The Brow, Overton

Drainage Strategy

95018-RP-D-0001

Rev: P01

May 2024

JPS CIVIL + STRUCTURAL ENGINEERS

Document History

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This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

1 Introduction

1.1 Commission

JP Structural Design were appointed by to carry out a Drainage Strategy for the construction of a new residential house within the grounds of The Brow, Overton.

1.2 Limitations

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The findings of this Strategy have been based on data available at the time of the study and on the review of available information that has been undertaken to date. They relate to the current development proposals as outlined in **Appendix A**. Should the proposed end use of the site change after the completion of this assessment, then the findings of this report will need to be reviewed and updated accordingly.

2 Existing Site and Proposed Development

2.1 Site Location

The proposed development is located on the outskirts of Overton-On-Dee village approximately 7 Km south of Wrexham. The post code of the proposed development is LL13 ODY and the national grid reference SJ370419.

2.2 Site Description

The proposed site covers an area of 0.164 ha as shown on the site information drawing in **Appendix B** and effectively comprises the eastern boundary of 'The Brow' estate.

The area identified for the new dwelling is relatively flat with an anticipated driveway to fall approximately 1.5m to join the existing access which serves The Brow.

The site is bounded to the east by the rear gardens of No 15 Wrexham Road and 6 Willow Street. There is also an adjacent secondary access track to the South which serves The Brow.

The topographic survey indicates that the site has a high point of 67.950 (Above Ordnance Datum)

2.3 Existing Drainage

As the identified site is currently garden area it is not served by any drainage. Public sewer records were obtained from Severn Trent Water (STW) and are provided in **Appendix C**. The records indicate the following:

- There is a 225mm diameter public foul sewer situated within Wrexham Road to the north of the site. The sewer flows in an east direction before turning down Willow Street.
- The 225mm diamater sewer increase to 300mm within Willow Street before passing the secondary access track entrance.

2.4 Existing Waterbodies

The site lies approximately 200m to the north of the River Dee however the site is segregated from the river by an area of woodland / forest.

There are no canals or reservoirs within the immediate vicinity of the site.

2.5 Ground Conditions

According to the Soilscapes soils dataset (http://www.landis.org.uk/soilscapes/), shown in Appendix B soil conditions at the site are described as freely draining slightly acid loamy soils.

2.6 Existing Flood Risk

Figure 1 of TAN15 defines three development advice zones as follows:

- Zone A: Considered to be of little or no risk of fluvial or tidal/coastal flooding.
- Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits.

- Zone C: Based on (the Natural Resources Wales) flood outline, equal to or greater than 0.1% (river, tidal or coastal). Zone C is subdivided into the following two zones:
    - Zone C1: Areas of the floodplain which are developed and served by significant infrastructure, including flood defenced.
    - Zone C2: Areas of the floodplain without significant flood defence infrastructure.

The development advice zones are shown on the Development Advice Map and are defined by the predicted extent of the 1 in 1,000 (rivers and sea) annual exceedance probability (AEP) event (Zone C) and British Geological Survey drift data (Zone B).

The Development Advice Map is shown on the site information drawing in **Appendix B** and indicates that the site is in Zone A.

2.7 Proposed Development

The scheme consists of the construction of a new dwelling with associated garage, driveway and landscaped areas.

Based upon the latest development plans the total construction area will be approximately 565m^2 as shown on the site information plan in **Appendix B.**

3 Drainage Proposals

3.1 Foul Drainage

The foul drainage disposal is proposed to follow the requirements of Building Regulations 2010 Part H (2015 Edition), Drainage and Waste Disposal and Sewers for Adoption 7th Edition. Part H1 of the above document contains the following requirements:

"An adequate system of drainage shall be provided to carry foul water from appliances within the building on to the following, listed in order of priority."

a) A public sewer or where that is not reasonably practicable

b) A private sewer communicating with a public sewer, or where that is not reasonably practicable,

c) Either a septic tank which has appropriate form of secondary treatment or another wastewater treatment system; or, where that is not reasonably practicable,

d) A cesspool

The proposed peak foul discharge generated by the development has been calculated in accordance with Sewers for Adoption (7th Ed.), using a peak flow rate of 0.6 l/s/ha of developable land for domestic flows, the expected peak flow rate from the development would be 0.1 l/s. It is anticipated that this will not have a negative impact on the existing drainage network.

It is proposed to discharge foul flows from the site to the existing 300mm diameter foul drain situated in Willow Street via the Access Track. Although the depth of the sewer is unknown at the time of writing, the natural topography and distance the sewer has travelled should ensure a gravity connection is viable

3.2 Surface Water Drainage

3.2.1 Surface Water Drainage Guidance and Policy

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and adopt the principles of water management scheme as stated in section 2 of the "Statutory National Standards for Sustainable Drainage Systems (Wales)" (SNSSUDS) document 2018.

From the 7th January 2019 Schedule 3 of the Flood and Water Management Act has been implemented by the Welsh Government which requires any development of more than 1 unit or where the construction area is greater than 100m² to comply with the SuDS Approval Bodies (SAB's) design guidance and minister's standards which will require all sites to adopt SuDs in their design. The standards are listed below;

S1 – Surface Water Runoff Destination

S2 – Surface Water Runoff Hydraulic Control

S3 – Water Quality

S4 – Amenity

S5 – Biodiversity

S6 – Design of Drainage for Construction, Operation and Maintenance

The Standards listed will need to be met by the design in order to comply with the SNSSUDS. S1 is a hierarchy standard with standards S2-S6 being fixed.

3.2.2 S1 – Surface Water Runoff Destination

In accordance with Welsh Government guidance, surface water runoff should be disposed of according to the following hierarchy:

a) Rainwater collected for use;

b) Infiltrated to ground;

c) To a surface water body;

d) To a surface water sewer, highway drain or another drainage system;

e) To a combined sewer.

It is necessary to identify the most appropriate method of controlling and discharging surface water. The design should seek to improve the local run-off profile by using systems that can either attenuate run-off and reduce peak flow rates or positively impact on the existing flood profile.

3.2.2.1 Rainwater Collected for Use

Rainwater butts could be used as a means of capturing rainwater for irrigation and washing purposes.

3.2.2.2 Infiltrated to Ground

As detailed in Section 2 the site is underlain by freely draining soils, as such the disposal of surface water via infiltration may be feasible; however, infiltration tests have not been undertaken at this stage. Such tests should be undertaken at the detail design stage in accordance with the guidelines in BRE365. Based upon the soil description on the BGS online geology maps, a typical infiltration rate that would be expected to be obtained from the sand and gravel deposits would be in the region of 1.0×10^{-5}m/s.

3.2.2.3 To a Surface Water Body

If soakaways proved to be unviable a connection to the river could be investigated

3.2.2.4 To a Surface Water Sewer, Highway Drain or Another Drainage System

Should not be necessary as a soakaways are anticipated to work.

3.2.3 S2 - Surface Water Runoff Hydraulic Control

This standard requires surface water to be managed to prevent as far as possible any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties and the receiving water body. Consideration is also required to the risk associated with runoff from events greater than 1 in 100-year return period with mitigating proposals developed for the scheme.

3.2.3.1 Interception of Runoff

Permeable paving is proposed within the driveway areas which will provide interception of runoff for small rainfall events, in these instances the demand will likely outweigh the first 5mm of collection so it is assumed that storm water would be intercepted.

3.2.3.2 Hydraulic Control (Option 1 - Infiltration)

It is anticipated that infiltration will be suitable for this site, therefore surface water runoff generated by the roof areas is proposed to drain to an infiltration facility situated a minimum of 5m away from the proposed buildings in the car park area to the south.
The infiltration facility has been modelled using Causeway Flow (refer to **Appendix E**). The required storage volume has been sized to store the 1:100 rainfall event including a 40% increase in rainfall intensity to allow for climate change.
Based on the assumed infiltration rate of 1.0 x 10-5m/s, a total storage volume of 12m³ would be required. It is proposed that this storage is provided in a geo-cellular infiltration tank with a plan area of 16m² and a depth of 0.8m. A preliminary surface water drainage layout is provided in **Appendix D**.

3.2.3.3 Exceedance Flows and Flood Pathways

Where flows exceed the capacity of the storage, flows will overtop the system and shed over the garden areas

3.2.3.4 Flood Risks to People

To minimise overland flows towards the building, the level design of the external areas should seek to contain flows within the gardens as much as possible.

3.2.4 S3 – Water Quality

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems including sewers.

The roof water and car parking areas have low hazard levels, with low levels of contamination. The proposed permeable paving is deemed to be sufficient to remove the suspended sediments from the car park surface water prior to discharge to the ground or public sewer network.

3.2.5 S4 – Amenity

This standard requires that the design of the surface water management system should maximise amenity benefits.

As these proposals are for the construction of a new dwelling, which are "closed off" from the general public, it is not possible to add amenity benefits enjoyable by the public within the confines of the proposed development.

3.2.6 S5 – Biodiversity

This standard requires that the surface water management system should maximise biodiversity benefits. The SuDS scheme biodiversity strategy should revolve around the creation of significant and varied habitat to increase the overall biodiversity of the site and ecological value.

However due to the nature of the proposals, one dwelling within a garden setting there are limited opportunities for the inclusion of Biodiversity features

3.2.7 S6 – Design of Drainage for Construction, Operation and Maintenance and Structural Integrity

The proposed system is not intended to be adopted, however, it will still be designed to the standards set out in CIRIA C753.

The construction of most of the surface water drainage will only require the use of standard civil engineering and landscaping operations, e.g. excavation, filling, grading, pipe-laying, chamber construction, topsoiling, seeding and planting, which a competent contractor would be expected to be able to undertake - Construction details are contained in **Appendix F**. Specific method statements may be required for the installation of proprietary drainage products such as the soakaway, rainwater butts and porous paving as workers may not be aware of the specific installation requirements, to ensure the structural integrity of the features.

Regular inspections of SuDS features will need to be undertaken upon construction completion to ensure amenity, water quantity and water quality standards and a maintenance plan to do so will be required upon handover of the site to client. A draft copy of the maintenance plan is contained in **Appendix G**.

4 Conclusions

4.1 Recommendations

Public sewer records indicate that there is a 300mm diameter foul public pump main situated within Willow Street, investigation should be undertaken to confirm the connection manhole construction and depth.

It is recommended that infiltration testing in accordance with the guidelines in BRE365 are carried out prior to the detail design stage, to verify the on-site infiltration potential of the underlying ground.

4.2 Conclusions

The proposed development is not expected to be affected by general objections in respect to draining the site. There will be suitable conditions imposed to ensure that the drainage proposals are designed and constructed in accordance with relevant statutory requirements, including Building Regulations 2010 and the requirements of Wrexham County Council's SuDS Approving Body.

5 Appendices

Appendix A – House Proposals



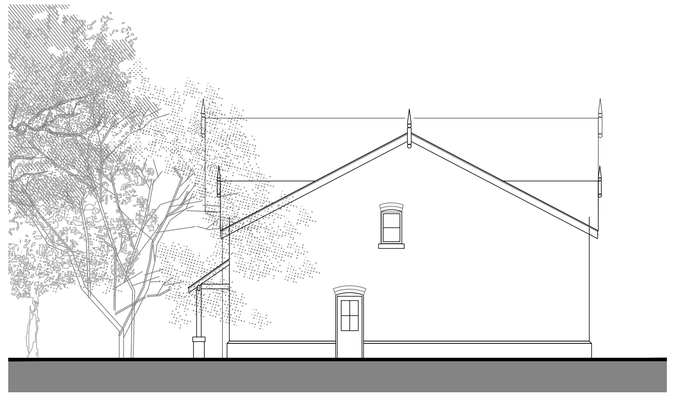
FRONT ELEVATION FACING EAST



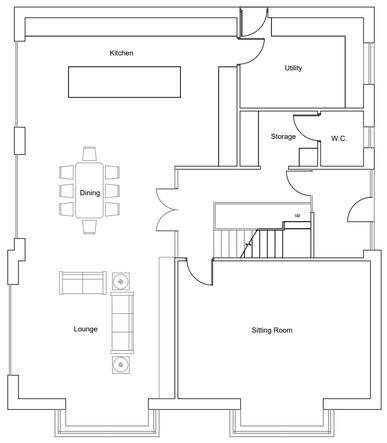
REAR ELEVATION FACING WEST



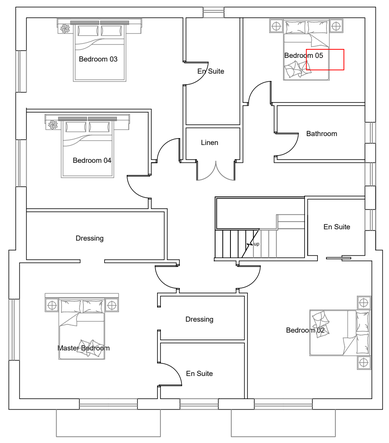
SIDE ELEVATION FACING SOUTH



SIDE ELEVATION FACING NORTH



GROUND FLOOR PLAN



FIRST FLOOR PLAN

willacy horsewood architects

client
RAFELA & SOPHIE FITZHUGH

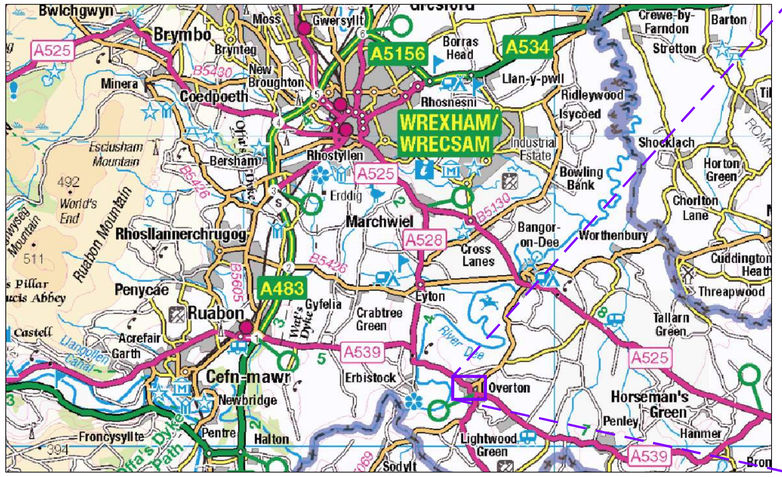
job
PROPOSED NEW DWELLING ON LAND ADJACENT TO THE BROW, WREXHAM ROAD, OVERTON ON DEE LL13 0DY

title
PROPOSED GROUND FLOOR PLAN

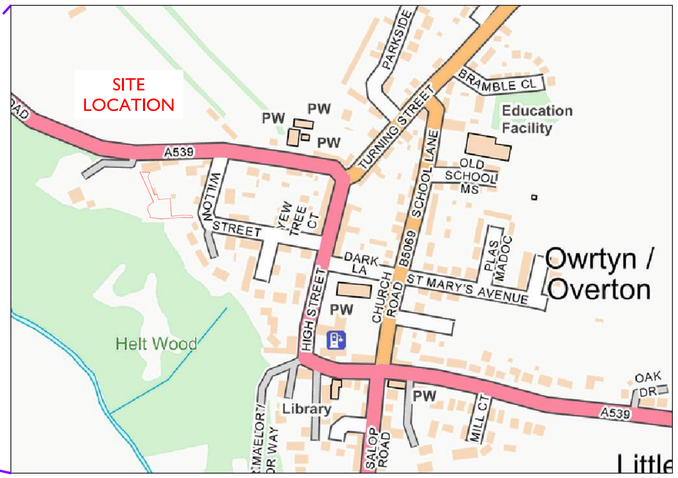
scale	date	job no.	drawing no.	rev
1 : 100/A1	22 JAN 24	WH1259	GA01	

penmon house, 76, hoole road, hoole, chester ch2 3nl
www.willacyhorsewood.co.uk
Tel: 01244 853891 07973322953 E-Mail: mark@willacyhorsewood.co.uk

Appendix B – Site Information Drawing



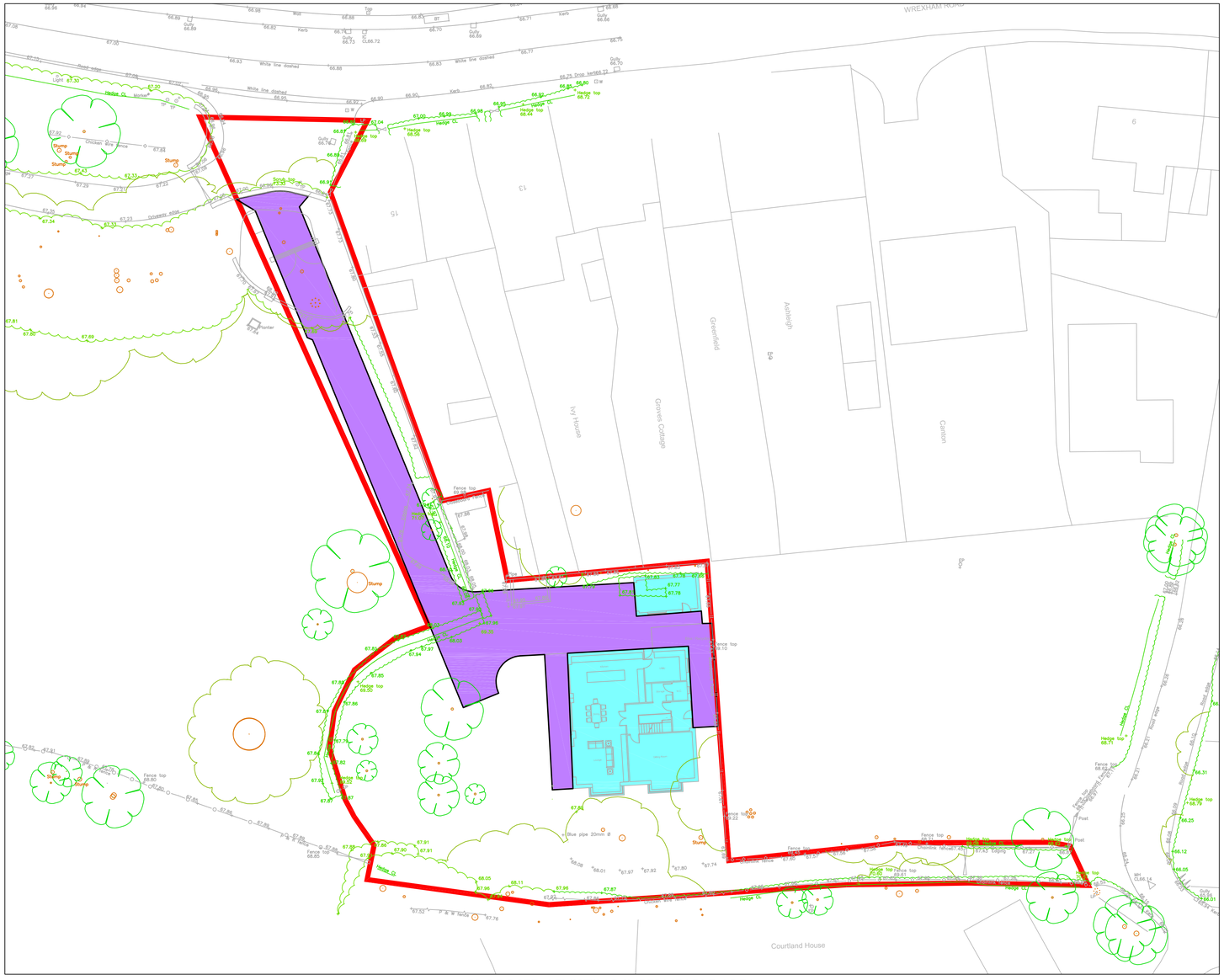
APPROX SCALE
1:100,000



APPROX SCALE
1:5,000



DEVELOPMENT ADVICE MAP
APPROX SCALE 1:10,000



PROPOSED / EXISTING IMPERMEABLE AREA
APPROX SCALE 1:250



SOIL SCAPES MAP
NTS

EXISTING SATELITE IMAGE
APPROX SCALE 1:1,000

SITE CO-ORDINATES

OS X (Eastings)	337061
OS Y (Northings)	341925
Nearest Post Code	LL13 0DY
Nat Grid	SJ370419 / SJ3706141925

AREAS

- SITE BOUNDARY 1640 SQ M
- PROPOSED IMPERMEABLE AREA 185 SQ M
- PROPOSED PERMEABLE PAVINGS 380 SQ M

Freely draining slightly acid loamy soils

Texture:
Loamy

Coverage:
England: 15.5%,**Wales:** 24.4%,**England & Wales:**16.7%

Drainage:
Freely draining

Fertility:
Low

Landcover:
Arable and grassland

Habitats:
Neutral and acid pastures and deciduous woodlands; acid communities such as bracken and gorse in the uplands

Carbon:
Low

Drains to:
Local groundwater and rivers

Water protection:
Groundwater contamination with nitrate; siltation and nutrient enrichment of streams from soil erosion on certain of these soils

SOIL SCAPES
INFORMATION

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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PURPOSE OF ISSUE	STATUS
PRELIMINARY	P

PROJECT
THE BROW
WILLOW STREET

TITLE
DRAINAGE SCHEME
SITE INFORMATION

CLIENT
MS RAFELA FITZHUGH

DRAWN BY	CHECKED BY	APPROVED BY
SB	RH	JP
DATE	**SCALE (@ A1)**	**PROJECT NUMBER**
24.05.2024	As Shown	95018

DRAWING NUMBER	REV
0600	P01

Appendix C – Sewer Records

Dŵr Cymru
Welsh Water

PLOT @ THE BROW

22/05/2024

Scale: 1: 1000



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

Dwr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

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Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Appendix D – Proposed Drainage

Aqua Flow Sub-base specification*
All granular sub-base material shall comprise crushed clean stone, rock or concrete possessing well defined edges. It must be sound, clean, non friable and free from clay or other deleterious matter.

The material must be non plastic when tested in accordance with BS1377 Test No. 4

The crushed stone used for the laying course and sub-base must have a minimum 10% fines value of 150kN when tested in accordance with BS812 Part 111.

The selected test samples shall not be oven dried and should be soaked in water at room temperature for 48 hours before the test.

The 125mm deep upper sub-base material should be graded 5mm-20mm to BS EN 13242: 2002.

Grading of lower layer of sub-base stone:

BS EN Sieve size	% passing
80mm	100
63mm	90-100
40mm	60-80
20mm	15-30
10mm	0-5

Depth of Sub-base
A total depth subbase depth of 300mm should be used on a permeable geotextile layer such as INBITEX AP SC 1000.

Capping Layer
The subgrade will need to achieve a minimum soaked CBR of 5% prior to the installation of the Aquaflow system granular 6F2 capping material in accordance with clause 613 of the Highways Agency specification is to be used in accordance with the table below.

CBR (%) SUBGRADE	1%	2%	3%	4%	5%	8%	10%	15%
CAPPING LAYER	* 600	350	250	200	150			

* - PLUS GROUND STABILISATION TO BE DISCUSSED WITH ENGINEER

NOTES

1. THE WORKS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SPECIFICATIONS, NATIONAL BUILDING SPECIFICATION (NBS) AND SEWERS FOR ADOPTION, 7TH EDITION.

2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS DRAWINGS, ARCHITECTS DRAWINGS, MECHANICAL AND ELECTRICAL DRAWINGS AND SPECIFICATIONS.

3. THE LOCATION, LINE & LEVEL OF ALL KNOWN EXISTING BURIED SERVICE MAINS AND DRAINAGE PIPEWORK INDICATED ON THE DRAWINGS ARE APPROXIMATE AND FOR GUIDANCE PURPOSES ONLY. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THEIR EXACT LINE & LEVEL BY WAY OF HAND EXCAVATED TRIAL PITS, PRIOR TO THE COMMENCEMENT OF ANY EXCAVATION WORKS ON SITE. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO MAINTAIN THE STRUCTURAL INTEGRITY OF ALL ABOVE AND BELOW GROUND SERVICE MAINS / DRAINAGE INSTALLATIONS.

4. THE CONTRACTOR MUST COMPLY WITH ALL CURRENT LEGISLATION RELATING TO HEALTH & SAFETY.

5. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY WORKS, AND IS ALSO RESPONSIBLE FOR THE SAFE MAINTENANCE AND STABILITY OF EXISTING BUILDINGS AT ALL TIMES.

6. THE MAIN CONTRACTOR IS RESPONSIBLE FOR THE MITIGATION OF ALL OCCURRENCES OF GROUND WATER DURING THE CONSTRUCTION PERIOD.

7. THE CONTRACTOR SHALL MAKE ALLOWANCE FOR RAISING / LOWERING ALL EXISTING ACCESS COVERS & FRAMES TO SUIT NEW FINISHED LEVELS.

8. ALL SOFT / HARD PAVED AREAS AFFECTED BY THE WORKS SHALL BE FULLY REINSTATED UPON COMPLETION OF THE WORKS. ALL SURFACE MARKINGS DAMAGED BY THE WORKS SHALL BE FULLY REINSTATED.

9. ALL SURPLUS EXCAVATED MATERIAL SHALL BE DISPOSED OF OFF SITE.

10. ALL LEVELS ARE TO ORDNANCE DATUM

KEY

PROPOSED FOUL DRAIN

PROPOSED SW DRAIN

SVP — PROPOSED SOIL VENT PIPE

RWP — PROPOSED RAIN WATER DOWN PIPE

WB — PROPOSED WATER BUTT

PERMEABLE PAVING
80mm AQUAFLOW PERMEABLE PAVING BLOCK SYSTEM
(SUBJECT TO ARCHITECTS APPROVAL OR SIMILAR PERMEABLE PAVING SYSTEM)
50mm PERMEABLE LAYING COURSE 2-6mm CLEAN CRUSHED STONE & JOINTING MATERIAL
1 LAYER OF INBITEX GEOTEXTILE
REFER TO AQUAFLOW SUB BASE NOTES*

5m³ OF ATTENUATION CONSISTING OF AQUA CELL 'NG ' STORAGE BLOCKS INSTALLED AS SOAKAWAY
8 UNITS x 4 UNITS X 2 UNIT
(4m x 4m x 0.8m @ 95% VOID RATIO)
TO BE BACKFILLED & VENTED IN ACCORDANCE WITH MANUFACTURERS GUIDANCE & RECOMMENDATIONS TO CATER FOR THE 100 YEAR STORM EVENT WITH A 40% ALLOWANCE FOR CLIMATIC CHANGE
CL 67.740
IL 66.140

SMH 1.1
CL 67.600
IL 66.715

SMH 1.2
CL 67.600
IL 66.850

FMH 1.3
CL 67.600
IL 67.000

SMH 1.0
CL 67.700
IL 66.660

FMH 1.2
CL 67.600
IL 66.850

SMH 2.0
CL 67.700
IL 66.870

SMH 2.1
CL 67.600
IL 67.000

FMH 1.1
CL 67.740
IL 66.700

SJ37411803
CL Unk
IL Unk

SJ37411902
CL 66.14
IL Unk

FMH 1.0
CL 66.500
IL 65.500

150Ø @ 1:100
150Ø @ 1:40
150Ø @ 1:30
150Ø @ 1:tbc
300Ø

ASSUMED FFL +67.750

Courtland House
Greenfield
Ivy House
Groves Cottage
Ashleigh
Canton

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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PURPOSE OF ISSUE: PRELIMINARY	STATUS: P
PROJECT: THE BROW, WILLOW STREET	
TITLE: DRAINAGE SCHEME, PROPOSED DRAINAGE LAYOUT	
CLIENT: MS RAFELA FITZHUGH	
DRAWN BY: SB	CHECKED BY: RH
APPROVED BY: JP	
DATE: 24.05.2024	SCALE (@ A1): 1:150
PROJECT NUMBER: 95018	
DRAWING NUMBER: 0602	REV: P01

Appendix E – Surface Water Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	40	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
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)
SMH 2.1	0.009	4.00	67.600	1200	37.542	9.815	0.600
SMH 2.0			67.700	1200	24.158	9.042	0.830
SMH 1.2	0.010	4.00	67.600	1200	36.687	27.511	0.750
SMH 1.1			67.600	1200	23.263	26.331	0.885
SMH 1.0			67.700	1200	23.547	21.043	1.040
Soakaway			67.340		8.862	20.270	1.240

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)
1.000	SMH 2.1	SMH 2.0	13.406	0.600	67.000	66.870	0.130	103.1	150	4.23	50.0
1.001	SMH 2.0	SMH 1.0	12.017	0.600	66.870	66.660	0.210	57.2	150	4.38	50.0
2.000	SMH 1.2	SMH 1.1	13.476	0.600	66.850	66.715	0.135	99.8	150	4.22	50.0
2.001	SMH 1.1	SMH 1.0	5.296	0.600	66.715	66.660	0.055	96.3	150	4.31	50.0
1.002	SMH 1.0	Soakaway	14.705	0.600	66.660	66.100	0.560	26.3	150	4.50	50.0

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)
1.000	0.989	17.5	1.7	0.450	0.680	0.009	0.0	32	0.632
1.001	1.332	23.5	1.7	0.680	0.890	0.009	0.0	27	0.775
2.000	1.006	17.8	1.9	0.600	0.735	0.010	0.0	33	0.657
2.001	1.024	18.1	1.9	0.735	0.890	0.010	0.0	33	0.662
1.002	1.972	34.9	3.6	0.890	1.090	0.019	0.0	33	1.279

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)
1.000	13.406	103.1	150	Circular	67.600	67.000	0.450	67.700	66.870	0.680
1.001	12.017	57.2	150	Circular	67.700	66.870	0.680	67.700	66.660	0.890
2.000	13.476	99.8	150	Circular	67.600	66.850	0.600	67.600	66.715	0.735
2.001	5.296	96.3	150	Circular	67.600	66.715	0.735	67.700	66.660	0.890

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	SMH 2.1	1200	Manhole	Adoptable	SMH 2.0	1200	Manhole	Adoptable
1.001	SMH 2.0	1200	Manhole	Adoptable	SMH 1.0	1200	Manhole	Adoptable
2.000	SMH 1.2	1200	Manhole	Adoptable	SMH 1.1	1200	Manhole	Adoptable
2.001	SMH 1.1	1200	Manhole	Adoptable	SMH 1.0	1200	Manhole	Adoptable

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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)
1.002	14.705	26.3	150	Circular	67.700	66.660	0.890	67.340	66.100	1.090

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	SMH 1.0	1200	Manhole	Adoptable	Soakaway		Junction	

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.000	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	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node Soakaway Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.03600	Safety Factor	2.0	Invert Level (m)	66.100
Side Inf Coefficient (m/hr)	0.03600	Porosity	0.95	Time to half empty (mins)	1488

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	16.0	16.0	0.800	16.0	16.0	0.801	0.0	16.0

Other (defaults)

Entry Loss (manhole)	0.250	Entry Loss (junction)	0.000	Apply Recommended Losses	x
Exit Loss (manhole)	0.250	Exit Loss (junction)	0.000	Flood Risk (m)	0.300

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	368.854	104.373
100 year +40% CC 15 minute winter	258.845	104.373
100 year +40% CC 30 minute summer	255.101	72.185
100 year +40% CC 30 minute winter	179.018	72.185
100 year +40% CC 60 minute summer	180.954	47.821
100 year +40% CC 60 minute winter	120.222	47.821
100 year +40% CC 120 minute summer	116.088	30.679
100 year +40% CC 120 minute winter	77.126	30.679
100 year +40% CC 180 minute summer	90.626	23.321
100 year +40% CC 180 minute winter	58.909	23.321
100 year +40% CC 240 minute summer	72.104	19.055

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Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 240 minute winter	47.904	19.055
100 year +40% CC 360 minute summer	55.175	14.198
100 year +40% CC 360 minute winter	35.865	14.198
100 year +40% CC 480 minute summer	43.619	11.527
100 year +40% CC 480 minute winter	28.979	11.527
100 year +40% CC 600 minute summer	35.816	9.797
100 year +40% CC 600 minute winter	24.472	9.797
100 year +40% CC 720 minute summer	31.983	8.572
100 year +40% CC 720 minute winter	21.495	8.572
100 year +40% CC 960 minute summer	26.337	6.935
100 year +40% CC 960 minute winter	17.446	6.935
100 year +40% CC 1440 minute summer	19.151	5.133
100 year +40% CC 1440 minute winter	12.870	5.133
100 year +40% CC 2160 minute summer	13.707	3.788
100 year +40% CC 2160 minute winter	9.444	3.788
100 year +40% CC 2880 minute summer	11.375	3.049
100 year +40% CC 2880 minute winter	7.645	3.049
100 year +40% CC 4320 minute summer	8.565	2.239
100 year +40% CC 4320 minute winter	5.641	2.239
100 year +40% CC 5760 minute summer	7.017	1.796
100 year +40% CC 5760 minute winter	4.542	1.796
100 year +40% CC 7200 minute summer	5.944	1.516
100 year +40% CC 7200 minute winter	3.836	1.516
100 year +40% CC 8640 minute summer	5.175	1.320
100 year +40% CC 8640 minute winter	3.340	1.320
100 year +40% CC 10080 minute summer	4.604	1.174
100 year +40% CC 10080 minute winter	2.971	1.174

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 97.93%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	SMH 2.1	10	67.054	0.054	4.5	0.0780	0.0000	OK
960 minute winter	SMH 2.0	930	67.013	0.143	0.4	0.1615	0.0000	OK
960 minute winter	SMH 1.2	930	67.013	0.163	0.4	0.2278	0.0000	SURCHARGED
960 minute winter	SMH 1.1	930	67.013	0.298	0.4	0.3369	0.0000	SURCHARGED
960 minute winter	SMH 1.0	930	67.013	0.353	0.8	0.3991	0.0000	SURCHARGED
960 minute winter	Soakaway	930	67.013	0.913	0.8	12.1676	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	SMH 2.1	1.000	SMH 2.0	4.5	0.884	0.258	0.0684
960 minute winter	SMH 2.0	1.001	SMH 1.0	0.4	0.451	0.017	0.2097
960 minute winter	SMH 1.2	2.000	SMH 1.1	0.4	0.414	0.023	0.2372
960 minute winter	SMH 1.1	2.001	SMH 1.0	0.4	0.425	0.022	0.0932
960 minute winter	SMH 1.0	1.002	Soakaway	0.8	0.837	0.023	0.2589
960 minute winter	Soakaway	Infiltration		0.1			

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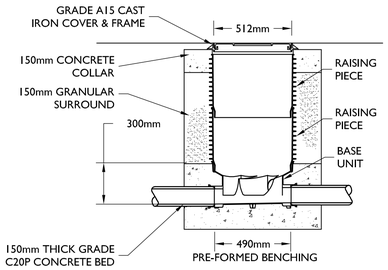
Appendix F – Drainage Details

SURFACE WATER MANHOLES

MH Ref.	MANHOLE DETAILS							COVER DETAILS		PIPE DETAILS					MANHOLE LAYOUT	COMMENTS / DETAILS
	Internal Size	Type			Levels		Depth (m)	BS EN 124 Cover Ref.	Cover Size Clear Opening	Type of Pipe	Size In	Size Out	Invert Level			
		Brick	Conc	PPIC	Cover	Invert										
SMH 1.0	475Ø			*	67.700	66.660	1.040	A15	475Ø	CLAY	150a		66.660		LD, LIGHT WEIGHT PPIC DETAIL	
	LD									CLAY		150b	66.660			
										CLAY	150c		66.660			
SMH 1.1	475Ø			*	67.600	66.715	0.885	C250	600x600	CLAY	150a		66.715		HD, HEAVY DUTY PPIC DETAIL	
	HD									CLAY		150b	66.715			
SMH 1.2	475Ø			*	67.600	66.850	0.750	C250	600x600	CLAY	100a		66.900		HD, HEAVY DUTY PPIC DETAIL	
	HD									CLAY		150b	66.850			
										CLAY	100c		66.900			
SMH 2.0	475Ø			*	67.700	66.870	0.830	A15	475Ø	CLAY	150a		66.870		LD, LIGHT WEIGHT PPIC DETAIL	
	LD									CLAY		150b	66.870			
SMH 2.1	475Ø			*	67.600	67.000	0.600	A15	475Ø	CLAY	100a		67.000		LD, LIGHT WEIGHT PPIC DETAIL	
	LD									CLAY		150b	67.000			

FOUL MANHOLES

MH Ref.	MANHOLE DETAILS							COVER DETAILS		PIPE DETAILS					MANHOLE LAYOUT	COMMENTS / DETAILS
	Internal Size	Type			Levels		Depth (m)	BS EN 124 Cover Ref.	Cover Size Clear Opening	Type of Pipe	Size In	Size Out	Invert Level			
		Brick	Conc	PPIC	Cover	Invert										
FMH 1.0	475Ø			*	66.500	65.500	1.000	C250	600x600	CLAY	150a		65.500		HD, HEAVY DUTY PPIC DETAIL	
	HD									CLAY		150b	65.500			
FMH 1.1	475Ø			*	67.740	66.700	1.040	C250	600x600	CLAY	150a		66.700		HD, HEAVY DUTY PPIC DETAIL	
	HD									CLAY		150b	66.700			
FMH 1.2	475Ø			*	67.600	66.850	0.750	A15	475Ø	CLAY	150a		66.850		LD, LIGHT WEIGHT PPIC DETAIL	
	LD									CLAY		150b	66.850			
										CLAY	100c		66.900			
FMH 1.3	475Ø			*	67.600	67.000	0.600	A15	475Ø	CLAY	150a		67.000		LD, LIGHT WEIGHT PPIC DETAIL	
	LD									CLAY		150b	67.000			
										CLAY	100c		67.050			

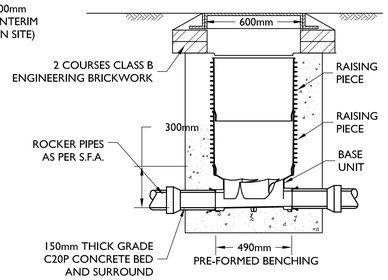


DIMENSIONS:
INTERNAL DIAMETER 500mm
OVERALL DEPTH 650 TO 1000mm
(COVER TO INVERT OF MAIN CHANNEL) (CUT TO INTERIM DEPTHS ON SITE)
CHANNEL 100mm

CONNECTION POINTS:
6x100mm TO ALLOW 1 OUTLET AND 5 INLETS 2xRH & 2LH AT 45° & 90° TO THE MAIN CHANNEL
SIDE INLETS ENTER THE INSPECTION CHAMBER 50mm ABOVE MAIN CHANNEL

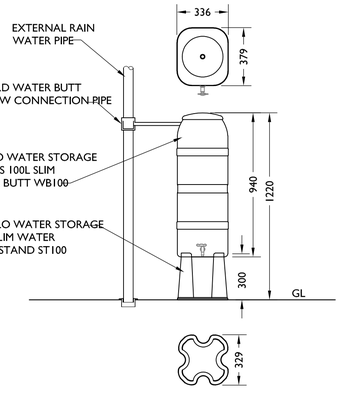
INLETS & OUTLETS:
TO CONNECT DIRECT TO V.C. BELOW GROUND PIPEWORK



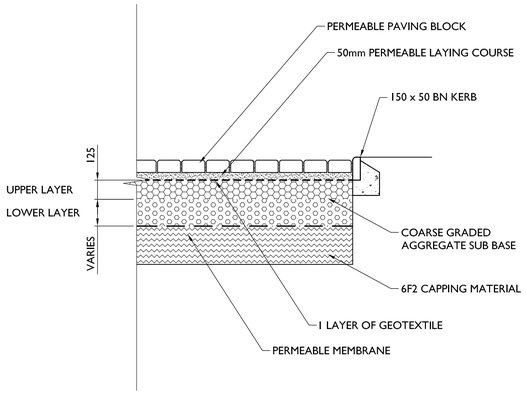


LIGHTWEIGHT POLYPROPYLENE INSPECTION CHAMBER
SCALE 1:20

HEAVY DUTY POLYPROPYLENE INSPECTION CHAMBER
SCALE 1:20

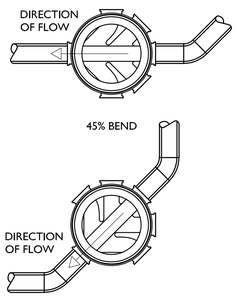


WATER BUTT DETAIL
SCALE 1:20

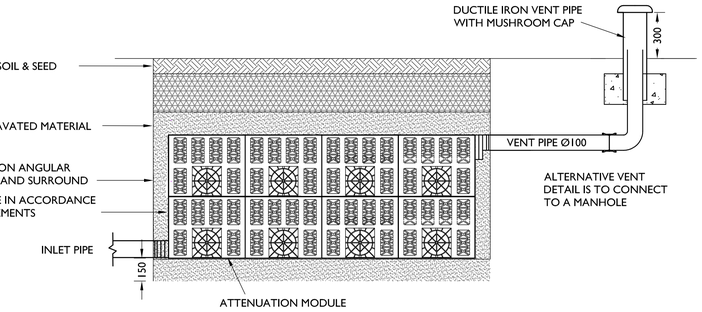


PERMEABLE OR SEMI PERMEABLE PAVING SYSTEM
SCALE 1:20

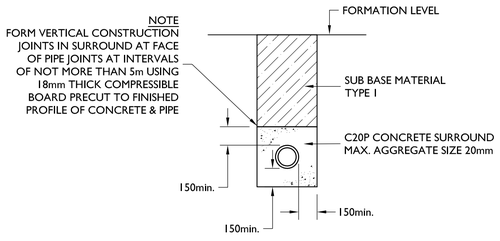
NOTE
ORIENTATION OF PPIC BASES SHOULD ALWAYS ENSURE MAIN CHANNEL IS IN OPERATION FOR FOUL RUNS INCORPORATING EXTERNAL 'SLOW' BENDS AS NECESSARY



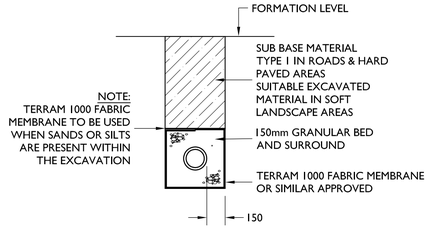
PPIC BASES
SCALE 1:20



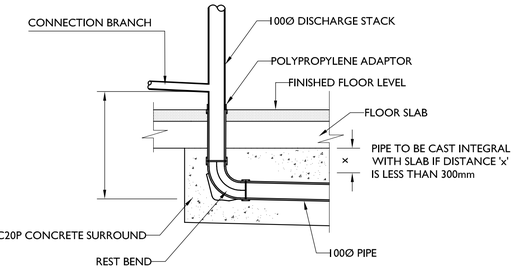
MODULAR SOAKAWAY DETAIL IN SOFT LANDSCAPE AREAS
SCALE 1:20



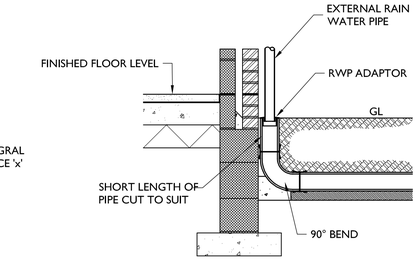
PIPE BEDDING - TYPE Z
SCALE 1:25



PIPE BEDDING - TYPE S
SCALE 1:25



FOUL OUTLET CONNECTION DETAIL
SCALE 1:20



R.W.P. CONNECTION DETAIL
SCALE 1:20

NOTES

1. ALL LEVELS AS SHOWN ARE AS PER TOPOGRAPHICAL SURVEY.
2. CONSTRUCTION AND TESTING OF DRAINS AND SEWERS TO COMPLY WITH BS EN 1610. CONTRACTOR SHALL NOTE THAT TOLERANCES OF + OR - 5% OF THE PIPES INTERNAL DIAMETER MUST BE ACHIEVED UPTO A MAXIMUM OF 20mm
3. FOR MANHOLE CONSTRUCTION INFORMATION REFER TO STANDARD DETAILS DRAWINGS.
4. PRECAST MANHOLES SHALL COMPLY WITH BS EN 1917
5. POLYPROPYLENE CHAMBERS TO COMPLY WITH BS 7158.
6. BRICKWORK CHAMBERS WILL TO BE CONSTRUCTED FROM CLASS B ENGINEERING BRICKS COMPLYING WITH BS 3921. BRICKS SHALL ALSO BE FROST-RESISTANT CATEGORY F.
7. CLAY PIPES TO COMPLY TO BS EN 295
8. CONCRETE PIPES TO COMPLY TO BS EN 1916
9. TYPE OF PIPE "PERF" REFERS TO PERFORATED FILTER DRAINS TO COMPLY TO BS 4962.
10. PLASTIC PIPE ALTERNATIVES
IN NON-AGGRESSIVE SOIL CONDITIONS PLASTIC PIPE ALTERNATIVES WILL BE DEEMED ACCEPTABLE. IF THE CONTRACTOR INTENDS TO USE PLASTIC PIPEWORK IN ACCORDANCE WITH BS 4660 - THE FOLLOWING STANDARDS WILL BE REQUIRED:

DRAINAGE CONNECTIONS OF LESS THAN 150Ø SHALL BE SOLID WALL uPVC PIPES COMPLYING WITH BS EN 1401-1

PIPE SIZES 150-900Ø (TO BE USED IN FOUL OR COMBINED FLOW DRAINAGE SYSTEMS) SHALL BE THERMOPLASTIC STRUCTURED WALL PIPE COMPLYING WITH WIS 4-35-01

PIPE SIZES 150-900Ø (TO BE USED IN SURFACE WATER DRAINAGE SYSTEMS) SHALL BE THERMOPLASTIC STRUCTURED WALL PIPES WITH BBA & HAPAS ACCREDITATION.

THE CONTRACTOR SHALL SUBMIT DETAILS OF THE PROPOSED PLASTIC PRODUCTS FOR APPROVAL BY THE ENGINEER.

11. THE CONTRACTOR SHALL ALSO NOTE THAT CONNECTIONS TO PUBLIC SEWERS & MATERIALS USED IS SUBJECT TO AGREEMENT WITH THE ADOPTING AUTHORITY AND THE CONTRACTOR SHALL THEREFORE ASSUME THAT TRADITIONAL MATERIALS MUST BE USED UNLESS EXPRESSIVELY INFORMED OTHERWISE.
12. MOULDED PPIC BASES HAVE A CAST IN SLOPE OF 20mm ACROSS THE MAIN CHANNEL AND A STEP OF 75mm FROM THE MAIN CHANNEL TO INCOMING BRANCHES. WHERE PPIC MANHOLES ARE SHOWN, LEVELS HAVE BEEN CALCULATED TO REFLECT THE SLOPE / STEP AS NECESSARY.
13. MOULDED MINI PPIC BASES HAVE A CAST IN SLOPE OF 20mm ACROSS THE MAIN CHANNEL AND A STEP OF 35mm FROM THE MAIN CHANNEL TO INCOMING BRANCHES. WHERE MINI PPIC MANHOLES ARE SHOWN, LEVELS HAVE BEEN CALCULATED TO REFLECT THE SLOPE / STEP AS NECESSARY.

REV	DESCRIPTION	BY	CHK	APR	DATE
-	-	-	-	-	-

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PURPOSE OF ISSUE: PRELIMINARY	STATUS: P
PROJECT: THE BROW WILLOW STREET	
TITLE: DRAINAGE SCHEME MANHOLE SCHEDULES & CONSTRUCTION DETAILS	
CLIENT: MS RAFELA FITZHUGH	
DRAWN BY: SB	CHECKED BY: RH
APPROVED BY: JP	
DATE: 24.05.2024	SCALE (@ A1): 1:150
PROJECT NUMBER: 95018	
DRAWING NUMBER: 0603	REV: P01

Appendix G – Maintenance Plan

The Brow
Overton
Maintenance Plan

95018-RP-D-0002
Rev: P01
May 2024

JPS CIVIL + STRUCTURAL ENGINEERS

Table 1: SuDS Maintenance Inspection Checklist

GENERAL INFORMATION			
Site ID	Land at The Brow		
Site Location and co-ordinates (GIS if appropriate)	Wrexham Road, Overton LL13 0DY (337061, 341925)		
Elements forming the SuDS scheme	Soakaway	**Approved Drawing Reference(s)**	-
Inspection frequency	Annual	**Approved Specification Reference**	-
Type of development	Residential	**Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)**	-
Agreements Restrictions			
Discharge Type	**Connection**	**Outflow**	**Agreement**
Surface Water	To Soakaway	-	-
Foul	To public sewer	0.1 l/s (Peak)	S106

DRAFT

	Inspection date				Inspection date			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
GENERAL INSPECTION ITEMS								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?								
SILT/SEDIMENT ACCUMULATION								
Does permeable or porous surfacing require sweeping to remove silt?								
INFRASTRUCTURE								
Are the Soakaways vents clear?								
Are Rainwater Down Pipes and gutters clear of debris /detritus?								
Drainage network to be checked CCTV survey. A list of defects should be compiled with high, medium and low risk of failure. High risk defects should be fixed immediately, medium risk should be fixed within 6 months and low risk to be monitored.								

DRAFT

Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
OTHER OBSERVATIONS								
Information appended (e.g. photos)								

DRAFT

	Inspection date				Inspection date			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
SUITABILITY OF CURRENT MAINTENANCE REGIME								
Continue as current Increase maintenance Decrease maintenance								
NEXT INSPECTION								
Proposed date for next inspection								

DRAFT

Additional Notes