.666	Open Manhole	2100
1.006	o	300	11	80.983	78.573	2.110	Open Manhole	2700
1.007	o	300	12	80.398	78.411	1.687	Open Manhole	1500
1.008	o	300	13	79.902	78.309	1.293	Open Manhole	1500
1.009	o	300	14	79.299	77.799	1.200	Open Manhole	1500
1.010	o	300	15	78.799	76.168	2.331	Open Manhole	1500
1.011	o	1350	16	77.700	72.518	3.832	Open Manhole	2400
4.000	o	300	17	77.760	77.160	0.300	Open Manhole	1200
4.001	o	300	17	77.760	77.110	0.350	Open Manhole	1200
1.012	o	1350	17	76.274	72.445	2.479	Open Manhole	2400

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	24.878	401.3	2	81.852	78.877	2.075	Open Manhole	2100
1.001	25.499	398.4	3	81.450	78.813	1.737	Open Manhole	2100
1.002	28.118	401.7	5	81.011	78.743	1.368	Open Manhole	2100
2.000	15.000	170.5	5	81.011	79.418	1.368	Open Manhole	2100
1.003	10.474	402.8	6	80.817	78.717	1.200	Open Manhole	2100
1.004	24.787	399.8	7	80.837	78.655	1.282	Open Manhole	2100
1.005	32.214	392.9	11	80.983	78.573	1.510	Open Manhole	2700
3.000	33.847	402.9	9	81.572	78.645	2.027	Open Manhole	2100
3.001	18.371	399.4	10	81.165	78.599	1.666	Open Manhole	2100
3.002	10.307	396.4	11	80.983	78.573	1.510	Open Manhole	2700
1.006	16.680	103.0	12	80.398	78.411	1.687	Open Manhole	1500
1.007	10.495	102.9	13	79.902	78.309	1.293	Open Manhole	1500
1.008	12.723	24.9	14	79.299	77.799	1.200	Open Manhole	1500
1.009	9.490	19.0	15	78.799	77.299	1.200	Open Manhole	1500
1.010	21.342	19.4	16	77.700	75.068	2.332	Open Manhole	2400
1.011	29.073	398.3	17	76.274	72.445	2.479	Open Manhole	2400
4.000	10.000	200.0	17	77.760	77.110	0.350	Open Manhole	1200
4.001	10.000	5.0	17	76.274	75.110	0.864	Open Manhole	2400
1.012	22.195	403.5	18	75.915	72.390	2.175	Open Manhole	2400

Coopers		Page 6
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage		Network 2019.1

PIPELINE SCHEDULES for 7424 N1 SW01.SWS

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	o	1350	18	75.915	72.390	2.175	Open Manhole	2400
1.014	o	1350	19	76.118	72.339	2.429	Open Manhole	2400
1.015	o	225	20	76.389	72.268	3.896	Open Manhole	2400
1.016	o	225	C1	76.510	72.228	4.057	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.013	20.552	403.0	19	76.118	72.339	2.429	Open Manhole	2400
1.014	28.586	402.6	20	76.389	72.268	2.771	Open Manhole	2400
1.015	6.716	170.0	C1	76.510	72.228	4.057	Open Manhole	1200
1.016	9.183	30.3	C2	76.650	71.925	4.500	Open Manhole	1200

Free Flowing Outfall Details for 7424 N1 SW01.SWS

Outfall Pipe	Outfall Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.016	C2		76.650	71.925	0.000	1200	0
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Simulation Criteria for 7424 N1 SW01.SWS

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 3 Number of Storage Structures 2 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)	18.600	Storm Duration (mins)	30
Ratio R	0.350		

Coopers		Page 7
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage		Network 2019.1

Online Controls for 7424 N1 SW01.SWS

Complex Manhole: 11, DS/PN: 1.006, Volume (m³): 37.8

Hydro-Brake® Optimum

Unit Reference	MD-SHE-0137-1000-1600-1000
Design Head (m)	1.600
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	137
Invert Level (m)	78.573
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.600	10.0	Kick-Flo®	0.989	8.0
Flush-Flo™	0.472	10.0	Mean Flow over Head Range	-	8.7

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

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.9	0.800	9.4	2.000	11.1	4.000	15.4	7.000	20.1
0.200	8.8	1.000	8.0	2.200	11.6	4.500	16.3	7.500	20.8
0.300	9.6	1.200	8.7	2.400	12.1	5.000	17.1	8.000	21.5
0.400	9.9	1.400	9.4	2.600	12.5	5.500	17.9	8.500	22.1
0.500	10.0	1.600	10.0	3.000	13.4	6.000	18.7	9.000	22.7
0.600	9.9	1.800	10.5	3.500	14.5	6.500	19.4	9.500	23.3

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Discharge Coef 0.544 Width (m) 2.000 Invert Level (m) 80.215

Orifice Manhole: 17, DS/PN: 4.001, Volume (m³): 1.4

Diameter (m) 0.031 Discharge Coefficient 0.600 Invert Level (m) 77.110

Hydro-Brake® Optimum Manhole: 20, DS/PN: 1.015, Volume (m³): 56.1

Unit Reference	MD-SHE-0144-1500-3150-1500
Design Head (m)	3.150
Design Flow (l/s)	15.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	144
Invert Level (m)	72.268
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1500

Coopers		Page 8
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage		Network 2019.1

Hydro-Brake® Optimum Manhole: 20, DS/PN: 1.015, Volume (m³): 56.1

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	3.150	15.0	Kick-Flo®	1.286	9.8
Flush-Flo™	0.628	12.4	Mean Flow over Head Range	-	11.8

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)	Depth (m)	Flow (l/s)
0.100	5.2	0.800	12.3	2.000	12.1	4.000	16.8	7.000	22.0
0.200	10.2	1.000	11.8	2.200	12.6	4.500	17.8	7.500	22.7
0.300	11.4	1.200	10.7	2.400	13.2	5.000	18.7	8.000	23.4
0.400	12.0	1.400	10.2	2.600	13.7	5.500	19.6	8.500	24.1
0.500	12.3	1.600	10.9	3.000	14.6	6.000	20.4	9.000	24.8
0.600	12.4	1.800	11.5	3.500	15.8	6.500	21.2	9.500	25.4

Coopers		Page 9
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage		Network 2019.1

Storage Structures for 7424 N1 SW01.SWS

Cellular Storage Manhole: 17, DS/PN: 4.001

Invert Level (m) 77.160 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	158.4	158.4	0.500	158.4	196.2	0.501	0.0	196.2

Cellular Storage Manhole: 17, DS/PN: 1.012

Invert Level (m) 74.300 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)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	135.0	135.0	1.200	135.0	191.4	1.201	0.0	191.4

Volume Summary (Static)

Length Calculations based on Centre-Centre

Pipe Number	USMH Name	Manhole Volume (m ³)	Pipe Volume (m ³)	Storage Structure Volume (m ³)	Total Volume (m ³)
1.000	1	10.211	15.827	0.000	26.037
1.001	2	10.304	16.222	0.000	26.526
1.002	3	9.134	17.888	0.000	27.021
2.000	4	3.270	0.596	0.000	3.866
1.003	5	7.855	6.663	0.000	14.519
1.004	6	7.274	15.769	0.000	23.042
1.005	7	7.558	20.494	0.000	28.051
3.000	8	11.395	21.533	0.000	32.928
3.001	9	10.138	11.687	0.000	21.825
3.002	10	8.888	6.557	0.000	15.445
1.006	11	13.799	1.179	0.000	14.978
1.007	12	3.511	0.742	0.000	4.253
1.008	13	2.815	0.899	0.000	3.714
1.009	14	2.651	0.671	0.000	3.322
1.010	15	4.649	1.509	0.000	6.158
1.011	16	23.443	41.615	0.000	65.058
4.000	17	0.679	0.707	0.000	1.385
4.001	17	0.735	0.707	23.776	25.218
1.012	17	17.322	31.770	153.943	203.034
1.013	18	15.947	29.418	0.000	45.365
1.014	19	17.096	40.918	0.000	58.013
1.015	20	18.643	0.267	0.000	18.910
1.016	C1	4.842	0.365	0.000	5.207
Total		212.157	284.001	177.719	673.876

Coopers		Page 10
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage Network 2019.1		

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.347 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.		(m)	(m)	(m³)
1.000	1	60 Winter		1	+0%	100/15 Winter				79.039	-0.800	0.000
1.001	2	60 Winter		1	+0%	100/15 Winter				79.038	-0.739	0.000
1.002	3	60 Winter		1	+0%	100/15 Winter				79.038	-0.675	0.000
2.000	4	15 Winter		1	+0%	100/15 Winter				79.580	-0.151	0.000
1.003	5	60 Winter		1	+0%	100/15 Winter				79.038	-0.605	0.000
1.004	6	60 Winter		1	+0%	30/120 Winter				79.038	-0.579	0.000
1.005	7	60 Winter		1	+0%	30/120 Winter				79.037	-0.518	0.000
3.000	8	60 Winter		1	+0%	100/15 Winter				79.037	-0.592	0.000
3.001	9	60 Winter		1	+0%	30/120 Winter				79.037	-0.508	0.000
3.002	10	60 Winter		1	+0%	30/60 Winter				79.037	-0.462	0.000
1.006	11	60 Winter		1	+0%	1/15 Summer				79.037	0.164	0.000
1.007	12	180 Winter		1	+0%	100/60 Winter				78.481	-0.230	0.000
1.008	13	180 Winter		1	+0%					78.354	-0.255	0.000
1.009	14	15 Winter		1	+0%					77.850	-0.249	0.000
1.010	15	15 Winter		1	+0%					76.217	-0.251	0.000
1.011	16	180 Winter		1	+0%	100/60 Summer				72.822	-1.046	0.000
4.000	17	120 Winter		1	+0%	100/30 Winter				77.226	-0.234	0.000
4.001	17	120 Winter		1	+0%	100/30 Summer				77.226	-0.184	0.000
1.012	17	180 Winter		1	+0%	100/60 Summer				72.821	-0.974	0.000
1.013	18	180 Winter		1	+0%	100/60 Summer				72.820	-0.920	0.000
1.014	19	180 Winter		1	+0%	100/30 Winter				72.818	-0.871	0.000
1.015	20	180 Winter		1	+0%	1/15 Summer				72.817	0.324	0.000
1.016	C1	180 Winter		1	+0%					72.288	-0.165	0.000

Coopers		Page 11
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage		Network 2019.1

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	1	0.01		4.4		OK
1.001	2	0.01		7.1		OK
1.002	3	0.02		11.2		OK
2.000	4	0.23		8.1		OK
1.003	5	0.03		14.2		OK
1.004	6	0.02		15.5		OK
1.005	7	0.02		13.9		OK
3.000	8	0.01		4.5		OK
3.001	9	0.00		2.5		OK
3.002	10	0.01		3.5		OK
1.006	11	0.11		9.9	SURCHARGED	
1.007	12	0.12		9.9		OK
1.008	13	0.06		9.9		OK
1.009	14	0.07		11.9		OK
1.010	15	0.06		13.8		OK
1.011	16	0.01		12.5		OK
4.000	17	0.02		1.1		OK
4.001	17	0.00		0.6		OK
1.012	17	0.01		13.8		OK
1.013	18	0.01		15.5		OK
1.014	19	0.01		15.3		OK
1.015	20	0.41		12.3	SURCHARGED	
1.016	C1	0.16		12.3		OK

Coopers		Page 12
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage Network 2019.1		

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.347 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

									Water	Surcharged	Flooded		
PN	US/MH			Return	Climate	First (X)		First (Y)	First (Z)	Overflow	Level	Depth	Volume
	Name	Storm		Period	Change	Surcharge		Flood	Overflow	Act.	(m)	(m)	(m³)
1.000	1	60	Winter	2	+0%	100/15	Winter				79.127	-0.712	0.000
1.001	2	60	Winter	2	+0%	100/15	Winter				79.128	-0.649	0.000
1.002	3	60	Winter	2	+0%	100/15	Winter				79.127	-0.586	0.000
2.000	4	15	Winter	2	+0%	100/15	Winter				79.591	-0.140	0.000
1.003	5	60	Winter	2	+0%	100/15	Winter				79.127	-0.516	0.000
1.004	6	60	Winter	2	+0%	30/120	Winter				79.127	-0.490	0.000
1.005	7	60	Winter	2	+0%	30/120	Winter				79.127	-0.428	0.000
3.000	8	60	Winter	2	+0%	100/15	Winter				79.126	-0.503	0.000
3.001	9	60	Winter	2	+0%	30/120	Winter				79.126	-0.419	0.000
3.002	10	60	Winter	2	+0%	30/60	Winter				79.126	-0.373	0.000
1.006	11	60	Winter	2	+0%	1/15	Summer				79.126	0.253	0.000
1.007	12	240	Summer	2	+0%	100/60	Winter				78.481	-0.230	0.000
1.008	13	360	Winter	2	+0%						78.354	-0.255	0.000
1.009	14	15	Winter	2	+0%						77.852	-0.247	0.000
1.010	15	15	Winter	2	+0%						76.220	-0.248	0.000
1.011	16	240	Winter	2	+0%	100/60	Summer				72.910	-0.958	0.000
4.000	17	120	Winter	2	+0%	100/30	Winter				77.250	-0.210	0.000
4.001	17	120	Winter	2	+0%	100/30	Summer				77.250	-0.160	0.000
1.012	17	240	Winter	2	+0%	100/60	Summer				72.908	-0.887	0.000
1.013	18	240	Winter	2	+0%	100/60	Summer				72.907	-0.833	0.000
1.014	19	240	Winter	2	+0%	100/30	Winter				72.906	-0.783	0.000
1.015	20	240	Winter	2	+0%	1/15	Summer				72.904	0.411	0.000
1.016	C1	360	Winter	2	+0%						72.288	-0.165	0.000

Coopers		Page 13
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage		Network 2019.1

2 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

			Pipe		
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status
					Level Exceeded
1.000	1	0.01		5.4	OK
1.001	2	0.01		8.3	OK
1.002	3	0.02		11.9	OK
2.000	4	0.30		10.5	OK
1.003	5	0.03		15.5	OK
1.004	6	0.02		16.8	OK
1.005	7	0.02		14.9	OK
3.000	8	0.01		5.9	OK
3.001	9	0.00		2.5	OK
3.002	10	0.01		3.3	OK
1.006	11	0.11		9.9	SURCHARGED
1.007	12	0.12		9.9	OK
1.008	13	0.06		9.9	OK
1.009	14	0.07		12.8	OK
1.010	15	0.07		15.5	OK
1.011	16	0.01		12.7	OK
4.000	17	0.02		1.3	OK
4.001	17	0.00		0.7	OK
1.012	17	0.01		13.8	OK
1.013	18	0.01		15.4	OK
1.014	19	0.01		15.4	OK
1.015	20	0.42		12.4	SURCHARGED
1.016	C1	0.16		12.4	OK

Coopers		Page 14
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010	Designed by LW	
File 7424 N1 SW13.MDX	Checked by AJ	
Micro Drainage		Network 2019.1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.347 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

PN	US/MH		Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth
	Name	Storm							(m)	(m)
1.000	1	120 Winter	30	+0%	100/15 Winter				79.632	-0.207
1.001	2	120 Winter	30	+0%	100/15 Winter				79.633	-0.144
1.002	3	120 Winter	30	+0%	100/15 Winter				79.632	-0.081
2.000	4	120 Winter	30	+0%	100/15 Winter				79.633	-0.098
1.003	5	120 Winter	30	+0%	100/15 Winter				79.632	-0.011
1.004	6	120 Winter	30	+0%	30/120 Winter				79.629	0.012
1.005	7	120 Winter	30	+0%	30/120 Winter				79.629	0.074
3.000	8	120 Winter	30	+0%	100/15 Winter				79.629	0.000
3.001	9	120 Winter	30	+0%	30/120 Winter				79.629	0.084
3.002	10	120 Winter	30	+0%	30/60 Winter				79.629	0.130
1.006	11	120 Winter	30	+0%	1/15 Summer				79.629	0.756
1.007	12	1440 Summer	30	+0%	100/60 Winter				78.481	-0.230
1.008	13	1440 Summer	30	+0%					78.354	-0.255
1.009	14	15 Summer	30	+0%					77.863	-0.236
1.010	15	15 Winter	30	+0%					76.234	-0.234
1.011	16	240 Winter	30	+0%	100/60 Summer				73.256	-0.612
4.000	17	180 Winter	30	+0%	100/30 Winter				77.362	-0.098
4.001	17	120 Winter	30	+0%	100/30 Summer				77.361	-0.049
1.012	17	240 Winter	30	+0%	100/60 Summer				73.255	-0.540
1.013	18	240 Winter	30	+0%	100/60 Summer				73.253	-0.487
1.014	19	240 Winter	30	+0%	100/30 Winter				73.251	-0.438
1.015	20	240 Winter	30	+0%	1/15 Summer				73.247	0.754
1.016	C1	1440 Summer	30	+0%					72.288	-0.165

Coopers		Page 15
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage		Network 2019.1

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

PN	US/MH Name	Flooded		Pipe		Status	Level Exceeded
		Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
1.000	1	0.000	0.01		5.7	OK	
1.001	2	0.000	0.01		6.0	OK	
1.002	3	0.000	0.01		8.9	OK	
2.000	4	0.000	0.20		7.0	OK	
1.003	5	0.000	0.02		10.9	OK	
1.004	6	0.000	0.02		12.1	SURCHARGED	
1.005	7	0.000	0.02		11.3	SURCHARGED	
3.000	8	0.000	0.01		7.4	OK	
3.001	9	0.000	0.01		4.2	SURCHARGED	
3.002	10	0.000	0.01		5.1	SURCHARGED	
1.006	11	0.000	0.11		9.9	SURCHARGED	
1.007	12	0.000	0.12		9.9	OK	
1.008	13	0.000	0.06		9.9	OK	
1.009	14	0.000	0.10		17.9	OK	
1.010	15	0.000	0.11		24.4	OK	
1.011	16	0.000	0.01		15.0	OK	
4.000	17	0.000	0.03		1.9	OK	
4.001	17	0.000	0.00		1.0	OK	
1.012	17	0.000	0.01		15.6	OK	
1.013	18	0.000	0.01		18.3	OK	
1.014	19	0.000	0.01		18.3	OK	
1.015	20	0.000	0.42		12.4	SURCHARGED	
1.016	C1	0.000	0.16		12.4	OK	

Coopers		Page 16
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage Network 2019.1		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 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 Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 3 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 18.600 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.347 Cv (Winter) 0.840

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

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 2, 30, 100
 Climate Change (%) 0, 0, 0, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.		(m)	(m)	(m³)
1.000	1	60 Winter	100	+40%	100/15 Winter					80.536	0.697	0.000
1.001	2	60 Winter	100	+40%	100/15 Winter					80.536	0.759	0.000
1.002	3	60 Winter	100	+40%	100/15 Winter					80.534	0.821	0.000
2.000	4	60 Winter	100	+40%	100/15 Winter					80.552	0.821	0.000
1.003	5	60 Winter	100	+40%	100/15 Winter					80.531	0.888	0.000
1.004	6	60 Winter	100	+40%	30/120 Winter					80.529	0.912	0.000
1.005	7	60 Winter	100	+40%	30/120 Winter					80.524	0.969	0.000
3.000	8	60 Winter	100	+40%	100/15 Winter					80.524	0.895	0.000
3.001	9	60 Winter	100	+40%	30/120 Winter					80.523	0.978	0.000
3.002	10	60 Winter	100	+40%	30/60 Winter					80.521	1.022	0.000
1.006	11	60 Winter	100	+40%	1/15 Summer					80.519	1.646	0.000
1.007	12	60 Winter	100	+40%	100/60 Winter					78.783	0.072	0.000
1.008	13	60 Winter	100	+40%						78.478	-0.131	0.000
1.009	14	60 Winter	100	+40%						77.973	-0.126	0.000
1.010	15	60 Winter	100	+40%						76.321	-0.147	0.000
1.011	16	240 Winter	100	+40%	100/60 Summer					75.491	1.623	0.000
4.000	17	180 Winter	100	+40%	100/30 Winter					77.588	0.128	0.000
4.001	17	180 Winter	100	+40%	100/30 Summer					77.587	0.177	0.000
1.012	17	240 Winter	100	+40%	100/60 Summer					75.490	1.695	0.000
1.013	18	240 Winter	100	+40%	100/60 Summer					75.493	1.753	0.000
1.014	19	240 Winter	100	+40%	100/30 Winter					75.503	1.814	0.000
1.015	20	240 Winter	100	+40%	1/15 Summer					75.505	3.012	0.000
1.016	C1	240 Winter	100	+40%						72.295	-0.158	0.000

Coopers		Page 17
Park House Sandpiper Court Chester CH4 9QU	Whithouse Club Middleton Road Manchester	
Date 23/06/2010 File 7424 N1 SW13.MDX	Designed by LW Checked by AJ	
Micro Drainage		Network 2019.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7424 N1 SW01.SWS

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level
				Flow (l/s)		Exceeded
1.000	1	0.02		15.3	SURCHARGED	
1.001	2	0.03		18.4	SURCHARGED	
1.002	3	0.04		31.5	SURCHARGED	
2.000	4	0.57		20.0	FLOOD RISK	
1.003	5	0.10		46.5	SURCHARGED	
1.004	6	0.08		54.3	FLOOD RISK	
1.005	7	0.08		63.1	SURCHARGED	
3.000	8	0.03		19.4	SURCHARGED	
3.001	9	0.04		23.7	SURCHARGED	
3.002	10	0.07		33.6	SURCHARGED	
1.006	11	1.16		108.5	SURCHARGED	
1.007	12	1.36		108.5	SURCHARGED	
1.008	13	0.60		108.2	OK	
1.009	14	0.63		111.8	OK	
1.010	15	0.52		114.6	OK	
1.011	16	0.04		81.0	SURCHARGED	
4.000	17	0.06		3.5	FLOOD RISK	
4.001	17	0.00		1.4	FLOOD RISK	
1.012	17	0.10		166.2	SURCHARGED	
1.013	18	0.08		131.6	SURCHARGED	
1.014	19	0.04		72.9	SURCHARGED	
1.015	20	0.50		15.0	SURCHARGED	
1.016	C1	0.19		15.0	OK	