RIDGE

DRAINAGE STRATEGY
BRANCH HILL HOUSE, BRANCH HILL
LONDON NW3 7LS

ALMAX GROUP

December 2019

BELOW GROUND DRAINAGE STRATEGY
BRANCH HILL HOUSE, BRANCH HILL, LONDON NW3 7LS

December 2019

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RIDGE

VERSION CONTROL

PROJECT NAME: Branch Hill House
PROJECT NUMBER: 5008338
DOCUMENT REFERENCE: 5008338-RDG-XX-XX-DOC-C-0001
DOCUMENT STATUS: Preliminary

REV	DATE	DESCRIPTION	AUTHOR	CSE	ICSE
-	09.12.2019	Initial Issue	Thomas Clark	Paul Battersby	James McCulloch
1.1	16.12.2019	Update following Client comments	Thomas Clark	Paul Battersby	Rob Leland
			Digitally signed by Tom Clark DN: cn=Tom Clark, c=GB, o=Ridge & Partners LLP, ou=Civil Engineering, email=tomclark@ridge.co.uk Date: 2019.12.18 16:01:07	Digitally signed by Paul Battersby DN: cn=Paul Battersby, c=GB, o=Ridge & Partners LLP, ou=Civil Engineering, email=paulbattersby@ridge.co.uk Date: 2019.12.18 16:06:18	Rob Leland 2019.12.18 16:14:24Z00'00'

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1. INTRODUCTION

1.1. Appointment and Brief

This surface and foul water drainage strategy (DS) has been prepared on behalf of Almax Group for a proposed development at Branch Hill House (hereby referred to as the 'Application Site').

The purpose of this document is to outline the development of the proposed DS, providing sufficient detail to enable both a thorough review of design principles adopted and further refinement of the design as part of the ongoing development of the project.

It aims to demonstrate the foul and surface water management at the Application Site, as follows:

- Provide an analysis of the impact of the proposed development on surrounding foul water infrastructure and identify the constraints present on the site in terms of suitability of conventional gravity drainage.
- Demonstrate the principles of surface water management in terms of constraints on discharge, permitted discharge rates and required volumes of attenuation (where required), describing how these can be accommodated within the development proposals.

The proposed DS outline herein is subject to further detailed analysis at design stage.

1.2. Aims and Objectives

The DS has been prepared with reference to the following requirements:

- The DS must:
  - Ensure that flood risk to the Application Site and surrounding area is not increased over the lifetime of the Proposed Development;
  - Conform with all relevant national and local flood risk polices;
  - Adopt current design standards;

- The DS should:
  - Mimic the existing drainage characteristics of the Application Site as far as is practical;
  - Look for opportunities to provide a reduction in flood risk to the Application Site and the surrounding area;
  - Adhere to current best practice guidance;
  - Contribute to the enhanced amenity and aesthetic value of the Application Site; and
  - Propose opportunities for biological enhancement and provide habitats for wildlife in urban areas.

1.3. Limitations

The purpose of this report as outlined in Section 1.2, together with those related matters specifically referred to therein and it is not intended to be used for any other purposes. The report is for the sole benefit and may only be relied upon by the addressee, to whom we will owe a duty of care. The report and any part of it is confidential to the addressee and should not be disclosed to any third party for any purpose, without the prior written consent of Ridge and Partners LLP as to the form and context of such disclosure. The granting of such consent shall not entitle the third party to place reliance on the report, nor shall it confer any third-party rights pursuant to the Contracts (Rights of Third Parties) Act. The report may not be assigned to any third party.

1.4. Reference Information

The following information has been obtained and interrogated as part of this study:

- Ridge and Partners. (2019). Level 2 Flood Risk Assessment
- Ridge and Partners. (2019). Ground Investigation Report
- Thames Water Asset Records (2019)
- Planit I E Limited Landscape General Arrangement Drawing no 1926-PLA-00-GF-DR-L-0001 Rev P01

In addition, the following documents have been consulted:

- Communities and Local Government Document. (2012). The National Planning Policy Framework;
- Environment Agency. (2016). Flood Risk Assessments: Climate Change Allowances;
- Environment Agency. (2013). Rainfall Runoff Management for Developments;
- Environment Agency. (2019). Flood Risk Assessments: Climate Change Allowances;
- CIRIA. (2015). C753 – The SuDS Manual;
- Secretary of State. (2015). Building Regulations Approved Document H;
- Department for Environment, Food and Rural Affairs. (2015). Non-Statutory Technical Standards for Sustainable Drainage Systems;
- London Assembly. (2017). The London Plan;
- London Assembly. (2019). Draft New London Plan (Accessed November 2019).
- London Assembly. (2014). Sustainable Design and Construction Supplementary Planning Guidance.
- Camden Borough Council (2017) Camden Local Plan

2. PROJECT BACKGROUND

2.1. Site Location and Existing Land Use

The Application Site is located off Branch Hill in Camden, London. The Ordinance Survey (OS) grid reference for the application site is 526041 E, 186065 N and the post code is NW3 7LS. The existing site houses a residential manor house with an existing 1960's extension. The road, Spedan close that crosses through the site is assumed to be a private road.

2.2. Existing Drainage Infrastructure

The Sewerage Undertaker is understood to be Thames Water and review of their asset records) suggests the following public infrastructure within close vicinity of the Application Site:

- To the East Elevation:
  - Records suggest there is a 305 mm diameter combined sewer flowing North to south along Branch Hill, at an unknown depth. This run enters a 940 x 635 combined sewer at the junction of Branch Hill and Spedan Close.

- To the North West Elevation:
  - Records suggest a 229mm (9inch) diameter combined sewer is present.

The existing site is not known to have any surface water flow restriction or benefit from SuDS features.

Similarly, it is assumed that the existing Application Site discharges both foul and surface water to the public sewer network via connections to the North West.

2.3. Topography

The existing site is within a wider hillside setting. Slope angles are approximately 6° which correlates to a 10m fall across the site. The site is on level ground at approximately 125m above sea level.

The site slopes from east to west and north to south. A selection of approximate existing site levels is outlined below:

- NW corner: 124.5m AOD
- SW corner: 118.65m AOD
- NE corner: 124.5m AOD
- SE corner: 128.4m AOD

The proposal for the site includes amendments to the existing site topography, as shown on drawing 1926-PLA-00-GF-DR-L-0002 Rev P01. This regrading introduces new high and low points on the road through the development which the drainage strategy will need to take in to account.

2.4. Hydrology

It is assumed that surface water currently generated by the application site is discharged to the various combined sewers in Heysham Lane.

The exact number, location and condition of the existing connections to the public sewer are not fully known at the time of writing and will require further investigation.

Greenfield/Brownfield Runoff Rates

Greenfield/Brownfield runoff rates have been estimated for the existing site using the Micro drainage Source Control module. Please see the for the existing impermeable area calculation and the Micro drainage Calculation respectively.

Total Area (Ha)	Impermeable area (Ha)	Brownfield runoff rate (l/s)	Greenfield runoff rate (l/s)
0.7326	0.1652	3.6	2.7

2.5. Proposed Development

The proposed project principally comprises the demolition of the existing 1960's extension whilst retaining the existing Branch Hill House. A new 5 storey residential development with a single storey of basement will be constructed in its place.

The site area is approximately 0.8 hectares. For the purposes of the assessment of the impact of climate change the design life for the development has been assumed to be 60 years, the criteria set within the NPPF.

3. ANALYSIS OF NATIONAL AND LOCAL POLICY

3.1. National Policy

National Planning Policy Framework (NPPF)

Communities and Local Government Document. (2012). *The National Planning Policy Framework* requires the Planning Application to demonstrate that the Proposed Development will be safe for the duration of its' design life, taking into account the vulnerability of its' users and without increasing flood risk elsewhere, and where possible, reducing flood risk overall.

Non-Statutory Technical Standards for Sustainable Drainage Systems

Department for Environment, Food and Rural Affairs. (2015). *Non-Statutory Technical Standards for Sustainable Drainage Systems* state that the peak rate of discharge from a redevelopment during the 1:1 year and 1:100 year rainfall events should be as close as reasonably practical to the corresponding greenfield runoff rate, but should never exceed that of the pre-development state.

The standards also recommend that, where reasonably practicable, the runoff volume generated from the 1:100 year, 6 hour rainfall event should be constrained to the corresponding greenfield runoff volume.

Building Regulations Approved Document H

Secretary of State. (2015). *Building Regulations Approved Document H* establishes a hierarchy for surface water disposal and encourages a SuDS approach. The hierarchy stipulates that surface water runoff which is not collected for re-use must be discharged in the following order of priority:

1. Discharge to ground via infiltration; or, where not reasonably practicable,
2. Discharge to a surface water body (i.e. river, watercourse or the like); or, where not reasonably practicable,
3. Discharge to a surface water sewer, highway drain or other surface water drainage system; or, where not reasonably practicable,
4. Discharge to a combined sewer.

3.2. Local Policy

The London Plan

The London Plan requires that the site should be designed such that it achieves greenfield run off rates and prefers Green over grey features. It also sets out a Drainage hierarchy as below:

1. Store rainwater for later use
2. Use infiltration techniques, such as porous surfaces in non-clay areas
3. Attenuate rainwater in ponds or open water features for gradual release
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release
5. Discharge rainwater direct to a watercourse
6. Discharge rainwater to a surface water sewer/drain
7. Discharge rainwater to the combined sewer.

Camden Local Plan

The Camden Local Plan, sets out that sites should not increase, and wherever possible reduce, surface water run- off through increasing permeable surfaces and use of Sustainable Drainage Systems. It also states, incorporating bio-diverse roofs, combination green and blue roofs and green walls where appropriate; and utilise Sustainable Drainage Systems (SuDS) in line with the drainage hierarchy to achieve a greenfield run-off rate where feasible.

3.3. Assessing Flood Risk

Please refer to the published Flood Risk Assessment produced by Ridge (Dated 2019). Considering the points contained within the FRA, it is considered that flood risk does not present a constraint to the DS.

3.4. Below Ground Drainage Diversions and Other Constraints

There is no Adopted drainage infrastructure present within the site curtilage and as such no diversion is proposed. However, due to the private sewer transfer in 2011, there may be unrecorded sewers that are now public. Should a sewer be located on site, contact should be made with Thames Water to ascertain its status.

3.5. Opportunities

The redevelopment of the Application Site presents an opportunity to contribute to a reduction in flood risk by reducing the current rate of discharge to the public sewer network.

The incorporation of sustainable drainage systems within the Proposed Development should seek to offer a reduction in peak runoff rates in accordance with both the national and local policies described above. Subsequently, a reduction in peak flow rates would result in a lower surface water flood risk downstream of the Proposed Development, with larger reductions providing a greater betterment.

Surface water currently generated by the Application Site is believed to discharge un-treated directly to the public combined sewer network. Subsequently the management of surface water in accordance with the requirements of local policy and CIRIA. (2015). *C753 – The SuDS Manual* would result in an increase in the quality of the surface water generated by the Application Site as a result of the Proposed Development.

4. FOUL WATER MANAGEMENT

4.1. Existing Discharge Rates and Points of Connection

The Application Site currently features a 3-storey (+1 storey basement) masonry residential manor house constructed circa 1870s, with an abutting 2-storey concrete frame residential block constructed circa 1960s. The site has formerly been used as a residential facility for senior-citizens but is currently occupied by building guardians.

As previously mentioned, the exact location and number of existing connections to the public sewer are not fully known at the time of writing. It has however been assumed for the purposes of this DS that all existing foul water discharges to the 305mm diameter combined sewer in Heysham Lane.

4.2. Proposed Discharge Rates and Points of Connection

The Proposed development will provide a total of 34 residential units. Where possible, existing foul water connections will be re-utilised for the Proposed Development and all foul water drainage will be designed and constructed in accordance with the Building Regulations Part H. Any new connections will be subject to a section 106 application with the sewerage undertaker. Based on 34 units with an average occupancy of 3 people, the peak foul flow generated is 1.6 l/s which can be communicated via a 100mm diameter pipe at minimum gradients of 1 in 80.

5. SURFACE WATER MANAGEMENT

5.1. Proposed Drainage Catchments

The site will comprise of one catchment based on the impermeable area of the roof, split in to sub catchments for each side of the proposed roof area. This is to allow for the site topography and locations available to store the surface water from extreme events.

5.2. SuDS Management Train

In accordance with the discharge hierarchy identified in Section 3, surface water generated by the Proposed Development should be discharged to ground via infiltration, where practicable to do so.

Due to the low infiltration rate recorded by the Ground Investigation report of, 9.68 x 10^{-6} and the recommendations contained within the report, it is not proposed to infiltrate to ground as the main means of disposing of surface water.

Similarly, the connection of surface water outlets to the public sewer at the Application Site (and surrounding properties) may suggest reasonably poor infiltration characteristics.

There are no appropriate surface water bodies within the immediate vicinity of the Application Site into which surface water should be discharged.

Subsequently it is proposed that the Application Site will dispose of surface water to the public combined sewer, via new appropriately design connections, subject to seeking appropriate permissions from the sewerage undertaker. The new connection to the combined sewer should come in at a higher level than the foul sewer and have a non-return valve on it, to prevent sewerage entering the surface water network.

5.3. Catchment Contributing Areas

A breakdown of the contributing areas for the proposed surface water drainage system, are as follows:

CATCHMENT	CATCHMENT AREA	PERMEABLE AREA	IMPERMEABLE AREA	% IMPERMEABLE
Total Site (Existing)	0.733 Ha	0.5678 Ha	0.1652 Ha	23.7 %
Total Site (Proposed)	0.733 Ha	0.4821 Ha	0.2509 Ha	34.2 %

The Proposed Development presents a **10.5%** increase in impermeable surfaces due to the increase in roof area. The impermeable area is made up of the proposed roof area and the road surfaces which will be positively drained using gullies.

5.4. Allowance for Climate Change

Table 2 (Peak Rainfall Intensity Allowance in Small and Urban Catchments) of Environment Agency. (2019). Flood Risk Assessments: Climate Change Allowances confirms the climate change allowance of **40%** should be adopted for the Application Site, assuming a lifespan of 100 years for residential development as recommended within the NPPF.

5.5. Allowable Discharge Rates

In accordance with the national and local policies outlined within Section 3, the Proposed Development should seek to limit the peak flow rate to the greenfield runoff rates, wherever practicable. Where this cannot be

achieved, a betterment rate of at least 50 % should be targeted within the constraints presented by the Application Site.

As has been confirmed in Section 2, the brownfield runoff rate for the Application Site has been determined as 3.6 l/s for QBAR.

It is proposed to limit the surface water discharge from the Application Site to between **50 %** of the current QBAR value and greenfield runoff rate, equating to **2 l/s**. This is a betterment of the current brownfield runoff rate and below the greenfield runoff rate.

5.6. Proposed SUDS Features

In order to achieve the above reduction in discharge rates, it is proposed to install shallow below ground geo-cellular attenuation tank(s) within the site curtilage. The tank(s) will be appropriately sized to accommodate the attenuated volume of surface water generated by the Application Site during the 1:100yr event plus the pre-determined allowance for climate change.

We understand that, the development will include a dedicated communal rainwater harvesting tank, for use by residents (if desired), but primarily for use by the groundsman tending to the wider landscaped areas. The size and location of this tank will be agreed at the detail-design stage.

Required total attenuation volumes for the impermeable areas have been determined for a range of storm events in accordance with the requirements of the non-statutory standards for sustainable drainage systems. An anticipated range of attenuation volumes has been determined using the Quick Storage Estimate function of the Source Control Module of Microdrainage software, to inform further rigorous assessment.

STORM EVENT	CONTRIBUTING AREA	MAXIMUM DISCHARGE	ATTENUATION VOL (RANGE)
1:1 AEP	2509m^2	2l/s	21m^3 – 34m^3
1:30 AEP	2509m^2	2l/s	68m^3 – 93m^3
1:100 AEP + 40% CC	2509m^2	2l/s	144m^3 – 191m^3

Consequently, a tank volume of **191 m^3** will be required in order to provide the maximum achievable betterment of 50 % during the 1:100 AEP event plus a 40 % allowance for climate change, as outlined above. This volume has been split proportionally between the front and rear portions of the proposed development due to site topography and suitable areas to store the storm events. Please see the appendixes for the proposed surface water strategy drawing.

With the above in consideration, the Proposed Development would therefore contribute to a reduction in flood risk associated with the exceedance of the public sewerage network within the vicinity of the Application Site, by providing a significant reduction in peak discharge rates and avoiding an increase in total runoff volume.

6. CONCLUSIONS

- The scheme proposes the demolition of the existing 1960's extension and construction of a new extension to form a 5-story residential development with a single-story basement.
- Both surface and foul water currently generated by the site is presumed to discharge to the public combined sewer network on Heysham Lane.
- Due to the unproductive nature of the underlying soils at the site and the incorporation of primarily using soakaways not considered to be practicable.
- No watercourses or other appropriate surface water bodies are present within close proximity to the site and it is therefore proposed that the development will connect to the existing public sewer for the disposal of surface water from impermeable areas.
- The discharge from the site post-development will be limited to a maximum rate of 2 l/s during all events up to and including the 1:100 AEP event, including a 40% allowance for climate change. This would demonstrate a significant betterment) to the existing condition without introducing an additional source of flood risk.
- To achieve the above limitations, 191.0 m^3 of below ground attenuation will be provided at the proposed development.
- The development proposals will contribute to a reduction in flood risk associated with the exceedance of the public surface water sewer network in the vicinity of the site by providing a significant reduction in peak runoff rates and by avoiding an increase in the total runoff volume.
- The proposed drainage strategy has been prepared to be robust and demonstrate that it is possible to drain the site in a sustainable manner in keeping with local policy requirements, without increasing flood risk to or from the Proposed Development.
- It should be noted that this strategy presents one possible solution to demonstrate that the Proposed Development can be sustainably drained and should not be interpreted as the definitive solution.

APPENDIX A – EXISTING SITE PLAN & SURVEY

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DRAWING NOTES:

CDM REGULATIONS 2015
SIGNIFICANT OR NON-OBVIOUS RISKS AND RISKS WHICH ARE DIFFICULT TO MANAGE ARE IDENTIFIED ON THIS DRAWING USING THE FOLLOWING SYMBOL IDENTIFIED TO THE RIGHT WITH BRIEF ACCOMPANYING TEXT. FOR FURTHER DETAILS OF THE RISKS IDENTIFIED BY DESIGNERS, REFERENCE SHOULD BE MADE TO CDM HAZARD REGISTER.

LEGEND

SITE BOUNDARY

REV	DRN	DATE	DESCRIPTION	CSE	ICSE

ORIGINATOR:

RIDGE
PROPERTY & CONSTRUCTION CONSULTANTS

CLIENT:
ALMAX GROUP

IN ASSOCIATION WITH:

PROJECT:
BRANCH HILL HOUSE

TITLE:
EXISTING IMPERMEABLE AREA DRAWING

TECH:	CSE:	ICSE:	SCALE: 1 : 200 @ A1
TC			INITIAL ISSUE: JM

STATUS:
PRELIMINARY

DRAWING No:

PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:	REV:
5008338	RDG	XX	ST	PL	C	0501	-

APPENDIX B – PROPOSED SITE PLAN

NOTES:
1. Do not scale from this drawing.
2. Always work to noted dimensions.
3. All dimensions are in millimetres unless otherwise stated.
4. All setting out, levels and dimensions to be agreed on site.
5. The dimensions of all materials must be checked on site before being laid out.
6. This drawing must be read with the relevant specification clauses and detail drawings.
7. Order of construction and setting out to be agreed on site.

KEY

KEY

Extent of Proposed Landscape Works

+(00.00) **Existing Spot Height**

+ 00.00 **Proposed Spot Height**

Proposed Contours

Existing Tree to be Retained
Note: Trees to be protected in accordance with BS 5837:2012 Trees in relation to design, demolition and construction – Recommendation.
Subject to Arboricultural Survey.

Existing Tree RPA
Refer to drawing SHA 681 RPA fro more information

Proposed Tree Planting
Refer to drawing 1926-PLA-00-GF-DR-L-0004 fro more information

Revision	Date	Description	Drawn	Apprvd.

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Client Almax Group

Project Branch Hill House

Drg Title Landscape Levels

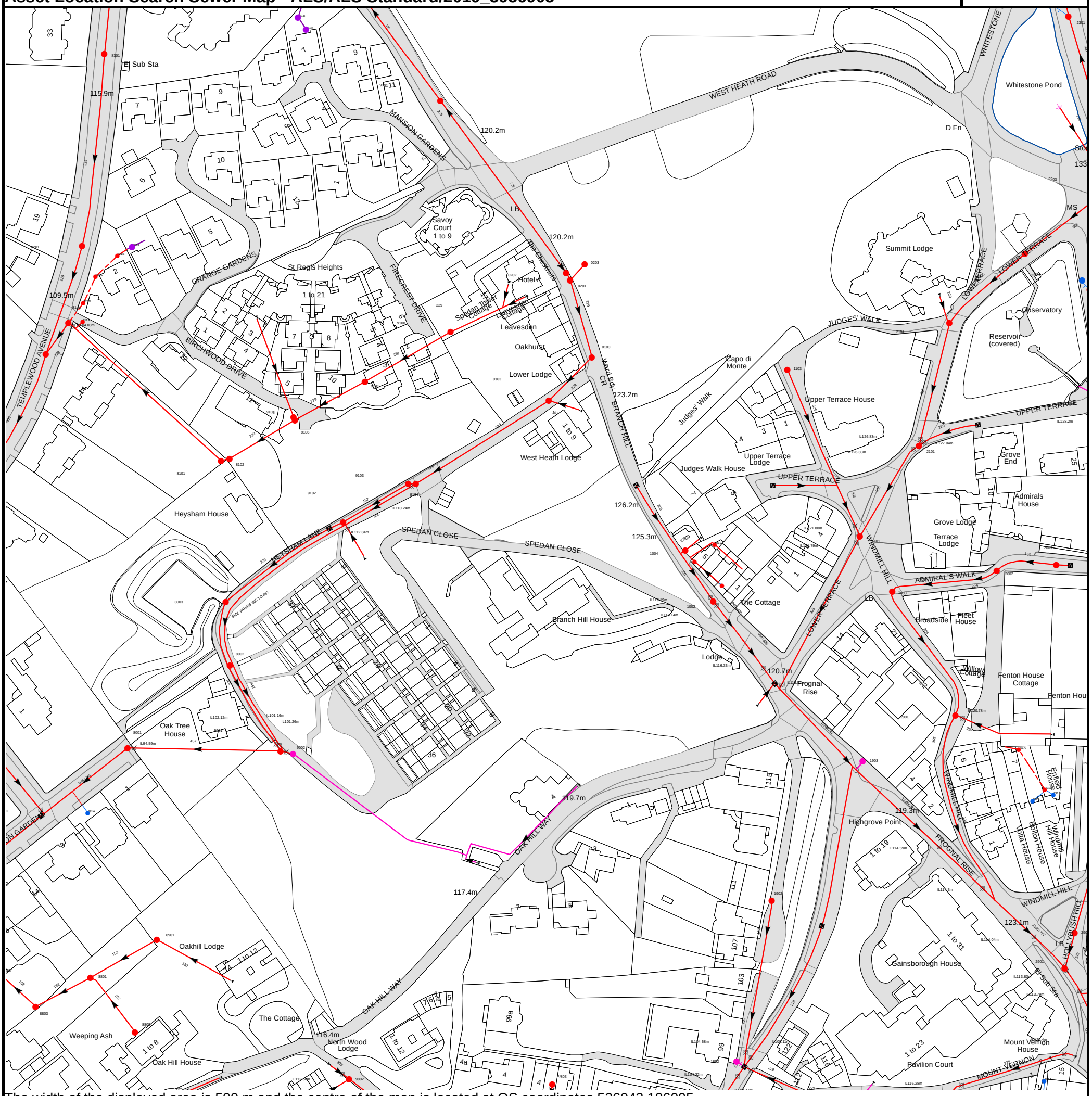
Created on	Created by	Approved by
12.12.19	SH	AN

Scale	Size	Workstage
1:200	A1	PLANNING

Drg No.	Suitability	Revision
1926-PLA-00-GF-DR-L-0002	S1	P01

APPENDIX C – THAMES WATER ASSET PLANS

Asset Location Search Sewer Map - ALS/ALS Standard/2019_3956905



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526042,186095

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
281A	n/a	n/a
1802	n/a	n/a
2901	n/a	113.83
2904	n/a	n/a
1902	117.19	115.02
291A	n/a	n/a
291B	n/a	n/a
291C	n/a	n/a
1903	118.02	n/a
201A	n/a	n/a
2001	123.76	120.01
1002	n/a	n/a
1003	n/a	n/a
101B	n/a	n/a
0203	119.79	118.27
2202	133.7	129.97
8201	111.46	107.18
9301	118.75	115.85
8301	115.6	113.56
931A	n/a	n/a
931B	n/a	n/a
2301	133.58	129.73
22BE	n/a	n/a
2002	n/a	n/a
2003	128.04	127.05
101A	n/a	n/a
1004	125.1	124.24
101C	n/a	n/a
1101	126.39	121.95
9102	113.95	109.05
9103	118.42	117.2
9104	118.55	114.13
8101	106.7	105.02
8102	107.08	105.59
2101	129.98	n/a
9106	109.42	107.99
9105	n/a	n/a
0102	120.81	116.83
9101	112.11	110.95
1103	132.5	127.72
0103	121.03	117.6
8103	107.87	102.91
9108	117.57	115.1
2104	133.73	129.63
8104	109.05	n/a
2201	132.86	130.97
0201	119.98	117.99
22BD	n/a	n/a
0202	119.92	118.67
891A	n/a	n/a
8801	n/a	n/a
8001	98.44	94.08
8805	n/a	n/a
8901	105.93	104.33
8003	106.63	102.78
8002	104.7	103.29
9001	103.99	101.16
9002	104.29	101.7
9802	116.4	112.34
0803	115.76	114.09
8803	102.9	99.02

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

ALS Sewer Map Key

Public Sewer Types (Operated & Maintained by Thames Water)

Foul: A sewer designed to convey waste water from domestic and industrial sources to a treatment works.

Surface Water: A sewer designed to convey surface water (e.g. rain water from roofs, yards and car parks) to rivers or watercourses.

Combined: A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.

Trunk Surface Water

Trunk Foul

Storm Relief

Trunk Combined

Vent Pipe

Bio-solids (Sludge)

Proposed Thames Surface Water Sewer

Proposed Thames Water Foul Sewer

Gallery

Foul Rising Main

Surface Water Rising Main

Combined Rising Main

Sludge Rising Main

Proposed Thames Water Rising Main

Vacuum

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. Example: a vent is a fitting as the function of a vent is to release excess gas.

Air Valve

Dam Chase

Fitting

Meter

Vent Column

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer. Example: A hydrobrake limits the flow passing downstream.

Control Valve

Drop Pipe

Ancillary

Weir

End Items

End symbols appear at the start or end of a sewer pipe. Examples: an Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol, Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

Outfall

Undefined End

Inlet

Other Symbols

Symbols used on maps which do not fall under other general categories

Public/Private Pumping Station

Change of characteristic indicator (C.O.C.I.)

Invert Level

Summit

Areas

Lines denoting areas of underground surveys, etc.

Agreement

Operational Site

Chamber

Tunnel

Conduit Bridge

Other Sewer Types (Not Operated or Maintained by Thames Water)

Foul Sewer

Surface Water Sewer

Combined Sewer

Gulley

Culverted Watercourse

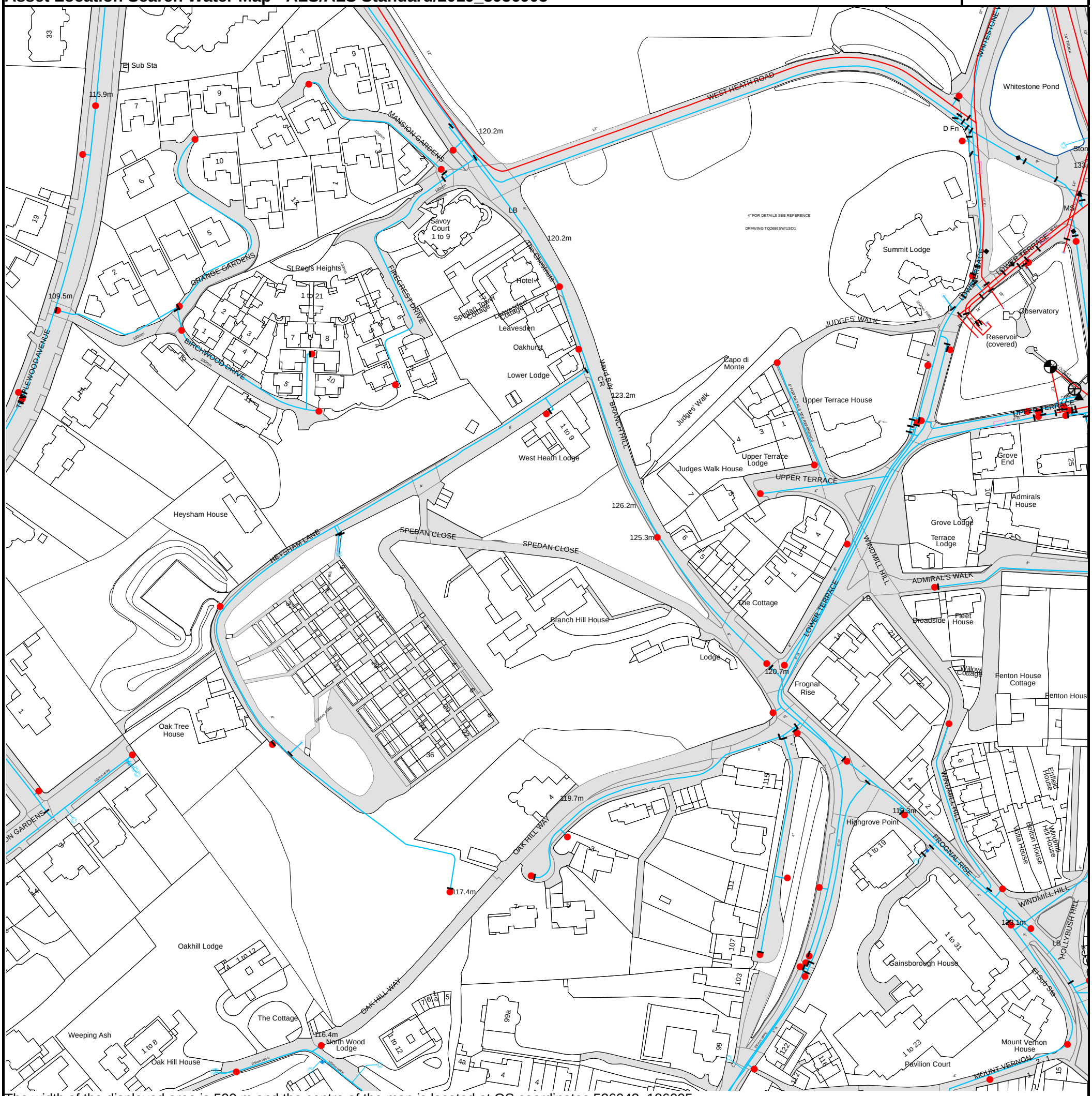
Proposed

Abandoned Sewer

Notes:

1) All levels associated with the plans are to Ordnance Datum Newlyn.
2) All measurements on the plans are metric.
3) Arrows (on gravity fed sewers) or flecks (on rising mains) indicate direction of flow.
4) Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
5) 'na' or '0' on a manhole level indicates that data is unavailable.
6) The text appearing alongside a sewer line indicates the internal diameter of the pipe in milimetres. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement. If you are unsure about any text or symbology present on the plan, please contact a member of Property Insight on 0845 070 9148.

Asset Location Search Water Map - ALS/ALS Standard/2019_3956905



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 526042, 186095.

The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

ALS Water Map Key

Water Pipes (Operated & Maintained by Thames Water)

4"

Distribution Main: The most common pipe shown on water maps. With few exceptions, domestic connections are only made to distribution mains.

16"

Trunk Main: A main carrying water from a source of supply to a treatment plant or reservoir, or from one treatment plant or reservoir to another. Also a main transferring water in bulk to smaller water mains used for supplying individual customers.

3" SUPPLY

Supply Main: A supply main indicates that the water main is used as a supply for a single property or group of properties.

3" FIRE

Fire Main: Where a pipe is used as a fire supply, the word FIRE will be displayed along the pipe.

3" METERED

Metered Pipe: A metered main indicates that the pipe in question supplies water for a single property or group of properties and that quantity of water passing through the pipe is metered even though there may be no meter symbol shown.

Transmission Tunnel: A very large diameter water pipe. Most tunnels are buried very deep underground. These pipes are not expected to affect the structural integrity of buildings shown on the map provided.

Proposed Main: A main that is still in the planning stages or in the process of being laid. More details of the proposed main and its reference number are generally included near the main.

Valves

- General Purpose Valve
- Air Valve
- Pressure Control Valve
- Customer Valve

Hydrants

- Single Hydrant

Meters

- Meter

End Items

Symbol indicating what happens at the end of a water main.

- Blank Flange
- Capped End
- Emptying Pit
- Undefined End
- Manifold
- Customer Supply
- Fire Supply

Operational Sites

- Booster Station
- Other
- Other (Proposed)
- Pumping Station
- Service Reservoir
- Shaft Inspection
- Treatment Works
- Unknown
- Water Tower

Other Symbols

- Data Logger

PIPE DIAMETER	DEPTH BELOW GROUND
Up to 300mm (12")	900mm (3')
300mm - 600mm (12" - 24")	1100mm (3' 8")
600mm and bigger (24" plus)	1200mm (4')

Other Water Pipes (Not Operated or Maintained by Thames Water)

Other Water Company Main: Occasionally other water company water pipes may overlap the border of our clean water coverage area. These mains are denoted in purple and in most cases have the owner of the pipe displayed along them.

Private Main: Indiates that the water main in question is not owned by Thames Water. These mains normally have text associated with them indicating the diameter and owner of the pipe.

APPENDIX D – BROWNFIELD RUN OFF RATE CALCULATION

ICP SUDS Mean Annual Flood

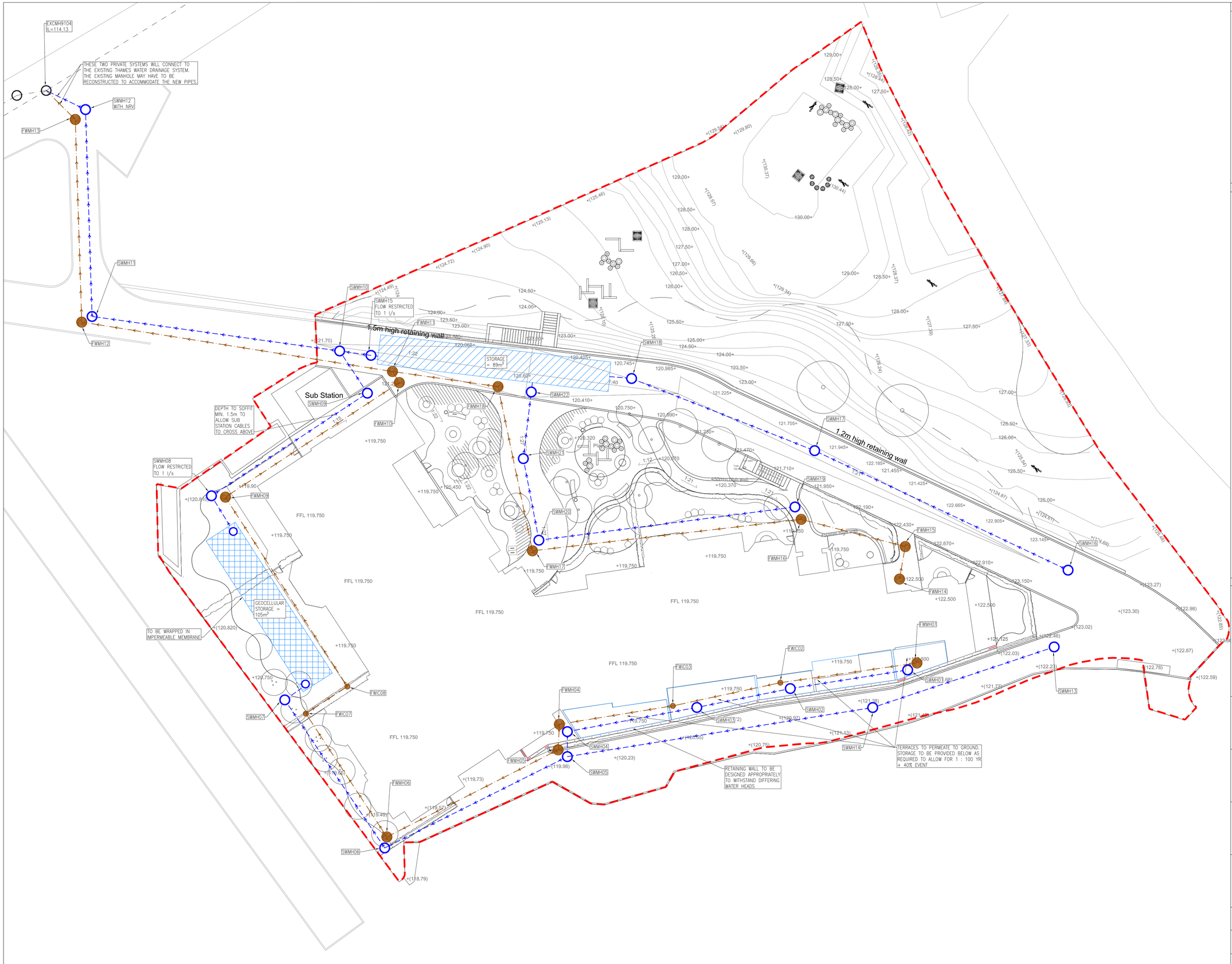
Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.733	Urban	0.165
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	2.7
QBAR Urban	3.6
Q100 years	10.0
Q1 year	3.0
Q30 years	7.6
Q100 years	10.0

APPENDIX E – BELOW GROUND DRAINAGE STRATEGY DRAWING



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CDM REGULATIONS 2015

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- NEW RWP LOCATIONS ARE REQUIRED FOR THE DETAILED DESIGN TO BE CARRIED OUT.
- TREES SHOULD NOT BE LOCATED WITHIN THE FOOTPRINT OF THE PROPOSED STORAGE TANKS.
- THE PLANNING BOUNDARY MAY NEED TO BE MODIFIED TO ALLOW CONSTRUCTION OF THE DRAINAGE TO THE EXISTING SYSTEM.

LEGEND

- SITE BOUNDARY
- PRIVATE FOUL DRAIN
- PRIVATE S.W. DRAIN
- PUBLIC COMBINED SEWER
- EXISTING MANHOLE/ GULLY
- MANHOLE
- MH/IC — PRIVATE MANHOLE/INSPECTION CHAMBER depth > 600mm – 450 DIA. (SEE PLAN FOR TYPE)
- GEOCELLULAR STORAGE
- CULVERT STORAGE

REV	DRN	DATE	DESCRIPTION	CSE	ICSE

ORIGINATOR:

RIDGE
PROPERTY & CONSTRUCTION CONSULTANTS

CLIENT:
ALMAX GROUP

IN ASSOCIATION WITH:

PROJECT:
BRANCH HILL HOUSE

TITLE:
FOUL & SURFACE DRAINAGE STRATEGY

TECH:	CSE:	ICSE:	SCALE: 1 : 200 @ A1
JM	TC		INITIAL ISSUE: DEC 2019

STATUS:
PRELIMINARY

DRAWING No:

PROJECT:	ORG:	ZONE:	LEVEL:	TYPE:	ROLE:	NUMBER:	REV:
5008338	RDG	XX	ST	PL	C	0500	-

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