



**ARCH
ASSOCIATES**

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY REPORT

LAND AT DUMBLETON COPSE
SOUTHAMPTON
SO19 6AL

**FLOOD RISK ASSESSMENT
& DRAINAGE STRATEGY REPORT**
for

LAND AT DUMBLETON COPSE
SOUTHAMPTON
SO19 6AL

Client:
Foreman Homes

ISSUE		A	B	C
Issued By	B Baker	C Hendry		
Date	16.01.2024	14.03.2024		
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Approved By	CH	CH		

Project No. FHL016



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1.0 Executive Summary

Arch Associates has been appointed to prepare a Flood Risk Assessment and Drainage Strategy Report for the proposed construction of 3 number 4 bedroom dwellings and 3 number 5 bedroom dwellings with associated landscaping. Access to the properties is proposed from Pinewood Park and Dumbleton Close.

The 0.983 hectare greenfield site is currently woodland with some gravel tracks which provide access from the end of Pinewood Park to an industrial unit.

In terms of water management, surface water runoff from the new construction will be predominantly directed into permeable paving subbase before then flowing into an attenuation tank. RWP run-off from the lower rear sections of the site cannot flow into the subbase given their lower elevation and therefore these will be directed into catchpit manholes before reaching the tank. All surface water will subsequently discharge to a watercourse located in close to the northern boundary at the bottom of the valley. The surface water run-off from the development will be restricted to a flow rate of 2.1 l/s and attenuated up to the 1:100+45% storm return period. Refer to Appendix D for the drainage strategy layout and calculations. More detailed information regarding the surface water strategy can be found in Section 5.1 of the report.

The proposed foul water drainage strategy is designed to connect to a new foul water sewer. The proposed foul water drainage strategy is discussed in more detail in Section 5.2 of this report.



2.0 Site Description

The 0.983 hectare site is located off Pinewood Park and Dumbleton Close, West End, Southampton and currently is an area of woodland, refer to Appendix A for development proposals.

2.1 Site Location and Surrounding Area

The application site is located at British National Grid reference SU 47666 12030.

The site is located on the outskirts of Southampton, 5.4km East of Southampton city centre. The north boundary is woodland, the east is residential dwellings on Pinewood Park, the south is residential dwellings on Dumbleton Close, whilst the west boundary consists of an industrial unit. See figures 2.1.1 to 2.1.4.

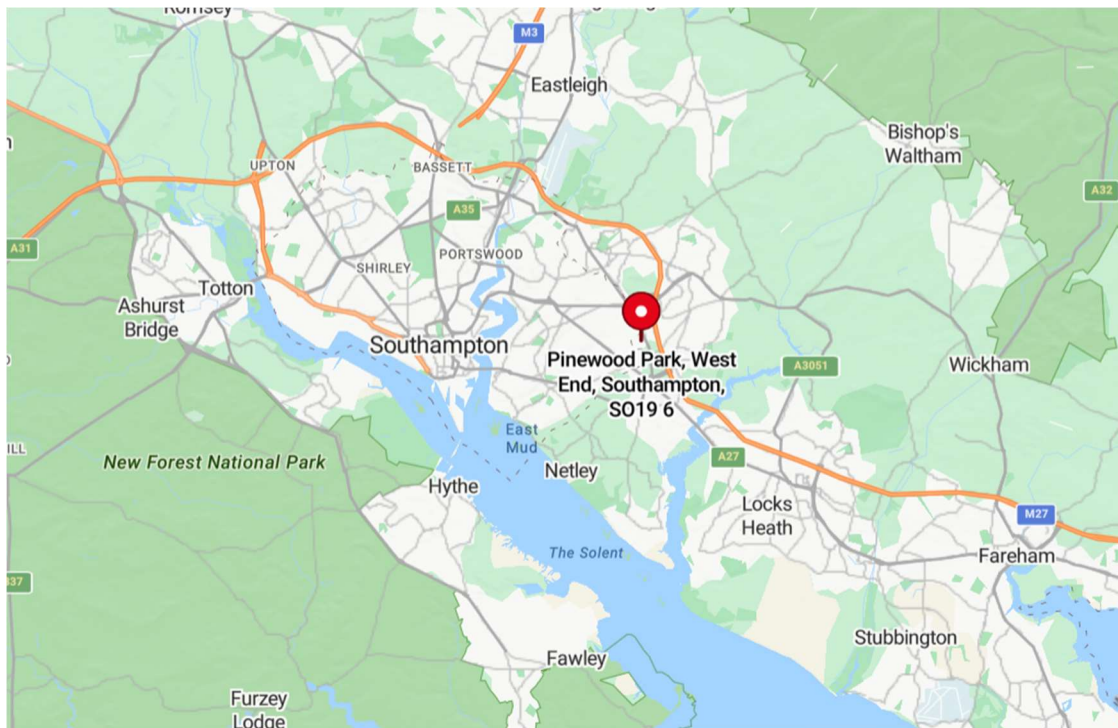


Figure 2.1.1 Site Location



Figure 2.1.2 Site Location



Figure 2.1.3 Aerial Image of Site Location



2.2 Geology

British Geological Survey maps indicate that the bedrock geology beneath the site is Wittering Formation – sand, silt and clay. There are no records of superficial geology in this area. See figure 2.2.1.

Wittering Formation mainly comprises of Greyish brown laminated clay; wavy- to lenticular-bedded sand interbedded with clay in equal proportions; and fine- to medium-grained sparsely glauconitic sand.

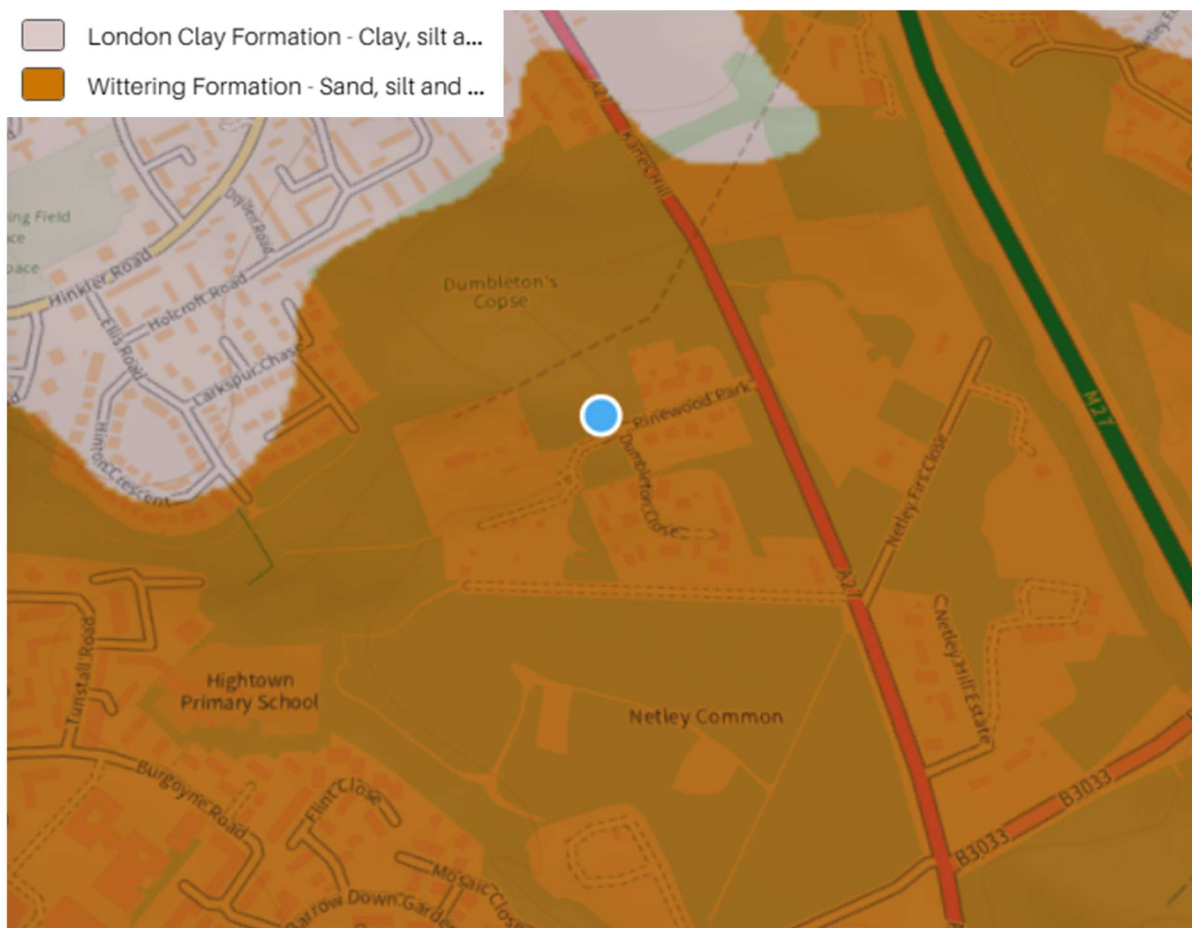


Figure 2.2.1 British Geological Survey Map



2.3 Topography

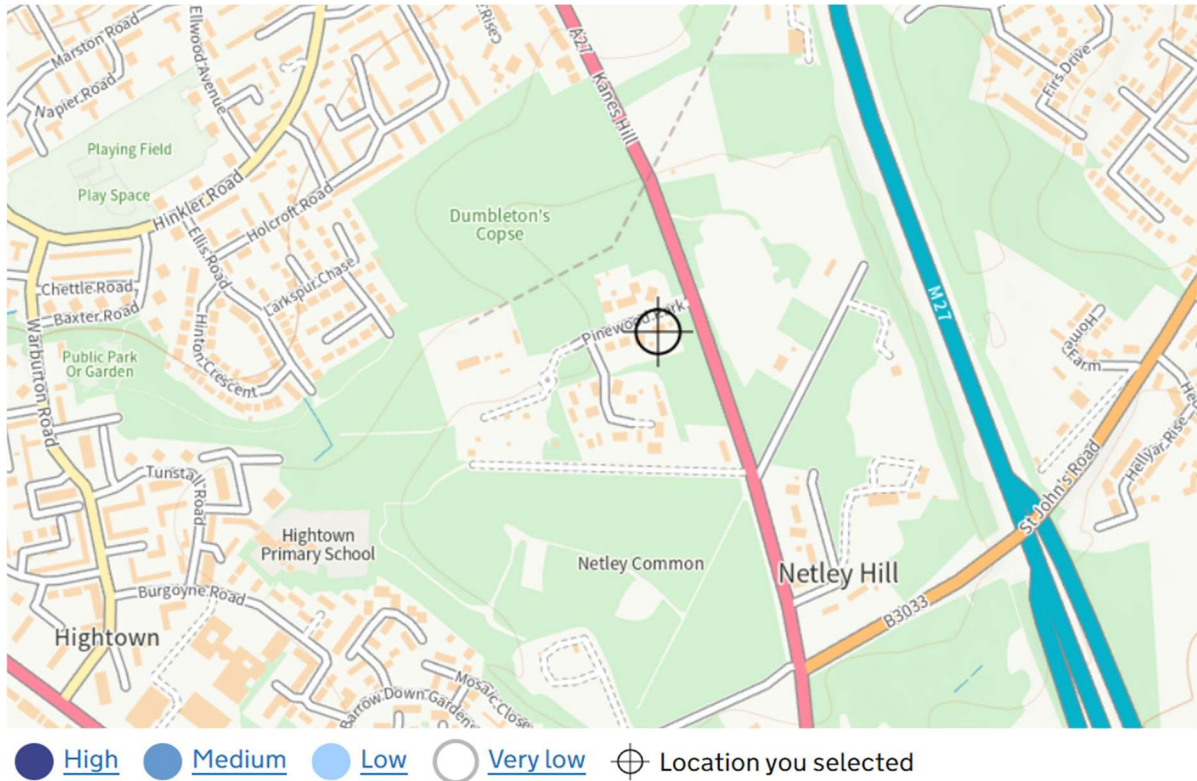
In September 2017, Digital Terrain Surveys LLP conducted a topographical survey on the application site, providing valuable insights into its terrain and elevation characteristics.

The survey revealed that site levels vary by 13.20 meters, with the highest point located in the southwest corner of the site, having an elevation of 72.88 meters above Ordnance Datum (mAOD). Conversely, the lowest point on the site is situated in the northwest corner, with an elevation of 59.68 meters above Ordnance Datum (mAOD). This information, documented in the survey, aids in comprehensive site planning and design by offering a clear understanding of the topographical features and elevation changes across the area. For further details, please refer to Appendix B.

3.0 Potential Sources of External Flooding

3.1 Tidal

The site, which is currently woodlands, is situated 4.21km northeast of The Solent, and therefore is not at risk of tidal flooding, see Figure 3.1.



3.2 Fluvial

The Environment Agency (EA) produces floodplain maps for the UK which show the areas at risk of fluvial and tidal flooding. The magnitudes of the flooding events considered are defined in terms of their return period. Generally, when determining the impact of any development within the floodplain of a fluvial reach, the design standard, against which the EA will consider the feasibility of any scheme, is typically the 1% annual probability flood (1 in 100 year return period flood) for sites within the floodplain, or the effects of a 1 in 100 year storm if outside the floodplain.

The EA flood zone maps identify undefended floodplain, giving the horizontal extent of low (Zone 1), medium (Zone 2) and high-risk flood zones (Zones 3a and 3b) depending on the severity of the flood event.

The site is categorized under Flood Zone 1, as delineated on the Environment Agency's Risk of Flood Zone Map, referenced as Figure 3.2. These designations are based on the agency's assessments of flood risk and serve as critical indicators for land use planning, regulatory compliance, and risk management, particularly in areas susceptible to flooding.

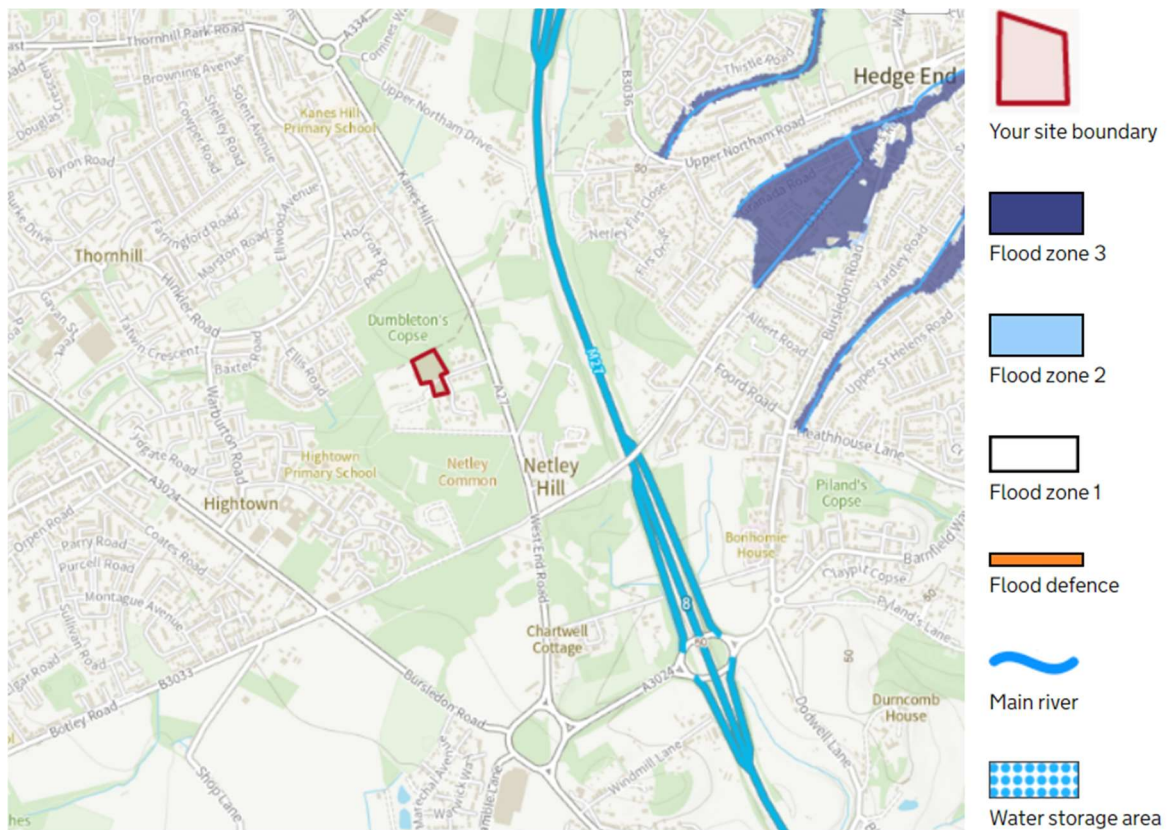


Figure 3.2 Environment Agency Flood Zone Map

3.3 Pluvial

The Environment Agency also produce maps which highlight the risk of flooding from surface water flows. These illustrate when the capacity of existing surface water drainage networks and channels are exceeded in extreme rainfall events.

The Environment Agency's risk of flooding from surface water map, as depicted in Figure 3.3, shows that most of the site is at a very low risk of pluvial flooding. However, there are localised areas of Low risk through the northern section of the site. Low risk means that this area has a chance of flooding of between 0.1% and 1% each year.

This map serves as a valuable tool for evaluating these flood risks. It visually delineates areas with higher or lower susceptibility to surface water flooding, considering factors such as topography and the state of existing drainage infrastructure.

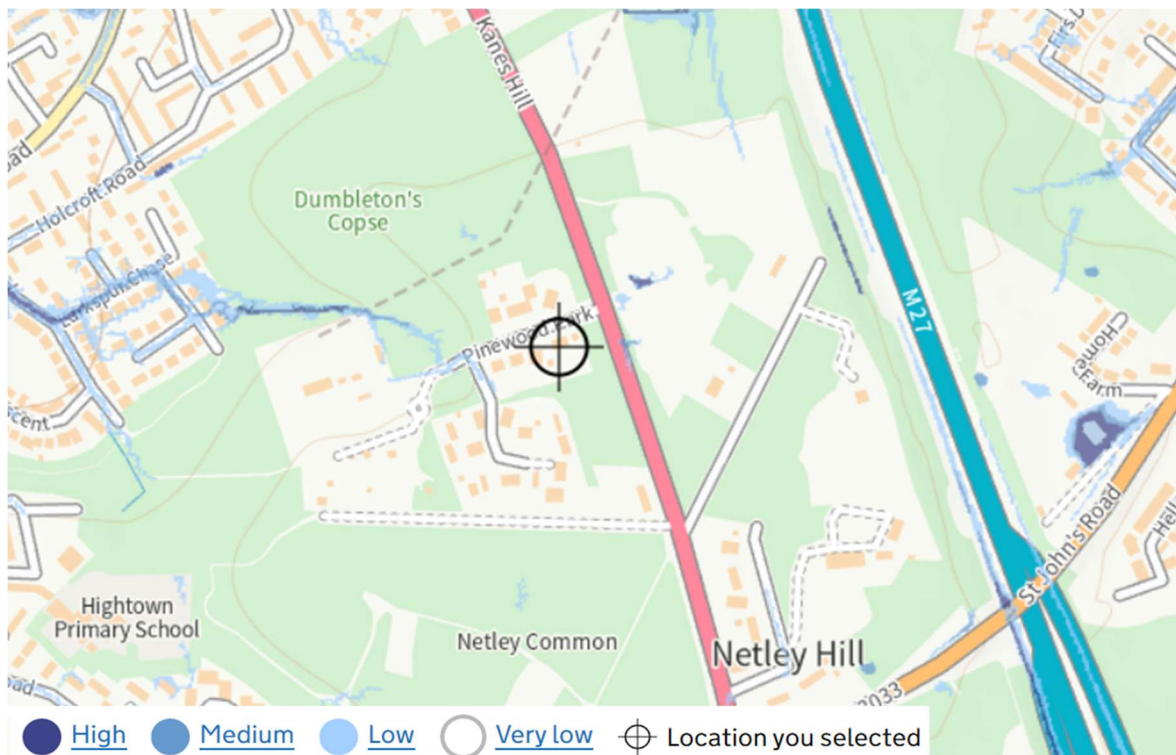


Figure 3.3 Environment Agency Pluvial Flood Risk Map

3.4 Groundwater

According to the Environment Agency (EA) Source Protection Maps the application site does not fall within any Source Protection Zones. See Figure 3.4.

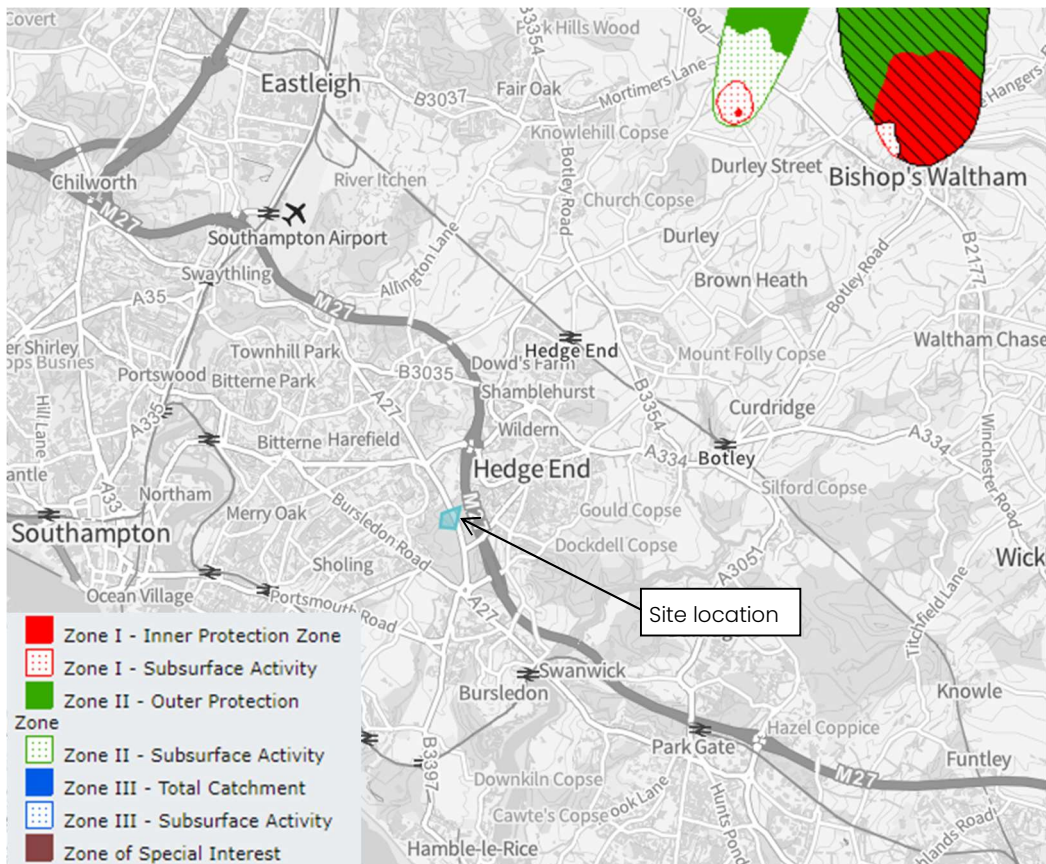


Figure 3.4 DEFRA Source Protection Zones Map

The site does also not fall into a Drinking Water protected area or Drinking Water safeguard zones for surface water or groundwater.

3.5 Reservoirs, Canals, and Other Artificial Sources

There is no risk of flooding to the site from reservoirs, canals, or other artificial sources when there is also flooding from rivers.

4.0 Strategic Flood Risk Assessment

Eastleigh Borough Council district is within the South Hampshire sub-region. A Strategic Flood Risk Assessment has been undertaken for South Hampshire by The Partnership for Urban South Hampshire (PUSH) which was updated in 2016.

The National Planning Policy Framework¹ (NPPF) and associated Planning Practice Guidance for Flood Risk and Coastal Change (PPG) set out the active role Local Planning Authorities (LPAs) should take to ensure that flood risk is understood and managed effectively and sustainably throughout all stages of the planning process. The NPPF outlines that Local Plans should be supported by a Strategic Flood Risk Assessment (SFRA) and LPAs should use the findings to inform strategic land use planning.

The SFRA indicates the site location is not within an area with any historic flooding issues.



5.0 Development Proposals

The 0.983 hectare greenfield site is currently woodland with some gravel tracks which provide access from the end of Pinewood Park to an industrial unit.

The proposal is for construction of 3 number 4 bedroom dwellings and 3 number 5 bedroom dwellings with associated landscaping. Access to the properties is proposed from Pinewood Park and Dumbleton Close.

5.1 Existing Site Drainage

Existing Runoff Rates

The existing site is completely greenfield. There are some road gullies located in the access road, within the site boundary.

The existing greenfield runoff rate, for the 9834m² area of development, has been calculated as shown in Figure 5.1. It is proposed to restrict the site outflow to the Q_{BAR} rate of 2.1 l/s.

<u>ICP SUDS Mean Annual Flood</u>				
Input				
Return Period (years)	1	Soil	0.300	
Area (ha)	0.983	Urban	0.000	
SAAR (mm)	800	Region Number	Region 7	
Results l/s				
QBAR Rural		2.1		
QBAR Urban		2.1		
Q1 year		1.8		
Q1 year		1.8		
Q30 years		4.7		
Q100 years		6.7		

Figure 5.1 Existing Greenfield Runoff Rates

SuDS Hierarchy of Systems and Justification of Usage

We have reviewed and taken into consideration the Environment Agency SuDS Hierarchy for SuDS systems which are noted below in order of preference:

1. Living Roofs
2. Basins and Ponds
3. Filter Strips and Swales
4. Infiltration Devices
5. Permeable Surfaces and Filter Drains
6. Tanked Systems

Following is the response to these systems identifying the most suitable system for the scheme and why the more favourable are unsuitable.

1. Living and green roofs impose a large load on the roof structure and require relatively flat roofs to ensure water retention, the proposed structure will not be able to cater for the large loads of a green roof system.
2. Attenuation basins will be unfeasible due to the compact nature of the site.
3. Impermeable and permeable Filter strips and swales will be unfeasible due to the compact nature of the site.
4. Infiltration devices will be unfeasible due to the substrata and falls across the site.
5. Tank Permeable surfaces will be adopted to act as filtration where possible and will also help to slow the water down
6. A positive surface water storage tank system with restricted connection to a drainage ditch, sewer or watercourse is feasible, as there is a watercourse in the nearby vicinity to the site.

Surface water runoff from the development will be predominantly directed into permeable paving subbase before then flowing into an attenuation tank. RWP run-off from the lower rear sections of the site cannot flow into the subbase given their lower elevation and

therefore these will be directed into catchpit manholes before reaching the tank. All surface water will subsequently discharge to a watercourse located in close to the northern boundary at the bottom of the valley.

To manage surface water runoff effectively, it is proposed to restrict run-off rates to the existing Q_{BAR} rate of 2.1 l/s.

The attenuation tank will be designed for the 1:100+45% storm return period, refer to Appendix D for a drainage strategy layout and calculations.

Water Quality

Water quality management of surface water should be carried out in accordance with the SuDS Manual (Ciria C753, November 2015).

C753 Part E Chapter 26 describes risks posed by surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e. the pollution source).
- The effectiveness of SuDS treatment components in reducing levels of pollutants the environmentally acceptable levels.
- The sensitivity of the receiving environment.

The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.





TABLE 26.1 Approaches to water quality risk management

Design method	Hazard characterisation	Risk reduction	
		For surface water	For groundwater
Simple index approach	Simple pollution hazard indices based on land use (eg Table 26.2 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.3 or equivalent)	Simple SuDS hazard mitigation indices (eg Table 26.4 or equivalent)
Risk screening ¹	Factors characterising traffic density and extent of infiltration likely to occur (eg Table 26.5 or equivalent)	N/A	Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (eg Table 26.5 or equivalent)
Detailed risk assessment	Site specific information used to define likely pollutants and their significance	More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels	
Process-based treatment modelling	Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff	Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in event mean discharge concentrations and total annual load reductions delivered by the system	

Note

¹ Risk assessment may be required as a result of the risk screening process.

As per Table 26.1 the Simple Index approach will be used as a design method for this site. Table 26.2 provides hazard classification of different land uses. The land uses for the surface water drainage for this site are:

- Roofs -impermeable surface.
- Drives -permeable surface.

To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following will have to be achieved for the surface running off the site.

$$\text{Total SuDS mitigation index} \geq \text{pollution hazard index}$$

Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual:

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

From Table 26.2 the following information is tabulated in Table 1.

Land Use	Destination of Runoff	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Roofs	Surface water	Very Low	0.2	0.2	0.05
Driveways	Surface water	Low	0.5	0.4	0.4
TOTALS			0.7	0.6	0.45

Table 1: Pollution hazard index and destination of runoff for the proposed site

The SuDS mitigation index will be obtained from Table 26.3 (for discharges to surface waters) of the SuDS manual.



TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

To provide the required mitigation is proposed to use a proprietary treatment system.

SuDS mitigation indexes are tabulated in Table 2 as follows:

			Mitigation Indices			
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roofs	Surface water	Table 26.4	Proprietary treatment system.	0.8	0.8	0.8
TOTALS				0.8	0.8	0.8

Table 2: SuDS mitigation index for RWPs draining directly to the piped system

			Mitigation Indices			
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Driveways	Surface water	Table 26.4	Permeable Paving	0.7	0.6	0.7
			Proprietary treatment system.	0.4	0.4	0.4
TOTALS				1.10	1.0	1.1

Table 2: SuDS mitigation index for driveways drainage into the permeable paving and then running through the Downstream Defender

In summary, the SuDS component mitigation indices (Table 2) are greater than pollution hazard indices (Table 1) and therefore deliver adequate treatment.

Storm Design Exceedance

It is difficult to completely guard against flooding since extreme events greater than the design standard event are always possible, however, it is practicable to minimise the risk by careful design of the layout of the development such that internal flooding is avoided. Areas of hard standing will be laid to falls away from the building to direct surface water runoff to areas where damage and disruption to operations will be minimised, Appendix D.

5.2 Proposed Site Foul Water Drainage Strategy

The foul water drainage for the site will be discharged to a new foul water sewer, of which it is proposed becomes adopted by Southern Water and will be located to the north of the site.

5.3 Future Maintenance of the System

The owner of the property will be responsible the maintenance of the system and a preliminary maintenance document for the system is within Appendix E.

6.0 Summary and Conclusion

The proposed development is sited within Flood Zone 1. The proposals are fully appropriate for the location as it will not be subject to any significant flood risks i.e. tidal, fluvial, ground water or sewer.

Surface water run-off from the proposed buildings will be discharged to a combination of permeable paving and a new attenuation tank, which will be designed for the 1:100+45% storm return period, refer to Appendix D for the drainage strategy layout and calculations.

It is proposed to restrict run-off rates to a design flow rate of 2.0 l/s. This flow rate is to be used for the 1:1 up to the 1:100+45% storm return periods, a reduction from the existing 1:30 and 1:100 year return period. The surface water will then be discharged to the watercourse.

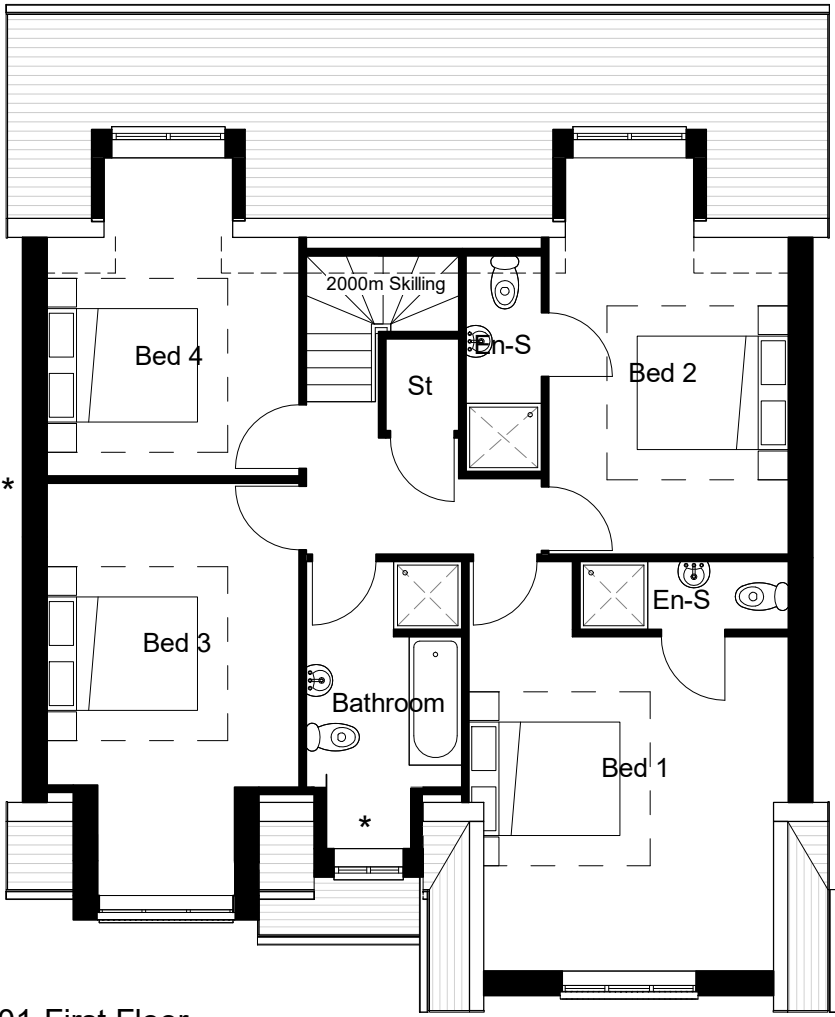
The drainage system will be designed to comply with the SuDS Manual water quality criteria.

The owner of the property will be responsible for the maintenance of the system.

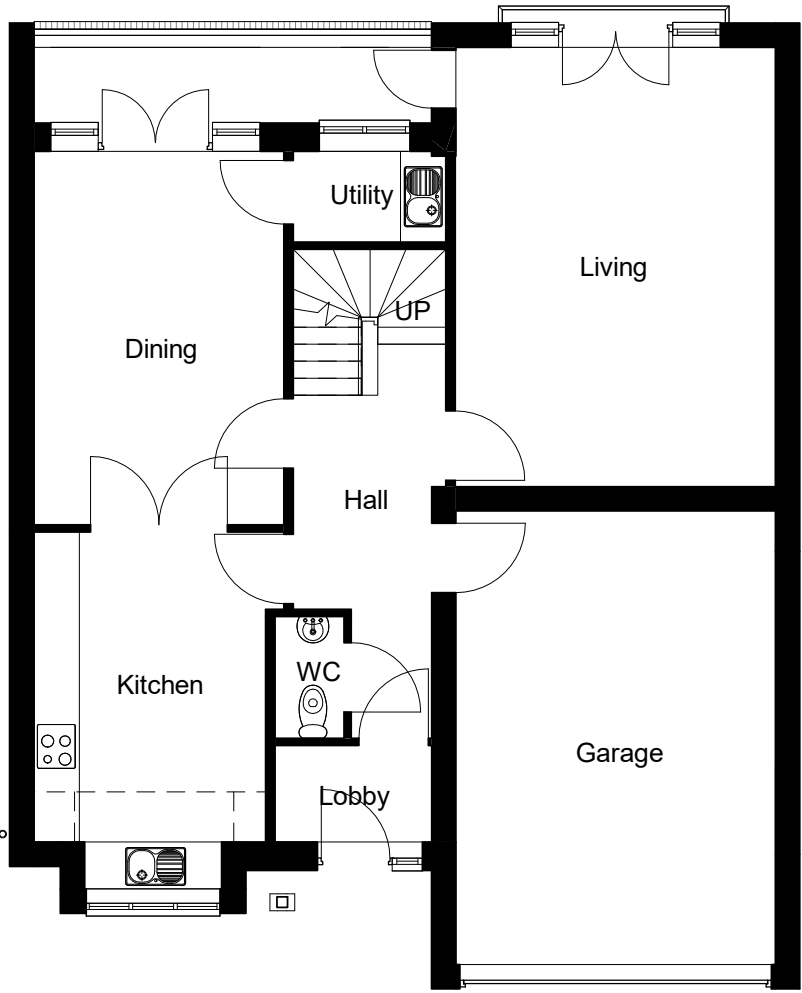
This Flood Risk Assessment has been prepared in accordance with Communities & Local Government, National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and the requirement of the Lead Local Flood Authority (LLFA).



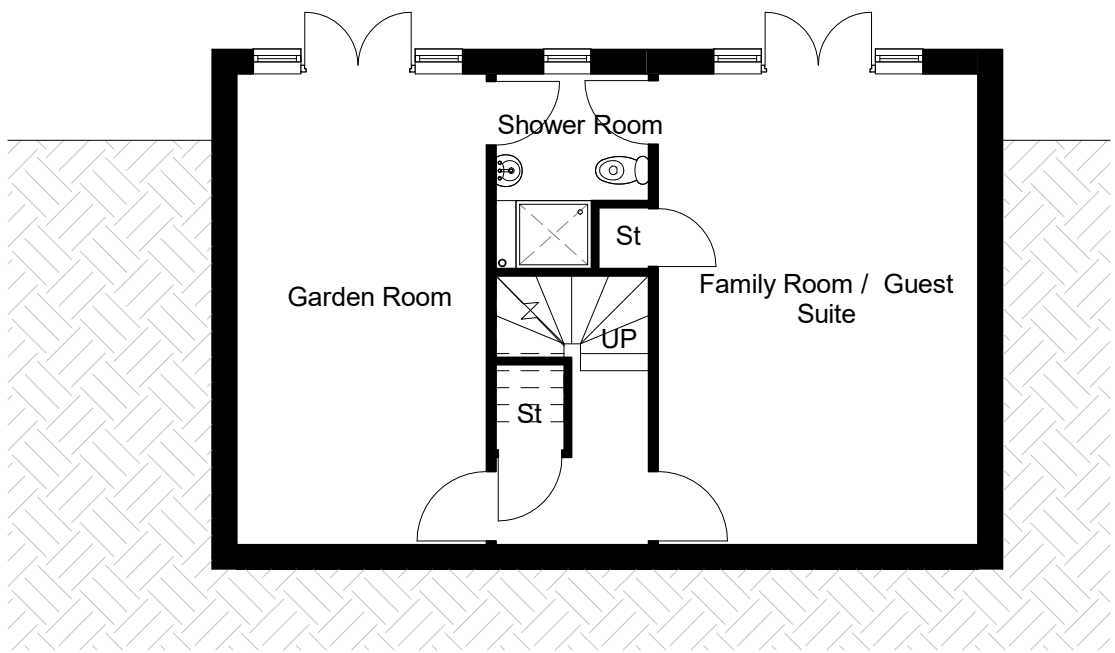
Appendix A – Development Proposals



Level 01-First Floor
1:100



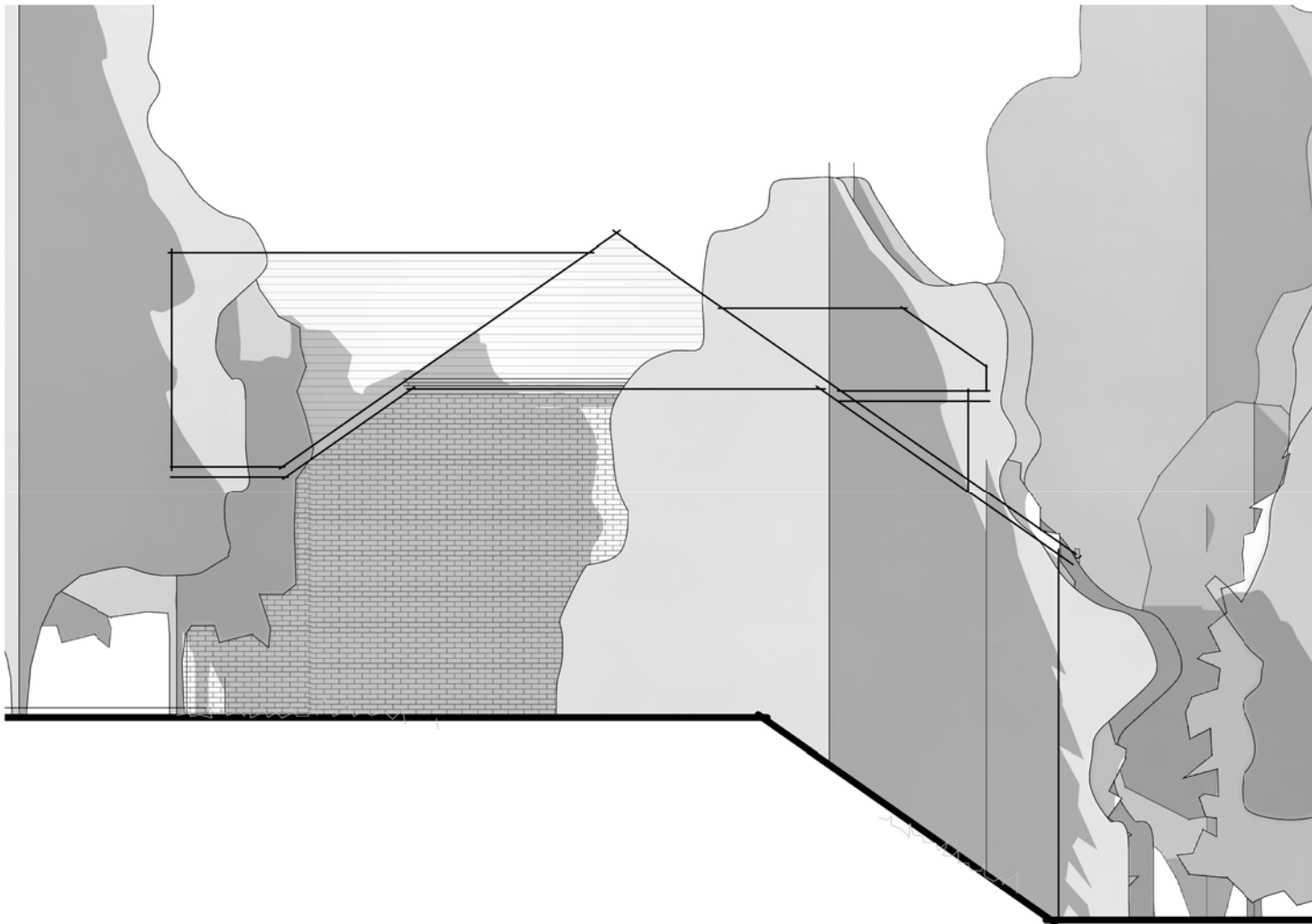
Level 00-Ground Floor
1:100



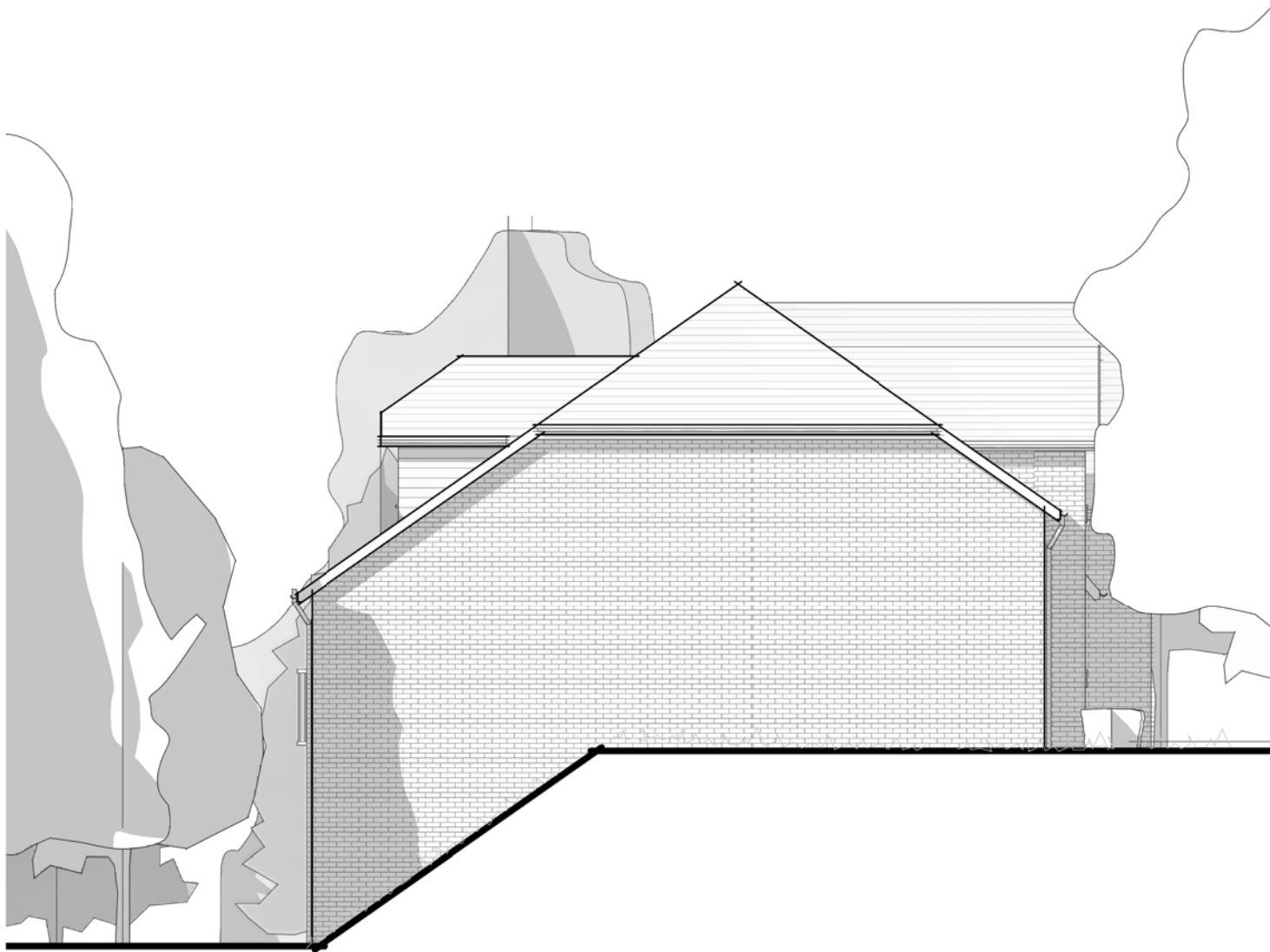
Level -01- Lower Ground Floor
1:100



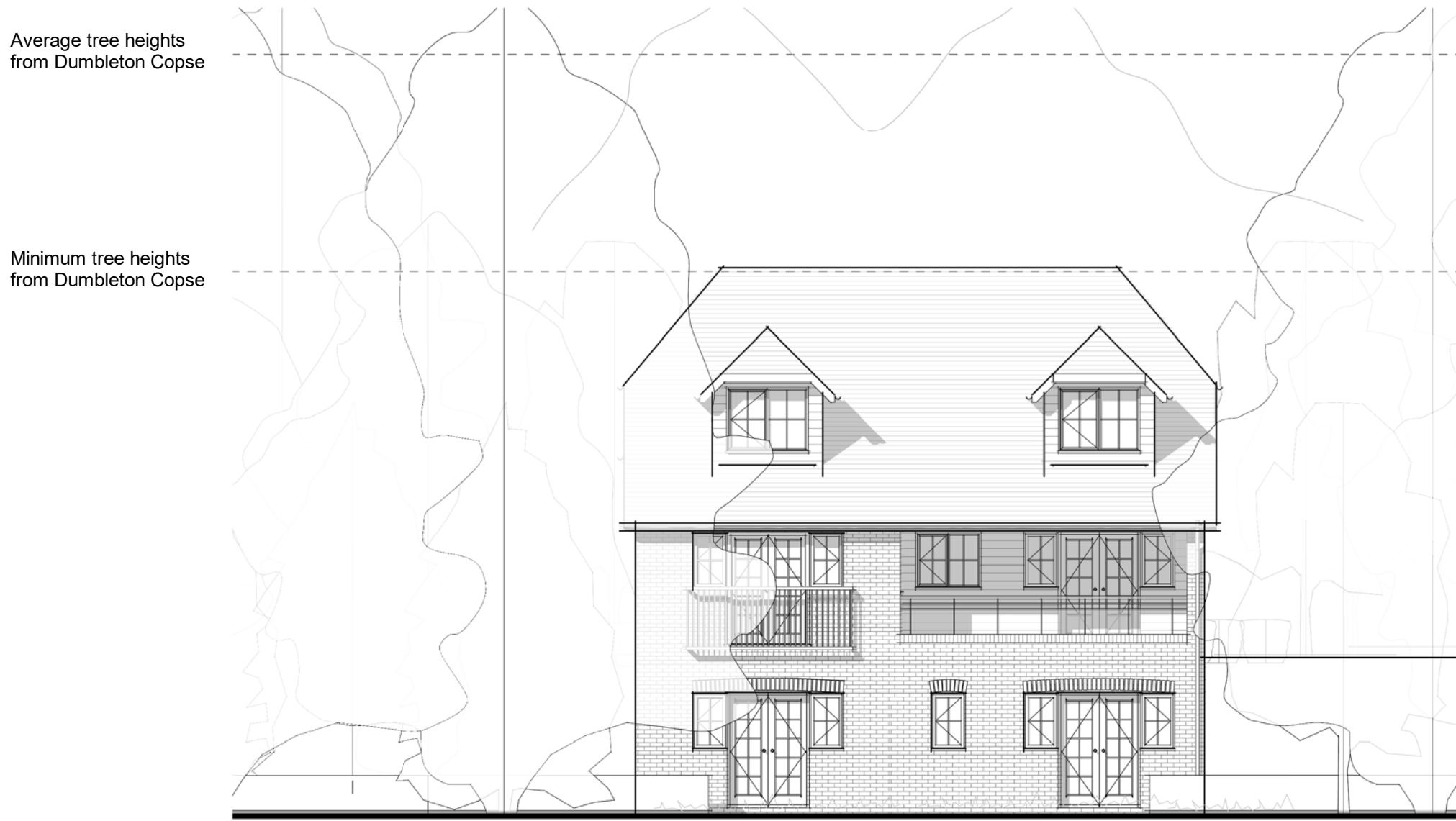
Front Elevation
1:100



Side Elevation B
1:100



Side Elevation A
1:100



Rear Elevation
1:100



Please Note:

This drawing must not be scaled, dimensions to be checked on site and any discrepancies are to be highlighted to the Architect prior to construction.

Topographical / Ordnance Survey information shown has been prepared by a third party. HGP accept no responsibility for accuracy or completeness of the survey.

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Design subject to detail development / approval. Measurements and accommodation schedules subject to amendments following coordinated input by others. Costings cannot be finalised until approval / confirmation by relevant authorities and Client.



Legend

As: Plots 1 & 3
Handed: Plot 2

Area Schedule (Net Internal Area)		
Name	Level	Area
Plots 1-3	Level 00-Ground Floor	103.3 m²
Plots 1-3	Level 01-First Floor	87.5 m²
Plots 1-3	Level -01- Lower Ground Floor	61.1 m²
		251.9 m²

I	Reduced building height	27.09.21	VP	HJE
H	Key plan updated	02.08.21	VP	HJE
G	Rear elevation amended	25.05.21	VP	HJE
F	Juliette balcony added	12.04.21	VP	HJE
E	Amended to client's comments	09.04.21	VP	HJE
D	Amended to client's comments	30.03.21	VP	HJE
C	Amended to client's comments	05.02.21	VP	HJE
B	Amended to client's comments	27.01.21	HE	HJE
A	Amended to client's comments	18.01.21	HE	HJE

Rev.	Description	DATE	DB	CB
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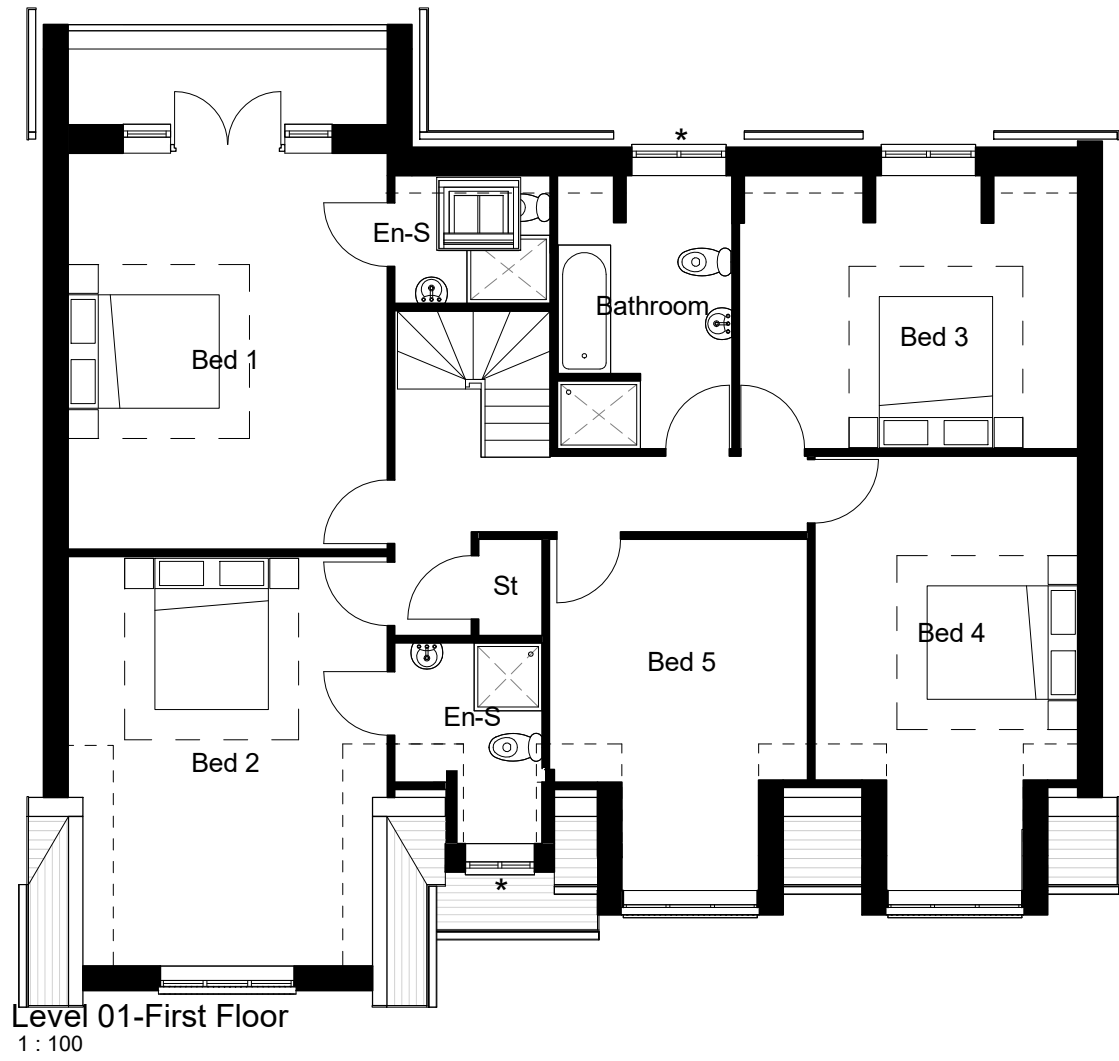
Date	Apr '20
Drawn By/Checked By	WT / HJE
Scale	As indicated@ A1
Revision	I
Project	Land at Dumbleton Copse, Eastleigh
Title	Plots 1-3 - Floor Plans and Elevations
Dwg#	_19.043.02.03
Status	Planning



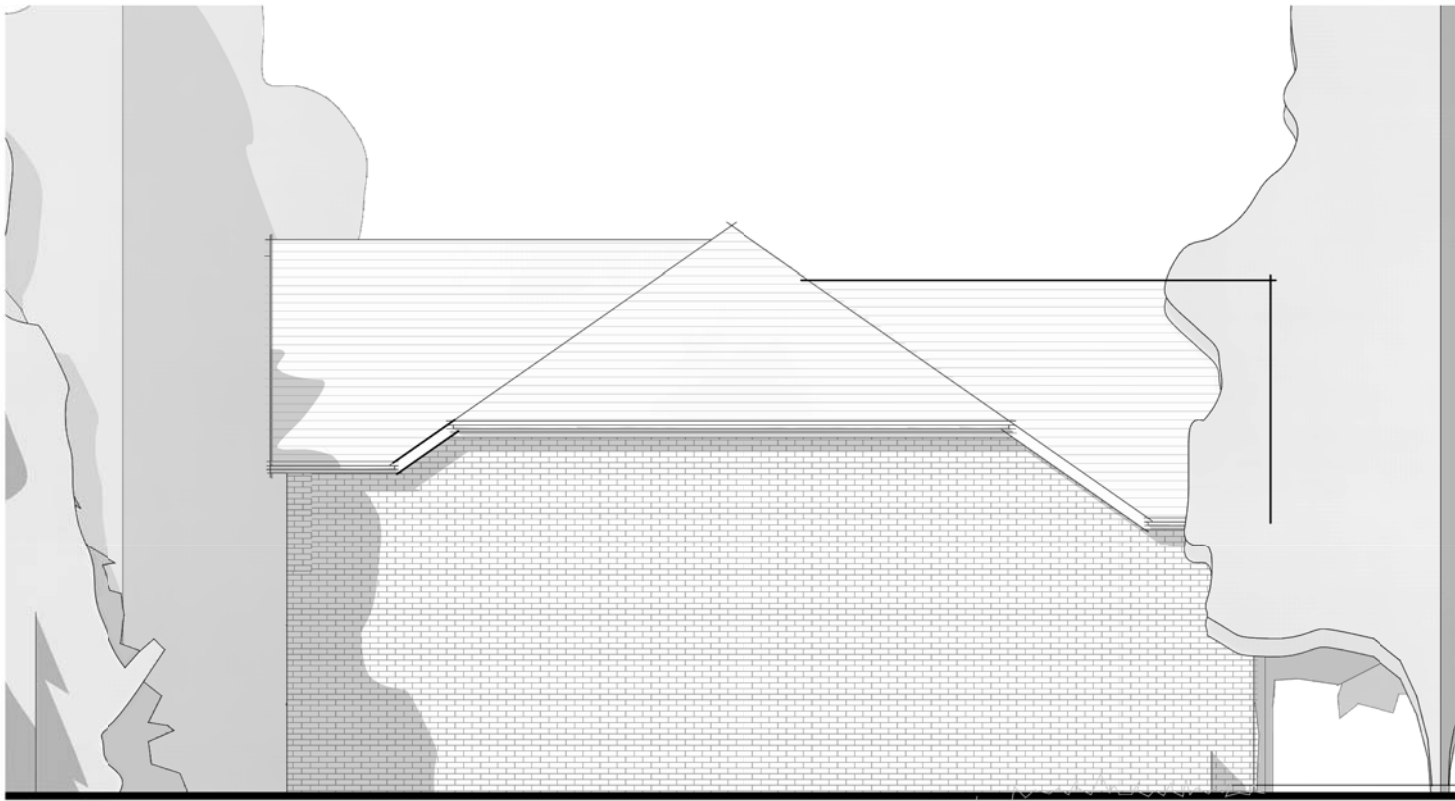
Furzehall Farm, Wickham Road
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01329 283 225
email@hgp-architects.co.uk
www.hgp-architects.co.uk

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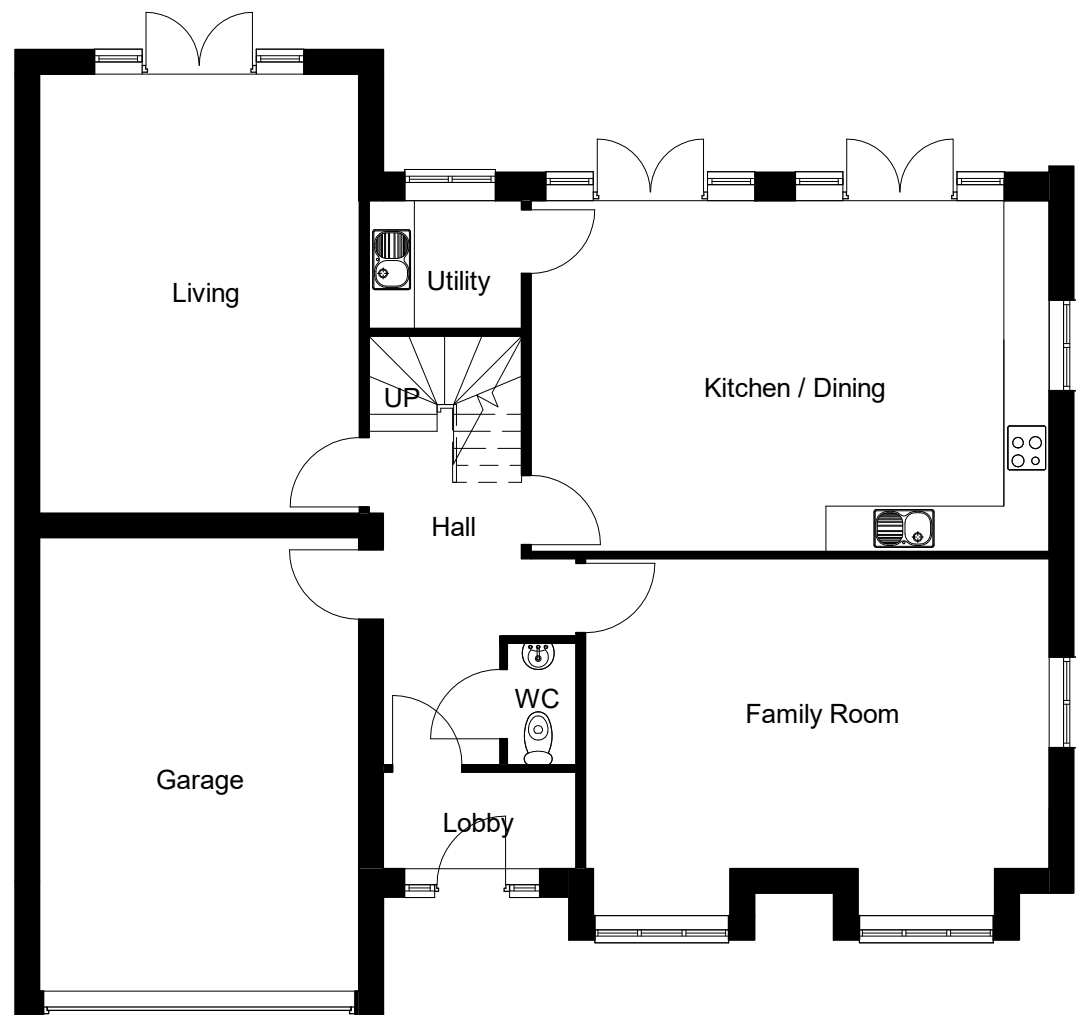
R.G.O.M.



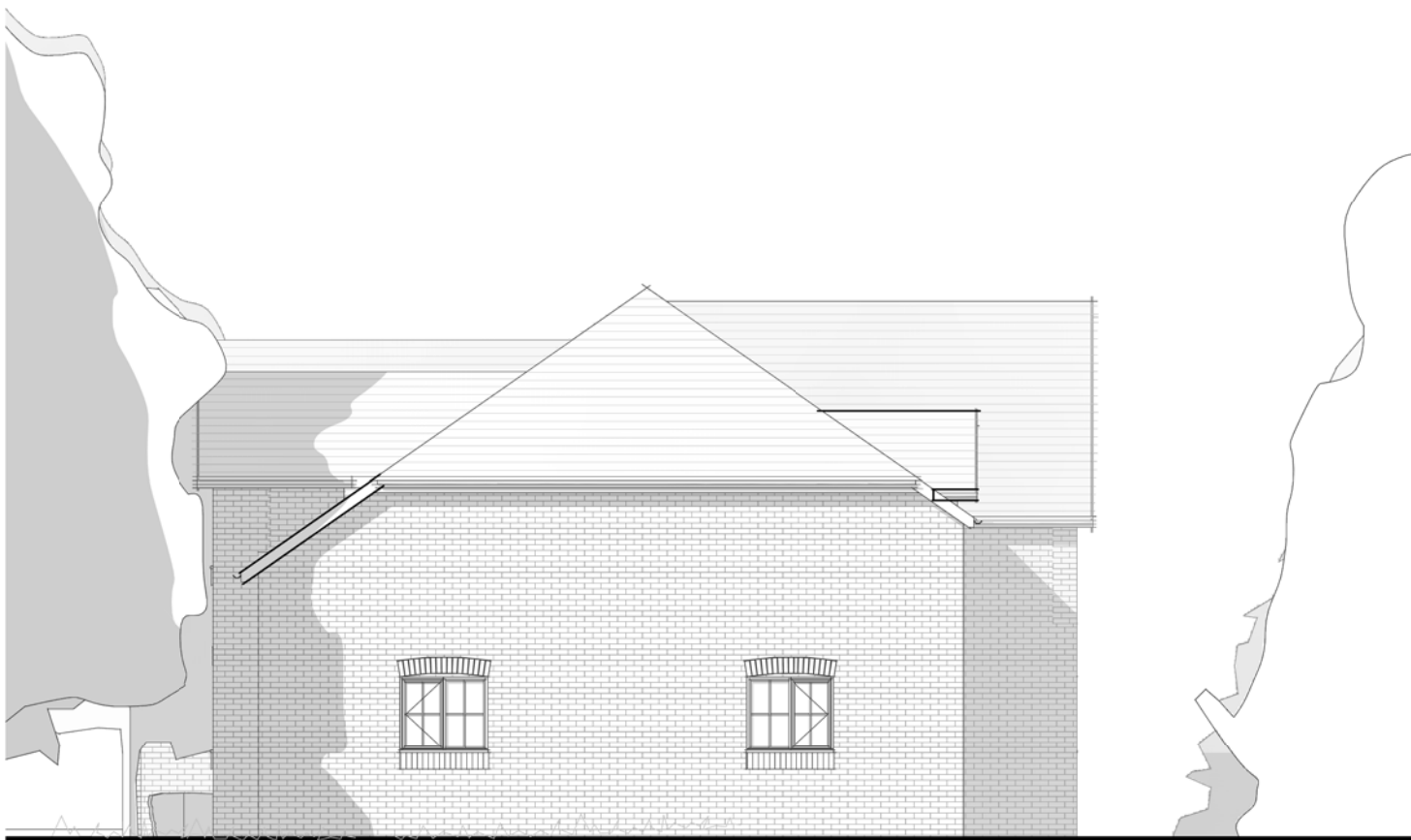
Front Elevation
1:100



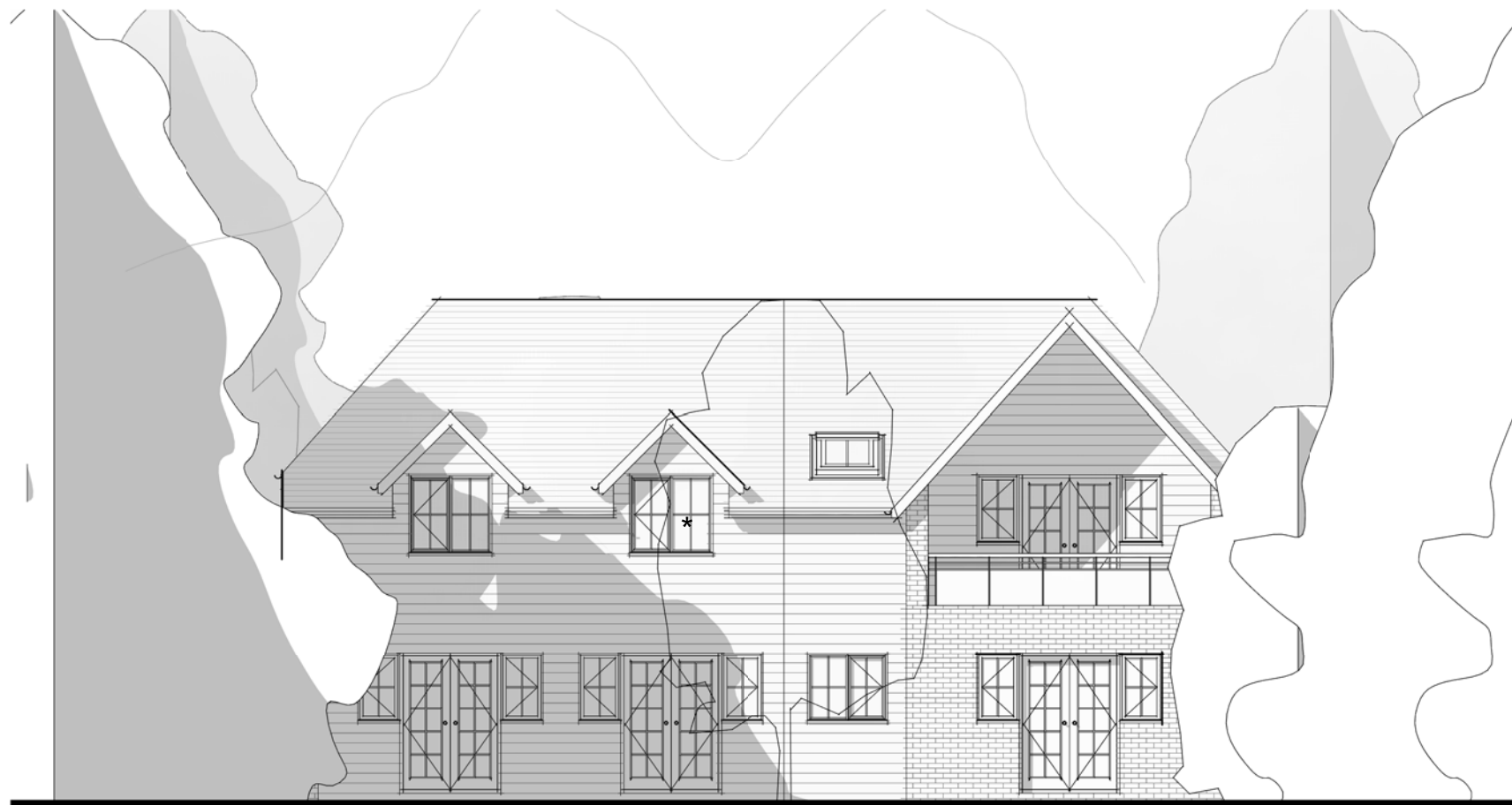
Side Elevation B
1:100



Level 00-Ground Floor
1:100



Side Elevation A
1:100



Rear Elevation
1:100



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Legend

Area Schedule (Net Internal Area)		
Name	Level	Area
Plots 5	Level 00-Ground Floor	134.1 m²
Plots 5	Level 01-First Floor	122.6 m²
		256.7 m²

I	Amended to client's comments	27.09.21	VP	HJE
H	Key plan updated	02.08.21	VP	HJE
G	Rear elevation amended	25.05.21	VP	HJE
F	Juliette balcony added	12.04.21	VP	HJE
E	Amended to client's comments	09.04.21	VP	HJE
D	Amended to client's comments	30.03.21	VP	HJE
C	Amended to client's comments	05.02.21	VP	HJE
B	Amended to client's comments	27.01.21	HE	HJE
A	Amended to client's comments	18.01.21	HE	HJE

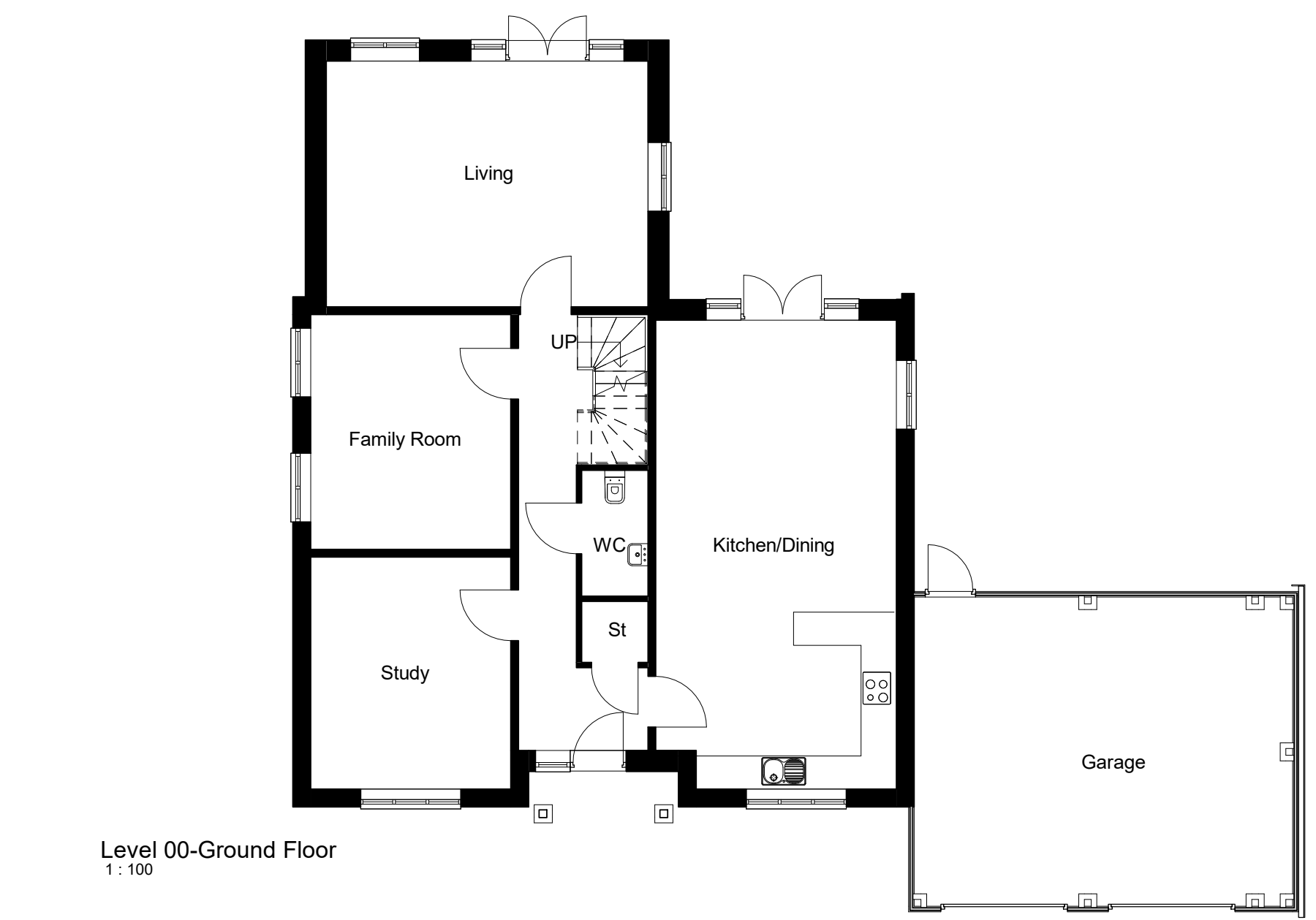
Rev.	Description	DATE	DB	CB
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Date	Apr '20
Drawn By/Checked By	WT / HJE
Scale	As indicated@ A1
Revision	I
Project	Land at Dumbleton Copse, Eastleigh
Title	Plot 5 - Floor Plans and Elevations
Dwg#	_19.043.02.04
Status	Planning



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R.G.O.M.



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Legend

Area Schedule (Net Internal Area)		
Name	Level	Area
Plot 4	Level 00-Ground Floor	114.9 m²
Plot 4	Level 01-First Floor	108.0 m²
		222.9 m²

H	Key plan updated	27.09.21	VP	HJE
G	Garage and Key Plan Updated	02.08.21	VP	HJE
F	Elevations amended to show copse to North	24.05.21	VP	HJE
E	Key plan updated	30.03.21	VP	HJE
D	Amended to client's comments	05.02.21	VP	HJE
C	En-suite amended	03.02.21	HE	HJE
B	Amended to client's comments	27.01.21	HE	HJE
A	Amended to match new site layout	18.01.21	VP	HJE

Rev.	Description	DATE	DB	CB
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Date	Apr '20
Drawn By/Checked By	WT / HJE
Scale	As indicated@ A1
Revision	H
Project	Land at Dumbleton Copse, Eastleigh
Title	Plot 4 Plans and Elevations
Dwg#	_19.043.02.05
Status	Planning

HGP
ARCHITECTS

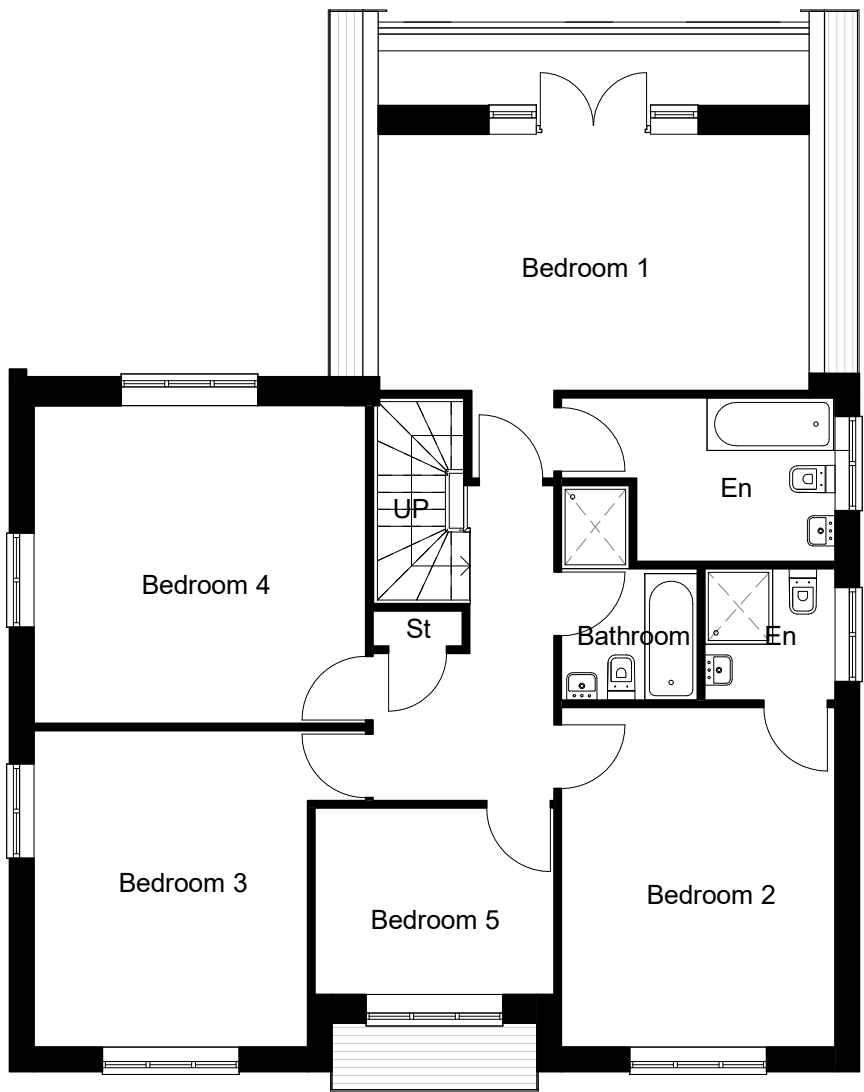

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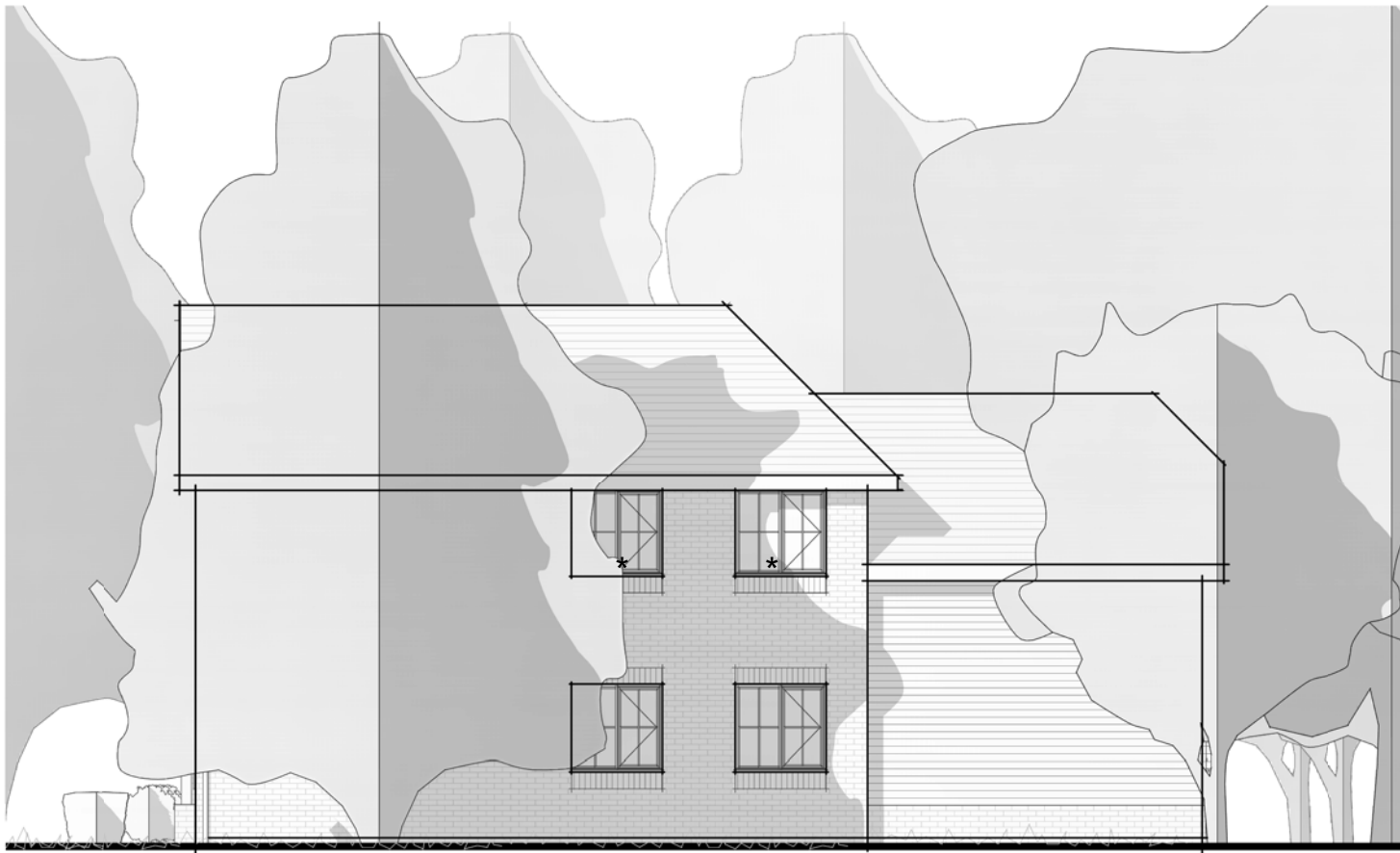
R.G.O.M.



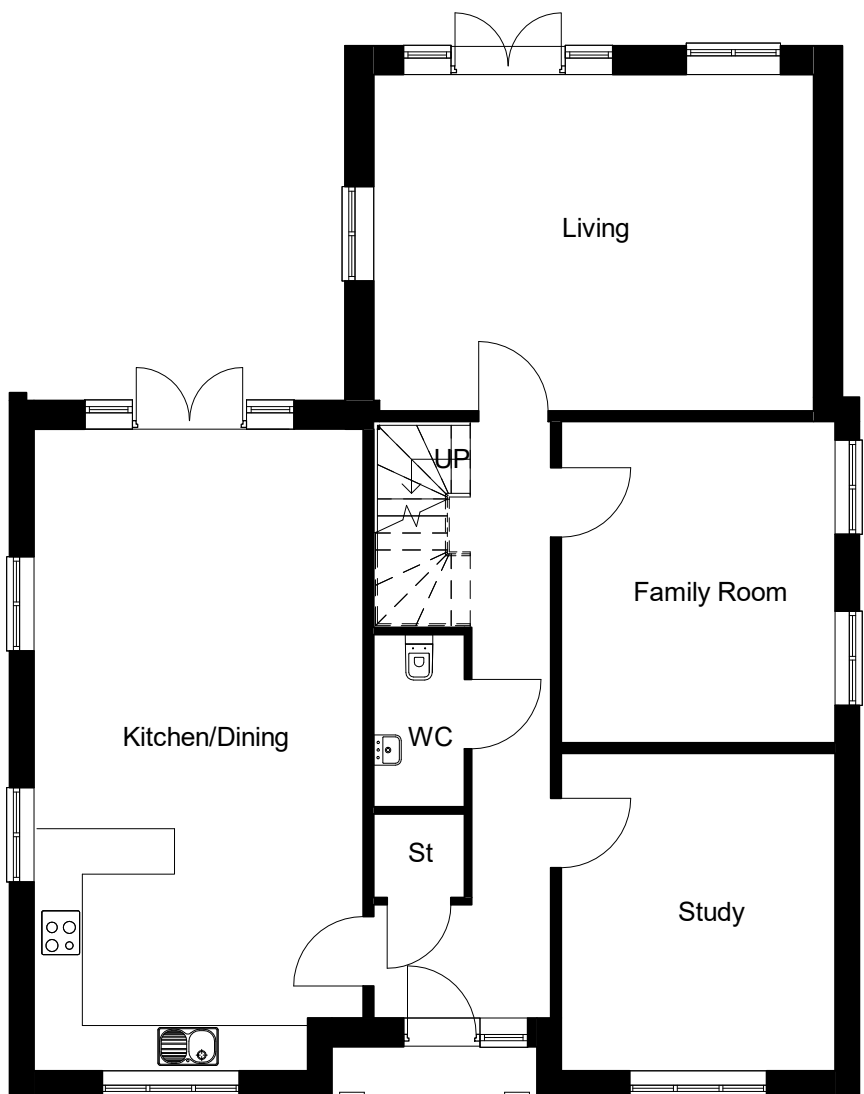
Level 01-First Floor
1 : 100



Front Elevation
1 : 100



Side Elevation A
1 : 100



Level 00-Ground Floor
1 : 100



Side Elevation B
1 : 100



Rear Elevation
1 : 100



Please Note:

This drawing must not be scaled, dimensions to be checked on site and any discrepancies are to be highlighted to the Architect prior to construction.

Topographical / Ordnance Survey information shown has been prepared by a third party. HGP accept no responsibility for accuracy or completeness of the survey.

This drawing is to be read in conjunction with all other project drawings, construction notes and / or project specifications including those by other project consultants and specialists. All discrepancies should be reported immediately.

Design subject to detail development / approval. Measurements and accommodation schedules subject to amendments following coordinated input by others. Costings cannot be finalised until approval / confirmation by relevant authorities and Client.



Legend

Area Schedule (Net Internal Area)		
Name	Level	Area
Plot 6	Level 00-Ground Floor	114.9 m ²
Plot 6	Level 01-First Floor	108.1 m ²
		223.0 m ²

H	Key plan updated	27.09.21	VP	HJE
G	Key plan updated	02.08.21	VP	HJE
F	Key plan updated	25.05.21	VP	HJE
E	Amended to client's comments	30.03.21	VP	HJE
D	Amended to client's comments	05.02.21	VP	HJE
C	En-suite amended	03.02.21	HE	HJE
B	Amended to client's comments	27.01.21	HE	HJE
A	Amended to match new site layout	19.01.21	VP	HJE

Rev.	Description	DATE	DB	CB
------	-------------	------	----	----

Date	Apr '20
Drawn By/Checked By	WT / HJE
Scale	As indicated@ A1
Revision	H
Project	Land at Dumbleton Copse, Eastleigh
Title	Plot 6 Plans and Elevations
Dwg#	_19.043.02.06
Status	Planning

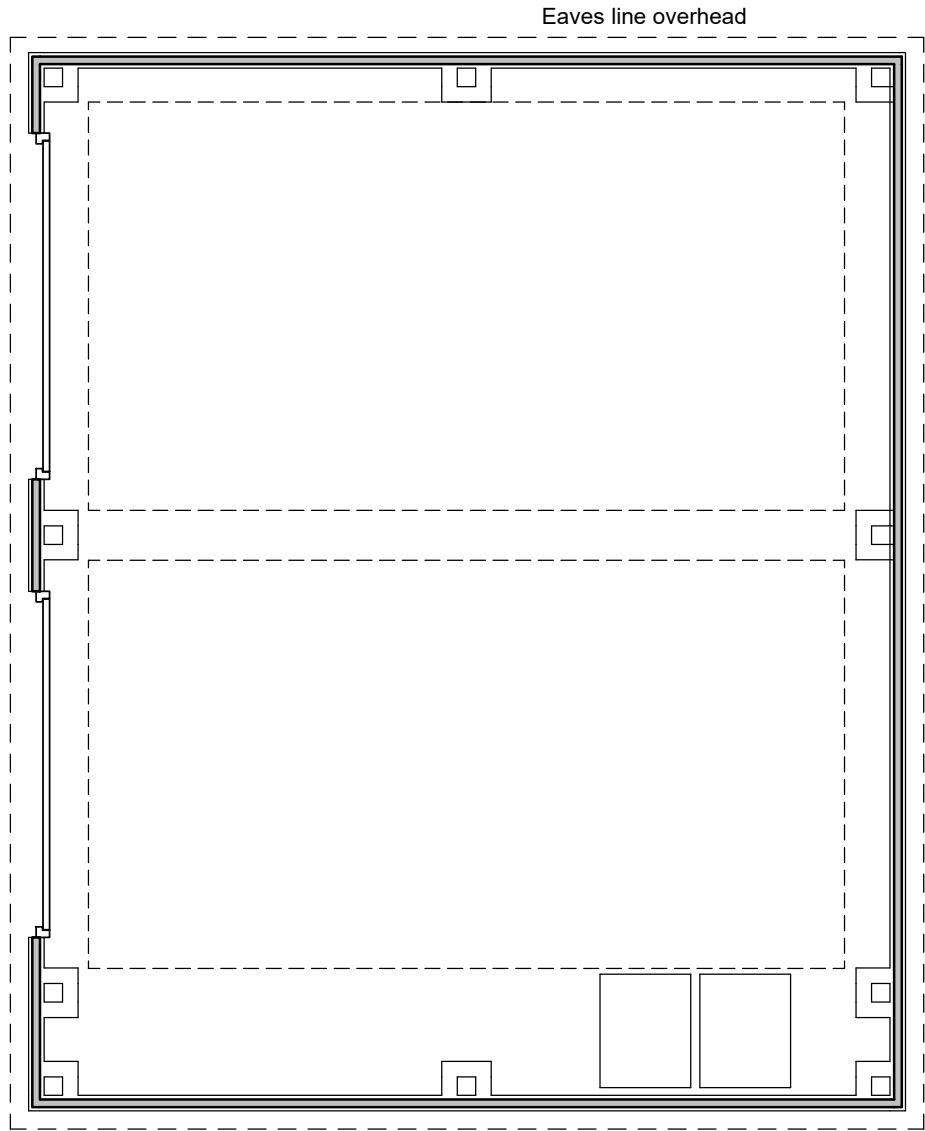


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Level 00-Ground Floor
1 : 50



Front Elevation
1 : 100



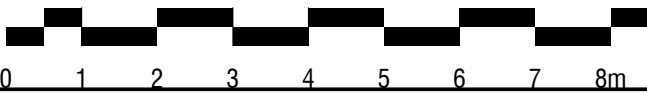
Rear Elevation
1 : 100



Side Elevation B
1 : 100



Side Elevation A
1 : 100



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Legend

Rev.	Description	DATE	DB	CB
A	Plot numbers amended	20.01.21	VP	HJE

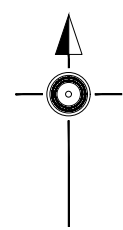
Date	Aug '20
Drawn By/Checked By	WT / HJE
Scale	As indicated@ A2
Revision	A
Project	Land at Dumbleton Copse, Eastleigh
Title	Garage Plot 6 - Floor Plan and Elevations
Dwg #	19.043__02.07
Status	Planning

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Appendix B - Topographical Survey



notes

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2. DO NOT copy, alter or reproduced in any way or pass to a third party without written authority

3. ~~DO NOT~~ scale these drawings - dimensions to be checked on site prior to commencing any work

4. READ in conjunction with other Consultants documentation & drawings regarding this project

5. DISCREPANCIES should be reported in writing to the project architect or engineer immediately

MODEL FILE REFERENCE-XXXXX-A-X-XX-XX-XX

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B

Extended survey commissioned

05.12.17

dp

AJC

A

Issued for Pre Application Submission

07.05.15

dp

AJC

rev.

description

date

by

ch

scale: 1:250 @ A1

client: Mr & Mrs King

date: November 2014

project: Land at Dumbleton's Copse
Netley Common
Southampton

drawn: dp

drawing: Topographic Survey

checked: AJC

status: Pre - Application

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t: 01794 830660 e: enquiries@vision-architects.org.uk

vision

architects

drawing No: 14026-A-G7-003

revision: B

Appendix D - Drainage Design and Calculations



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	2	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	0.400	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
DITCH			61.210	50	447618.760	112075.960	0.639
SW MH 01.00			61.210	450	447619.960	112072.340	0.600
SW MH 02.00			62.610	1200	447624.060	112057.210	1.390
SW TANK 01.00	0.154	5.00	62.040	50	447624.580	112055.280	0.800

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)
1.002	SW MH 01.00	DITCH	3.814	0.600	60.610	60.571	0.039	97.8	150	5.23	50.0
1.001	SW MH 02.00	SW MH 01.00	15.676	0.600	61.220	60.610	0.610	25.7	150	5.16	50.0
1.000	SW TANK 01.00	SW MH 02.00	1.999	0.600	61.240	61.220	0.020	99.9	150	5.03	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)
1.002	1.016	18.0	20.9	0.450	0.489	0.154	0.0	150	1.035
1.001	1.994	35.2	20.9	1.240	0.450	0.154	0.0	83	2.074
1.000	1.005	17.8	20.9	0.650	1.240	0.154	0.0	150	1.024

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	3.814	97.8	150	Circular	61.210	60.610	0.450	61.210	60.571	0.489
1.001	15.676	25.7	150	Circular	62.610	61.220	1.240	61.210	60.610	0.450
1.000	1.999	99.9	150	Circular	62.040	61.240	0.650	62.610	61.220	1.240

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.002	SW MH 01.00	450	Manhole	Adoptable	DITCH	50	Manhole	Adoptable
1.001	SW MH 02.00	1200	Manhole	Adoptable	SW MH 01.00	450	Manhole	Adoptable
1.000	SW TANK 01.00	50	Manhole	Adoptable	SW MH 02.00	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
DITCH	447618.760	112075.960	61.210	0.639	50		1	1.002	60.571	150
SW MH 01.00	447619.960	112072.340	61.210	0.600	450		1	1.001	60.610	150
							0	1.002	60.610	150

**Manhole Schedule**

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
SW MH 02.00	447624.060	112057.210	62.610	1.390	1200		1.000	61.220	150
SW TANK 01.00	447624.580	112055.280	62.040	0.800	50		1.001	61.220	150
							0 1.000	61.240	150

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	14.000	Drain Down Time (mins)	240
Ratio-R	0.200	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 %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	45	0	0
30	0	0	0				

Node SW MH 02.00 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	61.220	Product Number	CTL-SHE-0070-2000-0820-2000
Design Depth (m)	0.820	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node SW TANK 01.00 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	1.5	Invert Level (m)	61.240
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	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	102.0	0.0	0.800	102.0	0.0	0.801	0.0	0.0



Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	DITCH	164	60.603	0.032	1.8	0.0000	0.0000	OK
240 minute winter	SW MH 01.00	164	60.644	0.034	1.8	0.0055	0.0000	OK
240 minute winter	SW MH 02.00	164	61.336	0.116	1.8	0.1317	0.0000	OK
240 minute winter	SW TANK 01.00	164	61.337	0.097	3.9	9.7555	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	SW MH 01.00	1.002	DITCH	1.8	0.628	0.102	0.0111	21.7
240 minute winter	SW MH 02.00	Hydro-Brake®	SW MH 01.00	1.8				
240 minute winter	SW TANK 01.00	1.000	SW MH 02.00	1.8	0.252	0.103	0.0267	



Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute summer	DITCH	540	60.605	0.034	2.0	0.0000	0.0000	OK
960 minute summer	SW MH 01.00	540	60.646	0.036	2.0	0.0057	0.0000	OK
360 minute winter	SW MH 02.00	264	61.553	0.333	2.1	0.3761	0.0000	SURCHARGED
360 minute winter	SW TANK 01.00	264	61.553	0.313	7.0	31.5510	0.0000	SURCHARGED

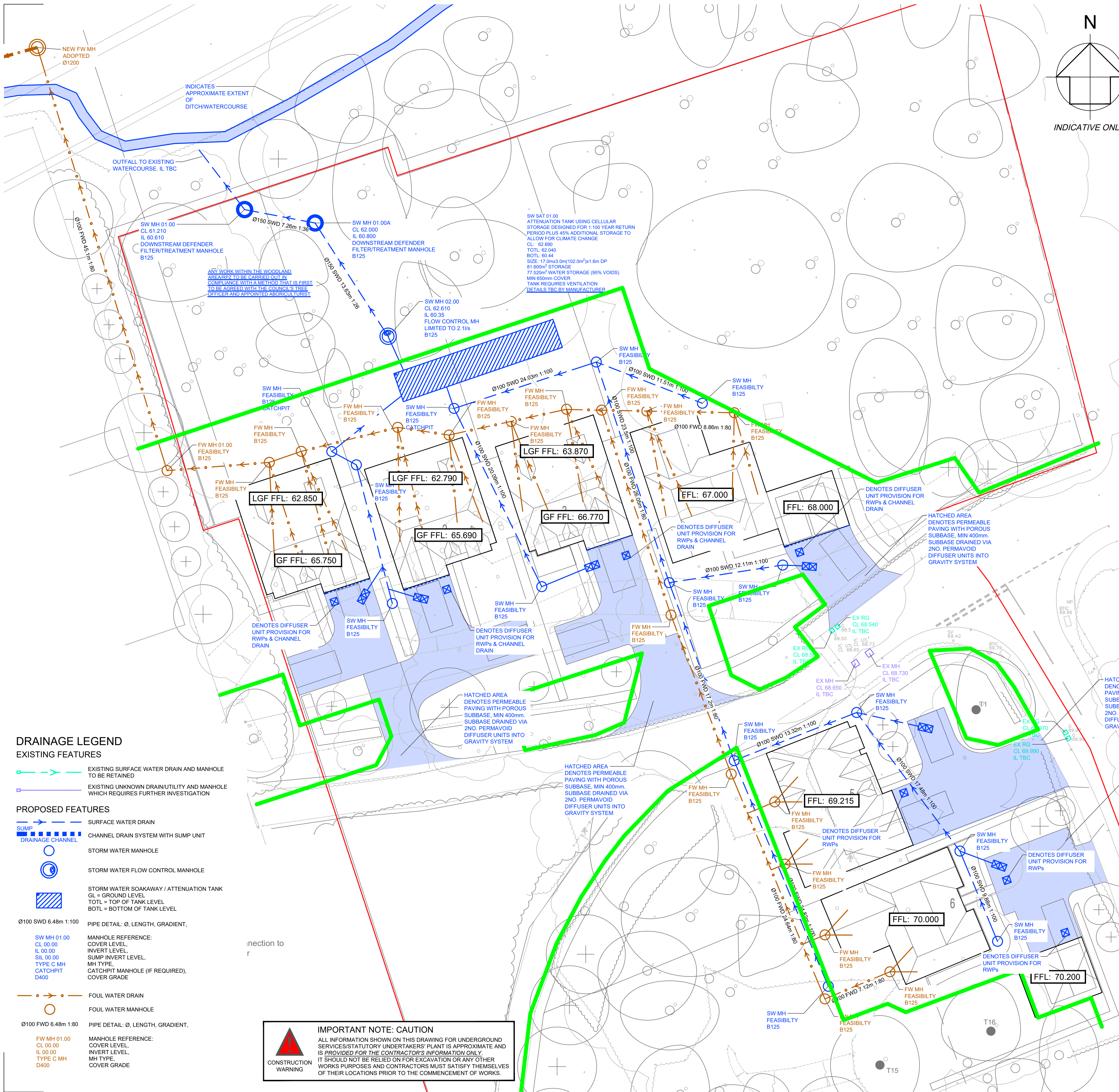
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute summer	SW MH 01.00	1.002	DITCH	2.0	0.644	0.111	0.0119	77.3
360 minute winter	SW MH 02.00	Hydro-Brake®	SW MH 01.00	2.0				
360 minute winter	SW TANK 01.00	1.000	SW MH 02.00	2.1	0.254	0.116	0.0352	



Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	DITCH	117	60.605	0.034	2.0	0.0000	0.0000	OK
30 minute winter	SW MH 01.00	117	60.646	0.036	2.0	0.0057	0.0000	OK
720 minute winter	SW MH 02.00	555	62.036	0.816	2.1	0.9226	0.0000	SURCHARGED
720 minute winter	SW TANK 01.00	555	62.036	0.796	8.4	80.2346	0.0000	FLOOD RISK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	SW MH 01.00	1.002	DITCH	2.0	0.644	0.111	0.0119	30.1
720 minute winter	SW MH 02.00	Hydro-Brake®	SW MH 01.00	2.0				
720 minute winter	SW TANK 01.00	1.000	SW MH 02.00	2.1	0.251	0.116	0.0352	



- GENERAL NOTES**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS AND DETAILS.
 - ALL FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS.
 - ANY DISCREPANCIES BETWEEN THIS DRAWING AND OTHER INFORMATION IS TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORKS ON SITE.
 - THE MAIN CONTRACTOR SHALL BE RESPONSIBLE FOR THE SETTING OUT AND ACCURACY OF ALL DIMENSIONS.
 - THE CONTRACTOR IS TO ENSURE THE STABILITY AND STRUCTURAL INTEGRITY OF THE EXISTING PROPERTY AT ALL TIMES DURING WORKS AND IS TO BE RESPONSIBLE FOR ALL PROPPING AND SHORING AS REQUIRED.
 - MAIN CONTRACTOR TO PROVIDE AND FIX SUITABLE BRACING AND PROPPING FOR ALL ELEMENTS IN THE TEMPORARY CONDITION DURING CONSTRUCTION STAGE, SUCH AS TO ENSURE STRUCTURE STABILITY AT ALL TIMES.
 - IT IS THE CONTRACTORS SOLE RESPONSIBILITY FOR ASCERTAINING SAFE DISPOSAL OF ANY OFF-SITE EXCAVATED SPOIL. NO CLAIM RESULTING FROM ABNORMAL TIP REQUIREMENTS WILL BE ENTERTAINED.

- DRAINAGE NOTES**
- ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, AND/OR SITUATED UNDER HIGHWAY TO BE VITRIFIED CLAY TO BS EN 295 & BS65 (SWS ONLY), OR CONCRETE PIPES TO BS EN 1916 & BS5911:1/PART 1, OR THERMOPLASTIC STRUCTURED WALL SEWER PIPES TO WIS 4-35-01 (CLASS 8kN/SOM) AND BE CAPABLE OF WITHSTANDING 4000 PSI JETTING PRESSURE. PRIVATE PIPES MAY BE VC OR PLASTIC.
 - FOR CONSTRUCTION DETAILS REFER TO THE RELEVANT ARCH ASSOCIATES DRAWING NUMBERS LISTED ON THE DRAWING ISSUE SHEET.
 - ADOPTABLE HIGHWAY WORKS ARE TO BE IN ACCORDANCE WITH LOCAL AUTHORITY DESIGN GUIDANCE.
 - ANY WORKS ASSOCIATED WITH THE HIGHWAY/EXTERNAL WORKS INCLUDING HIGHWAY DRAINAGE, SHALL BE IN ACCORDANCE WITH THE HIGHWAYS AGENCY MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS, VOL 1 (MCHW), UNLESS OTHERWISE SPECIFIED.
 - ALL ADOPTABLE DRAINAGE WORKS TO BE CONSTRUCTED AS DETAILED IN "THE CODE" FOR ADOPTION DESIGN AND CONSTRUCTION GUIDANCE AND THE LOCAL WATER AUTHORITY'S LOCAL PRACTICE NOTE.
 - ALL ADOPTABLE SEWERS WITH LESS THAN 1.20m OF COVER WHEN LAID BENEATH THE ROADS, OR 0.90m OF COVER IN OTHER AREAS, SHALL HAVE CONCRETE PROTECTION IN ACCORDANCE WITH EITHER OF THE DETAILS SHOWN ON THE STANDARD DRAWING PROVIDED.
 - ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED UPSTREAM CONNECTION POINT, THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
 - COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
 - ROAD GULLY PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS, ALL OTHER UN-REFERENCED PIPES ARE ASSUMED TO BE 100mm DIA. MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ADDITIONAL SPUR/MANHOLE CONNECTIONS ARE TO BE AGREED WITH THE RELEVANT ADOPTING AUTHORITY. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
 - ROAD REINSTATEMENTS ARE TO BE TO THE HIGHWAY AUTHORITY APPROVAL.
 - NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.

- NOTES**
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- SHALLOW PRIVATE DRAINS MAY REQUIRE PROTECTION USING CLASS 'Z' CONCRETE SURROUND OR PAVING SLABS BRIDGING THE TRENCH SUBJECT TO THE NHBC INSPECTOR'S REQUIREMENTS.
 - WHERE DRAINAGE RUNS PASS CLOSE TO BUILDINGS OR THEIR INVERT LEVELS ARE BELOW FOUNDATION LEVEL, THEN THE TRENCHES ARE TO BE BACK FILLED IN ACCORDANCE WITH THE STANDARD DETAIL PROVIDED.
 - REFERENCE SHOULD BE MADE TO THE STRUCTURAL ENGINEERS DETAILS FOR ALL ASPECTS OF FOUNDATION DESIGN AND CONSTRUCTION.
 - THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
 - THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE. NO DIMENSIONS ARE TO BE SCALED FROM THESE DRAWINGS.
 - IT IS THE CONTRACTORS/SUBCONTRACTORS RESPONSIBILITY TO ENSURE COMPLIANCE WITH THE CURRENT BUILDING REGULATIONS AND CODES OF PRACTICE.
 - STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
 - ALL DOWNPIPES ARE TO BE SEALED, IE CONNECTED DIRECTLY TO THE STORMWATER DRAIN. ACCESS POINTS TO BE PROVIDED 1m ABOVE GROUND LEVEL FOR EXTERNAL RWP'S AND 1m ABOVE FFL FOR INTERNAL RWP'S.
 - UNLESS OTHERWISE NOTED OR SIMILAR APPROVED DRAINS TO BE ACO MULTI DRAIN WITH A15 GRATING IN PEDESTRIAN AREAS, C250 IN CAR PARKS AND D400 IN CARRIAGEWAYS. SLOTTED CHANNEL TO BE USED FOR AREAS WITH FALLS <1:15 MESH GRATING TO BE USED WHERE FALLS >1:15.
 - GULLY AND CHANNEL DRAIN POSITIONS ARE LIABLE TO AMENDMENT WHEN THE DESIGN LEVELS HAVE BEEN DETERMINED.
 - MODULAR GEOCELLULAR STORAGE/SOAKAWAY SYSTEM TO CONFORM TO CIRIA C793 THE SUDS MANUAL, C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS & C698 SITE HANDBOOK FOR THE CONSTRUCTION OF SUDS. THE MANUFACTURER SHOULD PROVIDE A COMPLETE SET OF INDEPENDENT TEST RESULTS FOR A PROPOSED SYSTEM INCLUDING, AS A MINIMUM, STRESS/STRAIN CURVES FOR VERTICAL AND LATERAL COMPRESSION, AND CREEP TESTS UNDER SUSTAINED LONG-TERM LOADS. A BBA CERTIFICATE IS NOT INDEPENDENT TEST DATA.
 - ALL REDUNDANT DRAINAGE TO BE ABANDONED ONCE THE CONTRACTOR HAS SATISFIED HIMSELF THAT NO CONNECTIONS REMAIN LIVE. REDUNDANT DRAINAGE TO BE GRUBBED OUT.
 - ALL BELOW GROUND CONCRETE TO ACCORD WITH BS5328:1997/SULPHATE CLASS TB4.
 - IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. GENERALLY SUB SOIL DRAINS AFFECTED ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER DRAINAGE SYSTEM. PIPE DIAMETERS AND GRADIENTS ARE TO BE MAINTAINED.
 - BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ADDITIONAL SPUR/MANHOLE CONNECTIONS ARE TO BE AGREED WITH THE RELEVANT ADOPTING AUTHORITY. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
 - ROAD REINSTATEMENTS ARE TO BE TO THE HIGHWAY AUTHORITY APPROVAL.
 - NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.

KEY TO HEALTH AND SAFETY SYMBOLS

THESE NOTES ARE BASED ON THE USE OF EXPERIENCED AND COMPETENT CONTRACTORS CARRYING OUT THE WORK USING AN APPROVED SAFE METHOD OF WORKING

- INDICATES A RESIDUAL RISK REQUIRING A COMPULSORY ACTION
- INDICATES A RESIDUAL RISK REQUIRING A PROHIBITIVE ACTION
- INDICATES A RESIDUAL RISK AS A WARNING
- INDICATES A RESIDUAL RISK FOR INFORMATION

DRAINAGE LEGEND

- EXISTING FEATURES**
- EXISTING SURFACE WATER DRAIN AND MANHOLE TO BE RETAINED
 - EXISTING UNKNOWN DRAIN/UTILITY AND MANHOLE WHICH REQUIRES FURTHER INVESTIGATION

- PROPOSED FEATURES**
- SURFACE WATER DRAIN
 - CHANNEL DRAIN SYSTEM WITH SUMP UNIT
 - STORM WATER MANHOLE
 - STORM WATER FLOW CONTROL MANHOLE
 - STORM WATER SOAKAWAY / ATTENUATION TANK
TOTL = TOP OF TANK LEVEL
BOTL = BOTTOM OF TANK LEVEL
 - PIPE DETAIL: Ø, LENGTH, GRADIENT,
MANHOLE REFERENCE:
COVER LEVEL,
INVERT LEVEL,
SUMP INVERT LEVEL,
MH TYPE,
CATCHPIT MANHOLE (IF REQUIRED),
COVER GRADE
 - FOUL WATER DRAIN
 - FOUL WATER MANHOLE
 - PIPE DETAIL: Ø, LENGTH, GRADIENT,
MANHOLE REFERENCE:
COVER LEVEL,
INVERT LEVEL,
MH TYPE,
COVER GRADE

IMPORTANT NOTE: CAUTION
ALL INFORMATION SHOWN ON THIS DRAWING FOR UNDERGROUND SERVICES/STATUTORY UNDERTAKERS' PLANT IS APPROXIMATE AND IS PROVIDED FOR THE CONTRACTOR'S INFORMATION ONLY. IT SHOULD NOT BE RELIED ON FOR EXCAVATION OR ANY OTHER WORKS PURPOSES AND CONTRACTORS MUST SATISFY THEMSELVES OF THEIR LOCATIONS PRIOR TO THE COMMENCEMENT OF WORKS.

P07	14.03.24	INLET DIFFUSER UNITS SHOWN	CH
P06	12.03.24	AS CLOUDED	CH
P05	05.03.24	AS CLOUDED	CH
P04	19.02.24	PLOT 4 ADJUSTED	CH
P03	09.02.24	TANK MOVED TO AVOID RPA	CH
P02	16.01.24	UPDATED FOR PLANNING	BLB
P01	16.06.23	PRELIMINARY ISSUE FOR COMMENT	SPB
Rev.	Date	Description	By

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Architect
HGP ARCHITECTS

Project title
LAND AT DUMBLETON COPSE, SOUTHAMPTON, S019 6AL

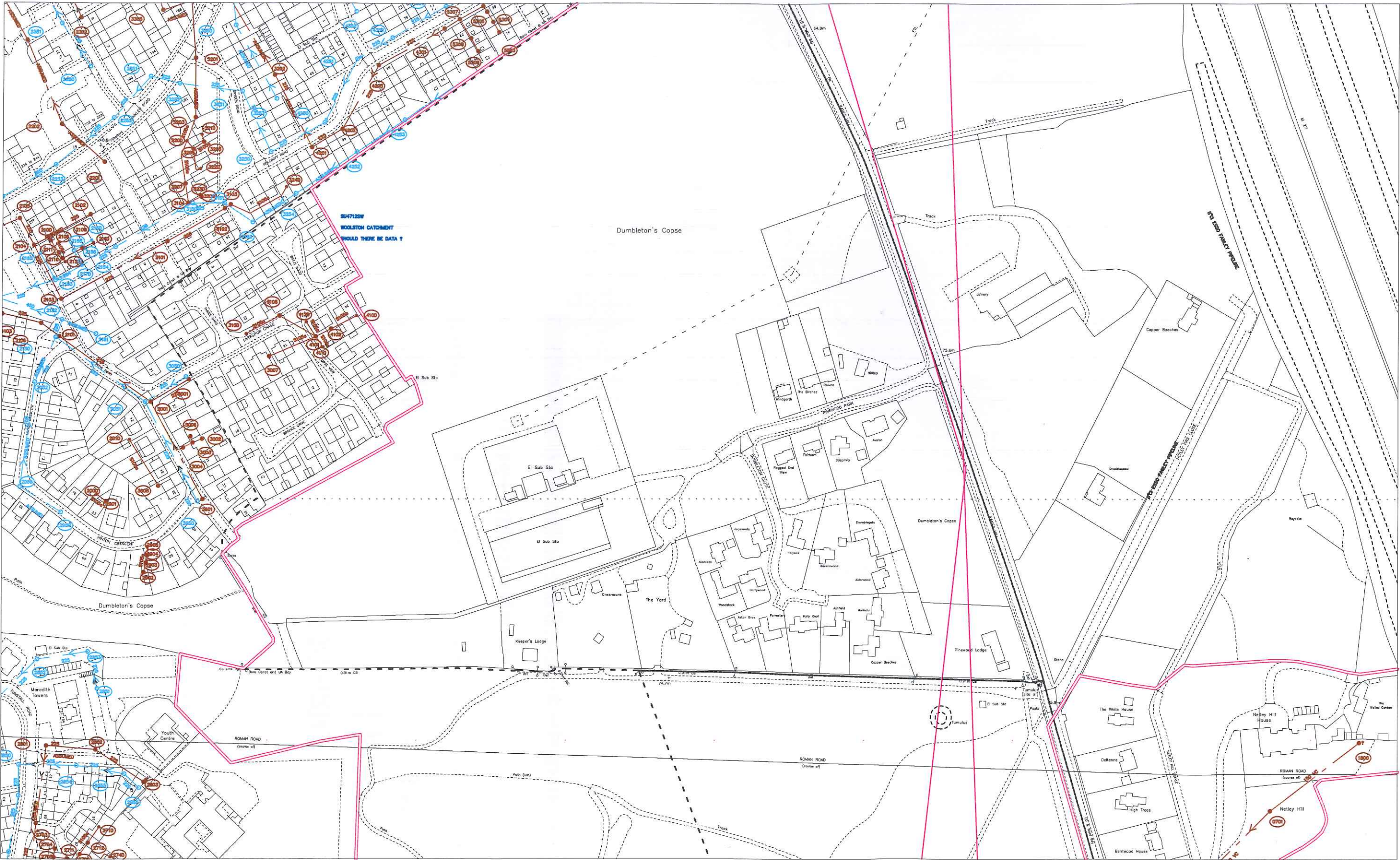
Drawing title
DRAINAGE STRATEGY PLAN

Scale	Paper size	Date	Drawn by	Checked by	Status
1:200	A1	JUN 2024	BLB	SPB	S2
Name					
Project code / No.	Originator	Zone	Level	Type	Role
FHL016 - AAL-XX-XX-DR-C-0500-P07					

Appendix C - Southern Water Sewer Records

SEWER RECORDS PAGE 1 OF 2

112333



111755

447195

O.S. REF.

SU4712SE

Title: 293138_Land adjoining Pinewood

Drawn by: kumaria

Scale: 1:2500

Date: 17/05/2018

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy.
The actual positions should be determined on site.

WARNING: BAC pipes are constructed of Bonded Asbestos Cement
WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement

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448139

SEWER RECORDS PAGE 2 OF 2

Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape	Node	Cover	Invert	Size	Material	Shape
0701X	74.94	72.23	150	VC	CIRC	3003X			UNK	UNK	CIRC												
1103X			UNK	UNK	CIRC	3004X			UNK	UNK	CIRC												
1800X			150	VC	CIRC	3006X			UNK	UNK	CIRC												
2001X	47.163	45.523	225	UNK	CIRC	3008X			UNK	UNK	CIRC												
2050X	49.183		150	UNK	CIRC	3050X	47.773	46.503	225	UNK	CIRC												
2051X	47.028		225	UNK	CIRC	3101X	49.517	48.017	225	UNK	CIRC												
2052X			150	UNK	CIRC	3102X	50.822	49.192	225	UNK	CIRC												
2101X	45.036	43.446	UNK	UNK	CIRC	3103X	50.733	49.593	150	UNK	CIRC												
2102X			225	UNK	CIRC	3104X			UNK	UNK	CIRC												
2103X	45.016	43.316	225	UNK	CIRC	3105X			UNK	UNK	CIRC												
2104X	45.168		225	UNK	CIRC	310DX			UNK	UNK	CIRC												
2105X	45.633	42.703	225	UNK	CIRC	3150X	50.087	48.057	225	UNK	CIRC												
2106X			225	UNK	CIRC	3151X	50.455		225	UNK	CIRC												
2108X			UNK	UNK	CIRC	3152X			UNK	UNK	CIRC												
2109X			100	VC	CIRC	3201X	46.948		225	UNK	CIRC												
210DX			225	UNK	CIRC	3202X			225	UNK	CIRC												
2110X			UNK	UNK	CIRC	3203X			225	UNK	CIRC												
2111X			UNK	UNK	CIRC	3204X			UNK	UNK	CIRC												
211DX			100	VC	CIRC	3205X			UNK	UNK	CIRC												
212DX			UNK	UNK	CIRC	3206X			UNK	UNK	CIRC												
2150X	45.032	43.872	225	UNK	CIRC	3207X			UNK	UNK	CIRC												
2151X			UNK	UNK	CIRC	320DX			UNK	UNK	CIRC												
2152X	44.748		450	UNK	CIRC	321DX			UNK	UNK	CIRC												
2153X	45.174	42.734	225	UNK	CIRC	322DX			UNK	UNK	CIRC												
2154X	47.6	45.23	225	UNK	CIRC	323DX			UNK	UNK	CIRC												
2155X	0.75		UNK	UNK	CIRC	324DX			UNK	UNK	CIRC												
2156X			UNK	UNK	CIRC	3250X	50.742	48.472	225	UNK	CIRC												
215DX			UNK	UNK	CIRC	3251X	48.922	47.012	225	UNK	CIRC												
216DX			100	VC	CIRC	3252X	47.656	45.686	225	UNK	CIRC												
217DX			225	UNK	CIRC	3253X			225	UNK	CIRC												
2201X	47.35	45.13	UNK	UNK	CIRC	3254X			UNK	UNK	CIRC												
2202X			UNK	UNK	CIRC	3305X			225	UNK	CIRC												
2250X	46.135	44.305	225	UNK	CIRC	3350X	47.338	45.188	225	UNK	CIRC												
2251X	47.219	45.469	225	UNK	CIRC	3901X	49.931	48.521	UNK	UNK	CIRC												
2252X	47.163	45.233	225	UNK	CIRC	3950X	49.864	48.774	225	UNK	CIRC												
2253X	46.255	44.805	225	UNK	CIRC	4101X			UNK	UNK	CIRC												
2302X	45.42	43.61	225	UNK	CIRC	4101Y			UNK	UNK	CIRC												
2304X			UNK	UNK	CIRC	4102X			UNK	UNK	CIRC												
2351X	45.122	43.322	225	UNK	CIRC	410DX			UNK	UNK	CIRC												
2703X	60.68		225	UNK	CIRC	411DX			UNK	UNK	CIRC												
2704X			UNK	UNK	CIRC	4201X	51.535	49.595	225	UNK	CIRC												
2705X			UNK	UNK	CIRC	4202X	52.152	50.162	225	UNK	CIRC												
2709X			UNK	UNK	CIRC	4203X	53.903	52.243	225	UNK	CIRC												
2712X			UNK	UNK	CIRC	4250X	51.9	49.32	225	UNK	CIRC												
271DX			UNK	UNK	CIRC	4251X	53.189	51.209	225	UNK	CIRC												
274DX			UNK	UNK	CIRC	4252X			UNK	UNK	CIRC												
2750X	60.191	58.421	225	UNK	CIRC	4253X			UNK	UNK	CIRC												
2751X	60.835	58.935	225	UNK	CIRC	4301X	54.772	53.322	225	UNK	CIRC												
2801X			UNK	UNK	CIRC	4350X	54.201	52.521	225	UNK	CIRC												
2802X	62.278	59.748	225	UNK	CIRC	4351X	54.6	53.05	225	UNK	CIRC												
2803X	63.243		225	UNK	CIRC	4352X	53.182	51.362	225	UNK	CIRC												
2850X	60.988	59.298	225	UNK	CIRC	5303X			UNK	UNK	CIRC												
2851X	59.245	58.155	225	UNK	CIRC	5304X			UNK	UNK	CIRC												
2852X	58.114	57.264	225	UNK	CIRC	5305X			UNK	UNK	CIRC												
2853X	58.359	57.459	225	UNK	CIRC	5306X			UNK	UNK	CIRC												
2854X	61.771	59.841	225	UNK	CIRC	5307X			UNK	UNK	CIRC												
2855X	62.742	60.402	225	UNK	CIRC	5308X			UNK	UNK	CIRC												
2856X	63.221	60.821	225	UNK	CIRC	5309X			UNK	UNK	CIRC												
2901X			UNK	UNK	CIRC																		
2902X			UNK	UNK	CIRC																		
2903X			UNK	UNK	CIRC																		
2904X			UNK	UNK	CIRC																		
2950X			UNK	UNK	CIRC																		
3001X	47.796	46.506	225	UNK	CIRC																		
3002X			UNK	UNK	CIRC																		

LINE STYLES / COLOURS

Brown	—	Foul
Red	—	Foul Syphon Sewer
Red	—	Foul Vacuum Main
Orange	—	Foul Rising Main
Dark Blue	—	Combined
Purple	—	Combined Syphon Sewer
Light Blue	—	Combined Rising Main
Yellow	—	Lateral Drain
Green	—	Building Over Agreement Area
Dark Blue	—	Treated Effluent
Purple	—	Sludge
Light Blue	—	Section 104 Area
Yellow	—	Surface Water
Green	—	Surface Water Rising Main
Green	—	Private
Green	—	Access Shaft
Green	—	Decommissioned

MATERIALS

AK	Alkathene
BAC	Bonded Asbestos Cement
BRC	Brick (Common)
BRG	Brick (Engineering)
CC	Concrete Box Culvert
CI	Cast Iron
CO	Concrete (In-Situ)
CP	Concrete (Pre-Cast)
CSB	Concrete Segments (balled)
CSU	Concrete Segments (unballed)
DI	Ductile Iron
GRG	Glass Reinforced Concrete
GRP	Glass Reinforced Plastic
MAC	Masonry in regular Courses
MAR	Masonry in random Courses
PE	Polyethylene
PF	Plastic Fibre
PP	Polypropylene
PVC	Polyvinyl Chloride
RPM	Reinforced Plastic Matrix
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
XXX	Other
ZZZ	Unknown

LEGEND - SEWERS

Manhole (SW)	Washout (SW)	Other (s)
Manhole (F&C)	Washout (F&C)	Other
Lamp hole (SW)	Rodding Eye (SW)	Change in sewer (s)
Lamp hole (F&C)	Rodding Eye (F&C)	Change in sewer
Pumping Station (SW)	Gauging point (SW)	Reflux valve
Pumping Station (F&C)	Gauging point (F&C)	Flap valve
Side entry manhole (SW)	Intercept chamber (SW)	Cascade
Side entry manhole (F&C)	Intercept chamber (F&C)	Anode
Blind shaft (SW)	Storm Tank (SW)	Valve
Blind shaft (F&C)	Storm Tank (F&C)	Closed Valve
Ejector station (SW)	Vortex chamber (SW)	Air Valve
Ejector station (F&C)	Vortex chamber (F&C)	Hatch box (SW)
Waterlight door (SW)	Label ellipse	Hatch box (F&C)
Waterlight door (F&C)	Dummy/S24 manhole	Direction arrow
Flushing ch. M=0 (SW)	Outfall	Emptying valve
Flushing ch. M=0 (F&C)	Penstock chamber	Cauchift
Flushing ch. M=0 (SW)	Damboards	Soakaway
Flushing ch. M=0 (F&C)	Storm overflow	Inlet
Demarcation Chamber	Backdrop manhole	Ballasting Pond

Wastewater treatment works

Marine treatment works	Outfall headworks
Vent	Vent column
Tidal storage tank	Blank end
Head of Public Sewer	Micro Pumping Station

SHAPES (S)

A	Arched	R	Rectangular
B	Barrel	S	Square
C	Circular	T	Trapezoidal
E	Egg	U	U Shape
H	Horseshoe	X	Other

NODE REFERENCING SYSTEM

1st digit:	hundred metre easing identifier
2nd digit:	hundred metre northing identifier
3rd digit:	sewer type identifier
4th digit:	next sequential node

Drawn by: kumaria

Title: 293138_Land adjoining Pinewood

Date: 17/05/2018





LEGEND - MAINS			
	Distribution Main / Communication pipe		Clockwise closing valve
	Trunk Main		Fire Hydrant
	Raw water main		Washout
	Non potable		Washout hydrant
	Abandoned main		Meter
	Proposed Main		Capped end
	Fire main		Emptying plug
	Non SWS		Stopcock
	Sluice valve		Leak Noise Correlator Survey Point
	Closed valve		Anode
	Air valve		Telemetry cable
	Butterfly valve		Access point / hatchbox
	Pressure reducing valve		
	Reflux valve		
	Motorised valve		

MATERIALS	
	Dialysis machine
	Break pressure tank
	Change node
	Pumping station
	Booster station
	Insertion Flow Meter Point
	Water tower
	Service reservoir
	Water Supply Works
	Bore hole / Well
	Intake
	Customer site
	Swab insertion point

Alkathene
Cast iron
Spun (grey) iron
Concrete
Ductile iron
Bonded Asbestos Cement
Glass reinforced plastic
Glass reinforced epoxy
(Unplasticised) Polyvinyl chloride
Polyethylene
Steel
Concrete segments bolted
Concrete segments unbolted
Galvanised iron
Ductile sleeve
Concrete pre-stressed
High performance polyethelene
Unknown

Drawn by:	kumaria	O.S.Ref:	SU4712SE
Scale:	1:2500	TITLE: 293138_Land adjoining Pinewood	
Date:	17/05/2018		

The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd. accept no responsibility in the event of inaccuracy. The actual positions of pipes should be determined on site.

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Appendix E – Maintenance Requirements