
DRAINAGE STRATEGY

**LAND AT BILBERRY CLOSE & ALBERT ROAD,
WHITEFIELD**

February 2025

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**LAND AT BILBERRY CLOSE & ALBERT ROAD,
WHITEFIELD**

Report Approved by D.W.Hadwin B.Eng(Hons) C.Eng MICE
For Keystone Design Associates

Signature.....

Date..... 18th February 2025.....

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1.0 INTRODUCTION

- 1.01 It is proposed to develop the existing site to accommodate seven bungalows with associated landscaping to land at Bilberry Close and Albert Road, Whitefield.
- 1.02 The works for the development would comprise the erection of the seven bungalows and installation of the new infrastructure, including landscaping, of which the drainage would be material. This report discusses the proposed strategy for the disposal of both foul and surface water.
- 1.03 This report is intended to provide supporting information for the consent of a discharge of conditions application following planning permission.

2.0 DESCRIPTION OF DEVELOPMENT

- 2.01 The development site is currently a plot of land located at Bilberry Close and Albert Road, Whitefield. The proposed bungalows are to be constructed across the site.
- 2.02 The development comprises of the erection of seven bungalows with associated landscaping. House types 1 is a semi-detached bungalows and will consist of a kitchen, dining/living room, bathroom, store and two bedrooms. House type 2 is a detached bungalow and will consist of a kitchen, dining/living room, bathroom, store and two bedrooms.
- 2.03 The proposed bungalows will be constructed across the site with associated landscaping.
- 2.05 The necessary infrastructure to cater for the proposed bungalows will need to be installed, this being services and drainage.
- 2.06 The drawings attached to appendix D as supplied by ourselves illustrates the proposed scheme.

3.0 LOCATION OF SITE

- 3.01 The site is located at Bilberry Close and Albert Road, Whitefield. The site is identified on the location plan at as appendix A.
- 3.02 The proposed site is surrounded by residential properties to the north, east and south with St. Michael's RC Primary School located to the north west. The existing site comprises of a plot of land.
- 3.03 The site is located on the corner of Albert Road and Bilberry Close, Whitefield and Whitefield is situated approximately 6.3 miles from the centre of Manchester. Whitefield is a town in the Metropolitan Borough of Bury, Greater Manchester. It lies on undulating ground above the Irwell Valley, along the south bank of the River Irwell, approximately 3 miles (4.8 km) southeast of Bury, and 5 miles (8.0 km) northwest of Manchester. Prestwich and the M60 motorway lie just to the south.
- 3.04 The site is located in a flood zone 1.
- 3.05 The ordnance survey grid reference is SD N405923, E381685.
- 3.06 The site is 0.32Ha area.

4.0 EXISTING DRAINAGE

- 4.01 There is a combined mains drainage located to the north of the site and foul & surface water mains drainage that crosses the site to the east. For the purpose of surface water drainage calculations the site will be treated as greenfield.
- 4.02 It is proposed to connect to the existing combined sewer infrastructure and proposed to redirect the existing foul & surface water infrastructure to the east of the site as shown on the drawing attached to appendix F.
- 4.03 It is proposed to connect to the existing foul & surface water sewer infrastructure which discharges into the combined sewer located to the north of the site as shown on the drawing attached to appendix F.

5.0 SURFACE WATER DRAINAGE STRATEGY

- 5.01 The primary flood risk generated by a development is the surface water runoff. The proposed development will have 33% impermeability which will increase the amount of surface water discharge; to comply with the planning condition the surface water will be attenuated within the site boundary.
- 5.02 The surface water drainage for any development site should be designed so that the volumes and peak flow rates of surface water leaving the site are limited to the original greenfield rates.
- 5.03 In order to comply with not increasing volume of discharge as a consequence of the development it will be necessary to provide surface water storage and/or infiltration to limit and reduce both the peak rate of discharge from the site.
- 5.04 The Environment Agency require that, for the range of annual flow rate probabilities, up to and including the 1% annual probability (1 in 100 year event) the developed rate of run-off into a watercourse should be no greater than the undeveloped rate of run-off for the same event. Water Authorities take a similar approach to that of the Environment Agency, however they ask that flows be restricted to include up to the 3.33% annual probability (1 in 30 year event), whilst demonstrating that the 1 in 100 year event does not pose a threat to the locality (known as designing for exceedance).
- 5.05 Climate change (CC) will be taken into account by increasing the rainfall intensity by 50% in compliance with DEFRA technical standards.

6.0 SUSTAINABLE DRAINAGE

- 6.01 The Technical Guidance for the National Planning Policy Framework requires that a development exceeding 0.4Ha or more than 4 dwellings requires that the management of the surface water runoff utilises Sustainable Urban Drainage (SUDS) and considers the hierarchy of provision which are as follows:
- Infiltration to ground - soakaways and permeable surfacing.
 - Discharge to local watercourse.
 - Discharge to public sewer.
 - Discharge to adjacent land drains and ponds.
- 6.02 The first option to be considered for surface water disposal for all proposed development must be infiltration into the ground. Even when there are alternative sewer connections or watercourses available infiltration must still be utilised unless it is proved unfeasible. The suitability for infiltration is determined by a percolation test. Where the underlying soil conditions are relatively impermeable, or the water table is high the site would not be suitable for ground infiltration and discharge to a water course or sewer may be considered.
- 6.03 The sub soil in this area is soft to firm to stiff clay close to the surface. The water table is also close to the ground surface. These ground conditions are not suitable for ground infiltration.
- 6.04 As discharge to the ground is not appropriate, the next level of SuDs is to be considered. There are no local water courses within the site or adjacent. Therefore, discharge to a water course is not an option.
- 6.05 In order to prevent an increase in flood risk to adjacent land and downstream of the site it will be necessary to restrict the surface water discharge from the development to the equivalent QBAR greenfield run-off rate from the site (mean annual greenfield peak flow). The SuDS Manual recommends the use of Report No.124 'Flood estimation for small catchments', Institute of Hydrology for catchments smaller than 50 hectares. The total site area of the development site 0.32 ha.
- 6.06 The Environment Agency standard advice is to calculate the existing greenfield run-off from the entire developable site. The calculated QBAR rate is 2.46 l/s, which is the maximum final discharge rate that should not be exceeded.
- 6.07 When calculating the final allowable discharge rate only the impermeable areas are considered. The other areas of the site which include landscaping and porous pavement will not contribute to the surface water run-off. The total area of impermeable surfacing is calculated at 33% of the total site area. Existing greenfield run-off rates are calculated at 2.14l/s and the 1 in 30 year event at 4.18l/s and the 1 in 100 year event at 5.11l/s.
- 6.08 Surface water flows from the site are to be restricted to the QBAR rate of 2.46l/s.

6.09 The Draft National Standards for Sustainable drainage systems covers the whole range of sustainable approaches to surface water drainage management including:

- source control measures including rainwater recycling and drainage.
- infiltration devices to allow water to soak into ground, that can include individual soakaways and communal facilities.
- filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns.
- filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed.
- basins and ponds to hold excess water after rain and allow controlled discharge that avoids flooding, and
- Underground storage to hold excess water after rain and allow controlled discharge that avoids flooding.

6.10 These SuDS solutions are considered below with reference to their suitability for the proposed development.

SuDS Group	Technique	Likely to be suitable?	Notes
Source Control	Rainwater Harvesting	Yes	Would not feasibly accommodate the full increase of volume of runoff created by the proposed development but would work alongside any attenuated system Rainwater butts can also be used to reduce run-off and water use.
Infiltration Devices	Permeable Paving	No	The ground sub strate is not suitable for infiltration
	Infiltration trenches and basins	No	Could be used to slow the movement of water down, but not as an effective means of dealing with run-off and The ground sub strate is not suitable for infiltration
Filtration	Soakaways	No	Clay substrate and highway table not suitable for surface water disposal
	Open Swales	No	Use for attenuation, evaporation, water quality and slowing water movement down and will fit with nature of site.
	Filter Strips	No	Could be used to slow the movement of water down, but not as an effective means of directly dealing with run-off
Retention/ Detention	Basin / Ponds	No	Suitable for controlling discharge to watercourse via a piped outfall, evaporation and treatment of run-off. Insufficient space to accommodate a pond
Underground Storage	Culverts / Tanks / Oversized Pipes	Yes	Suitable for controlling discharge to watercourse or sewer via a piped outfall No land take required to accommodate

7.0 PROPOSED DRAINAGE STRATEGY - SURFACE WATER

- 7.01 It is proposed that surface water drainage from the proposed development will be discharged into existing surface water sewer located to the east of the site via the new proposed manholes.
- 7.02 It is important when designing drainage systems for new developments that a scheme be considered to deal with the first 5mm of rainfall to hit the site. Around 50% of rainfall events are less than 5mm and cause no measurable runoff from greenfield areas into receiving waters. In contrast, runoff from a development takes place for virtually every rainfall event. This difference means that watercourses receive frequent discharges with polluted washoff from urban surfaces (hydrocarbons, suspended solids, metals etc). Replication of the greenfield runoff from small events will result in many fewer polluted discharges so limiting the potentially damaging impact on the receiving environment. This concept is known as interception and the volume of rainfall required to replicate the event known as Interception Storage.
- 7.03 The concept of Interception storage to prevent any runoff from rainfall depths up to 5mm, should therefore be provided. Certain SuDS features such as Swales and Pervious Pavements provide runoff characteristics that reflect this behaviour depending on their design. These will be considered and designed in to the proposed layout at detailed design stage once final volumes are calculated. An estimation of the Interception storage requirements for the outline proposal is included within the calculations below.
- 7.04 Above and beyond the Interception Storage requirements there are the more intense storms to consider. Attenuation will be required within the system to accommodate the volume of surface water created by restricting the outfall rates to the existing greenfield runoff.
- 7.05 There are a number of options available for attenuating the proposed flows from the development, however it is considered that the storage would be to utilise storm water crates. This solution allows for large quantities of storage at relatively shallow depths.
- 7.06 In calculating the surface water run off the following assumptions have been made:-
- **No infiltration** – Due to the ground conditions no infiltration is assumed, however if any could be achieved the volume discharged would be reduced.
 - **No Rainwater Harvesting / Water Butts** – Suitably designed rainwater harvesting tanks can significantly reduce the volume of run-off and form an integral part of the attenuated system. United Utilities usually accept that such techniques are suitable for collecting water up to and including the 1 in 1 year event.
 - **No storage within swales** – Swales have a combined advantage of providing a volume of storage, slowing the rate at which water enters the downstream system and providing a certain amount of infiltration into the ground.
 - Within the analysis it has also been assumed that 100% of the rainwater falling on the proposed impermeable areas enters the system. It is therefore considered that the analysis undertaken is robust.
- 7.07 In order to comply with Environment Agency peak rates of run-off will be restricted to the existing greenfield run-off rate and storage will be provided up to and including the 1 in 100yr storm event plus an allowance of 50% increase for climatic change. This is above and beyond the requirements of a United Utilities adopted drainage system which requires storage up to and including the 1 in 30yr storm event. Flows would be restricted by the hydrobrake which will limit discharge to the greenfield flow rate as calculated.

-
- 7.08 Causeway Flow program has been used to calculate the storage volume required for the development attached as appendix G. The storage volume is calculated at 30m³ and the 1 in 100 year event storage requirement is calculated at 33.19m³. Proposed Run-off Rates include an increase of 50% climatic change allowance.
- 7.09 It is generally accepted that surface water systems are designed to accommodate the 1 in 30yr plus climatic change event and anything above and beyond that could be allowed to flood the system. This is known as designing for exceedance. It is not achievable to accommodate exceedance due to the topography therefore the system has been designed to full accommodate the full exceedance within the drainage network.
- 7.10 It is also important to note that this system takes no account of the peripheral storage that will be available within the remainder of the proposed drainage network and therefore, notwithstanding the techniques outlined in para 6.9, the storage attenuation requirements will be less.

MAINTENANCE OF PROPOSED SUDS SYSTEMS.

- 7.11 It is important during any development process to consider the long term maintenance of the proposed drainage system. The more traditional non-SuDS route would be to have the system offered up for adoption through United Utilities, where they would take on responsibility for the maintenance of the drainage network. However, this is not the case with SuDS.
- 7.12 With the emerging Flood and Water Management Act 2010 (although it is noted that Schedule 3 relating to SuDS has not yet come into force), the SuDS Approving Body (SAB), would be obliged to adopt sustainable drainage solutions which comply with National Standards. Consequently, the system would have to be reviewed and approved by the SAB to ensure it meets these relevant standards.
- 7.13 Until such a time as Schedule 3 of the Act comes into force, the SuDS system (although approved by both the LPA and the SAB) would remain private and be maintained and managed by a private management company. This maintenance would be secured through ownership of the property. The system has been designed to require minimum maintenance and, the inspection and upkeep of the drainage system can be maintained in perpetuity.

8.0 PROPOSED DRAINAGE STRATEGY – FOUL WATER

- 8.01 There are foul sewers located to the east of the site. It is proposed to connect to the existing foul and combined sewers via new manholes that are to be installed.
- 8.02 The proposed development is to accommodate up to 7 houses. This comprises of seven, two bed, 3 person houses. The drainage has been designed to accommodate 21 persons. From British Water Code of Practice – Flow loads – 3 the predicted flow rate is $180 \times 21 = 3780$ l/day or 0.04 l/s. The calculated foul discharge from the site in compliance with Approved Document part H of the Building Regulations Table A1 would be 5.4l/s.

9.0 CONCLUSIONS

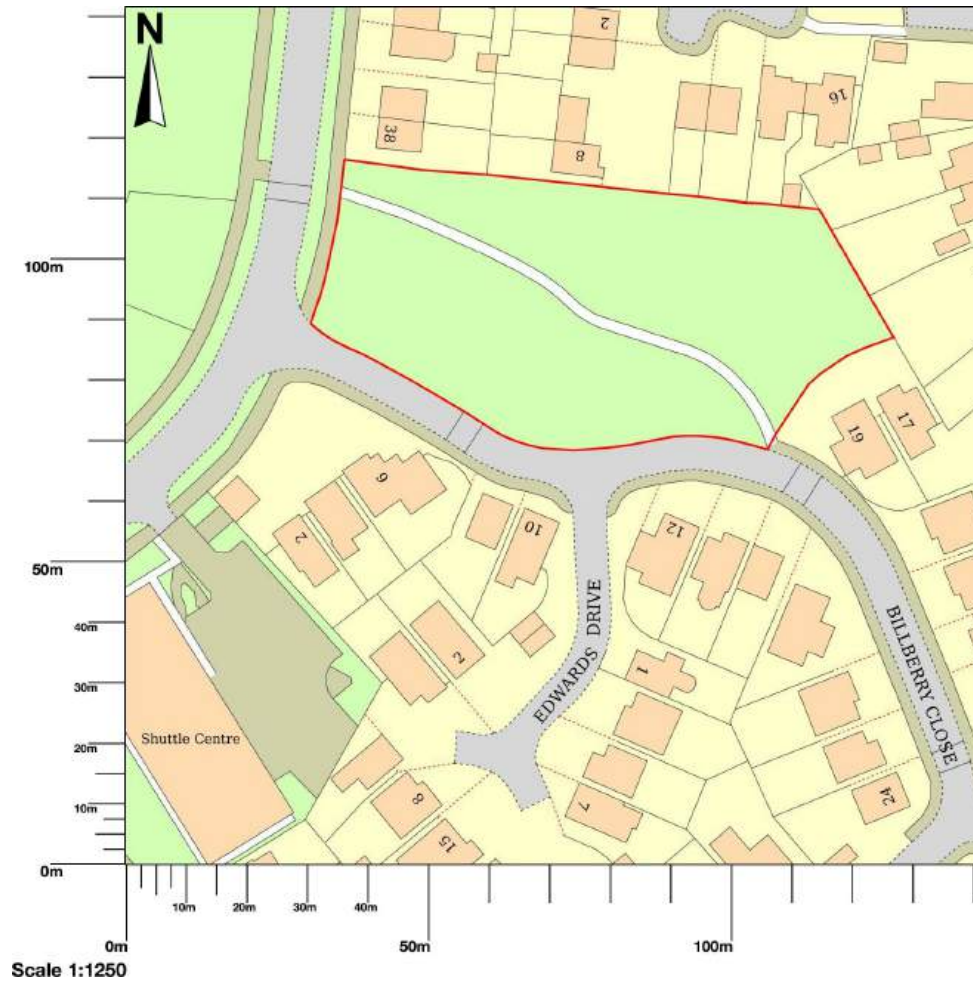
- 9.01 The site lies within Flood Zone 1 and in accordance with PPG is therefore suitable for residential development.
- 9.02 Run-off from the proposed development will be restricted to existing greenfield run-off rates. Storage up to and including the 1 in 100yr + climatic change event will be provided within the boundary of the site; the attenuation will be in the form of storm water crates.
- 9.03 The developer is committed to delivering a sustainable development and the drainage proposals will be designed in accordance with the techniques set out within the SuDS Manual. Future maintenance of the system will be secured in perpetuity, through the use of a planning condition.
- 9.04 Foul drainage will be discharged into the existing combined & foul sewer via new manholes installed on site.
- 9.05 The strategy outlined above shows a viable sustainable drainage solution is achievable within the constraints of the site. The delivery of a SuDS surface water system together with an appropriately designed foul network and connection can be secured through planning condition.

10.0 APPENCIES

Appendix A	Location plan
Appendix B	Environment Agency Flood Map
Appendix C	Topographical Survey
Appendix D	Proposed Scheme Drawing
Appendix E	Sewer Records
Appendix F	Proposed Drainage Drawings
Appendix G	Drainage Calculations
Appendix H	Surface Water Management & Maintenance Plan

***Appendix A
Location plan***

Billberry Close, Whitefield



Appendix B
Environment Agency Flood Map

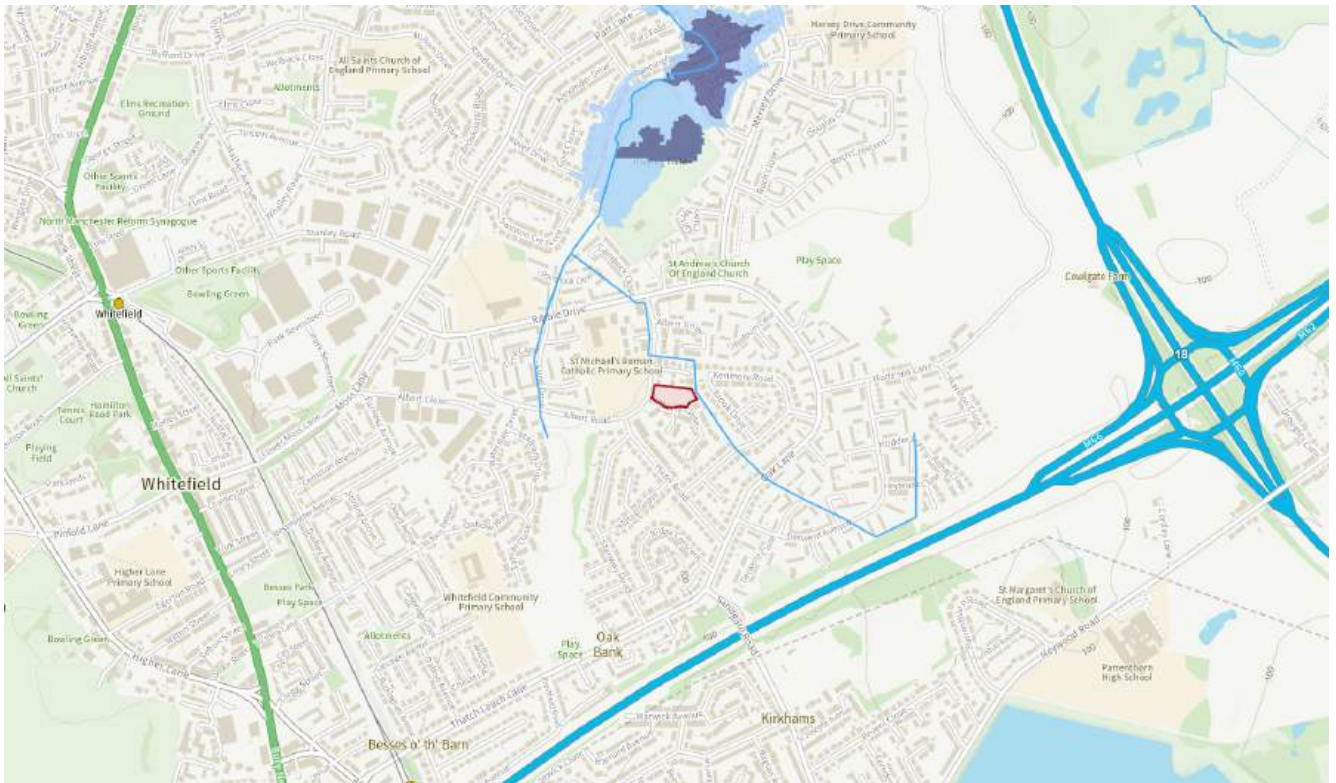
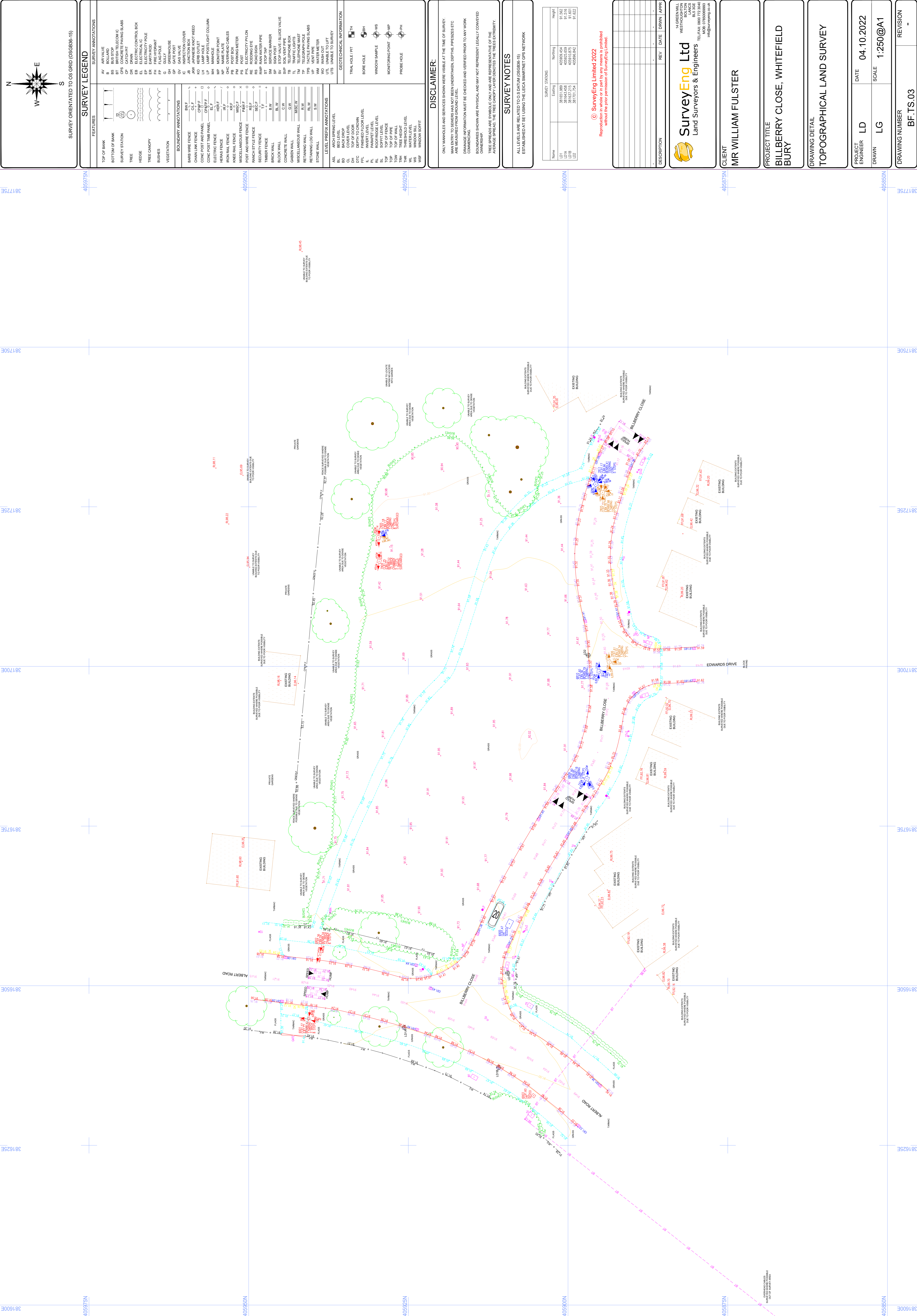


Fig 1 Extract from Environment Agency Flood Map

Appendix C
Topographical Survey



Appendix D
Proposed Scheme Drawing

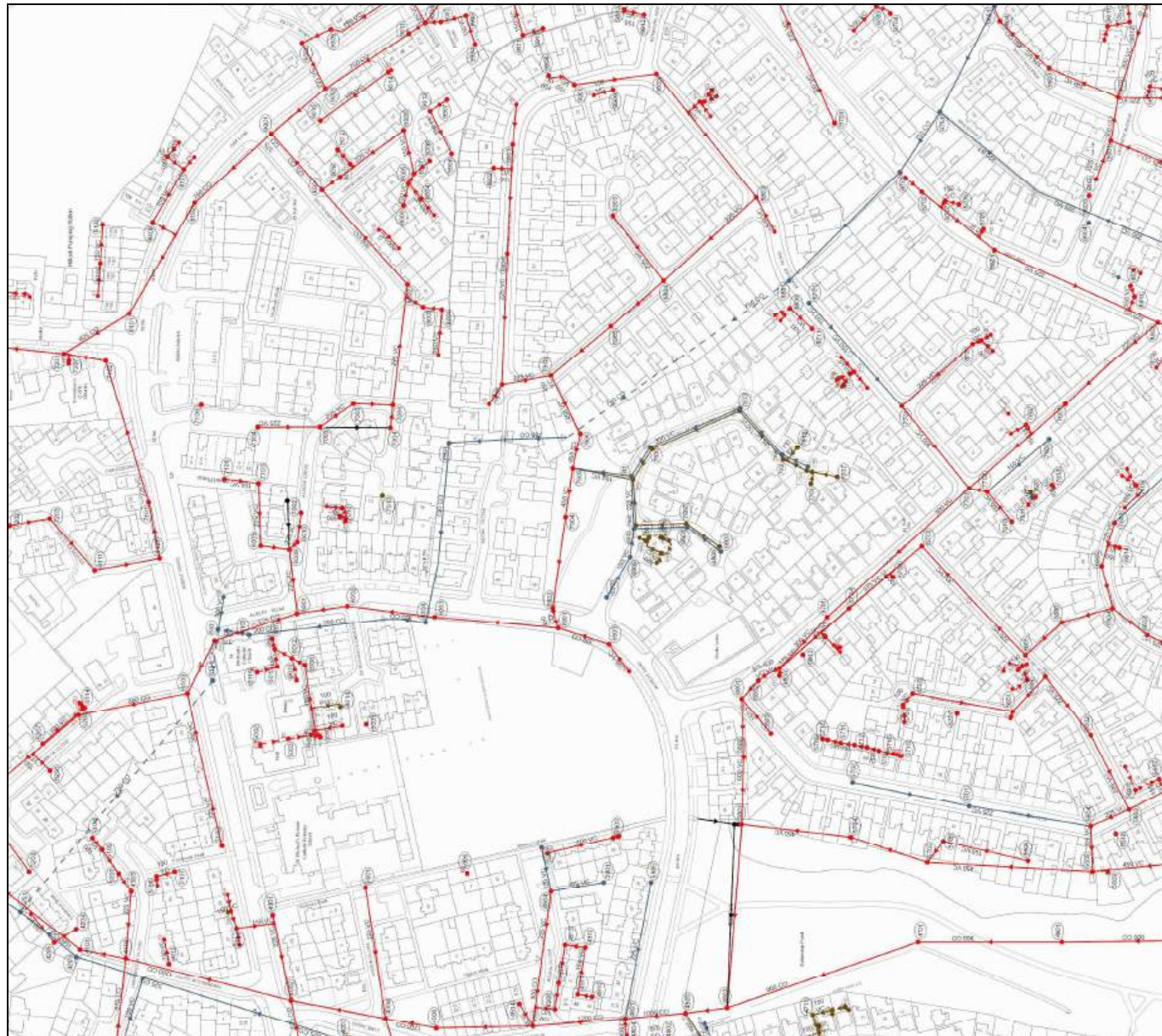


NOTES

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2. DO NOT SCALE FROM THIS DRAWING.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELATED DRAWINGS. THE CONTRACTOR SHOULD CONSULT THE ARCHITECT FOR ANY AMENDMENTS OR DETAILS.
4. THE CONTRACTOR IS TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF CONSTRUCTION WORKS. IF ANY DISCREPANCIES ARE FOUND, THE CONTRACTOR MUST IMMEDIATELY REPORT THEM TO THE ARCHITECT.
5. THE ASSUMPTIONS USED IN THE DESIGN DIFFER TO THAT FOUND ON SITE.

Rev.	Amendments	Date	By
Keystone Design Associates Ltd. Registered Office 201 Church Street Bilberry Close Whitefield, M45 8BL UK 01753 546600 Fax No. 01753 752901 Email: info@keystonedesign.co.uk			
PROJECT ADDRESS			
LAND AT BILLBERRY CLOSE AND ALBERT ROAD, WHITEFIELD, M45 8BL			
PROJECT TITLE			
RESIDENTIAL DEVELOPMENT			
DRAWING TITLE			
PROPOSED SITE PLAN			
Client: THOMPSONS		Scales: @A1 1:50@A1	
Drawn By: JG	Checked By: DWH	Date: 06/02/25	
DRAWING No. A025/005/BR/O1		Revision -	
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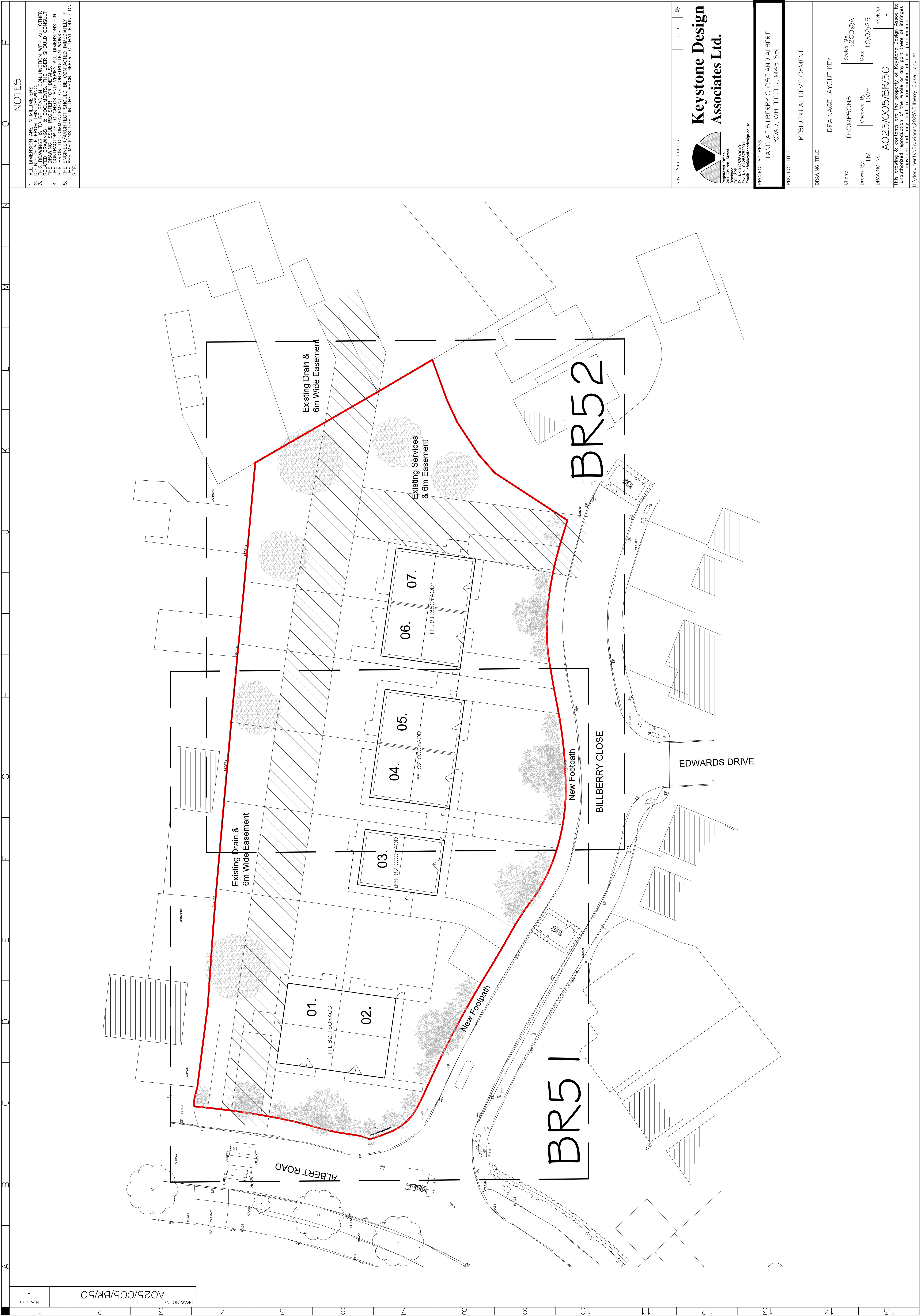
Appendix E
Sewer Records

[illegible]

The position of the underground apparatus shown on this plan is approximate **only** and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Appendix F
Proposed Drainage Drawing



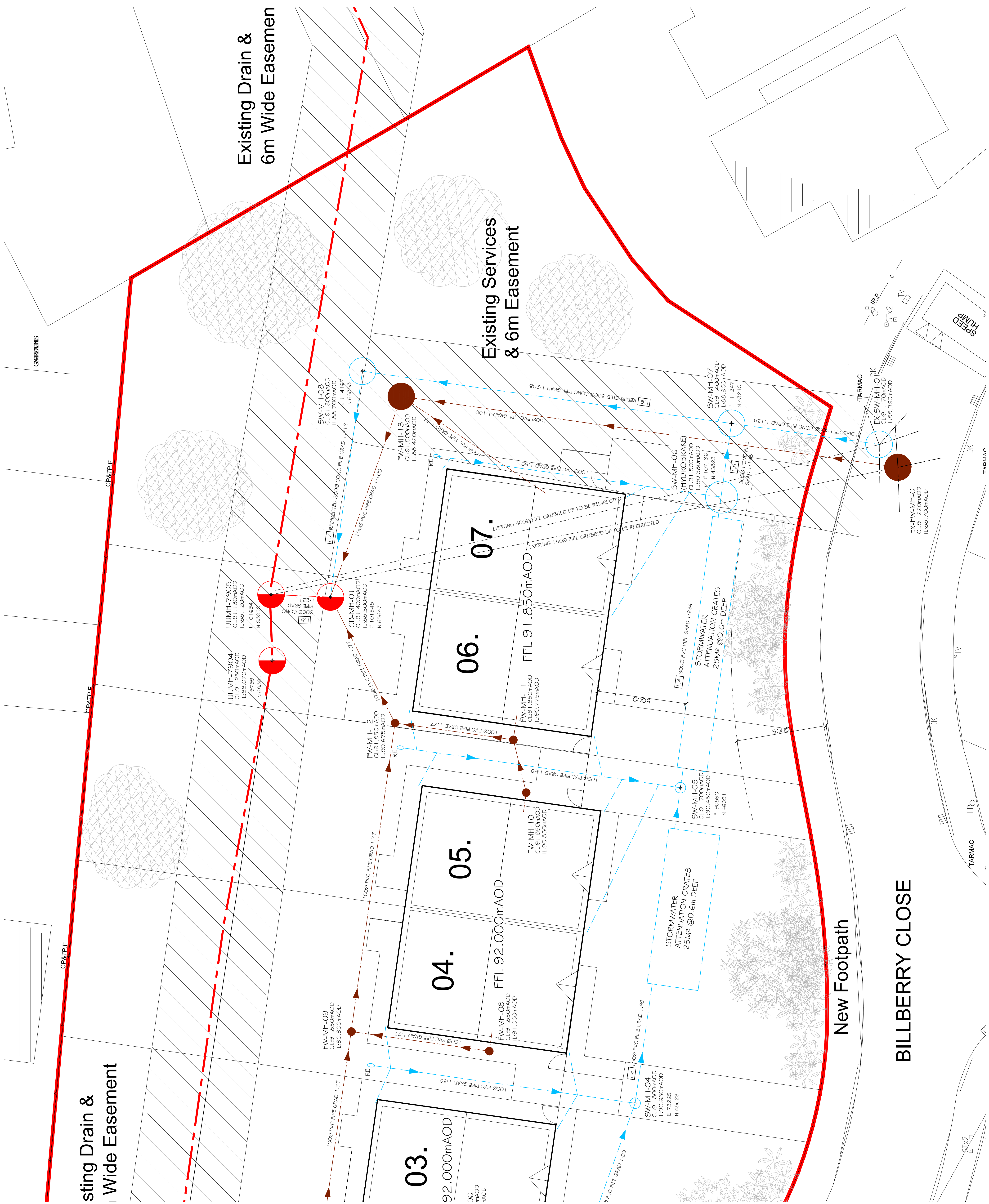
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5. THE ASSUMPTIONS USED IN THE DESIGN DIFFER TO THAT FOUND ON SITE.

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Keystone Design Associates Ltd. Registered Office 201 Church Street Bilberry Close Whitefield, M45 8BL UK 0161 2755201 0161 2755202 0161 2755203 Email: info@keystonedesign.co.uk			
PROJECT ADDRESS LAND AT BILBERRY CLOSE AND ALBERT ROAD, WHITEFIELD, M45 8BL			
PROJECT TITLE RESIDENTIAL DEVELOPMENT			
DRAWING TITLE DRAINAGE LAYOUT KEY			
Client: THOMPSONS		Scales @A1 1:200 @A1	
Drawn By: LM		Checked By: DWH	
Date: 10/02/25		Revision: -	
DRAWING No. A025/005/BR/50			
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5. THE ENGINEER/ARCHITECT SHOULD BE CONTACTED IMMEDIATELY IF THE ASSUMPTIONS USED IN THE DESIGN DIFFER TO THAT FOUND ON SITE.

DRAWING No. A025/005/BR/52



Rev.	Amendments	Date	By
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**Keystone Design
Associates Ltd.**

Registered Office
261 Church Street

PROJECT ADDRESS
LAND AT BILBERRY CLOSE AND ALBERT
ROAD, WHITEFIELD, M45 8BL

PROJECT TITLE	RESIDENTIAL DEVELOPMENT
DRAWING TITLE	DRAINAGE GENERAL ARRANGEMENT (2 OF 2)

Client:	THOMPSONS		Scales @A1 1:100@A1
Drawn By:	LM	Checked By: DWH	Date 10/02/25

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SURFACE WATER MANHOLE SCHEDULE													
M.H REF	CHAMBER TYPE	INTERNAL DIM	COVER GRADE	COVER LEVEL	INVERT LEVEL	DEPTH	PIPE	MATERIAL	DIAMETER	CHAMBER LAYOUT	EASTING	NORTHING	NOTES
SW-MH-01	TYPE 1	900	PVC	92.000	91.000	1.000	A B	PVC PVC	100 150		41.551	60.103	
SW-MH-02	TYPE 1	1200	PVC	91.900	90.870	1.030	A B C	PVC PVC PVC	150 100 150		52.340	56.197	
SW-MH-03	TYPE 1	1200	STEEL	91.850	90.730	1.120	A B C	PVC PVC PVC	150 100 150		63.991	51.983	
SW-MH-04	TYPE 1	1200	STEEL	91.600	90.630	1.170	A B C	PVC PVC PVC	150 100 150		73.265	48.623	
SW-MH-05	TYPE 1	1200	STEEL	91.700	90.450	1.250	A B C	PVC PVC PVC	150 100 300		90.890	46.091	
SW-MH-06	TYPE 1	1800	STEEL	91.600	90.360	1.220	A B C	PVC CONC CONC	300 500 300		107.136	43.623	HYDROPAKE INSTALLED
SW-MH-07	TYPE 1	1500	PVC	91.400	88.900	2.500	A B C	CONC CONC CONC	300 300 300		111.247	43.240	PPE A CONNECTION VIA BACKDROP
SW-MH-08	TYPE 1	1500	PVC	91.700	88.700	3.000	A B	CONC CONC	300 300		114.167	63.956	
DX-SW-MH-01	TYPE 1	1500	STEEL	91.400	88.300	3.100	A B C D E F	PVC PVC CONC PVC CONC CONC	225* 300* 100* 100* 300 300				PPE F TO BE GRUBBED UP AND REDIRECTED
NOTES: CHANNEL FITTINGS ARE TO BE USED IN ALL MANHOLES UPTO AND INCLUDING 300MM ALL LEVELS RELATE TO ORDNANCE DATUM ALL LATERAL PIPE CONNECTIONS TO BE MADE AT 500FIT LEVEL WITH MAIN DRAIN * = EXISTING PIPE													

COMBINED WATER MANHOLE SCHEDULE													
M.H REF	CHAMBER TYPE	INTERNAL DIM	COVER GRADE	COVER LEVEL	INVERT LEVEL	DEPTH	PIPE	MATERIAL	DIAMETER	CHAMBER LAYOUT	EASTING	NORTHING	NOTES
CB-MH-01	TYPE I	1500	PVC	91.400	88.300	3.100	A B C D	PVC PVC CONC CONC	100 150 300 300		101548	65647	
UUMH-7905	TYPE I	1500	PVC	91.160	88.120	3.060	A B C	CONC CONC CONC	300 450 450		101654	68959	
NOTES: CHANNEL FITTINGS ARE TO BE USED IN ALL MANHOLES UPTO AND INCLUDING 300MM ALL LEVELS RELATE TO ORDNANCE DATUM ALL LATERAL PIPE CONNECTIONS TO BE MADE AT SOPFIT LEVEL WITH MAIN DRAIN * = EXISTING PIPE													

FOUL WATER MANHOLE SCHEDULE											
M.H REF	CHAMBER TYPE	INTERNAL DIM	COVER GRADE	COVER LEVEL	INVERT LEVEL	DEPTH	PIPE	MATERIAL	DIAMETER	CHAMBER LAYOUT	NOTES
FW-MH-01	TYPE 3	450	PVC	92.000	91.355	0.645	A B	PVC PVC	100 100		
FW-MH-02	TYPE 3	450	PVC	92.000	91.270	0.730	A B	PVC PVC	100 100		
FW-MH-03	TYPE 3	450	PVC	92.000	91.400	0.600	A B	PVC PVC	100 100		
FW-MH-04	TYPE 3	450	PVC	92.000	91.315	0.685	A B	PVC PVC	100 100		
FW-MH-05	TYPE 3	450	PVC	92.000	91.200	0.800	A B C	PVC PVC PVC	100 100 100		
FW-MH-06	TYPE 3	450	PVC	91.850	91.145	0.705	A B C	PVC PVC PVC	100 100 100		
FW-MH-07	TYPE 3	450	PVC	91.850	91.045	0.805	A B C	PVC PVC PVC	100 100 100		
FW-MH-08	TYPE 3	450	PVC	91.850	91.000	0.850	A B C	PVC PVC PVC	100 100 100		
FW-MH-09	TYPE 3	450	STEEL	91.850	90.9	0.950	A B C D	PVC TBC* TBC* TBC*	100 TBC* 100 TBC*		
FW-MH-10	TYPE 3	450	PVC	91.850	90.850	1.000	A B	PVC PVC	100 100		
FW-MH-11	TYPE 3	450	PVC	91.850	90.775	1.075	A B C	PVC PVC PVC	100 100 100		
FW-MH-12	TYPE 3	450	PVC	91.850	90.675	1.175	A B C	PVC PVC PVC	100 100 100		
FW-MH-13	TYPE 1	1500	PVC	91.500	88.420	3.080	A B C	PVC PVC PVC	100 150 150		PIPE A CONNECTION VIA BACKDROP
DX-FW-MH-01	TYPE 1	1500	STEEL	91.220	88.700	2.520	A B C D E	PVC PVC PVC PVC PVC	150* 150* 150* 150* 150*		PIPE E EXISTING PIPE TO BE GRUBBED UP AND REDIRECTED
NOTES: CHANNEL FITTINGS ARE TO BE USED IN ALL MANHOLES UPTO AND INCLUDING 300MM ALL LEVELS RELATE TO ORDNANCE DATUM ALL LATERAL PIPE CONNECTIONS TO BE MADE AT SOFFIT LEVEL WITH MAIN DRAIN * = EXISTING PIPE											

Appendix G
Drainage Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	0.600
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
sw01	0.014	4.00	92.000	900	41.551	60.103	1.000
sw02	0.009	4.00	91.900	1200	52.340	56.197	1.030
sw03	0.006	4.00	91.850	1200	63.981	51.983	1.120
sw04	0.016	4.00	91.800	1200	73.265	48.623	1.170
sw05	0.016	4.00	91.700	1200	90.890	46.091	1.250
sw06	0.007	4.00	91.600	1800	107.136	43.813	1.220
sw07	0.000		91.400	1500	111.247	43.240	1.050
sw08	0.000		91.700	1500	114.167	63.858	1.450
cb01	0.000		91.400	1500	101.548	65.647	1.210
outfall	0.000		91.180	1500	101.684	68.959	1.005

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1	sw01	sw02	11.474	0.600	91.000	90.870	0.130	88.3	150	4.18	50.0
1.1	sw02	sw03	12.380	0.600	90.870	90.730	0.140	88.4	150	4.37	49.8
1.2	sw03	sw04	9.873	0.600	90.730	90.630	0.100	98.7	150	4.53	49.1
1.3	sw04	sw05	17.806	0.600	90.630	90.450	0.180	98.9	150	4.83	48.0
1.4	sw05	sw06	16.405	0.600	90.450	90.380	0.070	234.4	300	5.10	47.0
1.5	sw06	sw07	4.151	0.600	90.380	90.350	0.030	138.4	300	5.15	46.8
1.6	sw07	sw08	20.824	0.600	90.350	90.250	0.100	208.2	300	5.47	45.7
1.7	sw08	cb01	12.745	0.600	90.250	90.190	0.060	212.4	300	5.66	45.0
1.9	cb01	outfall	3.315	0.600	90.190	90.175	0.015	221.0	300	5.72	44.8

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1	1.070	18.9	1.9	0.850	0.880	0.014	0.0	32	0.684
1.1	1.069	18.9	3.1	0.880	0.970	0.023	0.0	41	0.794
1.2	1.011	17.9	3.9	0.970	1.020	0.029	0.0	47	0.807
1.3	1.010	17.9	5.9	1.020	1.100	0.045	0.0	59	0.904
1.4	1.023	72.3	7.8	0.950	0.920	0.061	0.0	66	0.673
1.5	1.335	94.3	8.6	0.920	0.750	0.068	0.0	61	0.838
1.6	1.085	76.7	8.4	0.750	1.150	0.068	0.0	67	0.718
1.7	1.075	76.0	8.3	1.150	0.910	0.068	0.0	67	0.711
1.9	1.053	74.5	8.3	0.910	0.705	0.068	0.0	67	0.700

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1	11.474	88.3	150	Circular	92.000	91.000	0.850	91.900	90.870	0.880
1.1	12.380	88.4	150	Circular	91.900	90.870	0.880	91.850	90.730	0.970
1.2	9.873	98.7	150	Circular	91.850	90.730	0.970	91.800	90.630	1.020
1.3	17.806	98.9	150	Circular	91.800	90.630	1.020	91.700	90.450	1.100
1.4	16.405	234.4	300	Circular	91.700	90.450	0.950	91.600	90.380	0.920
1.5	4.151	138.4	300	Circular	91.600	90.380	0.920	91.400	90.350	0.750
1.6	20.824	208.2	300	Circular	91.400	90.350	0.750	91.700	90.250	1.150
1.7	12.745	212.4	300	Circular	91.700	90.250	1.150	91.400	90.190	0.910
1.9	3.315	221.0	300	Circular	91.400	90.190	0.910	91.180	90.175	0.705

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1	sw01	900	Manhole	Adoptable	sw02	1200	Manhole	Adoptable
1.1	sw02	1200	Manhole	Adoptable	sw03	1200	Manhole	Adoptable
1.2	sw03	1200	Manhole	Adoptable	sw04	1200	Manhole	Adoptable
1.3	sw04	1200	Manhole	Adoptable	sw05	1200	Manhole	Adoptable
1.4	sw05	1200	Manhole	Adoptable	sw06	1800	Manhole	Adoptable
1.5	sw06	1800	Manhole	Adoptable	sw07	1500	Manhole	Adoptable
1.6	sw07	1500	Manhole	Adoptable	sw08	1500	Manhole	Adoptable
1.7	sw08	1500	Manhole	Adoptable	cb01	1500	Manhole	Adoptable
1.9	cb01	1500	Manhole	Adoptable	outfall	1500	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
sw01	41.551	60.103	92.000	1.000	900		0	1	91.000	150
sw02	52.340	56.197	91.900	1.030	1200		1	1	90.870	150
							0	1.1	90.870	150
sw03	63.981	51.983	91.850	1.120	1200		1	1.1	90.730	150
							0	1.2	90.730	150
sw04	73.265	48.623	91.800	1.170	1200		1	1.2	90.630	150
							0	1.3	90.630	150
sw05	90.890	46.091	91.700	1.250	1200		1	1.3	90.450	150
							0	1.4	90.450	300
sw06	107.136	43.813	91.600	1.220	1800		1	1.4	90.380	300
							0	1.5	90.380	300

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
sw07	111.247	43.240	91.400	1.050	1500		1	1.5	90.350	300
							0	1.6	90.350	300
sw08	114.167	63.858	91.700	1.450	1500		1	1.6	90.250	300
							0	1.7	90.250	300
cb01	101.548	65.647	91.400	1.210	1500		1	1.7	90.190	300
							0	1.9	90.190	300
outfall	101.684	68.959	91.180	1.005	1500		1	1.9	90.175	300

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15 30 60 120 180 240 360 480 600 720 960 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
2	0	0	0
30	40	0	0
100	50	0	0

Node sw06 Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	90.380	Product Number	CTL-SHE-0074-2400-1000-2400
Design Depth (m)	1.000	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.4	Min Node Diameter (mm)	1200

Node sw06 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	90.380
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	50.0	0.0	0.600	50.0	0.0	0.601	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 97.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	sw01	10	91.032	0.032	1.9	0.0294	0.0000	OK
15 minute summer	sw02	10	90.912	0.042	3.1	0.0542	0.0000	OK
15 minute summer	sw03	10	90.779	0.049	3.9	0.0607	0.0000	OK
15 minute winter	sw04	10	90.691	0.061	6.1	0.0852	0.0000	OK
1440 minute winter	sw05	1080	90.620	0.170	0.7	0.2357	0.0000	OK
1440 minute winter	sw06	1080	90.620	0.240	0.8	12.6360	0.0000	OK
1440 minute winter	sw07	1680	90.620	0.270	0.3	0.4765	0.0000	OK
1440 minute winter	sw08	1680	90.620	0.370	0.3	0.6532	0.0000	SURCHARGED
1440 minute winter	cb01	1680	90.620	0.430	0.1	0.7593	0.0000	SURCHARGED
15 minute summer	outfall	1	91.175	1.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	sw01	1	sw02	1.9	0.568	0.100	0.0385	
15 minute summer	sw02	1.1	sw03	3.1	0.692	0.164	0.0555	
15 minute summer	sw03	1.2	sw04	3.9	0.663	0.216	0.0576	
15 minute winter	sw04	1.3	sw05	5.9	0.802	0.333	0.1339	
15 minute winter	sw05	1.4	sw06	8.1	1.078	0.113	0.1473	
120 minute winter	sw06	1.5	sw07	1.5	0.445	0.016	0.1191	
120 minute winter	sw07	1.6	sw08	1.4	0.320	0.018	0.9814	
30 minute winter	sw08	1.7	cb01	1.3	0.366	0.017	0.6850	
15 minute summer	cb01	1.9	outfall	0.0	0.000	0.000	0.2083	0.0

Results for 2 year Critical Storm Duration. Lowest mass balance: 97.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	sw01	10	91.037	0.037	2.5	0.0337	0.0000	OK
15 minute summer	sw02	10	90.918	0.048	4.1	0.0631	0.0000	OK
15 minute winter	sw03	10	90.788	0.058	5.2	0.0719	0.0000	OK
15 minute winter	sw04	10	90.702	0.072	8.0	0.1008	0.0000	OK
1440 minute winter	sw05	1110	90.683	0.233	0.8	0.3235	0.0000	OK
1440 minute winter	sw06	1110	90.683	0.303	0.8	15.9695	0.0000	SURCHARGED
1440 minute winter	sw07	1650	90.683	0.333	0.3	0.5891	0.0000	SURCHARGED
1440 minute winter	sw08	1650	90.684	0.434	0.3	0.7662	0.0000	SURCHARGED
1440 minute winter	cb01	1650	90.684	0.494	0.1	0.8720	0.0000	SURCHARGED
15 minute summer	outfall	1	91.175	1.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	sw01	1	sw02	2.5	0.609	0.132	0.0473	
15 minute summer	sw02	1.1	sw03	4.1	0.734	0.217	0.0692	
15 minute winter	sw03	1.2	sw04	5.2	0.707	0.289	0.0722	
15 minute winter	sw04	1.3	sw05	7.8	0.876	0.439	0.1605	
15 minute winter	sw05	1.4	sw06	10.6	1.122	0.147	0.1894	
60 minute winter	sw06	1.5	sw07	1.8	0.470	0.019	0.1112	
60 minute winter	sw07	1.6	sw08	1.8	0.406	0.023	0.9452	
30 minute winter	sw08	1.7	cb01	1.7	0.382	0.022	0.7539	
15 minute summer	cb01	1.9	outfall	0.0	0.000	0.000	0.2143	0.0

Results for 30 year +40% CC Critical Storm Duration. Lowest mass balance: 97.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	sw01	900	91.238	0.238	0.4	0.2181	0.0000	SURCHARGED
1440 minute winter	sw02	900	91.238	0.368	0.6	0.4806	0.0000	SURCHARGED
1440 minute winter	sw03	900	91.238	0.508	0.8	0.6288	0.0000	SURCHARGED
1440 minute winter	sw04	900	91.238	0.608	1.2	0.8533	0.0000	SURCHARGED
1440 minute winter	sw05	900	91.237	0.787	1.5	1.0920	0.0000	SURCHARGED
1440 minute winter	sw06	900	91.237	0.857	1.7	32.3043	0.0000	SURCHARGED
480 minute winter	sw07	472	91.177	0.827	3.1	1.4613	0.0000	FLOOD RISK
960 minute winter	sw08	840	91.177	0.927	1.4	1.6374	0.0000	SURCHARGED
960 minute summer	cb01	795	91.175	0.985	0.9	1.7410	0.0000	FLOOD RISK
15 minute summer	outfall	1	91.175	1.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	sw01	1	sw02	6.5	0.751	0.343	0.0995	
15 minute winter	sw02	1.1	sw03	11.0	0.883	0.585	0.1631	
15 minute summer	sw03	1.2	sw04	12.7	0.808	0.712	0.1706	
15 minute winter	sw04	1.3	sw05	19.2	1.094	1.076	0.3029	
15 minute summer	sw05	1.4	sw06	26.2	1.274	0.362	0.6022	
480 minute winter	sw06	1.5	sw07	3.1	0.345	0.033	0.2923	
30 minute winter	sw07	1.6	sw08	2.6	0.481	0.034	1.4316	
15 minute winter	sw08	1.7	cb01	2.6	0.506	0.034	0.8970	
960 minute winter	cb01	1.9	outfall	1.4	0.020	0.019	0.2334	11.6

Results for 100 year +50% CC Critical Storm Duration. Lowest mass balance: 97.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute winter	sw01	405	91.575	0.575	1.0	0.5267	0.0000	SURCHARGED
600 minute winter	sw02	405	91.575	0.705	1.6	0.9205	0.0000	SURCHARGED
600 minute winter	sw03	405	91.574	0.844	2.0	1.0455	0.0000	FLOOD RISK
600 minute winter	sw04	405	91.574	0.944	2.9	1.3254	0.0000	FLOOD RISK
600 minute winter	sw05	405	91.572	1.122	3.9	1.5566	0.0000	FLOOD RISK
600 minute winter	sw06	405	91.572	1.192	4.3	33.1950	0.0000	FLOOD RISK
960 minute summer	sw07	540	91.178	0.828	5.6	1.4625	0.0000	FLOOD RISK
720 minute winter	sw08	450	91.177	0.927	2.6	1.6380	0.0000	SURCHARGED
360 minute winter	cb01	256	91.175	0.985	2.7	1.7412	0.0000	FLOOD RISK
15 minute summer	outfall	1	91.175	1.000	0.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	sw01	1	sw02	9.2	0.770	0.485	0.2020	
30 minute summer	sw02	1.1	sw03	12.3	0.877	0.649	0.2179	
15 minute summer	sw03	1.2	sw04	15.3	0.868	0.855	0.1738	
15 minute winter	sw04	1.3	sw05	23.4	1.328	1.310	0.3135	
15 minute winter	sw05	1.4	sw06	32.1	1.291	0.445	1.0493	
360 minute winter	sw06	1.5	sw07	6.8	0.371	0.072	0.2923	
360 minute winter	sw07	1.6	sw08	2.9	0.288	0.038	1.4664	
15 minute winter	sw08	1.7	cb01	2.9	0.510	0.039	0.8975	
720 minute winter	cb01	1.9	outfall	2.8	0.039	0.037	0.2334	27.4

Calculated by:	david hadwin
Site name:	bilberry close
Site location:	

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

Site Details

Latitude:	53.54953° N
Longitude:	2.27753° W
Reference:	2902773494
Date:	Feb 07 2025 15:37

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.336
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Methodology

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

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.

Soil characteristics

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

(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.

Hydrological characteristics

	Default	Edited
SAAR (mm):	998	998
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

(3) Is SPR/SPRHOST ≤ 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):	2.46	2.46
1 in 1 year (l/s):	2.14	2.14
1 in 30 years (l/s):	4.18	4.18
1 in 100 year (l/s):	5.11	5.11
1 in 200 years (l/s):	5.82	5.82

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.

Appendix H
Surface Water Management & Maintenance Plan

Surface Water
Management & Maintenance Plan

**LAND AT BILBERRY CLOSE & ALBERT ROAD,
WHITEFIELD**

February 2025

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Blackpool
FY1 3PB
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DOCUMENT ISSUE RECORD

Revision	Date	Details
Full	February 2025	Issued for action

**LAND AT BILBERRY CLOSE & ALBERT ROAD,
WHITEFIELD**

Report Approved by D.W.Hadwin B.Eng(Hons) C.Eng MICE
For Keystone Design Associates

Signature.....

Date.....19th February 2025.....

CONTENTS

1. INTRODUCTION
2. SITE DESCRIPTION
3. MANAGEMENT AND MAINTENANCE RESPONSIBILITIES AND SPECIFICATION

1.0 INTRODUCTION

- 1.01 This sustainable drainage management and maintenance plan for the lifetime of the development has been produced on behalf of Thompsons Building Contractors for the proposed development at land at Bilberry Close and Albert Road, Whitefield.
- 1.02 A Management Company will be commissioned to maintain the development in terms of the access, car parking / hardstanding areas, drainage, landscaping, open space, etc. An annual levy will be raised by the said company from the site occupants for the upkeep and future maintenance of the said infrastructure.

2.0 SITE DESCRIPTION

Existing Site and Drainage

- 2.01 The development site is currently a plot of land located at Bilberry Close and Albert Road, Whitefield. The proposed site is surrounded by residential properties to the north, east and south with St. Michael's RC Primary School located to the north west.
- 2.02 The proposed site is situated in Whitefield; Whitefield is situated approximately 6.3 miles from the centre of Manchester. Whitefield is a town in the Metropolitan Borough of Bury, Greater Manchester. It lies on undulating ground above the Irwell Valley, along the south bank of the River Irwell, approximately 3 miles (4.8 km) southeast of Bury, and 5 miles (8.0 km) northwest of Manchester. Prestwich and the M60 motorway lie just to the south.

Proposed drainage

- 2.03 Surface water from the development will connect to the existing surface water drainage via new manholes that are to be installed. The surface water drainage system is to remain private.
- 2.04 Foul water from the developed site will connect to the existing mains drainage via new manholes that are to be installed. The foul water drainage system is to remain private.
- 2.05 The proposed access and car parking / hardstanding areas within the site development are to remain private. Surface water runoff from the access and car parking / hardstanding areas will drain through SuDS / treatment features comprising trapped gullies and manhole chambers.

3.0 MANAGEMENT & MAINTENANCE RESPONSIBILITIES AND SPECIFICATION

- 3.01 The table below identifies the maintenance responsibilities for the various drainage features of the scheme.

Feature	Maintenance responsibility
Building drainage	Management company
Surface water drainage within the access and hardstanding areas	Management company
Foul water drainage within the access and hardstanding areas	Management company
Access and car parking / hardstanding areas including drainage (gullies and connections)	Management company

- 3.02 The table below lists the various drainage features utilised within the proposed drainage design for the development at land at Bilberry Close & Albert Road, Whitefield, along with the maintenance regime that should be followed.

BUILDING DRAINAGE	
Regular maintenance	Frequency
Visually inspect gutters to ensure they are kept clear of leaves, debris etc. Lift covers of drainage to inspect chambers for debris and build-up of silts.	Annually. No triggers other than maintenance to be taken on regular schedule.
Occasional tasks	Frequency
Remove leaves and debris from gutters. Specialist operatives with current confined spaces training to remove debris from inspection chambers to ensure outlets are kept clear of debris to ensure adequate drainage.	As required from regular maintenance inspection. Indicator of problem / trigger for maintenance when surcharging or flooding of drains occurs or gutters and chambers full of debris and leaves etc.
Remedial work	Frequency
Should drains be heavily blocked or damaged contact drainage maintenance company for unblocking / repair works.	As required. Indicator of problem / trigger for maintenance when drainage not functioning and unblocking pipes and chambers etc. not effective.
SURFACE WATER DRAINAGE WITHIN THE ACCESS AND HARDSTANDING AREAS	
Regular maintenance	Frequency
Check manhole covers are securely in place. Specialist operatives with current confined spaces training to lift covers and visually inspect manholes to ensure they are kept clear of leaves, debris, silt, etc. Check drainage pipes are operating as expected.	Annually or when notified.
Specialist operatives to carry out maintenance of pumping equipment in accordance with the manufacturer's recommendations.	Annually or when notified.
Occasional tasks	Frequency
Specialist operatives with current confined spaces training to remove debris and silt from the manholes to ensure outlets are kept clear of debris to ensure adequate drainage.	As required from regular maintenance inspection to trigger works.
Remedial work	Frequency
The specialist operatives are to advise the	As required from regular maintenance inspection.

management company of any repair works necessary to the manholes and pumping chamber. Drains heavily blocked or damaged to be jetted / repaired.	Indicator of problem / trigger for maintenance when drainage not functioning and unblocking pipes and chambers etc. not effective.
The specialist operatives are to advise the management company of any repairs to pumping equipment.	As required from regular maintenance inspection to trigger works or when equipment fails to work.
FOUL WATER DRAINAGE WITHIN THE ACCESS AND HARDSTANDING AREAS	
Regular maintenance	Frequency
Check manhole covers are securely in place. Specialist operatives with current confined spaces training to lift covers and visually inspect manholes and pumping chamber to ensure they are kept clear of leaves, debris, silt, etc. to ensure adequate drainage. Check drainage pipes are operating as expected.	Annually or when notified. No triggers other than maintenance to be taken on regular schedule.
Specialist operatives to carry out maintenance of pumping equipment in accordance with the manufacturer's recommendations.	Annually or when notified.
Occasional tasks	Frequency
Specialist operatives with current confined spaces training to remove debris and silt from the manholes and pumping chamber to ensure outlets are kept clear of debris to ensure adequate drainage.	As required from regular maintenance inspection to trigger works.
Remedial work	Frequency
The specialist operatives are to advise the management company of any repair works necessary to the manholes and pumping chamber. Drains heavily blocked or damaged to be jetted / repaired.	As required from regular maintenance inspection. Indicator of problem / trigger for maintenance when drainage not functioning and unblocking pipes and chambers etc. not effective.
The specialist operatives are to advise the management company of any repairs to pumping equipment.	As required from regular maintenance inspection to trigger works or when equipment fails to work.
ACCESS AND CAR PARKING / HARDSTANDING AREAS INCLUDING DRAINAGE (GULLIES AND CONNECTIONS)	
Regular maintenance	Frequency
Brush regularly and remove all sweepings from hard surfaces and inspect gullies for debris and silt. Clean out gullies.	As required. Indicator of problem / trigger for remedial action when road gullies clogged or blocked and remaining full and overflowing.
Occasional tasks	Frequency
Check wearing course to access and car parking / hardstanding areas for condition.	As required. Indicator of problem / trigger for remedial action when road gullies clogged or blocked and remaining full and overflowing.
Remedial work	Frequency
Repair and reinstatement of tarmac construction where required. Kerbing to be replaced where damaged.	As required. Indicator of problem / trigger for remedial action when road gullies clogged or blocked and remaining full and overflowing.

ATTENUATION STORAGE	
Regular maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
Remove debris from the catchment surface (where it may cause a risk to performance)	Monthly
For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter, remove and replace surface infiltration medium as necessary.	Annually
Remove sediment from pre-treatment structures and/or internal forebays.	Annually, or as required
Remedial work	Frequency
Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Frequency
Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required.
PERVIOUS PAVEMENTS	
Regular maintenance	Frequency
Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment.
Occasional tasks	Frequency
Stabilise and mow contributing and adjacent areas	As required
Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial work	Frequency
Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving	As required
Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)

Monitoring	Frequency
Initial inspection	Monthly for 3 months after installation
Inspect for evidence of poor operation and/or weed growth – if requires, take remedial action	Three-monthly, 48 hours after large storms in first six months
Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
Monitor inspection chambers	Annually
FLOW CONTROL DEVICES	
Regular maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
Remove debris and litter from the catchment surface (where it may cause a risk to performance)	Monthly
Inspect Hydrobrake and clear any material which may cause a blockage	Monthly
Occasional tasks	Frequency
Remove sediment	Annually, or as required
Remedial work	Frequency
Repair any damage or vandalism	As required
INLETS, OUTLETS, CONTROLS AND INSPECTION CHAMBERS	
Regular maintenance	Frequency
Inspect surface structures removing obstructions and silt as necessary. Check there is no physical damage.	Monthly
Strim vegetation 1m minimum surround to structures and keep hard aprons free from silt and debris.	Monthly
Remove cover and inspect ensuring water is flowing freely and that the exit route for water is unobstructed. Remove all debris and silt.	Annually
Occasional tasks	Frequency
Check topsoil levels are 20mm above edge of baskets and chambers to avoid mower damage	As required
Remedial work	Frequency
Unpack stone in basket features and unblock or repaid and repack stone as necessary.	As required
Repair physical damage if necessary	As required